



DATE: May 30, 2024

TO: Senate

FROM: Dr. David Hornsby, Vice-Provost and Associate Vice-President (Academic), and Chair, Senate Quality Assurance and Planning Committee

RE: Bachelor of Data Science
New Program Approval

SQAPC Motion

THAT SQAPC recommends to Senate the approval of the Bachelor of Data Science program as presented, to commence in Fall 2025.

Senate Motion

THAT Senate approve the proposed Bachelor of Data Science program as presented to commence in Fall 2025.

Background

This is a four-year, 20-credit undergraduate Data Science degree with two optional concentrations. This program is created through a collaboration between the School of Computer Science (SCS) and the School of Mathematics and Statistics. This collaboration creates a program with bases in data wrangling, inferential statistics, data analytics, artificial intelligence (AI), big data, and data ethics. Students that wish to further their expertise in Computer Science theory and AI can complete a concentration in AI. Students that wish to bolster their knowledge of inferential statistics and the theory behind it can complete a concentration in Statistics. The concentration and non-concentration paths have enough elective room for students to complete a minor and broaden the applicability of their degree. The unit will explore a completely online version of the program in the future.

Attachments

- Self-Study with Appendices (Volume I)
- Discussant Report
- Site visit Agenda
- External Reviewer Biographies
- External Reviewers' Report
- Unit response to the External Reviewers' Report and Implementation plan
- Dean's response to the External Reviewers' Report

SQAPC outcome memo
Dean's letter of support
Courseleaf Entries
Faculty CVs (Volume II)

Quality Assurance Framework and Carleton's Institutional Quality Assurance Process (IQAP)

Upon the above motion being passed by Senate, the required documentation will be submitted to the Ontario Universities' Council on Quality Assurance for approval. A submission to the Ministry for approval will follow. These approvals are required before the program can commence.



Institutional Quality Assurance Process

Bachelors of Data Science

New Program Approval Template

(Volume I)

May 2024

Approvals Table

This table will record that the brief has been approved by: 1) the program lead on behalf of the team; 2) the head of the academic unit or chair of the program committee (in the case of interdisciplinary programs not administered exclusively by one academic unit) on behalf of the unit or program committee; 3) the Faculty Dean(s).

Michel Barbeau and Robert C. Burk	
<u>Program Lead</u>	<u>Date</u>
Michel Barbeau	
<u>Chair/Director</u>	<u>Date</u>
Maria DeRosa	
<u>Dean(s):</u>	<u>Date</u>

Committees Reviews and Approvals

Vice-Presidents' Academic Research Committee (executive summary)	January 17 th , 2024
Provost's Budget Working Group (executive summary)	January 29 th , 2024
Curriculum Committee	
Faculty Board	
Senate Committee on Curriculum, Admissions on Studies Policy	
Senate Quality Assurance and Planning Committee	
Senate	
Quality Council	

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A. The Program

A1. Program overview

We are in the Fourth Industrial Revolution (*The Fourth Industrial Revolution*, 2016). Data, analytics, and their insights are integral to everything in our day-to-day lives. These insights influence the mundane, like which television show our streaming services recommend, to the life altering decisions made by science, industry, and the government. Traditionally, those involved with this process were siloed into mathematics, statistics, computer science, or analytics. However, a new field has emerged at the crossroads of these fields and the practical application of their techniques (Mike & Hazzan, 2022). Data Science is the study of how to extract value from captured or simulated data to infer knowledge from the patterns found therein (Mike & Hazzan, 2022). Additionally, Data Science is not just the study of extracting value from data, but it is also a process or a workflow (IBM, 2023; Irizarry, 2020; Mike & Hazzan, 2022; Sanders, 2019). Data Scientists form questions, design the collection and storage of data, write reliable and fast code for wrangling datasets, utilize inferential statistics, machine learning and Artificial Intelligence (AI) to analyze the data, and present the translated results in a responsible, reproducible and actionable way (Amazon Web Services, 2023; Berkeley School of Information, 2023; IBM, 2023; Irizarry, 2020; Meng, 2019; Mike & Hazzan, 2022).

In our data-driven world, there is a clear need for individuals from this field who can think analytically, creatively, and leverage AI and big data to aid in decision making (Davenport & Patil, 2012, 2022; World Economic Forum, 2023). The Government of Canada predicts a general shortage between 2022-2031 across computer science and statistics professions (See Appendix 4, Table 1, for a more detailed breakdown of the Canadian Occupational Projection System for 2022-2031). Specifically, data science has a moderate to very good outlook across Canada, with a good (4/5 stars) outlook in Ontario (Government of Canada & Employment and Social Development, 2023). StatsCan also noted their desire to hire data scientists from Carleton University in a Letter of Agreement (See Appendix 5). Given our data-driven present and future, data scientists are and will continue to be in-demand and important for society (Davenport & Patil, 2012, 2022).

At Carleton, discussions on the creation of an undergraduate Data Science program started at a January 2023 retreat focused on what impactful programs Carleton is equipped to pursue. Carleton University is well-established in Data Science at the graduate level, with a successful Collaborative Specialization in Data Science started in 2015 and a Data Science, Analytics, and Artificial Intelligence (DSAAI) Master's and PhD programs which started in 2022. Both programs prepare students theoretically and practically to enter their Data Science careers. In addition to these programs, Carleton is heavily involved in Ottawa's tech sector. Carleton hosts an annual Data Day¹, where Carleton researchers, data science experts and Carleton graduate students showcase and discuss cutting edge research and current developments in data science. Furthermore, our Institute for Data Science has an industrial advisory committee with members from IFS, Kx Systems, Shopify, IBM, TACTIX, MindBridge AI,

¹ In its tenth year as Data Day 10.0 (2024)

Intersect, the Ottawa Police Service, the City of Ottawa, and StatsCan, as well as corporate members of the Institute such as CISCO, Invest Ottawa/ Investir Ottawa, and Canarie. Therefore, we proposed that Carleton should pursue an Undergraduate Data Science program. A meeting with Statistics Canada (StatsCan) on February 6th, 2023 finalized this discussion, with StatsCan noting their need for data scientists. StatsCan agreed to consult on the development of this undergraduate degree in data science and take part in data science coursework as part of a signed Letter of Agreement for the May 1, 2023, to May 1, 2025, period (See Appendix 5).

Given our footprint in this field at the graduate level, Carleton should leverage its strengths and background to create an undergraduate data science program to prepare students to rapidly enter the workforce. We are proposing a four-year, 20-credit undergraduate Data Science Degree with two additional Concentrations. This program was created through a collaboration between the School of Computer Science (SCS) and the School of Mathematics. This collaboration has created a program with a basis in data wrangling, inferential statistics, analytics, AI, big data, and data ethics. Students that wish to further their expertise in Computer Science theory and AI can complete a Concentration in AI. Students that wish to bolster their knowledge of inferential statistics and the theory behind it can complete a Concentration in Statistics. Furthermore, the non-concentration path has enough elective room for students to complete a minor and broaden the applicability of their degree. The curriculum will have a strong basis in project-based learning and there are capstone project courses available for students to highlight their data science abilities in an applied, practical context. In alignment with Carleton Universities' Kinàmàgawin Report and progress report,(Carleton University Strategic Indigenous Initiatives Committee, 2020, 2022) curriculum will draw on appropriate Collaborative Indigenous Learning Bundles with a focus on data and research ethics when working with Indigenous communities. The program will be delivered in a hybrid format and we will explore a completely online version of the program in the future.

In Ontario, only six universities² and one college³ offer an English, Undergraduate Bachelor of Data Science, with five others only offering data science as a stream⁴. Nationally there are seven other English, Undergraduate Bachelor of Science with Data Science as a major topic of study⁵ (Appendix 4, Table 2). These programs are all relatively new, with the oldest starting in the 2017-2018 academic year at the University of Waterloo and Ontario Tech University, and the most recent starting at York University and Trent University in the 2023-2024 academic year. Regionally, two universities are offering a Bachelor's in Data Science. The University of Ottawa offers a five-year, dual-degree Honours BSc Mathematics and Honours BSc Computer Science (Data Science) and a four-year specialization in Data Science as part of their Honours BSc Computer Science program. Both programs are co-op eligible and are housed within the Faculty of Engineering. Trent University offers a four-year Bachelor of Science

² Brock University, University of Ottawa, Trent University, Western University, Wilfrid Laurier University, and York University.

³ Seneca College, Bachelor of Data Science and Analytics (Honours) (Hybrid) (DSA)

⁴ University of Guelph, Nipissing University, Ontario Tech University, University of Toronto, University of Waterloo.

⁵ British Columbia: University of Victoria, Thompson Rivers University, University of British Columbia, Simon Fraser University. Quebec: Concordia University. Manitoba: University of Winnipeg. Saskatchewan: University of Regina.

Program in Data Science. As part of Trent's program, students must select a focus such as business, economics, environmental science, history, mathematics or sociology (Trent University, 2023b) and they can complete a capstone project (Trent University, 2023a). Our program distinguishes itself from these through a few avenues. Most importantly, our program has a strong focus on AI. Regionally, we will be an approximately four-year program (e.g., 20-credits) as opposed to the five-year program offered by the University of Ottawa's Faculty of Engineering, providing a faster route to employability. Furthermore, our degree is housed in the Faculty of Science, unlike Engineering at the University of Ottawa. As mentioned above, an approximately four-year, undergraduate, stand-alone data science program is rare in Ontario, with only one other program like it in our region. Furthermore, our strong professional network, including StatsCan, and their direct involvement in our curriculum differentiates us from Trent and other new programs in Ontario.

This Data Science program will create data scientists who are able to synthesize and apply statistical and computer science skillsets to ethically extract knowledge and insights from data. They will be ready to enter the workforce or research, able to competently understand the theory behind the tools they utilize.

A2. Mission and strategic directions

The creation of this program is directly driven by Carleton Universities mission. The program synthesizes practical statistics, AI, and computer science to prepare students to directly enter the Data Science workforce. (Strategic Integrated Plan (2020b) [SIP] 1.1, 1.4; Strategic Mandate Agreement (2020a) [SMA] graduate employment rate in a related field, graduate employment earnings, skills & competencies). The program was created through a collaboration between the School of Computer Science and the School of Mathematics and Statistics (SIP 1.3; SMA institutional strength/focus). Faculty members within the Institute for Data Science will generally be cross appointed from other units, building on the pre-existing multi-disciplinary and collaborative nature of the Institute for Data Science (SIP 1.3, 1.5). This multi-disciplinary and collaborative nature is also supported by the addition of a Concentration in Artificial Intelligence and a Concentration in Statistics. Both Concentrations were created by the units that collaborated to create this Undergraduate degree. Future concentrations are also planned with other units such as the Department of Economics, and there is elective room to take a minor in the subject of the student's choice (SIP 1.3). In addition to internal collaboration, this program was also created with direct input from StatsCan on the program's overall goals as well as its curriculum, and with the guarantee that StatsCan will take on students from the program for projects (SIP 2.1, 2.2, 2.3, 2.5). Furthermore, the addition of DATA 4848 Consulting Project, and the integration of the Co-op program will create opportunities for students to directly apply their Data Science skills in professional and research contexts with internal and external collaborators (SIP 1.2; SMA experiential learning, community/local impact of student enrolment, economic impact, research funding & capacity: federal tri-agency funding secured, research revenue attracted from private sector sources).

Our curricular approach also places experiential learning as a key component of the program, with many courses having a project-based teaching style (SIP 1.4; SMA experiential learning). By utilizing and

adapting pre-existing curricula we are also sustainably meeting modern challenges in the workforce (SIP 3.2). We will integrate appropriate Collaborative Indigenous Learning Bundles into the coursework and, where appropriate, introduce students to Indigenous history, law and the ethical research practices with Indigenous people and groups (SIP 3.3; Carleton University Equity, Diversity and Inclusion Action Plan and Progress Report (2023) [EDI] SA1; Kinàmàgawin Report (2020) and Progress Report (2022) Call to Action 21). Equity-driven and responsive pedagogy will be pursued by ensuring diverse hiring committees are created when hiring new faculty members (EDI SA3, SA6, SA9). After the hiring process is complete, we will promote the utilization of tools such as the Faculty of Science EDI Teaching Toolkit, the Faculty of Science EDI in research pocket guide, and the School of Journalism and Communication's EDI checklist, and the completion EDI and anti-racism modules such as "Equity and Human Rights", "Equity in Your (work) Space – Faculty, Staff and Supervisors", "Inclusive Classroom – Faculty", "Responding to Disclosures of Sexual Violence", and "Breaking Down Barriers: Exploring Disability, Dignity and Ableism", all offered by the Department of Equity and Inclusive Communities (EDI SA6, SA9; Coordinated Accessibility Strategy: Education and Training). We will endeavour to ensure faculty members have completed the Kinàmàgawin Indigenous Learning Certificate within the first year of their appointments (Kinàmàgawin Report and Progress Report Call to Action 25). We will explore an online version of this program in the future to allow students to remotely complete the program and work with the Paul Menton Centre to ensure students are able to complete the current program, free from accessibility barriers. (SIP 3.4; EDI SA1, SA2; Coordinated Accessibility Strategy: Education and Training).

A3. Relationship to other academic programs at Carleton

Overall, we see a positive impact on the Faculty of Science's programs. Although this program may attract students who would have taken either the current Bachelors of Mathematics or Bachelors of Computer Science programs, it may also draw students into the Computer Science or Statistics programs if the Data Science pathway does not cover the breadth of Computer Science or Statistics material they are interested in. Including Data Science may also drive-up enrolment as high school applicants may better understand the career paths associated with a Data Science degree than the more abstract Computer Science or Statistics degrees. The Director of the School of Mathematics and Statistics, Prof. Robert Burk, the Director of the School of Computer Science & Interim Director of the Institute for Data Science, Prof. Michel Barbeau, and the Associate Dean of Science (Undergraduate Affairs), Prof. Julia Wallace are on the steering committee and have discussed these issues at length. On the recommendation of StatsCan, and to meet the need for multidisciplinary data scientists, we are in discussions with a multitude of sister units to create space for minors, integrate multidisciplinary courses into the curriculum, and produce double majors in the future. We have received letters of support from the Department of Health Sciences, the Department of Neuroscience, the Department of Chemistry, the Department of Physics, the Department of Philosophy, the School of Journalism and Communications, the School of Mathematics and Statistics, the Institute for Environmental and Interdisciplinary Sciences, the Institute of Biochemistry, the Institute for Data Science, and the Department of Economics supporting the utilization of courses for the program and for minors as necessary, and further collaboration with Data Science in the future (Appendix 5).

B. Program Learning Outcomes and Assessment

B.1 Program learning outcomes

Table B.1 gives the learning outcomes for the Bachelors of Data Science. Each one is given a convenient name for reference.

Table B.1: Learning outcomes

Learning Outcomes
Software Development Design and implement programs and systems to solve problems in a range of application domains, applying established software engineering concepts and techniques.
Programming Languages Apply proficiently at least one language from each of three groups of languages, namely systems programming languages, object-oriented languages and languages commonly used in data science.
Problem Solving Solve a substantial, practical data science problem independently by selecting and applying the appropriate methodologies
Advanced Knowledge Apply advanced knowledge of at least one specialized, state-of-the-art data science topic.
Communication Communicate data science analysis and results to audiences outside mathematics, statistics, and computer science by applying standard tools and styles, including visualization technique.
Modelling Build and assess statistical and machine learning models, employ a variety of formal inference procedures, and draw conclusions of appropriate scope from the analysis.
Ethics Apply critical inquiry to ethical issues in data science related to intellectual property, data privacy and security, and biases in models and data sets
Curation Maintain and/or repair data to ensure its integrity; and prepare it for use with a variety of statistical methods and models.

B2: Mapping learning outcomes to provincial degree-level expectations (DLEs)

The Council of Ontario Universities has established a framework of Degree Level Expectations (DLEs) that specify what students should know, and be able to do, after successfully completing a degree program. They are

1. Depth and breadth of knowledge
2. Knowledge of methodologies
3. Application of knowledge
4. Communication skills
5. Awareness of the limits of knowledge
6. Autonomy and professional capacity
7. Experiential Learning

Table B.2 maps each Bachelors of Data Science learning outcome to the DLEs it contributes to.

Table B.2: Learning outcomes and degree level expectations

Learning Outcomes	Degree Level Expectations Met ⁶
<p>Software Development Design and implement programs and systems to solve problems in a range of application domains, applying established software engineering concepts and techniques.</p>	<p>2. Knowledge of methodologies 3. Application of knowledge 5. Awareness of the limits of knowledge 6. Autonomy and professional capacity 7. Experiential Learning</p>
<p>Programming Languages Apply proficiently at least one language from each of three groups of languages, namely systems programming languages, object-oriented languages and languages commonly used in data science.</p>	<p>2. Knowledge of methodologies 3. Application of knowledge 7. Experiential Learning</p>
<p>Problem Solving Solve a substantial, practical data science problem independently by selecting and applying the appropriate methodologies</p>	<p>1. Depth and breadth of knowledge 4. Communication skills 6. Autonomy and professional capacity 7. Experiential Learning</p>
<p>Advanced Knowledge Apply advanced knowledge of at least one specialized, state-of-the-art data-science topic.</p>	<p>1. Depth and breadth of knowledge 3. Application of knowledge 5. Awareness of the limits of knowledge 6. Autonomy and professional capacity 7. Experiential Learning</p>

^Aadditional information on the DLEs can be found at: <https://oucqa.ca/framework/appendix-1/>

<p>Communication Communicate data science analysis and results to audiences outside mathematics, statistics, and computer science by applying standard tools and styles, including visualization technique.</p>	<p>1. Depth and breadth of knowledge 4. Communication skills 6. Autonomy and professional capacity 7. Experiential Learning</p>
<p>Modelling Build and assess statistical and machine learning models, employ a variety of formal inference procedures, and draw conclusions of appropriate scope from the analysis.</p>	<p>1. Depth and breadth of knowledge 2. Knowledge of methodologies 3. Application of knowledge 5. Awareness of the limits of knowledge 6. Autonomy and professional capacity 7. Experiential Learning</p>
<p>Ethics Apply critical inquiry to ethical issues in data science related to intellectual property, data privacy and security, and biases in models and data sets</p>	<p>1. Depth and breadth of knowledge 5. Awareness of the limits of knowledge 6. Autonomy and professional capacity</p>
<p>Curation Maintain and/or repair data to ensure its integrity and prepare it for use with a variety of statistical methods and models.</p>	<p>2. Knowledge of methodologies 3. Application of knowledge 6. Autonomy and professional capacity 7. Experiential Learning</p>

B.3 Program structure and curriculum map

Program structure

The undergraduate Bachelor of Data Science is a 20-credit degree, with the possibility to complete a minor, or one of two Concentrations. The programs will be administratively housed in the Institute for Data Science and jointly offered by the School of Mathematics and Statistics and the School of Computer Science. There is a Concentration in Statistics and a Concentration in AI. All three pathways are primarily created from pre-existing courses with new courses being created to further the necessary practical aspects of Data Science (Appendix 1,2). There is an opportunity in the Concentration in Statistics for a student to complete a consulting project (DATA 4848). The degree will have a Co-op option which will leverage our relationship with StatsCan and other institutions (Appendix 1).

The program will be delivered in a hybrid format. We will also explore a completely online version of the program in the future. The program learning outcomes and curriculum are based on discussions with StatsCan as well as reports by the National Academies of Science, Engineering and Medicine, the Association for Computing Machinery, and the Park City Math Institute (ACM Data Science Task Force, 2021; De Veaux et al., 2017; National Academies of Sciences, Engineering, and Medicine, 2018).

a. Program curriculum map

We map the learning outcomes to the set of courses that collectively meet them. We use the following tags on courses to indicate the level at which the course is delivered relative to the learning outcome the course is being associated with.

- I: Introductory
- R: Reinforcement
- M: Mastery

We do not provide specific details regarding 'Activities and Artifacts' within the curriculum map. Instead, the program employs course-embedded assignments as assessment activities and artifacts to demonstrate proficiency in program learning outcomes across three levels: introduction, reinforcement, and mastery. Assignments will be of the kind typically given in Computer Science and Math/Stats classes, ranging from small weekly problems sets to construction of moderately sized digital artifacts and analyses using statistical tools and program development environments. Certain pivotal courses may feature more extensive projects., predominantly centered around software development or data analysis, serving as primary assessment artifacts. The Undergraduate Data Science Curriculum Committee will ensure that each student undertakes at least two project-based advanced courses. These projects will fulfill the requirements of a capstone or “Honours” project within the degree, showcasing comprehensive reflection, demonstration of program learning outcomes, and ability to conduct independent work.

The program components are the courses listed in the calendar description of the requirements of the main degree (See Appendix 1). Three of the sections in the description given a choice of courses.

1. The section containing STAT 2507 *Introduction to Statistical Modelling I* allows for an alternative equivalent course to be substituted for STAT 2507. We do not include those courses in the curriculum map.
2. A similar comment applies to STAT 2509 *Introduction to Statistical Modelling II*.
3. There is a list of advanced courses that students must take at least two of. These all fulfil the same purpose in the curriculum map so we identify them under the term “Advanced Course”.

Some of the courses in the degree are not referred to in the curriculum map. In all cases they are courses required only as prerequisites for courses that are in the map.

The mapping is in Table B.3.

Table B.3: Program curriculum map summary

Learning Outcome	Year(s) Assessed	Program Components	Level
Software Development Design and implement programs and systems to solve problems in a range of application domains, applying established	2027	COMP 1405 Intro to Computer Science I COMP 1406 Intro to Computer Science II COMP 2401 Intro to Systems Programming COMP 2404 Intro to Software Engineering COMP 2406 Fundamentals of Web Applications	I I R R R

software engineering concepts and techniques.			
Programming Languages Apply proficiently at least one language from each of three groups of languages, namely systems programming languages, object-oriented languages and languages commonly used in data science.	2027	COMP 1405 Intro to Computer Science I COMP 1406 Intro to Computer Science II COMP 2401 Intro to Systems Programming COMP 2402 Abstract Data Types and Algorithms COMP 2404 Intro to Software Engineering STAT 1500 Intro to Statistical Computing DATA/STAT 2500 Data Wrangling in R DATA/STAT 3500 Statistical Programming in R	II R R I I R I R R
Problem Solving Solve a substantial, practical data science problem independently by selecting and applying the appropriate methodologies	2028	Advanced	R
Advanced Knowledge Apply knowledge of at least one specialized, state-of-the-art data-science topic.	2028	Advanced	M
Communication Communicate data science analysis and results to audiences outside mathematics, statistics, and computer science by applying standard tools and styles, including visualization technique.	2027	DATA 2200 Communication Skills for Data Scientists	M
Modelling Build and assess statistical and machine learning models, employ a variety of formal inference procedures, and draw conclusions of appropriate scope from the analysis.	2028	STAT 2507 Intro to Statistical Modelling I STAT 2509 Intro to Statistical Modelling II STAT 3503 Regression Analysis STAT 4601 Data Mining I COMP 3105 Intro to Machine Learning COMP 4107 Neural Networks	I R R M I M
Ethics Apply critical inquiry to ethical issues in data science related to intellectual property, data privacy and security, and biases in models and data sets	2026	COMP 2109 Introduction to Security and Privacy PHIL 2106 Information Ethics	I I

Curation Maintain and/or repair data to ensure its integrity and prepare it for use with a variety of statistical methods and models.	2027	COMP 2406 Fundamentals of Web Applications	I
		STAT 1500 Intro to Statistical Computing	I
		DATA/STAT 2500 Data Wrangling in R	R
		DATA/STAT 3500 Statistical Programming in R	R

B.4 Program learning outcomes assessment plan

Evidence for assessing program learning outcomes will be gathered from key courses during the cyclic review process. The primary source for collecting this assessment data will be the online course repository and database. The Undergraduate Data Science Curriculum Committee (UDSCC), consisting of faculty, staff, and student representatives, will retrieve and review course outlines, materials, and exemplars of assignments such as quizzes and exams. The committee will assess student exemplars of program assessment artifacts embedded in key courses and evaluate whether the program is achieving its learning outcomes.

We will leverage the existing system within the School of Computer Science and coordinate with other units heavily involved in the courses to transfer these materials to the Institute for Data Science, ensuring anonymization of data. The UDSCC will have access to this database of materials. Over the first four years of the program, we will evaluate the eight specified learning outcomes outlined in the curriculum map. Faculty meetings or retreats will facilitate discussions on assessment results and interpretation, with constructive feedback shared for continual improvement.

Proposed changes will be documented and reported to the Institute of Data Science Board. During the cyclical review process, the Chair of the UDSCC will oversee the review and present the findings in a report to both the UDSCC and the Institute of Data Science Board. Any approved changes will be forwarded to the Science Faculty Board through the IDS Director for final approval (refer to section C. Governance for further details).

B.5 Program Essential Requirements

PREAMBLE

“Program essential requirements are defined by the Ontario Human Rights Commission as “the knowledge and skills that must be acquired or demonstrated in order for a student to successfully meet the learning objectives of that... program.” The program essential requirements are components that contribute to the achievement of the learning outcomes of the program.

“An appropriate accommodation at the post-secondary level would enable a student to successfully meet the essential requirements of the program, with no alteration in bona fide standards or outcomes, although the way the student demonstrates mastery, knowledge and skills may be altered.”

-Ontario Human Rights Commission’s Policy on Accessible Education for Students with Disabilities (2018)

The aim of accommodation in a post-secondary context is to provide equal opportunities to all students to enjoy the same level of benefits and privileges and meet the requirements for acquiring an education.

Based on these principles, an accommodation will be considered appropriate where it will result in equal opportunity for an otherwise qualified student with a disability to attain the same level of performance, or enjoy the same level of benefits and privileges experienced by others, without compromising bona fide academic requirements.

Paul Menton Centre For Students with Disabilities (PMC)

The Paul Menton Centre is responsible for assessing requests for academic accommodation of students with disabilities through evaluations that are carried out on an individual basis, in accordance with human rights legislation and University policy, and with the support of relevant, professional/medical documentation. Students will only receive academic accommodation if the functional limitations of their disability impact directly on their academic performance.”

The program essential requirements of Bachelors of Data Science have been reviewed in consultation with the Paul Menton Centre to ensure capacity for reasonable academic accommodation of students with disabilities, in accordance with the Carleton University Academic Accommodation Policy. The learning outcomes can be attained as outlined in the program description with the use of appropriate academic accommodations.

C. Governance

The program will be governed by the Institute for Data Science (IDS), a new academic unit that is being created for this purpose and to administratively house the university's Data Science graduate programs. The Institute for Data Science is housed within the Faculty of Science. The Institute is administrated by the Director of the Institute for Data Science, with the support of the Institute for Data Science Board (IDSB) that consists of all faculty members of the IDS and external representatives from member units of the undergraduate and graduate Data Science programs. The IDSB discusses and forwards program changes to SCAP.

The IDS Director is appointed by the Dean of the Faculty of Science through consultation with the Directors of the School of Computer Science and the School of Mathematics and Statistics. The IDS Director is chosen from the IDS faculty within the Schools of Computer Science and Mathematics/Statistics,. The Director will be cross-appointed to IDS. The Director's term is three years.

The IDS Director will delegate Bachelor of Data Science program administration to the Undergraduate Data Science Chair, who also heads the Undergraduate Data Science Curriculum Committee (UDSCC). The UDSCC includes at least two IDS faculty members. Lab coordinators can attend the UDSCC in an advisory role. The UDSCC meets three times a year, typically once per term, or as needed, based on requirements.

The Undergraduate Data Science Chair is an IDS faculty member in the School of Computer Science or School of Mathematics and Statistics who is appointed by the Director of the IDS in consultation with the UDSCC for a two-year term. The responsibilities of the Undergraduate Data Science Chair are as follows:

- Organize student orientations.
- Conduct industry outreach.
- Present the Undergraduate Data Science program at Data Day.
- Other duties as specified by the current Carleton University Academic Staff Association Collective Agreement.

The responsibilities of the UDSCC are as follows:

- Review the program to ensure it meets its learning outcomes.
- Develop new curriculum based on recommendations from IDS faculty members, an eventual external advisory committee, and new university policies.
- Maintain the forms, documents, procedures, and guidelines associated with the Honours projects and theses.

The undergraduate co-op advisor will be appointed by the IDS Director. The undergraduate co-op advisor identifies and liaises with external stakeholders to ensure the smooth operation of the co-op program.

The undergraduate advisor provides administrative support to the UDSCC.

D. The Faculty

D.1. Faculty appointed to the unit or program.

The current faculty members cover much of the areas of expertise necessary to teach an Undergraduate Data Science degree. The SCS faculty members broadly cover machine learning, artificial intelligence, high performance computing, analytics, and natural language processing. The SMS faculty broadly cover frequentist and Bayesian statistics, computational statistics, high dimensional data, data mining, clustering, and statistical computing. The current make up is one chancellor's professor, three full professors, seven associate professors and four assistant professors.

Interdisciplinary and application motivated tool development are the hallmark of research in Data Science fields. Joint hires of cross appointed faculty provide a cost-effective approach to increasing the quantitative understanding in application centered domains while motivating quantitative research problems and facilitating customization of future program concentrations. To build upon the current faculty, seven new faculty will be hired. One Data Science member in year one, and one SCS and one SMS assistant professor each, in year three, year four, and year five. The goals for these new hires are detailed below.

It is of paramount importance for SCS to consider hiring more faculty members in data management. The points below highlight the need for recruiting one or two faculty members whose research focus is on data management for serving machine learning and data science pipelines.

Data science pipeline: From a technical standpoint, data science is about the pipeline from raw input data to insights that requires use of data cleaning and transformation, data analytic techniques, and data visualization. Data scientists heavily use Data Science Notebooks, such as Jupyter, Spark, and Zeppelin, despite their weaknesses in versioning, IDE integration, and support for asynchronous tasks. Data scientists rely on a rich ecosystem of open-source libraries such as Pandas for sophisticated analysis, including the latest machine learning frameworks. They also work with data lakes that hold datasets with varying levels of data quality— a significant departure from carefully curated data warehouses. This resulted in the typical data science pipeline consisting of several stages: One team prepares the data, sourced from heterogeneous data sources in data lakes. Another team builds models on the data. Finally, end users access the data and models through interactive dashboards. Data scientists repeatedly say that data cleaning, integration, and transformation together consume 80%-90% of their time. These are problems the data management community has experienced in the context of enterprise data for decades. Data management research can aid the iterative end-to-end development of the data-to-insights pipeline.

Data context and provenance: Unlike applications built atop curated data warehouses, today's data scientists tap into sources of varying quality for which correctness, completeness, freshness, and trustworthiness of data cannot be taken for granted. Data scientists need to understand and assess these properties of their data and to reason about their impact on the results of their data analysis. This

requires understanding the context of the incoming data and the processes working on it. This is a data provenance problem, which is an active area of research for the data management community. It involves tracking data, as it moves across repositories, integrating and analyzing the metadata as well as the data content. Beyond explaining results, data provenance enables reproducibility, which is key to data science, but is difficult, especially when data has a limited retention policy.

Data exploration at scale: As the volume and variety of data continues to increase, the data management community can develop more effective techniques for discovery, search, understanding, and summarization of data distributed across multiple repositories. For example, for a given dataset, a user might want to search for public and enterprise-specific structured data that are joinable, after suitable transformations, with this dataset. The joined data may then provide additional context and enrichment for the original dataset. Furthermore, users need systems that support interactive exploratory analyses that can scale to large datasets, since high latency reduces the rate at which users can make observations, draw generalizations, and generate hypotheses. To support these requirements, the system stack for data exploration needs to be further optimized using both algorithmic and systems techniques. Specifically, data profiling, which provides a statistical characterization of data, must be efficient and scale to large data statistical characterization of data, must be efficient and scale to large data repositories. It should also be able to generate at low latency approximate profiles for large data sets to support interactive data discovery. To enable a data scientist to get from a large volume of raw data to insights through data transformation and analysis, low latency and scalable data visualization techniques are needed.

Metadata management: The data management community can advance the state of the art for the tracking and managing metadata related to data science experiments and machine learning models. This includes automated labeling and annotations of data, such as identification of data types. Metadata annotations as well as provenance need to be searchable to support experimentation with different models and model versioning. Data provenance could be helpful to determine when to retrain models. Another metadata challenge is minimizing the cost of modifying applications as a schema evolves, an old problem where better solutions continue to be needed.

Evidence based decisions begin with the interpretation of an application area challenge as a quantitative problem and move through the data science pipeline under the scrutiny of reproducibility and inferential scrutiny. Data is summarized and information is distilled, often through complex models, but the validity of the evidence the model presents hinges on validity of the model. SMS will consider hiring more faculty members in the area of Inferential validation strengthening our integration with the community, for the following reasons:

Causal Inference: Although short term success is common when using novel data sources to inform important decisions, the medium-term utility depends on the causal mechanism linking information sources and the inferential goal. Causal inference seeks to produce inference accounting for the counterfactual; what would have been observed under different circumstances.

Data Privacy: Data Privacy combines application area expertise with ethical data handling and ensuring the plausible deniability for any user as to whether or not they are included in the dataset or inference. While each statistic published about a population provides an element of information about the individuals, if enough elements of information are released, then the individuals can be uniquely re-identified. Privacy Preserving Techniques (PPT) ensure that individuals maintain plausible deniability as to whether or not they are included among the individuals in the dataset. PPTs offer probabilistic privacy guarantees to the extent that the US Census Bureau has adopted their use for census releases. However, they are highly dependent on the use case and nuances of the domain of application. Considerable research needs to be done to ensure the protection of the individual while maintaining the utility of information about the population. In partnering with local and federal governmental departments, it is paramount that the privacy of Canadians is maintained while balancing the useful information guaranteeing the validity of evidence-based decisions.

Sports Analytics: Sports Analytics involves the development of tools that leverage the nuances of the game and combines the expertise of coaches with insights from data to inform offensive and defensive strategies on the field, ice, or court. Carleton already has laid the groundwork for becoming an upcoming hub for sports analytics. The variety of major sports teams in Ottawa brings substantial opportunities to extend our expertise by improving tools for coaches to optimize match ups and unlocking inference around patterns and likely outcomes under a variety of scenarios. A faculty member in this area would be highly interdisciplinary and work on application driven problems that interact with varsity and professional sports teams in the region.

Regarding supervision privileges, SCS and the SMS follows the general Faculty of Graduate and Postdoctoral Affairs (FGPA) guidelines. Adjunct Professors listed in Appendix B can co-supervise. There is no mandatory retirement age at Carleton. Among the core SCS faculty members, only one individual is on reduced time appointment, with retirement planned for December 2026. In SMS, there are two anticipated retirements in the next 5 years. There are two pre-existing planned appointments separate from the seven listed above. The appointment of a new assistant professor in the field of artificial intelligence is planned by SCS for July 1st, 2024. The appointment of a new assistant professor in the field data science is planned by SMS for July 1st, 2024. In year three, we plan to utilize existing faculty members to develop and teach the online courses via overload. The current program has a balance of senior and junior employees.

Table D.1: Core program faculty

Faculty Name	Rank	Appointment Status	Percentage Appointment	Supervision Privileges*	Area of Specialization/Field Affiliations
Frank Dehne	Chancellor's Professor	Tenure	100%	D	High performance computing, Parallel computing, Computational biochemistry, Online analytical processing
Dave Campbell	Full Professor	Tenure	100%	D	Bayesian modeling, MCMC, Dynamic systems, Machine learning, Text and image data, Functional data analysis
Pat Farrell	Full Professor	Tenure	100%	D	Categorical data analysis, Biostatistics, sampling, Applied statistics
Yuhong Guo	Full Professor	Tenure	100%	D	Machine learning, Artificial Intelligence, Computer vision, Natural language processing, Medical data analysis
Olga Baysal	Associate Professor	Tenure	100%	D	Software engineering, Mining software repositories, Human aspects of software engineering, Data science
Song Cai	Associate Professor	Tenure	100%	D	Empirical likelihood, Asymptotic theory, Density ratio model, Spatio-temporal modeling, Non- and semi-parametric inference, Statistical computing
Sanjeena Dang	Associate Professor and CRC in	Tenure	100%	D	Computational statistics, Biostatistics, Bioinformatics,

	Data Science and Analytics				Machine learning, High dimensional data, Mixture models, Variational approximations.
Majid Komeili	Associate Professor	Tenure	100%	D	Machine learning, Deep learning, Computer vision, Natural language processing.
Shirley Mills	Associate Professor	Tenure	100%	D	Applied statistics, Data mining, Statistical machine learning, Clustering, Classification of high dimensional data
Jason Nielson	Associate Professor	Tenure	100%	D	Functional data analysis, Longitudinal data analysis, Mixture models, Computational statistics/numerical analysis
Ahmed El-Roby	Associate Professor	Tenure	100%	C	Question answering, Knowledge graphs analytics, Domain adaptation, Data integration, Sports analytics
Matthew Holden	Assistant Professor	Preliminary	100%	CD	Surgical data science, Machine learning, Computer assisted surgery
Zinovi Rabinovich	Assistant Professor	Preliminary	100%	CD	Artificial Intelligence, Multi-agent systems, Intelligent agents, Perceptual control
Koon-Ho Alan Tsang	Assistant Professor	Preliminary	100%	CD	Artificial intelligence, Multi-agent systems, Game theory, Graph theory, Social networks,

					Computational social choice, Voting theory, Social network simulations, Algorithmic fairness Fair allocation
Junfeng Wen	Assistant Professor	Preliminary	100%	CD	Reinforcement learning, Transfer learning, Federated learning

*D=full privileges; M=full privileges at master's level only; CD=co-supervision privileges at doctoral level, full privileges at master's level;
CDM=co-supervision privileges only at both doctoral and master's level; CM=co-supervision privileges at master's level, no privileges at doctoral level

D.2. Faculty research funding.

Most of the professors have NSERC Discovery grants. Funding correlates to research production. As evidenced in their CVs, most Full Professors as well as some Associate Professors, have strong publication records, some presenting truly exceptional ones. Such expertise directly nourishes the contents of the advanced courses offered by these professors, (e.g., fourth-year courses) thus exposing students to the state-of-the-art in data science and artificial intelligence. Faculty members create and teach ‘Advanced Topics in Computer Science’ courses (COMP 4900) or “Directed Studies” Statistics courses (STAT 4907). They broaden the spectrum of offered courses and allow these professors to attract students to their area of research. Faculty members use their research funding to support students at all levels.

Faculty members use their research funding to support undergraduate students, often in the context of summer jobs. There are three main opportunities for undergraduate students to participate in the research of faculty of science members.

Undergraduate Student Research Awards (USRA): These awards are meant to stimulate student interest in research in the natural sciences and engineering. They are also meant to encourage students to undertake graduate studies and pursue research careers.

Dean’s Summer Research Internships (DSRIs): Every year, the Dean of Science offers paid summer research internships to top first-year science, computer science and mathematics students. These DSRIs offer students the opportunity to work with professors to conduct research.

I-CUREUS: The I-CUREUS program provides undergraduate students with an opportunity to work with a faculty member on a paid research project.

Table D.2: Operating Research Funding by Source and Year

Faculty members	Sum of Awarded Amount (Cash)	Sum of Awarded Amount (InKind)	Sum of Awarded Overhead	Sum of Awarded Total
El-Roby Ahmed	\$ 367,500	\$ 34,080	\$ -	\$ 401,580
Dehne Frank	\$ 1,380,215	\$ 30,000	\$ -	\$ 1,410,215
Nielsen Jason D.	\$ 100,000	\$ -	\$ -	\$ 100,000
Wen Junfeng	\$ 100,000	\$ -	\$ -	\$ 100,000
Komeili Majid	\$ 610,140	\$ 36,000	\$ -	\$ 646,140
Baysal Olga	\$ 449,880	\$ 25,000	\$ -	\$ 474,880
Farrell Patrick	\$ 1,060,166	\$ -	\$ 7,000	\$ 1,067,166
Dang Sanjeena	\$ 900,000	\$ -	\$ -	\$ 900,000
Cai Song	\$ 178,040	\$ -	\$ -	\$ 178,040
Guo Yuhong	\$ 2,263,184	\$ 14,599	\$ 2,200	\$ 2,279,983
Rabinovich Zinovi	\$ -	\$ -	\$ -	\$ -
Holden Matthew	\$ 211,000	\$ -	\$ -	\$ 211,000
Mills Shirley	\$ 168,159	\$ 50,000	\$ 5,557	\$ 223,716
Campbell David	\$ 672,127	\$ -	\$ 37,680	\$ 709,807
Tsang Alan	\$ 217,500	\$ -	\$ -	\$ 217,500
Grand Total	\$ 8,677,911	\$ 189,679	\$ 52,437	\$ 8,920,027

D.3. Distribution of thesis supervision.

Students will independently seek out a supervisor for COMP 4905 Honours Project from the School of Computer Science. Students will independently seek out a supervisor for STAT 4905 Honours Project from the School of Mathematics and Statistics.

Table D.3: Distribution of thesis supervision

Faculty Name	Rank	Completed				Current			
		Undergraduate	Master's	PhD	PDF	Undergraduate	Master's	PhD	PDF
Frank Dehne	Chancellor's Professor		31	16	4	0	0	1	0
Dave Campbell	Full Professor	9	8	6	5	0	3	3	0
Pat Farrell	Full Professor	53	15	9	7	4	1	1	2
Yuhong Guo	Full Professor	4	7	7	2	2	2	5	1
Olga Baysal	Associate Professor	30	22	1	0	0	4	3	0
Song Cai	Associate Professor	7	9	3	0	0	1	2	0
Sanjeena Dang	Associate Professor and CRC in Data Science and Analytics	4	16	4	1	1	4	4	0
Majid Komeili	Associate Professor	32	6	0	0	1	4	3	1
Shirley Mills	Associate Professor	40	100	2	0	2	2	2	0
Jason Nielson	Associate Professor	7	8	1	0	0	1	0	0
Ahmed El-Roby	Associate Professor	17	3	1	0	0	3	3	0
Matthew Holden	Assistant Professor	11	4	0	0	4	4	0	0
Zinovi Rabinovich	Assistant Professor	15	1	3	1	0	0	0	0
Koon-Ho Alan Tsang	Assistant Professor	2	3	0	0	0	1	1	0
Junfeng Wen	Assistant Professor	2	1	0	0	2	2	2	0

D.4. Current teaching assignments

In SCS and SMS, courses are assigned according to the following policies. Distinguished Research and Cross Appointed Professors (in other departments at Carleton University) are not assigned any teaching load in SCS or SMS. The Director, Associate Directors, Graduate Director, Institute of Data Science Director and Human Computer Interaction Program Director have teaching reductions due to their administrative responsibilities. Occasionally, faculty members receive teaching reductions associated with research awards or administrative duties in the Faculty of Science, e.g., for Dean or Associate Dean roles, or at the university level, e.g., Associate Vice President role. Chair holders alternate between teaching, one year, one undergraduate course (normally fourth year) and one graduate course, then only one graduate course the year after. Tenure-track faculty members teach three courses per year in SCS and four per year in SMS. Typically, they teach one graduate course in their area of research. They teach one advanced course (third or fourth year) in their area of expertise. Finally, they teach another course or courses at any of the four levels, normally, assigned from a list of faculty member provided preferences. The teaching load of faculty doing no research may be raised to five courses. Every instructor teaches a total six undergraduate courses per academic year, with three courses in the Fall term and three courses in the Winter term. Some of them are multiple sections, e.g., of the same topic. The assigned courses are mostly at the first- and second-year levels. We also hire Term Instructors and Contract Instructors. We typically have one or two Term Instructors, for a one or a two-year term. Their workload is the same as for Instructors. We also hire contract instructors, ten or twelve per year, to teach some of the undergraduate courses.

As the program is being created from pre-existing courses, current faculty member's teaching loads will not be affected. However, we will bolster current offerings with contract instructors as well as new faculty, as they are hired. Historical teaching loads are outlined in Table D.4. below and detailed in Appendix 6.

Table D.4: Distribution of Teaching Assignments (to be completed by OVPAVPA or FGPA and confirmed by the unit)

Faculty Name	Courses Taught		
	2023-24	2022-23	2021-22
Frank Dehne	0	1	1
Dave Campbell	1	1	1
Pat Farrell	2	0	0
Yuhong Guo	2	1	2
Olga Baysal	0	2	1
Song Cai	6	6	6
Sanjeena Dang	2	1	1

Majid Komeili	4	2	3
Shirley Mills	3	1	2
Jason Nielson	2	2	2
Ahmed El-Roby	4	4	3
Matthew Holden	4	4	1
Zinovi Rabinovich	3	0	0
Koon-Ho Alan Tsang	4	4	5
Junfeng Wen	3	3	0
Ahmed Almaskut	20	15	15
Wayne Horn	8	7	5

D.5 Contract instructors

Most of the core courses will be taught by pre-existing faculty. However, new sections of the courses will be taught with supplemental CI's. The CI needs are detailed below. We will need four contract instructors (CI) in year one, three new CIs in year two, nine CIs in year three, one CI in year four, no new CIs in year five, and seven CIs in year six. The Department of Philosophy will require one CI starting in year two to teach PHIL 2106 Information Ethics.

E. Program Admission and Enrolment

E.1. Admissions requirements

A student applying to the program is required to have an Ontario Secondary School Diploma (OSSD) or equivalent which includes a minimum of six 4U or M courses with no individual grade below 60%. Within these six courses must be Advanced Function and Calculus and Vectors. The average of these two courses must be 85% or higher. The strong math requirements are necessary for students to complete the Software development, programming languages, and Modeling learning outcomes. Although it is not an admissions requirement, every student will be required to have a laptop to complete the computer science coursework. See Appendix 3 for calendar language and equipment specifications.

E.2. Class sizes and course and program capacity

We expect to maintain class sizes of around 50 students but section sizes may differ based on the teaching style of the instructors.

E.3. Projected enrolment

It is difficult to gauge student demand for a data science program in Ontario as many of the programs were created after Ontario Universities Application Centre data became available to Carleton University (i.e., after 2021) and many of those created before 2021 are specializations or streams that are not separate from their parent degree (e.g., Bachelor of Computer Science with a Specialization in Data Science is counted as Bachelor of Computer Science.) However, the available data from Ontario Tech, the University of Ottawa and Wilfrid Laurier show a moderate upward trend in Data Science applications between 2017-2021 (Appendix 4, Figure 1) and first choice applications between 2017-2021 (Appendix 4, Figure 2). Registrations for a data science undergrad ranged from 9-26 in 2021 (Appendix 4, Figure 3). Therefore, there is an increasing demand for data science programs in Ontario and few spots available. Although the data is not available, consultations with other universities have indicated that applications and registrations for new data science programs are strong and rapidly increasing.

At Carleton, the computer science program has been an incredible success, with a consistent increase in enrolments and over 2900 full-time enrolments in the School of Computer Science's undergraduate program as of 2023 (Appendix 4, Figure 4). Data Science and AI related courses are some of the highest attended fourth-year courses in Computer Science and Statistics (See Appendix 4, Tables

3,4 for more detailed information). Furthermore, the AI concentration (441 students) is second in enrolment behind Software Engineering in the Computer Science program (See Appendix 8, Figure 5, and Tables 1,2 for more detailed information). This shows that students in Computer Science and Statistics are attempting to tailor their current programs to fit a Data Science and AI career. Given the combination of a healthy outlook for Data Science careers, the positive outlook from other institutions, and the incredible success of similar programs such as the Computer Science program, we believe an initial enrolment of 100 students is realistic (80 domestic, 20 international students). This number will increase to 150 in year 3 (120 domestic, 30 international students) and 200 in year 5 (160 domestic, 40 international students).

To ensure our recruitment activities for Data Science will reach a diverse pool of applicants, we will utilize Carleton University's existing undergraduate recruitment initiatives and maintain a strong presence in these recruitment activities over the duration of the program. Our Associate Dean Recruitment, Wellness and Success, will also oversee internal, Faculty-led initiatives, and work in collaboration with Undergraduate Recruitment to direct regional, provincial, national, and International, recruitment strategies.

The Data Science program will be featured in both the communication to prospective students and the events and initiatives for prospective students. The Data Science program will be included in undergraduate recruitment newsletters, email, phone and social media campaigns and will be featured in the general viewbook, the Indigenous student viewbook and science-specific printed publications. The data science program will be added to the Undergraduate Admissions website, virtual tour and Carleton360. The Data Science program will be prominently highlighted during the over 500 high school visits – both in mainstream and Indigenous student recruitment – that happen across the country and especially in the diverse Greater Toronto Area. The high school and community visits in the GTA and other diverse areas of the province will provide a more direct connection between the program and the communities it serves. Additionally, the Data Science program will be highlighted at Computer Science Workshops given to high school students either at Carleton University or their high schools.

F. Student Experience and Satisfaction

F.1. Student orientation, advising, and mentoring

Faculty will take AODA Information and Communications Training and the AODA Customer Service Standards courses. Additionally, we will endeavour to ensure faculty members have completed the Kinàmàgawin Indigenous Learning Certificate within the first year of their appointments. Faculty and staff will also be instructed to utilize the Faculty of Science EDI teaching Toolkit, the Faculty of Science EDI in research pocket guide and complete the modules “Equity and Human Rights”, “Equity in Your (work) Space – Faculty, Staff and Supervisors”, “Inclusive Classroom – Faculty”, “Responding to Disclosures of Sexual Violence”, and “Breaking Down Barriers: Exploring Disability, Dignity and Ableism”, all offered by the Department of Equity and Inclusive Communities.

Data science students, as members of the Faculty of Science have access to the Science Student Success Centre (SSSC). The centre helps all undergraduate students in the Faculty of Science define and achieve their academic, career, and social goals. It connects students with each other, with faculty and staff, and with professionals who have careers related to degree programs in the Faculty of Science. At the core of the SSSC is the belief that a positive university experience is deeply rooted in developing strong one-on-one relationships and continuing successes. All programming in the SSSC is designed to encourage relationship building and personal growth through the sharing of knowledge. Peer mentoring is the primary vehicle that the SSSC uses to accomplish the collective transference of knowledge and skills from one Faculty of Science student to another.

The SSSC fills gaps in support for undergraduate students in the Faculty of Science by actively listening to students, faculty, staff, and the SSSC student volunteer team, and then creating and maintaining programming that addresses the specific needs of Faculty of Science students. By utilizing its location in the Faculty of Science, the SSSC continuously evolves and anticipates the needs of students to provide timely, up-to-date support.

The SSSC team is built upon a volunteer funding model where staff employees and student volunteers function as a single unit. Top students in the Faculty of Science join the SSSC team and are held to the highest possible standards of professionalism and integrity. Student team members are challenged to accept ownership of the SSSC – to take creative risks, collaborate, lead, and push their limits to positively impact the lives of individuals and the Faculty of Science community.

Students in SCS have a unique set of knowledge, skills and opportunities within the Faculty of Science. The SSSC works with Co-op and Career Services to offer Carleton's largest career exploration and networking event for students who plan on entering the field of information and communication technology. An example event is the Computer Science Industry Mixer. Networking is key to finding the right job for you within the field of information technology. During the event, the students meet with professionals in a variety of positions in the field, hear what it is like to work for different types of companies, and search for your future employer at the Industry Mixer.

SSSC mentors work with students on an individual basis or in small groups to help them define and achieve their academic, career and social goals. Mentors help guide students who are at all levels of academic standing to first figure out what goals they would like to achieve, and then give them the knowledge they need to reach their goals. They maintain an excellent knowledge of the services available to support students both on and off campus and can connect students with the resources that best suit their needs.

The SSSC takes a proactive role in helping all first-year students succeed. The SSSC Early Warning Initiative helps students struggling in first-year courses at mid-terms and at the end of each term to find guidance and support. At the mid-point of each term, they contact all first-year students who are currently receiving a 60% or less in courses and offer them an opportunity to meet one-on-one with a mentor to discuss ways in which to improve their performance in the future. Topics covered in the

mentoring sessions include time management, which course components to focus more time on, how to better prepare for tests and exams, and where to go on campus for additional support. At the end of each term, they contact all first-year students who have a CGPA of 60% or below. Students are encouraged to take advantage of the one-on-one mentoring program offered in the SSSC where they can meet individually with a trained upper-year student, who can offer advice and tips.

The program SSSC Summer Matchup pairs incoming first-year students in the with an upper-year mentor in the summer before their first year of study at Carleton. The mentors contact incoming students in the summer and stay in touch with them throughout the school year to help them transition to Carleton more easily. Mentors answer questions about what it is like to be a student, the major differences between high school and university, where to get assistance with choosing and registering for classes, and how to get involved in activities after arriving on campus.

Student Societies and Clubs

Student societies and clubs are important to foster a sense of community among the students. The Faculty of Science sponsors the activities of several undergraduate student societies. Here are a few examples below that are available to Data Science students:

Carleton Science Student Society: It represents every student in the Faculty of Science. Science students are automatically a member of the Society and have the opportunity to participate in meetings, discussions, and run for executive or representative positions.

Carleton Computer Science Society: The Carleton Computer Science Society (CCSS) aims to create opportunities and resources for computer science students and anyone who is interested in similar fields. They represent undergraduate Computer Science students at Carleton University in Ottawa academically, socially, and technically. Their mandate is to engage Carleton University's computer science undergraduate students in social and academic activities, to provide services for those students to aid in their academic career at Carleton and to represent those students to the Carleton University community.

Women in Computer Science (WiCS): It is a group organized by the School of Computer Science, Carleton University with the mission of establishing a positive environment for women in computing at all academic levels. The goal is to develop a network of women in computing at Carleton that would allow them to share experiences and learn from each other. The mandate is: to establish an environment where women students are supported in their studies, to promote women in computer science, and to build a strong network of women in Computer Science.

Carleton University Women in Science and Engineering: The Carleton University Women in Science and Engineering (CU-WISE) is a group of enthusiastic undergraduate and graduate students who encourage and support women to pursue an education or career in Science and Engineering.

Egg{x}: The eggX club gathers people who want to create something that benefits themselves and the people around them. The aim is to make coding more approachable to all kinds of students. It is led by a

group of students in various programs who have had experience writing and using software. They run events and facilitate projects to help ease the process of building a programming portfolio.

AI Society: The Carleton Artificial Intelligence Society is an association built to fill the increasing demand for artificial intelligence education on the Carleton University campus. They are a group of artificial intelligence enthusiasts dedicated to increasing the Carleton undergraduate and graduate communities' understanding of artificial intelligence and data science. They meet weekly to learn and discuss artificial intelligence and develop artificial intelligence software. The goal is to help students succeed in the growing field of artificial intelligence. The society holds a weekly Friday night project where students work collaboratively to build an application that utilizes machine learning techniques. Additionally, they hold weekly talks or workshops to teach students more about data science and machine learning. Each event is attended by 30 dedicated students, most of which are undergraduate computer science students.

Carleton Competitive Programming Club: The goal is to provide a space for fellow students to practice their competitive programming, data structures and algorithms skills by solving problems together. They also aim to participate on behalf of Carleton University in competitions such as the ACM-ICPC.

Carleton Game Development Club: The club provides a space for students to build video games in a fun social environment all the while learning about game development. This club is open to everyone!

Carleton Quantum Computing Society: It is a cross-disciplinary student organization that aims to provide individuals with necessary skills and knowledge to succeed in their professional, personal, or academic journey into quantum computing.

F.2. Career paths of graduates

Students graduating from this degree will find careers across various fields such as information technology, retail, real estate, financial services, and media & communications (Glassdoor, 2023b, 2023a). Specifically, students could be hired in positions in any field with evidence-based or data-driven decision-making as a data scientist, data analyst, data engineer, data architect, machine learning engineer, or business intelligence engineer (Coursera, 2023). Furthermore, students are able to complete Honours pathways or complete a concentration to specialize and be eligible to enter into Master's programs in Computer Science, or Statistics.

G. Resources

The Undergraduate Data Science program will be housed in the Institute for Data Science. The Institute for Data Science will be made up of all current members of the Institute as well as new faculty hires as part of this program. The Institute will be administered by a Director and the Undergraduate degree will be administered by a Chair. A faculty member will act as a Co-op advisor. We will hire seven new faculty members and 18 contract instructors (CI) to support the program. The Department of Philosophy will also require one CI starting in year two to teach PHIL 2106 Information Ethics. To support

the administration maintenance of the program, a department administrator and undergraduate advisor will be hired in year one. Labs will be supported by hiring an additional lab coordinator. We will also support the program through hiring an additional 63 teaching assistants. In year three, we will utilize existing faculty to explore the online component.

G.1. Support and technical staff

In year one, we will need a department administrator and an undergraduate advisor. We will need 0.5 of a lab coordinator in year one and another 0.5 lab coordinator for 1.0 total lab coordinators in year three for the increased lab sections. We will need an additional 9 teaching assistants in year one, 11 in year two, 13.5 in year three, 13.5 in year four, 9.5 teaching assistants in year five and 6.5 in year six. Additional TA resources may be necessary for our sister units if enrolments in their courses increases above a certain threshold. Included in the amounts above are four additional teaching assistants a year to allocate to other units as necessary.

G.2. Space

Formalizing the IDS requires a small, initial investment of space for an institutional office which will house administrative support for students, staff and faculty. This space will be a distinct landing pad for all Institutional activities and act as a reception area for external and internal collaborators involved in the program. For the initial two years, we will use existing space for the rollout of new faculty and courses. In year three, we will require an additional allocation of teaching space to be used for 30-student classrooms and computer science tutorials, as well as four offices for incoming faculty. This space will preferably be placed near or around the IDS office, created in year one, and will be used as spaces for students to collaborate on capstone projects, and for faculty to build relationships with external stakeholders. In year three, we have requested funds to modernize one of the current Computer Science collaborative learning labs by renovating the room and providing screens and furniture to create a more open, collaborative lab space.

a. Laboratory facilities and computing resources

The Data Science program will utilize pre-existing SCS collaborative learning labs as necessary. These labs are equipped with moveable furniture, electrical outlets, and screens to allow students to complete their group work as they see fit. Collaborative classroom space will also be offered from SMS. There are computer labs with PC workstations for students, although it is mandatory that incoming students bring their own laptops. In addition to the physical labs, cloud computing resources will be available to students through OpenStack. These resources will be bolstered by funds for additional GPU's and Cloud storage services in year one. Course software is provided free to all students to be installed on their own machines or through virtual images.

b. Unit/program and affiliated research facilities

Faculty members may utilize their research facilities to support their classrooms, especially in upper year courses. Faculty member's research facilities will be directly used if students undertake summer jobs through the USRA, DSRI or I-CUREUS programs. If students take on summer jobs, faculty member's research facilities will be utilized by undergraduate students.

G.3. Library Resources

PREAMBLE

The Library report is prepared by the librarian or subject specialist responsible for the subject area(s) covered by the program, using a common template developed from guidelines established by the Ontario Council of University Libraries. The main purpose of the report is to specify whether any new resources or services are necessary in order to support the program, for example, whether the Library needs to purchase new books or subscribe to new journals or electronic resources.

The librarians and subject specialists preparing the reports rely on their own professional experience with collecting resources in the subject areas in order to make assessments about whether there are gaps in the collection that need to be filled in order to provide the appropriate teaching and research support for new, modified, or reviewed programs. They consult various sources for information about published resources in the subject area, including the database maintained by the Library's main monographs vendor, publishers' lists and websites, handbooks and guides to the literature, the library collections of universities that offer the program, various specialized sites relevant to the subject from professional societies and organizations, as well as basic information available in tools such as Google Scholar or generally on the web. They also generally consult faculty members (e.g., the Library representative or the department chair) to discuss their assessment of the strengths and gaps. The Library makes a clear distinction between those resources which are essential to the program and those which are simply "nice to have." Generally speaking, the reports list only the essential resources, with costing obtained from the vendors or agents from which the Library would obtain the materials: each item is listed and costed individually and the total amount is recorded in the report.

The report also provides context by providing information about the following, when possible or applicable: percentage of top-ranked journals which the Library subscribes to in the subject area(s); how much funds have been spent in the past fiscal year on e-resources, journals, and printed books in support of the subjects covered by the program; how much funds have been spent in the past 8 years on printed monographs for the program; specialized collections in archives, maps, data, and government information; instruction, teaching, and practicums carried out by Library staff in the classroom or in the Library; highlights from the Library website (e.g., links for subject and course guides and to online tutorials); research partnerships between the Library and the department or program; research consultations; help desk visits; and selected detailed statistical information about the Library.

H. Development of the Self-Study

The steering committee for the Data Science program consisted of internal representatives:

- Michel Barbeau, Program Co-Lead, Director, School of Computer Science; Interim Director, Institute for Data Science; Faculty of Science
- Prosenjit Bose, Associate Dean (Research and International), Faculty of Science
- Robert Burk, Program Co-Lead, Director, School of Mathematics and Statistics, Faculty of Science
- Dave Campbell, Professor, School of Mathematics and Statistics, School of Computer Science
- Maria DeRosa, Dean of Science, Faculty of Science
- Ethan Hermer, Professional Programs Officer, Office of the Dean of Science, Faculty of Science
- Douglas Howe, Professor, School of Computer Science
- Jeff Smirle, Director of External Affairs, Office of the Dean of Science, Faculty of Science
- Julia Wallace, Associate Dean, Undergraduate Affairs, Faculty of Science

All representatives listed above, except Dr. David Campbell and Dr. Douglas Howe contributed to the creation of the Data Science program throughout the Executive Summary, Business Plan, and Volumes. Dr. Dave Campbell and Dr. Douglas Howe joined the steering committee to complete Volume 1. Dr. Jim Green and StatsCan provided guidance on the curriculum. Tom Dufour at StatsCan has been approached for comment on the current curriculum. Nathasha Macdonald and the OIRP provided data science application data in Ontario. Dr. Allison Jaworski provided guidance on space allocation for the program. Jen Elliot provided language for recruitment. Dr. Rowan Thomson and Dr. Jason Hinek provided guidance on incorporating EDI in the program. Dr. Robyn Green provided guidance throughout the creation of Volume 1. Chloe Jones, Mikayla Paton and Dr. Kahente Horn-Miller provided guidance on the Collaborative Indigenous Learning Bundles.

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Appendix 1 – Course Calendar

Bachelor of Data Science (20.0 total credits)

A. Credits included in the Major CGPA (12.5 credits)		
1. 2.0 credits in:		2.0
MATH 1007 [0.5]	Elementary Calculus	
MATH 1104 [0.5]	Linear Algebra for Engineering or Science	
MATH 2007 [0.5]	Elementary Calculus II	
MATH 1805 [0.5]	Discrete Structures I	
2. 1.0 credit in:		1.0
PHIL 2106 [0.5]	Information Ethics	
DATA 2200 [0.5]	Communication Skills for Data Scientists	
3. 4.5 credits in:		4.5
COMP 1405 [0.5]	Introduction to Computer Science I	
COMP 1406 [0.5]	Introduction to Computer Science II	
COMP 2109 [0.5]	Introduction to Security and Privacy	
COMP 2401 [0.5]	Introduction to Systems Programming	
COMP 2402 [0.5]	Abstract Data Types and Algorithms	
COMP 2404 [0.5]	Introduction to Software Engineering	
COMP 2406 [0.5]	Fundamentals of Web Applications	
COMP 3105 [0.5]	Introduction to Machine Learning	
COMP 4107 [0.5]	Neural Networks	
4. 0.5 credits from:		0.5
STAT 2507 [0.5]	Introduction to Statistical Modelling I	
DATA/STAT 2517 [0.5]	Data Modelling I	

STAT 2559 [0.5]	Basics of Statistical Modeling	
5. 0.5 credits from:		0.5
STAT 2509 [0.5]	Introduction to Statistical Modelling II	
DATA/STAT 2519 [0.5]	Data Modelling II	
STAT 2655 [0.5]	Introduction to Probability with Applications (Honours)	
6. 2.5 credits in:		2.5
STAT 1500 [0.5]	Introduction to Statistical Computing	
DATA/STAT 2500 [0.5]	Data Wrangling in R	
DATA/STAT 3500 [0.5]	Statistical Programming in R	
STAT 3503 [0.5]	Regression Analysis	
STAT 4601 [0.5]	Data Mining I	
7. 1.0 credits from:		1.0
DATA/COMP 4115 [0.5]	Multiagent Systems	
COMP 4102 [0.5]	Computer Vision	
DATA/COMP 4116 [0.5]	Introduction to Natural Language Processing	
DATA/COMP 4117 [0.5]	Reinforcement Learning	
STAT 4503 [0.5]	Applied Multivariate Analysis (Honours)	
STAT 4504 [0.5]	Statistical Design and Analysis of Experiments (Honours)	
STAT 3504 [0.5]	Analysis of Variance and Experimental Design	
STAT 3507 [0.5]	Sampling Methodology	
STAT 4604 [0.5]	Statistical Computing	
STAT 4607 [0.5]	Bayesian Statistical Analysis (Honours)	
STAT 4502 [0.5]	Survey Sampling (Honours)	
8. 0.5 credits in COMP or Stat at the 4000-level		0.5

B. Credits not included in the Major (7.5 Credits)		
9. 7.5 credits in free electives		7.5
Total Credits		20.0

AI concentration (3.5 credits)

A. Credits included in the Concentration (3.5 credits)		
1. 2.0 credits in:		2.0
COMP 2804 [0.5]	Discrete Structures II	
COMP 3005 [0.5]	Database Management Systems	
COMP 3106 [0.5]	Introduction to Artificial Intelligence	
COMP 3804 [0.5]	Design and Analysis of Algorithms I	
2. 1.5 credits from:		1.5
COMP 3801 [0.5]	Algorithms for Modern Data Sets	
COMP 4804 [0.5]	Design and Analysis of Algorithms II	
DATA/COMP 4115 [0.5]	Multiagent Systems	
COMP 4102 [0.5]	Computer Vision	
DATA/COMP 4116 [0.5]	Introduction to Natural Language Processing	
DATA/COMP 4117 [0.5]	Reinforcement Learning	
COMP 4905 [0.5]	Honours Project	
COMP 4906 [1.0]	Honours Thesis	
Total Credits		3.5

Statistics concentration (4.0 credits)

A. Credits included in the Concentration (4.0 credits)		
1. 2.0 credits in:		2.0
DATA/STAT 3210 [0.5]	Inferential Data Science Foundations I	
STAT 3553 [0.5]	Regression Modelling (Honours)	
DATA/STAT 4321 [0.5]	Inferential Data Science Foundations II	
DATA/STAT 4322 [0.5]	Learning from Big Data	
2. 1.0 credit from:		1.0
STAT 3504 [0.5]	Analysis of Variance and Experimental Design	
STAT 4502 [0.5]	Survey Sampling (Honours)	
STAT 4503 [0.5]	Applied Multivariate Analysis (Honours)	
STAT 4504 [0.5]	Statistical Design and Analysis of Experiments (Honours)	
STAT 4607 [0.5]	Bayesian Statistical Analysis (Honours)	
3. 1.0 credits in:		1.0
DATA 4848 [1.0]	Consulting Project	
Or		
STAT 4905 [0.5]	Honours Project (Honours)	
And		
0.5 credits in STAT at the 4000 level		
Total Credits		4.5

Bachelor of Data Science: Co-op Admission and Continuation Requirements

- Maintain full-time status in each study term;
- Be eligible to work in Canada (for off-campus work)
- Have successfully completed COOP 1000 [0.0]

In addition to the following:

1. Registered as a full-time student in the B.DS program;
2. Successfully completed 5.0 or more credits;

Obtained an Overall CGPA of at least 8.00 and a Major CGPA of at least 8.00. These CGPAs must be maintained throughout the duration of the degree.

B.DS students must successfully complete four (4) work terms to obtain the Co-op Designation.

Co-op Work Term Course: DATA 3999

Appendix 2 - Course Descriptions

Pre-existing courses

COMP 1405 [0.5 credit]

Introduction to Computer Science I

Introduction to computer science and programming, for computer science students. Topics include: algorithm design; control structures; variables and types; linear collections; functions; debugging and testing. Special attention is given to procedural programming in a modern language, computational thinking skills, and problem decomposition.

Includes: Experiential Learning Activity

Precludes additional credit for BIT 1400, CGSC 1005, COMP 1005, ECOR 1041, ECOR 1042, ECOR 1051, ECOR 1606, ITEC 1400, ITEC 1401, SYSC 1005.

Prerequisite(s): restricted to students registered in the B.C.S. program, combined Honours in Computer Science and Mathematics, Honours Computer Mathematics, and Honours Computer Statistics.

Lectures three hours a week, tutorial one and a half hours a week.

COMP 1406 [0.5 credit]

Introduction to Computer Science II

A second course in programming for BCS students, emphasizing problem solving and computational thinking in an object-oriented language. Topics include abstraction, mutable data structures, methods, inheritance, polymorphism, recursion, program efficiency, testing and debugging.

Includes: Experiential Learning Activity

Precludes additional credit for BIT 2400, BUSI 2402, COMP 1006, ITEC 2400, ITEC 2401, SYSC 2004.

Prerequisite(s): COMP 1005 or COMP 1405. Restricted to students registered in the B.C.S. program, combined Honours in Computer Science and Mathematics, Honours Computer Mathematics, and Honours Computer Statistics.

Lectures three hours a week, tutorial one and a half hours a week.

COMP 2109 [0.5 credit]

Introduction to Security and Privacy

A tour of Internet security and privacy. Societal impacts and case studies. Topics from: protection goals of stakeholders; history of public key cryptography; programming languages and security; security engineering and testing; cybercrime and malware; Internet privacy and anonymity; government surveillance; regulation; ethics; blockchain applications.

Includes: Experiential Learning Activity

Prerequisite(s): COMP 1406 with a minimum grade of C-, and COMP 2401 with a minimum grade of C-.

Lectures three hours a week.

COMP 2401 [0.5 credit]

Introduction to Systems Programming

Introduction to system-level programming with fundamental OS concepts, procedures, primitive data types, user-defined types. Topics may include process management, memory management, process coordination and synchronization, inter-process communication, file systems, networking, pointers, heap and stack memory management, and system/library calls.

Includes: Experiential Learning Activity

Precludes additional credit for SYSC 2006.

Prerequisite(s): (COMP 1006 or COMP 1406 or SYSC 2004) with a minimum grade of C-.

Lectures three hours a week, tutorial one and a half hours a week.

COMP 2402 [0.5 credit]

Abstract Data Types and Algorithms

Introduction to the design and implementation of abstract data types and to complexity analysis of data structures. Topics include: stacks, queues, lists, trees and graphs. Special attention is given to abstraction, interface specification and hierarchical design using an object-oriented programming language.

Precludes additional credit for SYSC 2100.

Prerequisite(s): (COMP 1006 or COMP 1406 or SYSC 2004) with a minimum grade of C-.

Lectures three hours a week.

COMP 2404 [0.5 credit]

Introduction to Software Engineering

Introduction to object-oriented software development, with emphasis on the design and implementation of maintainable, reusable software. Topics include abstraction, modularity, encapsulation, and an introduction to design patterns.

Includes: Experiential Learning Activity

Precludes additional credit for SYSC 3010, SYSC 3110.

Prerequisite(s): COMP 2401 with a minimum grade of C-.

Lectures three hours a week, tutorial one and a half hours a week.

COMP 2406 [0.5 credit]

Fundamentals of Web Applications

Introduction to Internet application development; emphasis on computer science fundamentals of technologies underlying web applications. Topics include: scripting and functional languages, language-based virtual machines, database query languages, remote procedure calls over the Internet, and performance and security concerns in modern distributed applications.

Includes: Experiential Learning Activity

Precludes additional credit for SYSC 4504.

Prerequisite(s): (COMP 1006 or COMP 1406 or SYSC 2004) with a minimum grade of C-.

Lectures three hours a week, tutorial one and a half hours a week.

COMP 2804 [0.5 credit]

Discrete Structures II

A second course in discrete mathematics and discrete structures. Topics include: counting, sequences and sums, discrete probability, basic statistics, recurrence relations, randomized algorithms. Material is illustrated through examples from computing.

Prerequisite(s): COMP 1805 with a minimum grade of C-, or permission of the School of Computer Science for those in Combined Honours in Computer Science and Mathematics.

Lectures three hours a week.

COMP 3005 [0.5 credit]

Database Management Systems

Introduces students to concepts of database management systems, database design and file structures. Topics include: entity-relationship modeling and object oriented database design, data models (relational, network and object oriented), the relational algebra, SQL, normalization theory, physical data organization, object oriented databases and OQL.

Precludes additional credit for BUSI 3400.

Prerequisite(s): COMP 1805 with a minimum grade of C-, and either COMP 2402 or (SYSC 2004 and SYSC 2100).

Lectures three hours a week.

COMP 3105 [0.5 credit]

Introduction to Machine Learning

An introduction to methods for automated learning of relationships on the basis of empirical data. Includes topics in supervised and unsupervised machine learning and deeper knowledge of specific algorithms and their applications. Evaluation and quantification of performance of ML systems. Discussion of data ethics.

Includes: Experiential Learning Activity

Precludes additional credit for COMP 4105 (no longer offered), SYSC 4415.

Prerequisite(s): COMP 2402 and (COMP 2404 or SYSC 3010 or SYSC 3110) and COMP 2804 and (MATH 1104 or MATH 1107).

Lectures three hours a week.

COMP 3106 [0.5 credit]

Introduction to Artificial Intelligence

Principles and tools used in Artificial Intelligence. Fundamentals of Knowledge Representation and Reinforcement Learning and Nature-Based computing. Methods for non-adversarial problem solving including non-exhaustive and heuristic-based strategies for searching the state space. Methods for adversarial problem solving, modeled as two-person and multi-person games.

Includes: Experiential Learning Activity

Precludes additional credit for COMP 4106 (no longer offered).

Prerequisite(s): COMP 2402 and (COMP 2404 or SYSC 3010 or SYSC 3110) and COMP 2804.

Lectures three hours a week.

COMP 3801 [0.5 credit]

Algorithms for Modern Data Sets

Algorithm design techniques for modern data sets arising in, for example, data mining, web analytics, epidemic spreads, search engines and social networks. Topics may include: data mining, hashing, streaming, clustering, recommendation systems, link analysis, dimensionality reduction, online, social networking, game theoretic and probabilistic algorithms.

Prerequisite(s): COMP 2804 with a minimum grade of B+.

Lecture three hours a week.

COMP 3804 [0.5 credit]

Design and Analysis of Algorithms I

An introduction to the design and analysis of algorithms. Topics include: divide-and-conquer, dynamic programming, linear programming, greedy algorithms, graph algorithms, NP-completeness.

Also listed as MATH 3804.

Prerequisite(s): COMP 2402 and either COMP 2804 or (MATH 2007 and MATH 2108).

Lectures and tutorials three to four and a half hours a week.

COMP 4102 [0.5 credit]

Computer Vision

The basic ideas and techniques of computer vision. The central theme is reconstructing 3D models from 2D images. Topics include: image formation, image feature extraction, camera models, camera calibration, structure from motion, stereo, recognition, augmented reality, image searching.

Includes: Experiential Learning Activity

Prerequisite(s): (COMP 2404 or SYSC 3010 or SYSC 3110) and (MATH 1104 or MATH 1107).

Lectures three hours a week.

COMP 4107 [0.5 credit]

Neural Networks

An introduction to neural networks and deep learning. Theory and application of Neural Networks to problems in machine learning. Various network architectures will be discussed. Methods for improving optimization and generalization of neural networks. Neural networks for unsupervised learning.

Includes: Experiential Learning Activity

Precludes additional credit for COMP 5206.

Prerequisite(s): COMP 3105 and (MATH 1104 or MATH 1107).

Lectures three hours a week.

COMP 4804 [0.5 credit]

Design and Analysis of Algorithms II

A second course on the design and analysis of algorithms. Topics include: advanced recurrence relations, algebraic complexity, advanced graph algorithms, amortized analysis, algorithms for NP-complete problems, randomized algorithms.

Prerequisite(s): COMP 3804 or MATH 3804.

Lectures three hours a week.

COMP 4905 [0.5 credit]

Honours Project

Under the supervision of a faculty member, Honours students complete a major Computer Science project in fourth year. Permission to register is granted once an approved project proposal is submitted to the Department. See deadlines and details on the School web site.

Includes: Experiential Learning Activity

Precludes additional credit for COMP 4906.

Prerequisite(s): registration in the B.C.S. Honours program or one of the Combined Computer Science Honours programs and permission of the School of Computer Science.

COMP 4906 [1.0 credit]

Honours Thesis

An independent research project under the direct supervision of a faculty advisor. Permission to register is granted once an approved project proposal is submitted to the School of Computer Science.

Evaluation is based on a written thesis and a poster presentation.

Includes: Experiential Learning Activity

Precludes additional credit for COMP 4905.

Prerequisite(s): fourth-year standing in a B.C.S. Honours program with a minimum CGPA of 9.0 in the major and permission of the School of Computer Science.

COOP 1000 [0.0 credit]

Co-op Preparation

This mandatory course introduces Co-op students to the Co-operative Education Program, job search, application, and interview processes while preparing students for the transition from university to a professional work environment. Graded SAT/UNSAT.

Prerequisite(s): Restricted to co-op students.

Online eight-week six-module course.

MATH 1007 [0.5 credit]

Elementary Calculus

Limits. Differentiation of the elementary functions, including trigonometric functions. Rules of differentiation. Applications of differentiation: max-min problems, curve sketching, approximations. Introduction to integration: definite and indefinite integrals, areas under curves, fundamental theorem of calculus.

Precludes additional credit for BIT 1000, BIT 1100, BIT 1200, MATH 1002 (no longer offered), MATH 1004, MATH 1401/ECON 1401, MATH 1402/ECON 1402, MATH 1052.

Prerequisite(s): Ontario Grade 12 Mathematics: Advanced Functions; or MATH 0005 and MATH 0006; or equivalent.

Lectures three hours a week, tutorial one hour a week.

MATH 1104 [0.5 credit]

Linear Algebra for Engineering or Science

Systems of linear equations. Matrix algebra. Determinants. Invertible matrix theorem. Cramer's rule. Vector space R^n ; subspaces, bases. Eigenvalues, diagonalization. Linear transformations, kernel, range. Complex numbers (including De Moivre's theorem). Inner product spaces and orthogonality. Applications.

Precludes additional credit for BIT 1001, BIT 1101, BIT 1201, MATH 1102 (no longer offered), MATH 1107, MATH 1119, MATH 1401/ECON 1401, MATH 1402/ECON 1402, MATH 1152. Note: MATH 1119 is not an acceptable substitute for MATH 1104.

Prerequisite(s): Ontario Grade 12 Mathematics: Advanced Functions, or MATH 0005, or equivalent, or permission of the School. Restricted to students in the Faculty of Engineering, the School of Computer Science, or in certain B.Sc. and B.A.S. programs where specified.

Lectures three hours a week and tutorial one hour a week.

MATH 2007 [0.5 credit]

Elementary Calculus II

Techniques of integration, improper integrals. Polar coordinates, parametric equations. Indeterminate forms, sequences and series, Taylor's formula and series.

Precludes additional credit for BIT 2007 (no longer offered), MATH 1002 (no longer offered), MATH 1005, MATH 2052.

Prerequisite(s): i) MATH 1004, or a grade of C- or higher in MATH 1007; or MATH 1052 and permission of the School.

Lectures three hours a week, tutorial one hour a week.

MATH 1805 [0.5 credit]

Discrete Structures I

Introduction to discrete mathematics and discrete structures. Topics include: propositional logic, predicate calculus, set theory, complexity of algorithms, mathematical reasoning and proof techniques, recurrences, induction, finite automata and graph theory. Material is illustrated through examples from computing.

Includes: Experiential Learning Activity

Precludes additional credit for MATH 1800.

Prerequisite(s): one Grade 12 university preparation Mathematics course; and one of: COMP 1005 or or COMP 1405 or SYSC 1100 (which may be taken concurrently).

Lectures three hours a week, tutorial one hour a week.

STAT 1500 [0.5 credit]

Introduction to Statistical Computing

Basics of programming in R and introduction to statistical software; generating statistical plots; computing descriptive statistics; performing basic statistical procedures; fundamentals of numerical analysis; optimization; generating random numbers, performing simple simulations and simulation-based inference.

Includes: Experiential Learning Activity

Prerequisite(s): Ontario Grade 12 Mathematics: Advanced Functions, or MATH 0005, or equivalent.

Lectures three hours a week, laboratory one hour a week.

STAT 2507 [0.5 credit]

Introduction to Statistical Modelling I

A data-driven introduction to statistics. Basic descriptive statistics, introduction to probability theory, random variables, discrete and continuous distributions, contingency tables, sampling distributions, distribution of sample mean, Central Limit Theorem, interval estimation and hypothesis testing. A statistical software package will be used.

Includes: Experiential Learning Activity

Precludes additional credit for BIT 2000, BIT 2009, BIT 2100 (no longer offered), BIT 2300 (no longer offered), ECON 2201 (no longer offered), ECON 2210, ENST 2006, GEOG 2006, STAT 2601, STAT 2606, and STAT 3502. May not be counted for credit in any program if taken after successful completion of STAT 2559.

Prerequisite(s): an Ontario Grade 12 university-preparation Mathematics or equivalent, or permission of the School of Mathematics and Statistics.

Lectures three hours a week, laboratory one hour a week.

STAT 2559 [0.5 credit]

Basics of Statistical Modeling I

A data-driven introduction to statistics. Basic descriptive statistics, introduction to probability theory, random variables, discrete and continuous distributions, contingency tables, sampling distributions, distribution of sample mean, Central Limit Theorem, interval estimation and hypothesis testing. A statistical software package will be used.

Includes: Experiential Learning Activity

Precludes additional credit for BIT 2000, BIT 2009, BIT 2100 (no longer offered), BIT 2300 (no longer offered), ECON 2201 (no longer offered), ECON 2210, ENST 2006, GEOG 2006, STAT 2601, STAT 2606, and STAT 3502. May not be counted for credit in any program if taken after successful completion of STAT 2559.

Prerequisite(s): an Ontario Grade 12 university-preparation Mathematics or equivalent, or permission of the School of Mathematics and Statistics.

Lectures three hours a week, laboratory one hour a week.

STAT 2509 [0.5 credit]

Introduction to Statistical Modelling II

A data-driven approach to statistical modeling. Basics of experimental design, analysis of variance, simple linear regression and correlation, nonparametric procedures. A statistical software package will be used.

Includes: Experiential Learning Activity

Precludes additional credit for STAT 2602, STAT 2607, ECON 2202, ECON 2220.

Prerequisite(s): STAT 2507 or STAT 2601 or STAT 2606 or STAT 3502; or permission of the School.

Lectures three hours a week, laboratory one hour a week.

STAT 2655 [0.5 credit]

Introduction to Probability with Applications (Honours)

Probability axioms, basic combinatorial analysis, conditional probability and independence, discrete and continuous random variables, joint and conditional distributions, expectation and moments, probability and moment generating functions, Chebyshev's inequality and weak law of large numbers, central limit theorem, sampling distributions, simulation and applications to descriptive statistics.

Precludes additional credit for STAT 2605.

Prerequisite(s): MATH 2052 with a grade of C+ or higher or MATH 2007 or MATH 1005 with a grade of B+ or higher; and MATH 2152 with a grade of C+ or higher or MATH 2107 with a grade of B+ or higher; or permission of the School.

Lectures three hours a week, tutorial one hour a week.

STAT 3503 [0.5 credit]

Regression Analysis

Review of simple and multiple regression with matrices, Gauss-Markov theorem, polynomial regression, indicator variables, residual analysis, weighted least squares, variable selection techniques, nonlinear regression, correlation analysis and autocorrelation. Computer packages are used for statistical analyses.

Includes: Experiential Learning Activity

Precludes additional credit for STAT 3553.

Prerequisite(s): i) STAT 2509 or STAT 2602 or STAT 2607 or ECON 2202 or ECON 2220 or equivalent; and ii) MATH 1152 or MATH 1107 or MATH 1119 or equivalent; or permission of the School.

Lectures three hours a week and one hour laboratory.

STAT 3504 [0.5 credit]

Analysis of Variance and Experimental Design

Single and multifactor analysis of variance, orthogonal contrasts and multiple comparisons, analysis of covariance; nested, crossed and repeated measures designs; completely randomized, randomized block, Latin squares, factorial experiments, related topics. Computer packages are used for statistical analyses.

Includes: Experiential Learning Activity

Precludes additional credit for STAT 4504.

Prerequisite(s): STAT 3503 or permission of the School.

Lectures three hours a week and one hour laboratory.

STAT 3507 [0.5 credit]

Sampling Methodology

The sample survey as a vehicle for information collection in government, business, scientific and social agencies. Topics include: planning a survey, questionnaire design, simple random, stratified, systematic and cluster sampling designs, estimation methods, problem of non-response, related topics.

Includes: Experiential Learning Activity

Prerequisite(s): one of: STAT 2507, STAT 2509, STAT 2601, STAT 2602, STAT 2606, STAT 2607, ECON 2201, ECON 2202, ECON 2210, ECON 2220, or equivalent; or permission of the School.

Lectures three hours a week and one hour laboratory.

STAT 3553 [0.5 credit]

Regression Modelling (Honours)

Linear regression - theory, methods and application(s). Normal distribution theory. Hypothesis tests and confidence intervals. Model selection. Model diagnostics. Introduction to weighted least squares and generalized linear models.

Includes: Experiential Learning Activity

Precludes additional credit for STAT 3503.

Prerequisite(s): i) STAT 2559 with a grade of C- or higher, or STAT 2509 with a grade of B or higher; and ii) a grade of C- or higher in MATH 1152 or MATH 1107 or MATH 1104; or permission of the School.

Lectures three hours a week, laboratory one hour a week.

STAT 4502 [0.5 credit]

Survey Sampling (Honours)

Basic concepts in sampling from finite populations; simple random sampling; stratified sampling; choice of sampling unit; cluster and systematic sampling; introduction to multistage sampling; ratio estimation; sampling with unequal probabilities and with replacement; replicated sampling; related topics.

Prerequisite(s): i) STAT 2559 or STAT 2509; and ii) either STAT 3559, or a grade of C + or better in STAT 3509; or permission of the School.

Lectures three hours a week.

STAT 4503 [0.5 credit]

Applied Multivariate Analysis (Honours)

Selected topics in regression and correlation non-linear models. Multivariate statistical methods, principal components, factor analysis, multivariate analysis of variance, discriminant analysis, canonical correlation, analysis of categorical data.

Prerequisite(s): STAT 3553 or (STAT 3509 and STAT 3503) or permission of the School.

Also offered at the graduate level, with different requirements, as STAT 5509, for which additional credit is precluded.

Lectures three hours a week.

STAT 4504 [0.5 credit]

Statistical Design and Analysis of Experiments (Honours)

An extension of the designs discussed in STAT 2559 to include analysis of the completely randomized design, designs with more than one blocking variable, incomplete block designs, fractional factorial designs, multiple comparisons; and response surface methods.

Includes: Experiential Learning Activity

Precludes additional credit for STAT 3504 and ECON 4706. PSYC 3000 is precluded for additional credit for students registered in a Mathematics program.

Prerequisite(s): STAT 3553 or STAT 3503; or permission of the School of Mathematics and Statistics.

Lectures three hours a week, laboratory one hour a week.

STAT 4601 [0.5 credit]

Data Mining I (Honours)

Data visualization; knowledge discovery in datasets; unsupervised learning: clustering algorithms; dimension reduction; supervised learning: pattern recognition, smoothing techniques, classification. Computer software will be used.

Includes: Experiential Learning Activity

Prerequisite(s): STAT 3553 or STAT 3503 or MATH 3806, or permission of the School.

Lectures three hours a week, laboratory one hour a week.

STAT 4604 [0.5 credit]

Statistical Computing (Honours)

Statistical computing techniques, pseudo-random number generation, tests for randomness, numerical algorithms in statistics; optimization techniques; environments for data analysis, efficient programming techniques; statistics with mainstream software.

Includes: Experiential Learning Activity

Prerequisite(s): STAT 3553 or STAT 3503 or permission of the School.

Lectures three hours a week, laboratory one hour a week.

STAT 4607 [0.5 credit]

Bayesian Statistical Analysis (Honours)

Probability basics for Bayesian statistics. Bayesian inference for simple exponential families. Markov Chain Monte Carlo for posterior inference. Empirical Bayes. Hierarchical Bayes. Bayesian inference for the multivariate normal model. Bayesian linear regression. More advanced topics may be included.

Computer software will be used.

Includes: Experiential Learning Activity

Prerequisite(s): STAT 3553 or permission of the School.

Lectures three hours a week, laboratory one hour a week.

PHIL 2106 0.5 credit]

Information Ethics

An exploration of ethical issues that arise in the Age of Information. Topics to be discussed may include technology, surveillance and privacy, social media and privacy, social media and cognitive bias, bias in algorithms, AI ethics, intellectual property, and freedom of expression and assembly.

Precludes additional credit for PHIL 2104 (no longer offered).

Prerequisite(s): a course in philosophy or second-year standing.

Lectures three hours a week.

Changes to Pre-Existing Courses

STAT 4905 [0.5 credit]

Honours Project (Honours)

Consists of a written report on some approved topic or topics in the field of statistics, together with a short lecture on the report.

Includes: Experiential Learning Activity

~~Prerequisite(s): B.Math.(Honours) students only.~~

New Courses

DATA/COMP 4115 [0.5 credit]

Multiagent Systems

Multiagent systems is a branch of artificial intelligence that explores the interactions between multiple rational entities, where each may have access to different information and possibly conflicting priorities. This course takes an approach founded on economic game theory. We will examine how coordination and cooperation can emerge, and how to design systems to achieve global goals despite a lack of cooperation from individual entities. Students should be comfortable with rigorous mathematics and formal proofs. Assignments will also require basic Python programming skills.

Prerequisite(s): COMP 3106

Lectures three hours a week.

DATA/COMP 4116 [0.5 credit]

Introduction to Natural Language Processing

AI has fundamentally transformed the field of natural language processing through the development of large language models. This course introduces the fundamental techniques and methodologies of modern natural language processing. Selected topics from the following list will be covered: word embedding, language models and RNNs, machine translation, self-attention and transformers, natural language generation, BERT and pre-trained models, question answering, and GPT models.

Prerequisite(s): COMP 3106

Lectures three hours a week.

DATA/COMP 4117[0.5 credit]

Reinforcement Learning

Learn about designing and programming reinforcement learning agents to perform complex tasks in interactive environments. Topics include Markov decision processes, dynamic programming methods, Monte Carlo methods, temporal difference learning, prediction/control with function approximation, policy gradient, and deep reinforcement learning algorithms.

Prerequisite(s): COMP 3105

Lectures three hours a week.

DATA 2200 [0.5]

Communication Skills for Data Scientists

Technical communication and data visualization skills for data science majors, concentrating on writing and orally presenting scientific papers and technical reports. Principles of clarity and precision in writing and oral communication. Practical exercises and readings from recent technical publications will be used.

Prerequisite(s): STAT 2559

Lectures three hours a week

DATA 3900 [0.5 credit]

Special Topics in Data Science

Specific topics of current interest. Topics may vary from year to year.

Prerequisite(s): third-year standing in the Data Science program or permission of the Institute for Data Science.

Lecture, seminars, or workshops three hours per week.

DATA 3999 [0.0 credit]

Co-operative Work Term

On completion of each work term, the student must submit to the Institute for Data Science a written report on the work performed. Graded Sat or Uns.

Includes: Experiential Learning Activity

Prerequisite(s): registration in the Co-operative Education Option, and permission of the Institute for Data Science.

DATA 4848 [1.0 credit]

Consulting project

This course is designed to give students some practical experience as a data science consultant through classroom discussion of issues in consulting and participation in the real consulting projects.

Prerequisite(s): Fourth year standing in the Undergraduate Data Science program.

DATA 4900 [0.5 credit]

Special Topics in Data Science

Specific topics of current interest. Topics may vary from year to year.

Prerequisite(s): third-year standing in the Data Science program or permission of the Institute for Data Science.

Lecture, seminars, or workshops three hours per week.

DATA /STAT 2500 [0.5 credit]

Data Wrangling in R

This course introduces how to wrangle data in the programming language, R. Modern reproducible workflows are emphasized through the entire data lifecycle from acquisition, to cleaning, manipulation, and visualization. Data will be accessed from relational databases, APIs, and online sources including web scraping html and text. Cleaning and manipulating data will be considered from numeric, categorical, time, date, and text formats including handling regular expressions. Data visualization and report generation using dynamic user controlled tools will be emphasized.

Prerequisite(s): DATA 1500, COMP 1405, and one of STAT 2507, STAT 2559, or DATA/STAT 2517

Lectures three hours a week, laboratory one hour a week.

DATA/STAT 2517 [0.5 credit]

Data Modelling I

Statistical thinking in a data-rich environment. Emphasis is on modelling real phenomena and using statistical knowledge to formulate problems and analyze the data to provide insights. Basic graphical and numerical descriptive statistics. Elementary probability rules, basic combinatorial formulae, conditional probability, Bayes' Theorem, and independence. Discrete Distributions in practice using the binomial and Poisson distributions, their probability mass functions, expectations and variances. Continuous probability distributions including the probability density function, expectation, variance, coefficient of variation, the cumulative distribution function of the uniform, gamma, exponential, and normal distribution, along with the normal approximation to the binomial distribution, jointly distributed random variables, statistics and their distributions, and the Central Limit Theorem. One sample hypothesis tests for means and proportions. An open source statistical software package will be used.

Prerequisite(s): An Ontario Grade 12 university-preparation Mathematics or equivalent, or permission of the School of Mathematics and Statistics.

Lectures three hours a week, laboratory one hour a week.

DATA/STAT 2519 [0.5 credit]

Data Modelling II

Statistical thinking in a data-rich environment. Emphasis is on modelling real phenomena and using statistical knowledge and computational skills to formulate problems, plan data collection campaigns or identify and gather relevant existing data, and analyzing the data to provide insights. Topics include sampling distributions, the Central Limit Theorem, one and two sample estimation problems and hypothesis tests, linear regression and correlation, one and two way Analysis of Variance. An open source statistical software package will be used.

Prerequisite(s): DATA/STAT 2517

Lectures three hours a week, laboratory one hour a week.

DATA/STAT 3500 [0.5 credit]

Statistical Programming in R

This course introduces modern coding practices in R. Topics include running simulations and common

statistical models, retrieving diagnostics and model estimates, and presenting and visualizing the results. Emphasis on modern, reproducible workflows and version control.

Prerequisite: STAT 2500

Lectures three hours a week, laboratory one hour a week.

DATA/STAT 4322 [0.5 credit]

Learning from Big Data

A data-first tour of advanced statistical models. Focus will be on a series large real world forecasting and prediction competitions. Tools and workflows for statistical modeling will be explored.

Lectures three hours a week, laboratory one hour a week.

DATA/STAT 3210 [0.5 credit]

Inferential Data Science Foundations I

Theoretical foundations to data science tools including empirical distribution functions, point estimation, interval estimation, tests of hypotheses, maximum likelihood and method of moments.

Formal tools are developed, and concepts are demonstrated using simulation and software. Abstract concepts are made concrete through visualization and numerical computation. An open source statistical software package will be used.

Pre-requisite: STAT 3553

Lectures three hours a week, laboratory one hour a week.

DATA/STAT 4321 [0.5 credit]

Inferential Data Science Foundations II

Inferential data science tools extending to big data including asymptotic properties of likelihoods, parametric and non-parametric approaches, bootstrap, jackknife estimation, frequentist and Bayesian perspectives. Formal tools are developed, and concepts are demonstrated using simulation and software. Abstract concepts are made concrete through visualization and numerical computation. An open source statistical software package will be used.

Pre-requisite: DATA/STAT 3210

Lectures three hours a week, laboratory one hour a week.

Appendix 3 - Admission Requirements

The Ontario Secondary School Diploma (OSSD) or equivalent including a minimum of six 4U or M courses with no individual grade below 60%. The six 4U or M courses must include Advanced Functions, and Calculus and Vectors. The average of Advanced Functions and Calculus and Vectors must be 85% or higher. The program has limited enrolment. Admission is not guaranteed and all requirements are subject to change.

The admissions average cut-off for this program will be between 85-88%

Everyone enrolled in the Data Science program are required to have a laptop. Students are expected to retain this laptop for use in subsequent years until the completion of their studies. The specification for this laptop are as follows:

PC or MAC laptops with the following minimum specifications:

- CPU: Intel I5/i7/i9/Xeon or AMD Ryzen line.
- 8 GB or more of RAM.
- 256 GB or larger hard drive (SSD drive recommended)
- wireless networking (WiFi)
- Camera, mic and audio.

Appendix 4 - Figures and Tables

Table 1. Data from the Canadian Occupational Projection System for 2022-2031. Data extracted on June 21, 2023.

Occupation*	COPS code	Job Openings	Job Seekers	Surplus	Occupational Outlook
Database analysts and data administrators (Data scientist's category) **	2172	29,300	32,700	3,400	SHORTAGE ²
Economists and economic policy researchers and analysts & Business development officers and marketing researchers and consultants	4162	20400	21500	1100	BALANCE ¹
Software engineers and designers	2173	44300	48800	4500	SHORTAGE ²
Information systems analysts and consultants	2171	143700	157800	14100	SHORTAGE ²
Mathematicians, statisticians and actuaries	2161	4600	2800	-1800	SHORTAGE ²
Court reporters, transcriptionists, records management technician And statistical officers	1250	10500	10600	100	BALANCE ¹
Financial and investment analysts	1112	23700	29700	6000	BALANCE ¹
Computer programmers and interactive media developers	2174	80500	89900	9400	SHORTAGE ²
Web designers and developers	2175	1040	12700	11660	BALANCE ¹
Computer and information systems managers	0213	42600	53400	10800	SHORTAGE ²

*The 2022 COPS exercise was developed using the 2016 version of the National Occupational Classification (NOC). The 2016 NOC has 500 occupations. However, many of these occupations are small in terms of employment. Such occupations were combined into broader groupings

according to the specific tasks of each occupation. By grouping small occupations with similar tasks together, 293 occupational groupings were obtained. Although NOC already has a more recent version (2021), the model's input data were only available in the 2016 version of the NOC at the time of the development of the projections.

**COPS utilizes Database analysts and data administrators – 2172 to determine the expected outlook of Data Scientists - 227147 (Government of Canada & Employment and Social Development, 2023).

¹Labour demand and labour supply are expected to be broadly in line for this occupation group over the 2022-2031 period at the national level. The section below contains more detailed information regarding the outlook for this occupational group.

²This occupational group is expected to face labour shortage conditions over the period of 2022-2031 at the national level. The section below contains more detailed information regarding the outlook for this occupational group

Table 2. English, Bachelor of Data Science Programs in Canada including Ontario College Programs

Province	University	Program
Ontario	Brock University	Bachelor of Science in Data Sciences and Analytics (Honours) ¹
Ontario	University of Guelph	BSc. Mathematical Sciences - Statistics and Data Science Stream
Ontario	Nipissing University	Bachelor of Science Specialization in Data Science
Ontario	Nipissing University	Bachelor of Science Honours Specialization in Data Science
Ontario	Ontario Tech University	Bachelor of Science (Honours) Computer Science - Data Science Specialisation
Ontario	University of Ottawa	Honours BSc Computer Science, Data Science Option
Ontario	University of Ottawa	Honours BSc Mathematics and Honours BSc Computer Science (Data Science) ¹
Ontario	University of Toronto	Specialist Program in Statistics - Statistical Machine Learning and Data Science Stream
Ontario	Trent University	Bachelor of Science Program in Data Science ¹
Ontario	University of Waterloo	Bachelor of Mathematics (BMath - Data Science)
Ontario	University of Waterloo	Bachelor of Computer Science (BCS - Data Science)
Ontario	Western University	Major in Data Science ¹
Ontario	Western University	Honours Specialization in Data Science
Ontario	Wilfrid Laurier University	Honours BSc Data Science ¹
Ontario	Wilfrid Laurier University	Honours BSc Data Science - Big Data Concentration
Ontario	Wilfrid Laurier University	Honours BSc Data Science - Financial Risk Analysis Concentration
Ontario	Wilfrid Laurier University	Honours BSc Data Science - Statistical Analysis Concentration ¹

Ontario	York University	Data Science - Bachelor of Science - Honours ¹
Ontario	Seneca College*	Bachelor of Data Science and Analytics (Honours) (Hybrid) (DSA) ¹
British Columbia	University of Victoria	Combined BSc in Data Science
British Columbia	Thompson Rivers University	BSc, Major in Data Science
British Columbia	University of British Columbia	Bachelor of Science in Data Science (Okanagan)
British Columbia	Simon Fraser University	BSc (Major/Honours) in Data Science
Quebec	Concordia University	Bachelor of Computer Science - Data Science
Manitoba	University of Winnipeg	BSc in Statistics, Data Science Stream
Saskatchewan	University of Regina	BSc in Data Science

*Ontario College Program

¹Undergraduate in Data Science Degree

Table 3. List of the maximum enrolment of fourth-year Computer Science (COMP) courses from 2018-2022. Removed Honours Projects, Honours Thesis, Internships, Co-op, and unnamed Directed Studies or special topics courses for clarity.

Rank	Course	Max Enrolment	Rank	Course	Max Enrolment
1	COMP4102 Computer Vision	185	15	COMP4501 Real-Time Games	32
2	COMP4106 Topics in Artificial Intellig	165	16	COMP4105 Machine Learning	25
3	COMP4108 Computer Systems Security	139	17	COMP4111 Data Mgmt for Business Intel.	23
4*	COMP4004 Software Quality Assurance	129	18	COMP4206 Evolving Information Networks	11
4*	COMP4109 Applied Cryptography	129	19	COMP4805 Theory of Automata	4
5	COMP4701 Computing, Society, and Ethics	123	20*	COMP4308 Computational Systems Biology	3
6	COMP4001 Distributed Computing	119	20*	COMP4803 Computable Functions	3
7	COMP4601 Mobile Multimedia	109	21	COMP4806 Numerical Linear Algebra	2
8	COMP4107 Neural Networks	95	22*	COMP4002 Real-Time 3D Game Engines	0
9	COMP4202 Computational Aspects of GIS	73	22*	COMP4100 Multimedia Systems	0
10	COMP4203 Wireless Networks & Security	70	22*	COMP4101 Distributed Object Management	0
11	COMP4602 Social Networking	62	22*	COMP4104 Princip&Pract Distrib Programm	0
12*	COMP4003 Transaction Processing Systems	59	22*	COMP4114 Quantum Computing and Info	0
12*	COMP4009 Parallel Computing	59	22*	COMP4300 Computational Molecular Biol.	0
13	COMP4000 Distributed Operating Systems	37	22*	COMP4807 Mobile Robot Programming	0
14	COMP4804 Design & Analysis of Algor II	35			

*Courses with the same max enrolment.

Table 4. List of the maximum enrolment of fourth-year Statistics (STAT) courses from 2018-2022. Removed Honours Projects, Honours Thesis, Internships, Co-op, and unnamed Directed Studies or special topics courses for clarity.

Rank	Course	Max Enrolment
1	STAT4502 Survey Sampling	27
2	STAT4500 Parametric Estimation	21
3	STAT4601 Data Mining I	18
4	STAT4604 Statistical Computing	16
5	STAT4503 Applied Multivariate Analysis	15
5	STAT4504 Stat Design & Analysis of Exp	15
6	STAT4508 Stochastic Models	14
7	STAT4603 Time Series & Forecasting	11
7	STAT4501 Probability Theory	9
8	STAT4555 Monte Carlo Simulation(Honour)	8
10	STAT4660 Actuarial Mathematics II	5
11	STAT4506 Nonparametric Statistics	4
12	STAT4507 Statistical Inference	3
13	STAT4607 Bayesian Statistical Analysis	2
14*	STAT4509 Adv. Mathematical Modelling	0
14*	STAT4661 Risk Modelling II	0

*Courses with the same max enrolment

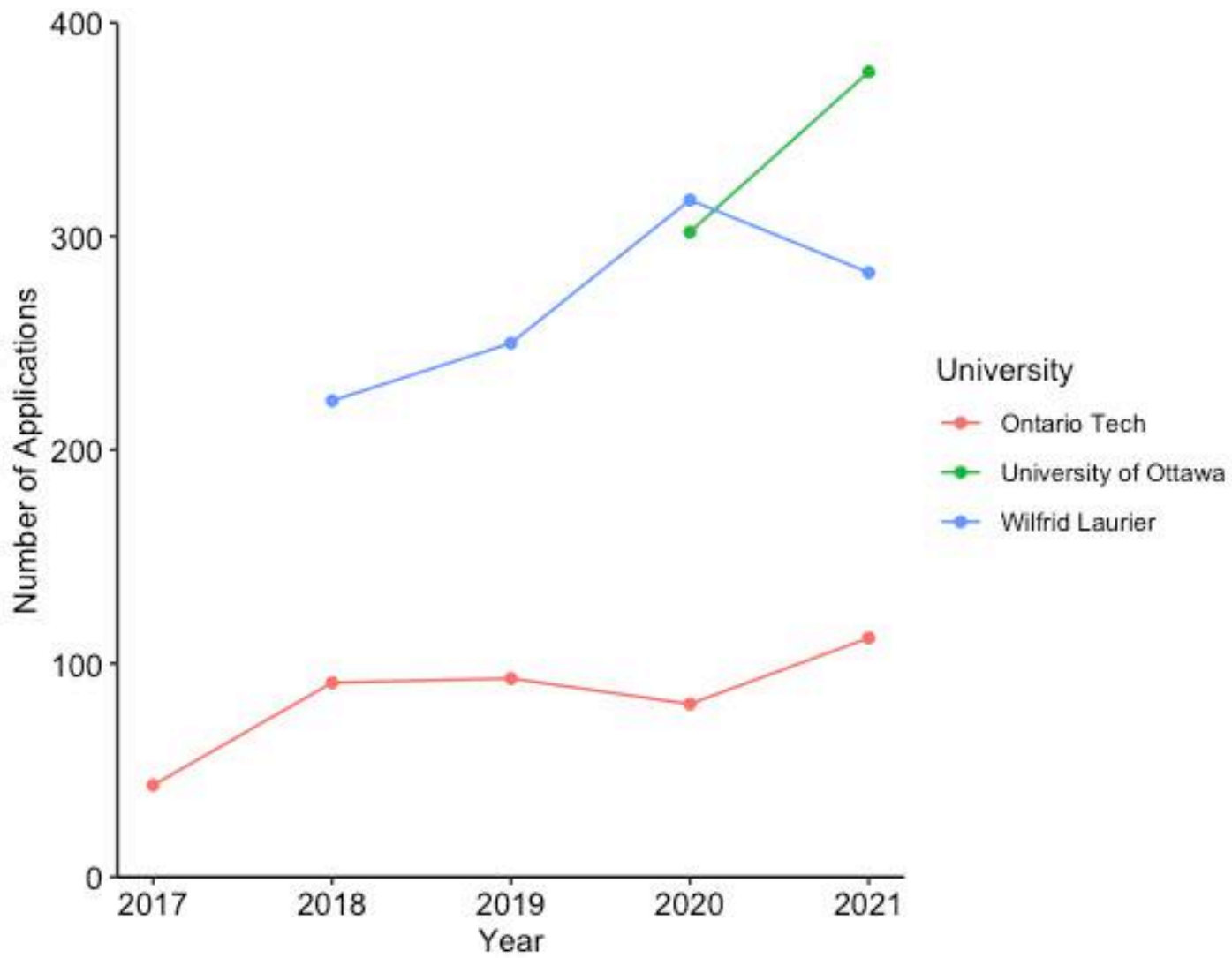


Figure 1. Number of applications to an English Data Science program at Ontario Universities with a Data Science program before 2021.

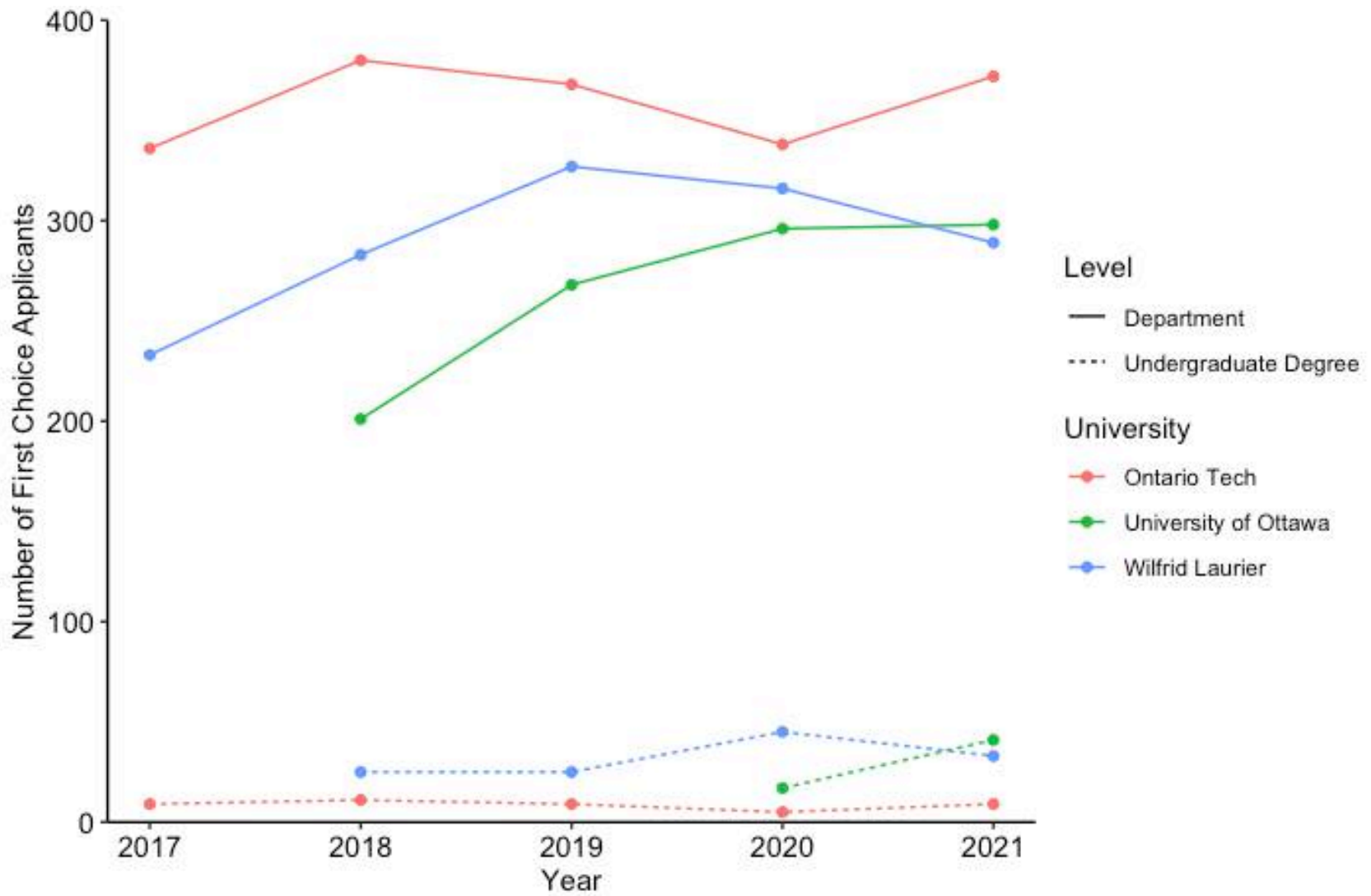


Figure 2. Number of first choice applications to an English, Data Science undergraduate programs and their associated departments at Ontario Universities with a Data Science program before 2021.

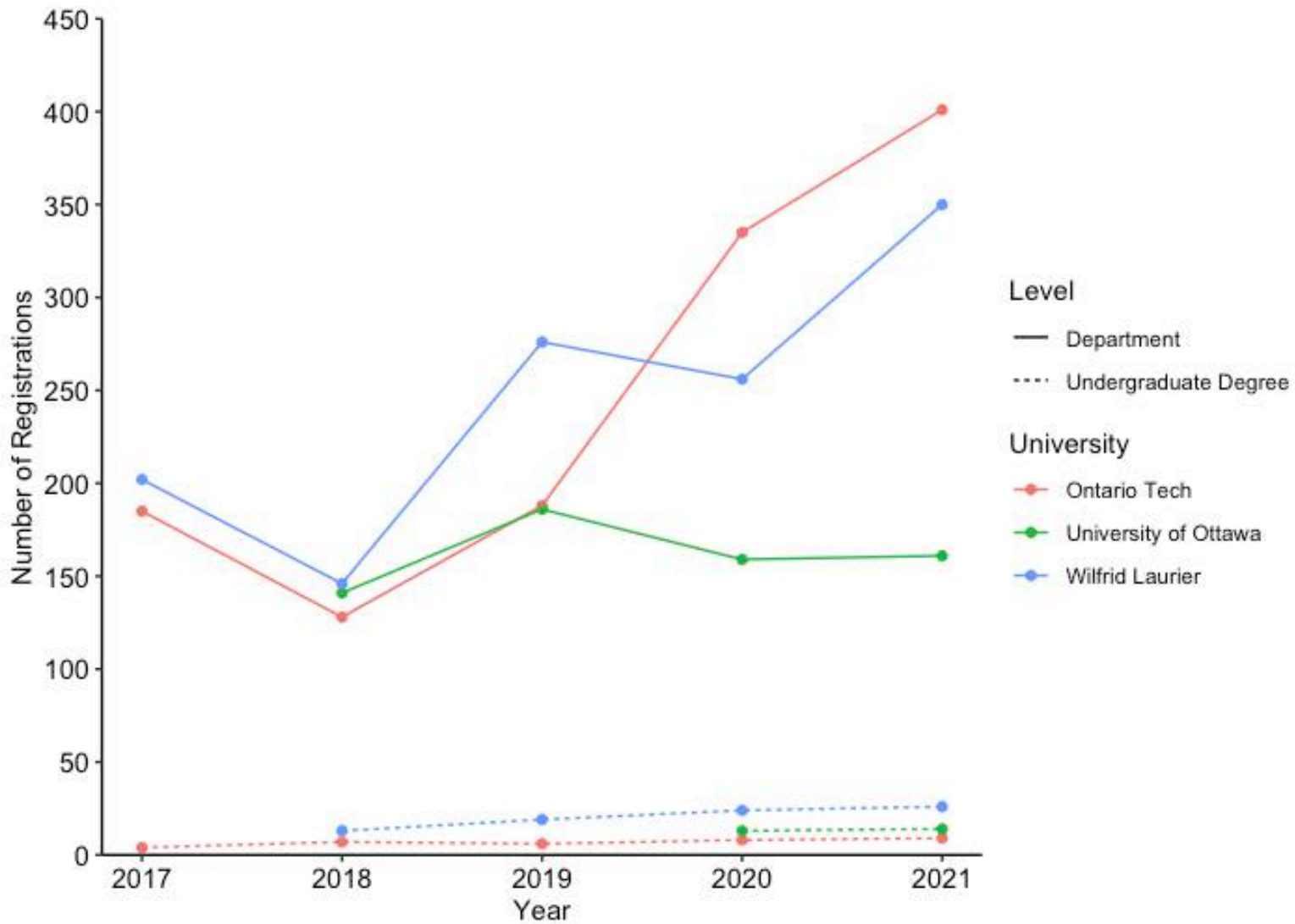


Figure 3. Number of registrations to an English, Data Science undergraduate programs and their associated departments at Ontario Universities with a Data Science program before 2021.

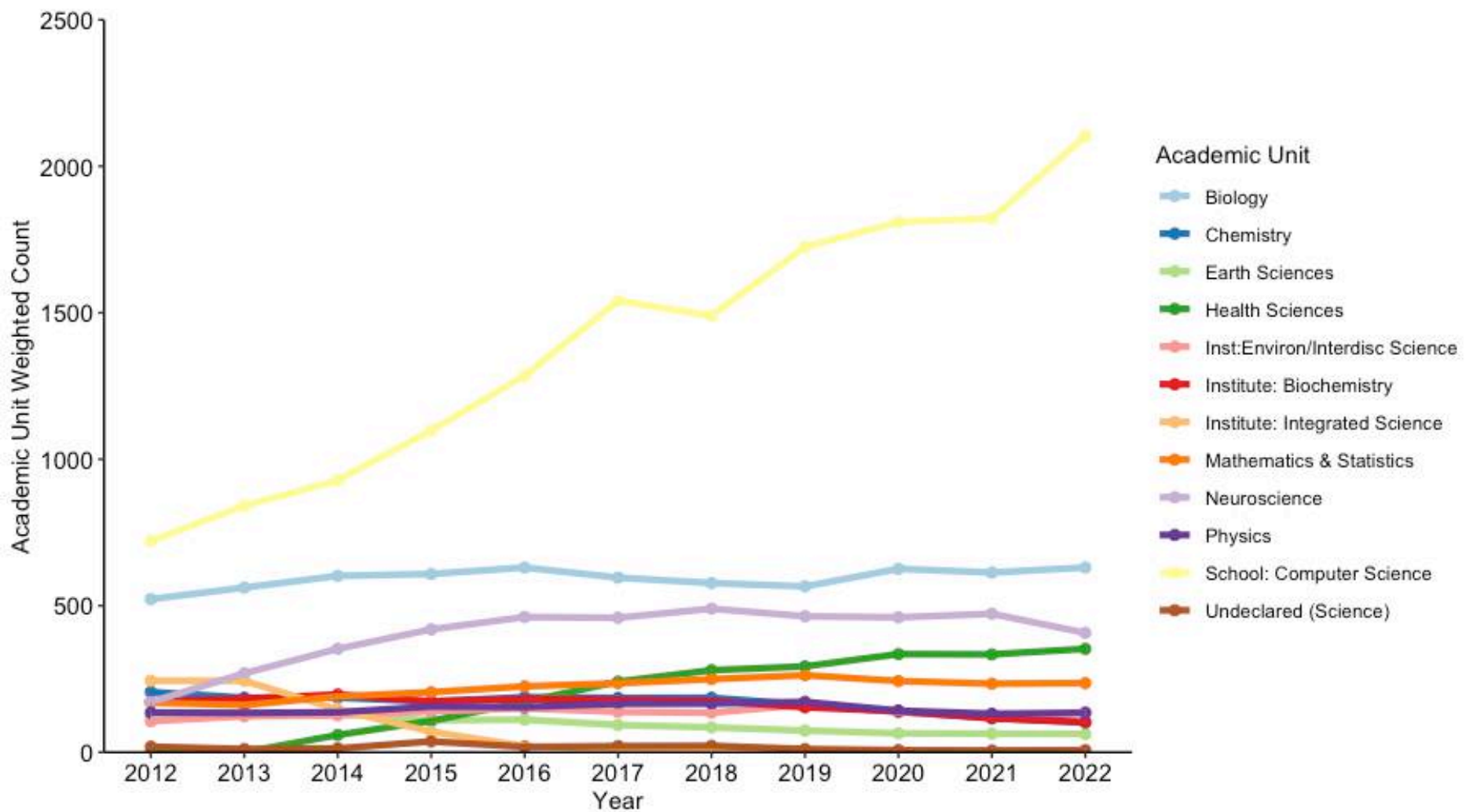


Figure 4. Academic unit weighted count of newly enrolled, full-time students at Carleton University from 2012-2022 by Academic Unit.

Appendix 5 - Letters of Support

STATEMENT OF SUPPORT FROM SISTER UNIT

RE: Carleton University is proposing an Honours Bachelor in Data Science program housed in the Institute of Data Science that builds on Carleton's strong pedagogical background in data science at the graduate level.

I support this change unconditionally.

I do not support this change.

I support this change, with the following reservations:

On behalf of the Department of Health Sciences, I support creating an Honours Bachelor of Data Science program and its associated concentrations. The Department of Health Sciences can accommodate additional students who wish to take a Minor in Health Sciences. However, additional TA resources will be required for some courses if the demand surpasses expectations.

While not included in the proposal, we also see potential overlap in future courses offered by the Department of Health Sciences. We look forward to continuing to collaborate to expand elective options and future program additions.

Signature:



Name: Martin Holcik

Title: Chair

Academic unit: Department of Health Sciences

Date: September 21, 2023

STATEMENT OF SUPPORT FROM SISTER UNIT

RE: Carleton University is proposing an Honours Bachelor in Data Science program housed in the Institute of Data Science that builds on Carleton's strong pedagogical background in data science at the graduate level.

I support this change unconditionally.

I do not support this change.

I support this change, with the following reservations:

On behalf of the Department of Neuroscience, I support the creation of an Honours Bachelor of Data Science program and its associated concentrations. The Department of Neuroscience can accommodate additional students who wish to take a Minor in Neuroscience and Mental Health.

Signature:



Name: Matthew Holahan

Title: Chair

Academic unit: Department of Neuroscience

Date: September 22, 2023

STATEMENT OF SUPPORT FROM SISTER UNIT

RE: Carleton University is proposing an Honours Bachelor in Data Science program housed in the Institute of Data Science that builds on Carleton's strong pedagogical background in data science at the graduate level.

I support this change unconditionally.

I do not support this change.

I support this change, with the following reservations:

On behalf of the Department of Chemistry, I support the creation of an Honours Bachelor of Data Science program and its associated concentrations. The Department of Chemistry can accommodate additional students who wish to take a Minor in Chemistry.

While not included in the proposal, we see potential opportunity to create a Combined Honours in Chemistry and Data Science and look forward to continuing to collaborate in the future.

Signature:



Name: Seán Barry

Title: Chair

Academic unit: Department of Chemistry

Date: September 28, 2023

STATEMENT OF SUPPORT FROM SISTER UNIT

RE: Carleton University is proposing an Honours Bachelor in Data Science program housed in the Institute of Data Science that builds on Carleton's strong pedagogical background in data science at the graduate level.

I support this change unconditionally.

I do not support this change.

I support this change, with the following reservations:

On behalf of the Department of Physics, I support the creation of an Honours Bachelor of Data Science program and its associated concentrations. The Department of Physics can accommodate additional students who wish to take a Minor in Physics. We note that in order to have the required pre-req to courses specified in the minor in physics the students will need to take some math courses that are not built in the program (in particular MATH 2004 and MATH 3705).

While not included in the proposal, we see potential opportunity to create a Combined Honours in Physics and Data Science and look forward to continuing to collaborate in the future.

Signature: 

Name: Thomas Gregoire

Title: Chair

Academic unit: Department of Physics

Date: September 25, 2023

STATEMENT OF SUPPORT FROM SISTER UNIT

RE: Carleton University is proposing an Honours Bachelor in Data Science program housed in the Institute of Data Science that builds on Carleton's strong pedagogical background in data science at the graduate level.

I support this change unconditionally.

I do not support this change.

I support this change, with the following reservations:

On behalf of the Department of Philosophy, I support the creation of an Honours Bachelor of Data Science program and its associated concentrations. The Department of Philosophy can accommodate additional students who wish to take PHIL 2106 Information Ethics. However, additional instructor and teaching assistant resources will be required for PHIL 2106.

While not included in the proposal, we also see potential overlap in future courses offered by the Department of Philosophy. We look forward to continuing to collaborate to expand elective options, such as a course on the Ethics of Artificial Intelligence.

Signature:



Name: Annie Larivée

Title: Chair

Academic unit: Department of Philosophy

Date: September 28, 2023

Note: It is not easy to find a local contract instructor with the expertise required to teach PHIL2016 Information Ethics regularly. To be able to offer the course every year, one solution would be to find a specialist in information ethics willing to build a solid asynchronous online course that could be reused. Such a project would require TLS's technical support and additional financial resources.

STATEMENT OF SUPPORT FROM SISTER UNIT

RE: Carleton University is proposing an Honours Bachelor in Data Science program housed in the Institute of Data Science that builds on Carleton's strong pedagogical background in data science at the graduate level.


I support this change unconditionally.

I do not support this change.

I support this change, with the following reservations:

On behalf of the School of Journalism and Communication's Communication and Media Studies, I support the creation of an Honours Bachelor of Data Science program and its associated concentrations. Our Undergraduate Program Committee has reviewed the proposal and, subject to final approval at a full program meeting, Communication and Media Studies can accommodate additional students who wish to take COMS 2200 Big Data and Society. However, additional teaching assistant resources will be required for COMS 2200.

While not included in the proposal, we also see potential overlap in courses offered by the School of Journalism and Communication, such as COMS 2500 Communication and Science. We look forward to continuing to discuss elective options for the program, the possibility of Data Science students taking a minor in Communication and Media Studies and developing a double major in Data Science, Communication and Media Studies.

Signature: 

Name: Benjamin Woo

Title: Associate Director and Program Head (COMS)

Academic unit: School of Journalism and Communication

Date: Oct. 2, 2023

STATEMENT OF SUPPORT FROM SISTER UNIT

RE: Carleton University is proposing an Honours Bachelor in Data Science program housed in the Institute of Data Science that builds on Carleton's strong pedagogical background in data science at the graduate level.

I support this change unconditionally.

I do not support this change.

I support this change, with the following reservations:

On behalf of the School of Mathematics and Statistics, I support the creation of an Honours Bachelor of Data Science program and its associated concentrations.

Signature:



Name: Robert C. Burk

Title: Director

Academic unit: School of Mathematics and Statistics

Date: September 29, 2023



**Institute of Environmental
and Interdisciplinary Science**
1125 Colonel By Drive
Ottawa, ON K1S 5B6 Canada
613 867 6711
Steven.Cooke@carleton.ca

October 2, 2023

STATEMENT OF SUPPORT FROM SISTER UNIT

Carleton University is proposing an Honours Bachelor in Data Science program housed in the Institute of Data Science that builds on Carleton's strong pedagogical background in data science at the graduate level.

I support this change unconditionally.

I do not support this change.

I support this change, with the following reservations:

On behalf of the Institute for Environmental and Interdisciplinary Sciences (IEIS), I support the creation of an Honours Bachelor of Data Science program and its associated concentrations. This is an exciting opportunity and one we would like to see come to fruition.

While not included in the proposal, we see the potential opportunity to create a minor in Environmental Sustainability (we have courses from our Environmental Science core as well as others offered by other units that we could suggest to help craft such a minor) as well as integrating Interdisciplinary Science and Practice Program courses as electives. We look forward to continuing to discuss these options in the future.

Steven J. Cooke

Director, Institute for Environmental and Interdisciplinary Sciences

Fellow of the Royal Society of Canada, Fellow of the Royal Canadian Geographical Society, Fellow of the American Fisheries Society, International Fellow of the Explorers Club

STATEMENT OF SUPPORT FROM SISTER UNIT

RE: Carleton University is proposing an Honours Bachelor in Data Science program housed in the Institute of Data Science that builds on Carleton's strong pedagogical background in data science at the graduate level.

I support this change unconditionally.

I do not support this change.

I support this change, with the following reservations:

On behalf of the Institute of Biochemistry, I support the creation of an Honours Bachelor of Data Science program and its associated concentrations.

While not included in the proposal, we see other potential curricular opportunities and look forward to continuing to collaborate in the future.

Signature:

Name: Véronic Bézaire

Title: Director

Academic unit: Institute of Biochemistry

Date: October 2nd, 2023

STATEMENT OF SUPPORT FROM SISTER UNIT

RE: Carleton University is proposing an Honours Bachelor in Data Science program housed in the Institute of Data Science that builds on Carleton's strong pedagogical background in data science at the graduate level.

I support this change unconditionally.

I do not support this change.

I support this change, with the following reservations:

On behalf of the School of Computer Science and the Institute of Data Science, I support the creation of an Honours Bachelor of Data Science program and its associated concentrations.

Signature: 

Name: Michel Barbeau

Title: Director/ Interim Director

Academic unit: School of Computer Science/ Institute for Data Science

Date: September 29, 2023

STATEMENT OF SUPPORT FROM SISTER UNIT

RE: Carleton University is proposing an Honours Bachelor in Data Science program housed in the Institute of Data Science that builds on Carleton's strong pedagogical background in data science at the graduate level.


I support this change unconditionally.

I do not support this change.

I support this change, with the following reservations:

On behalf of the Department of Economics, I support the creation of an Honours Bachelor of Data Science program and its associated concentrations. The Department of Economics can accommodate additional students who wish to take ECON 2210 Introductory Statistics for Economics and ECON 2220 Introductory Econometrics. The Department of Economics can accommodate additional students who wish to take a Minor in Economics. However, additional instructor or teaching assistant resources will be required for these initiatives.

While not included in the proposal, we also see the potential for a double major in data Science and Economics. We look forward to continuing to collaborate to create future program additions and expand elective options to include courses such as the two flagship courses in our B. ECON - Economics Data Science Concentration, namely, ECON 4708 Economic Data Science – Analytics and ECON 4709 Economic Data Science - Applications in the Data Science curriculum.

Signature: 

Name: Hashmat U. Khan

Title: Chair and Professor

Academic unit: Department of Economics

Date: October 2nd, 2023

LETTER OF AGREEMENT

Between

Statistics Canada
(herein referred to as “StatCan”)

and

Carleton University
(herein referred to as “Carleton”)

1. Purpose

The purpose of this agreement is to facilitate and promote collaboration between StatCan and Carleton University, with a view to supporting and strengthening collaboration with respect to recruitment, placement opportunities and educational programs.

2. Effective Date and Duration

This agreement covers the period from July 4, 2023, to June 30, 2025. Only the signatories, or persons occupying the positions of the signatories, may authorize amendments and extensions to this agreement.

3. Commitments

The parties agree as follows:

- a) It is agreed that StatCan will make efforts to increase experiential and work-integrated learning opportunities for Carleton undergraduate students within the agency where and when possible, with our shared values in accessibility, equity, diversity and inclusion forming a foundation for these engagements.
- b) It is agreed that StatCan, when asked by Carleton, will provide input on the development of new programs at Carleton University, including (but not limited to) a new undergraduate degree in Data Science, a Graduate Diploma in Data Science, and short, technical courses in topics such as data literacy, Data Science in the production of Official Statistics, Data Stewardship, classification for coding, natural language processing, data engineering, geomatics, ethics/transparency/privacy and communication.
- c) It is agreed that Carleton will increase opportunities for StatCan employees to deliver guest lectures in Carleton courses, including having the Chief Statistician agreeing to deliver one (1) special seminar to Carleton students, faculty and staff during the term of this agreement at a mutually agreeable date and time.
- d) It is agreed that Carleton will investigate opportunities to develop second language training programs for students that have work placements at StatCan.

3. Amendments

The parties agree that the agreement may be amended at any time before its term as provided upon consent of both parties. If the proposed amendment is accepted, the parties intend to sign it and agree to affix it to this MOU.

4. Termination

The parties agree that this agreement may be terminated unilaterally by either party at any time before its term by giving the other Party at least one (1) month of advance written notice.

5. General and Signatures

The contact for StatCan will be:

Kathleen Mitchell
Assistant Chief Statistician
Statistics Canada
100 Tunney's Pasture Driveway
Ottawa ON K1A 0T6
613-889-1350
Kathleen.Mitchell@statcan.gc.ca

The contact for CARLETON UNIVERSITY will be:

Jeffrey Smirle
Director, External Affairs
Carleton University Faculty of Science
1125 Colonel By Drive
Ottawa ON K1S 5B6
613-698-8327
Jeffrey.smirle@carleton.ca

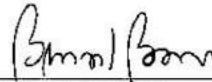
To confirm understanding and acceptance of the terms and conditions of this agreement, all parties have signed, in the appropriate spaces on the following page.



Anil Arora
Chief Statistician of Canada
Statistics Canada

June 14th, 2023

Date



Benoit-Antoine Bacon
President and Vice-Chancellor
Carleton University

June 21, 2023

Date

Appendix 6 – Teaching Assignments



Office of Institutional Research & Planning

Table D.4 Distribution of Teaching Assignments (2021-2023)

Department(s): Mathematics & Statistics, School: Computer Science

Term(s): Fall, Winter, Summer

Position(s): Faculty Member

Name	Academic Year	Courses Taught	Credit	Term
Almaskut, Ahmed Zedan	2023/2024	MATH3999A - Co-op Work Term	0	Summer
		STAT2509A - Intro to Stat Modelling II	0.50	Summer
		STAT3999A - Co-operative Work Term	0	Summer
		STAT5904S - Statistical Internship	0.50	Summer
		MATH0999A - Math Matters	0	Fall
		MATH3999A - Co-op Work Term	0	Fall
		MATH5906F - Research Internship	0.50	Fall
		STAT2507A - Intro to Stat Modelling I	0.50	Fall
		STAT2507B - Intro to Stat Modelling I	0.50	Fall
		STAT2509A - Intro to Stat Modelling II	0.50	Fall

	STAT3999A - Co-operative Work Term	0	Fall
	STAT5904F - Statistical Internship	0.50	Fall
	BIT2000A - Probability for Tech	0.50	Winter
	BIT2009A - Statistics for Technology	0.50	Winter
	MATH3999A - Co-op Work Term	0	Winter
	MATH5906W - Research Internship	0.50	Winter
	STAT2509B - Intro to Stat Modelling II	0.50	Winter
	STAT3504A - ANOVA and Experimental Design	0.50	Winter
	STAT3999A - Co-operative Work Term	0	Winter
	STAT5904W - Statistical Internship	0.50	Winter
	Total: 20	6.50	
2022/2023	MATH3999A - Co-op Work Term	0	Summer
	STAT5904S - Statistical Internship	0.50	Summer
	BIT2000B - Intro to Statistics	0.50	Fall
	MATH3999A - Co-op Work Term	0	Fall
	STAT2507A - Intro to Stat Modelling I	0.50	Fall
	STAT2507C - Intro to Stat Modelling I	0.50	Fall
	STAT2509A - Intro to Stat Modelling II	0.50	Fall
	STAT5904F - Statistical Internship	0.50	Fall
	BIT2000D - Intro to Statistics	0.50	Winter
	BIT2009A - Statistics for Technology	0.50	Winter
	MATH3999A - Co-op Work Term	0	Winter
	MATH5906W - Research Internship	0.50	Winter
	STAT2507H - Intro to Stat Modelling I	0.50	Winter

		STAT3504A - ANOVA and Experimental Design	0.50	Winter
		STAT5904W - Statistical Internship	0.50	Winter
		Total: 15	6.00	
	2021/2022	MATH3999A - Co-op Work Term	0	Summer
		STAT5904S - Statistical Internship	0.50	Summer
		BIT2000B - Intro to Statistics	0.50	Fall
		MATH3999A - Co-op Work Term	0	Fall
		STAT2507C - Intro to Stat Modelling I	0.50	Fall
		STAT2507D - Intro to Stat Modelling I	0.50	Fall
		STAT2509A - Intro to Stat Modelling II	0.50	Fall
		STAT3999A - Co-operative Work Term	0	Fall
		STAT5904F - Statistical Internship	0.50	Fall
		BIT2009A - Statistics for Technology	0.50	Winter
		MATH3999A - Co-op Work Term	0	Winter
		STAT2509B - Intro to Stat Modelling II	0.50	Winter
		STAT3504A - ANOVA and Experimental Design	0.50	Winter
		STAT3999A - Co-operative Work Term	0	Winter
		STAT5904W - Statistical Internship	0.50	Winter
		Total: 15	5.00	
		Total	50	17.50
Baysal, Olga	2022/2023	COMP5117F - Mining Software Repositories	0.50	Fall
		DATA5000W - Data Science Seminar	0.50	Winter

		Total: 2	1.00	
	2021/2022	DATA5000V - Data Science Seminar	0.50	Winter
		Total: 1	0.50	
	Total	3	1.50	
Cai, Song	2023/2024	STAT3503A - Regression Analysis	0.50	Summer
		STAT4503A - Applied Multivariate Analysis	0.50	Fall
		STAT5503F - Linear Models	0.50	Fall
		STAT5509F - Multivariate Analysis	0.50	Fall
		STAT5603W - Reliability & Surv Analysis	0.50	Winter
		STAT5702W - Modern Applied & Computational	0.50	Winter
		Total: 6	3.00	
	2022/2023	STAT4503A - Applied Multivariate Analysis	0.50	Fall
		STAT4603A - Time Series & Forecasting	0.50	Fall
		STAT5504F - Stochastic Proc. & Time Series	0.50	Fall
		STAT5509F - Multivariate Analysis	0.50	Fall
		STAT2509C - Intro to Stat Modelling II	0.50	Winter
		STAT5502W - Sampling Theory and Methods	0.50	Winter
	Total: 6	3.00		
	2021/2022	STAT5901S - Directed Studies	0.50	Summer
		STAT4503A - Applied Multivariate Analysis	0.50	Fall
		STAT5503F - Linear Models	0.50	Fall

		STAT5509F - Multivariate Analysis	0.50	Fall
		STAT5602W - Analysis of Categorical Data	0.50	Winter
		STAT5603W - Reliability & Surv Analysis	0.50	Winter
		Total: 6	3.00	
	Total	18	9.00	
Campbell, Dave	2023/2024	DATA5001W - Fund. Data Science & Analytics	0.50	Winter
		Total: 1	0.50	
	2022/2023	DATA5001W - Fund. Data Science & Analytics	0.50	Winter
		Total: 1	0.50	
	2021/2022	STAT5702F - Modern Applied & Computational	0.50	Fall
		Total: 1	0.50	
Total	3	1.50		
Dang, Sanjeena	2023/2024	STAT3553A - Regression Modelling	0.50	Fall
		STAT4504A - Stat Design & Analysis of Exp	0.50	Winter
		Total: 2	1.00	
	2022/2023	STAT5900F - Seminar	0.50	Fall
		Total: 1	0.50	
	2021/2022	STAT4504A - Stat Design & Analysis of Exp	0.50	Winter
		Total: 1	0.50	
Total	4	2.00		

Dehne, Frank	2022/2023	COMP5704F - Parallel Algor & Applic in DS	0.50	Fall
		Total: 1	0.50	
	2021/2022	COMP5704W - Parallel Algor & Applic in DS	0.50	Fall
		Total: 1	0.50	
	Total	2	1.00	
El-Roby, Ahmed Hassan Me	2023/2024	COMP4900H - Spec Topics in Comp Sci	0.50	Fall
		COMP5118F - Trends in Big Data Management	0.50	Fall
		COMP3005A - Database Management Systems	0.50	Winter
		COMP3005B - Database Management Systems	0.50	Winter
		Total: 4	2.00	
	2022/2023	COMP3005A - Database Management Systems	0.50	Fall
		COMP3005B - Database Management Systems	0.50	Fall
		COMP5118W - Trends in Big Data Management	0.50	Winter
		DATA5000U - Data Science Seminar	0.50	Winter
		Total: 4	2.00	
	2021/2022	COMP3005A - Database Management Systems	0.50	Fall
		COMP5118W - Trends in Big Data Management	0.50	Winter
		DATA5000Y - Data Science Seminar	0.50	Winter

		Total: 3	1.50	
	Total	11	5.50	
Farrell, Patrick	2023/2024	STAT4502A - Survey Sampling	0.50	Fall
		STAT5602W - Analysis of Categorical Data	0.50	Winter
		Total: 2	1.00	
	Total	2	1.00	
Guo, Yuhong	2023/2024	COMP5116F - Machine Learning	0.50	Fall
		COMP4900D - Spec Topics in Comp Sci	0.50	Winter
		Total: 2	1.00	
	2022/2023	COMP5116F - Machine Learning	0.50	Fall
		Total: 1	0.50	
	2021/2022	COMP5116F - Machine Learning	0.50	Fall
		COMP3106A - Intro to AI	0.50	Winter
		Total: 2	1.00	
Total	5	2.50		
Holden, Matthew Stephen	2023/2024	COMP3106A - Intro to AI	0.50	Fall
		COMP4107B - Neural Networks	0.50	Winter
		COMP4900F - Spec Topics in Comp Sci	0.50	Winter
		COMP5900F - Special Topics in Comp Sci	0.50	Winter
		Total: 4	2.00	
	2022/2023	COMP5900A - Selected Topics in Comp Sci	0.50	Summer
		COMP3106A - Intro to AI	0.50	Fall

		COMP4107B - Neural Networks	0.50	Winter	
		COMP5900F - Selected Topics in Comp Sci	0.50	Winter	
		Total: 4	2.00		
	2021/2022	COMP3106A - Intro to AI	0.50	Fall	
		Total: 1	0.50		
	Total	9	4.50		
	Horn, Wayne Stanley	2023/2024	STAT2601A - Business Statistics	0.50	Summer
			MATH0999A - Math Matters	0	Fall
			STAT2601A - Business Statistics	0.50	Fall
			STAT2601B - Business Statistics	0.50	Fall
STAT2605A - Probability Models			0.50	Fall	
STAT2507G - Intro to Stat Modelling I			0.50	Winter	
STAT2601D - Business Statistics			0.50	Winter	
STAT2601E - Business Statistics			0.50	Winter	
Total: 8		3.50			
2022/2023		STAT2606A - Business Statistics	0.50	Summer	
		STAT2601A - Business Statistics	0.50	Fall	
		STAT2601B - Business Statistics	0.50	Fall	
		STAT2655A - Intro. to Prob. with Appl.	0.50	Fall	
		STAT2507F - Intro to Stat Modelling I	0.50	Winter	
		STAT2507G - Intro to Stat Modelling I	0.50	Winter	
	STAT3506A - Stochastic Processes & Applica	0.50	Winter		
Total: 7	3.50				

	2021/2022	STAT2606A - Business Statistics	0.50	Fall
		STAT2606B - Business Statistics	0.50	Fall
		STAT2655A - Intro. to Prob. with Appl.	0.50	Fall
		STAT2507F - Intro to Stat Modelling I	0.50	Winter
		STAT2507G - Intro to Stat Modelling I	0.50	Winter
		Total: 5	2.50	
Total	20	9.50		
Komeili, Majid	2023/2024	COMP5900E - Special Topics in Comp Sci	0.50	Fall
		COMP4102A - Computer Vision	0.50	Winter
		COMP4900W - Spec Topics in Comp Sci	0.50	Winter
		DATA5000W - Data Science Seminar	0.50	Winter
		Total: 4	2.00	
	2022/2023	COMP5900F - Selected Topics in Comp Sci	0.50	Fall
		DATA5000V - Data Science Seminar	0.50	Winter
		Total: 2	1.00	
	2021/2022	COMP4105A - Machine Learning	0.50	Fall
		COMP5900F - Selected Topics in Comp Sci	0.50	Fall
		DATA5000W - Data Science Seminar	0.50	Winter
		Total: 3	1.50	
	Total	9	4.50	
	Mills, Shirley E.	2023/2024	STAT4601A - Data Mining I	0.50
STAT5703W - Data Mining I			0.50	Fall

		STAT5713A - Advanced Data Mining	0.50	Winter
		Total: 3	1.50	
	2022/2023	STAT6901F - Directed Studies	0.50	Fall
		Total: 1	0.50	
	2021/2022	STAT4601A - Data Mining I	0.50	Winter
		STAT5703W - Data Mining I	0.50	Winter
		Total: 2	1.00	
	Total	6	3.00	
Nielsen, Jason Dennis	2023/2024	STAT2655A - Intro. to Prob. with Appl.	0.50	Fall
		STAT2559A - Basics of Stat Modelling Hons.	0.50	Winter
		Total: 2	1.00	
	2022/2023	STAT4604A - Statistical Computing	0.50	Fall
		STAT1500A - Intro to Statistical Computing	0.50	Winter
		Total: 2	1.00	
	2021/2022	STAT1500A - Intro to Statistical Computing	0.50	Winter
		STAT2559A - Basics of Stat Modelling Hons.	0.50	Winter
		Total: 2	1.00	
	Total	6	3.00	
Rabinovich, Zinovi	2023/2024	COMP3000B - Operating Systems	0.50	Fall
		COMP4900G - Spec Topics in Comp Sci	0.50	Winter
		COMP5900G - Special Topics in Comp Sci	0.50	Winter

		Total: 3	1.50	
	Total	3	1.50	
Tsang, Koon-Ho Alan	2023/2024	COMP4701A - Computing, Society, and Ethics	0.50	Fall
		COMP4900B - Spec Topics in Comp Sci	0.50	Fall
		COMP5900G - Special Topics in Comp Sci	0.50	Fall
		COMP4602A - Social Networking	0.50	Winter
		Total: 4	2.00	
	2022/2023	COMP4701A - Computing, Society, and Ethics	0.50	Fall
		COMP4701B - Computing, Society, and Ethics	0.50	Fall
		COMP4900B - Adv Topics in Computer Science	0.50	Fall
		COMP5900G - Selected Topics in Comp Sci	0.50	Fall
		Total: 4	2.00	
	2021/2022	COMP4900B - Adv Topics in Computer Science	0.50	Fall
		COMP4900C - Adv Topics in Computer Science	0.50	Fall
		COMP5900G - Selected Topics in Comp Sci	0.50	Fall
		COMP4602A - Social Networking	0.50	Winter
		COMP5900H - Selected Topics in Comp Sci	0.50	Winter
		Total: 5	2.50	

	Total	13	6.50	
Wen, Junfeng	2023/2024	COMP3105A - Intro to Machine Learning	0.50	Fall
		COMP4900C - Spec Topics in Comp Sci	0.50	Fall
		COMP5900J - Special Topics in Comp Sci	0.50	Winter
		Total: 3	1.50	
	2022/2023	COMP3105A - Intro to Machine Learning	0.50	Fall
		COMP4900C - Adv Topics in Computer Science	0.50	Winter
		COMP5900J - Selected Topics in Comp Sci	0.50	Winter
		Total: 3	1.50	
Total	6	3.00		

Note: These courses are taught by professors who belong to the department(s).

OIRP. Mar 07, 2024 03:01 PM

Discussant Report

New Program Review

Name: [Hashmat Khan](#)

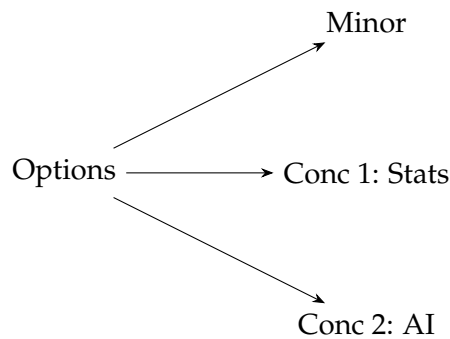
May 15th, 2024

Program being reviewed

Bachelor of Data Science (Honours)

Review of self-study (Volume I)

The self-study is well-written and provides a clear description of the new Bachelor of Data Science program. It is a 20 credit program with the possibilities for students to pursue a minor, or one of the two concentrations as shown below:



The program will be housed in a new unit within the Faculty of Science, namely, the Institute of Data Science. There are eleven statements of support from other units, which reflects the popularity of data science across the university.

Review of External Reviewers' Report

The External Reviewers have made nine clear recommendations.

Review of Unit Response and Implementation Plan

Unit Response and Implementation Plan: Summary of Recommendations

- One weakness
- Four concerns (of which three are agreed to unconditionally)
- Four opportunities

The reviewers made nine recommendations, of which seven recommendations are '*agreed to unconditionally*' while two are '*agreed to in principle*'. Four recommendations are flagged as 'opportunity', four as 'concern', and one as 'weakness'. Both the unit and the Dean responses adequately address these categories. The Dean's responses indicate a strong support for the recommendations and a willingness to address them in a timely manner.

DISCUSSANT'S CONCERN:

None.

DISCUSSANT RECOMMENDATION:

Recommendations #7 (collaboration with other units) and #8 (exploring micro-credentials, online offerings) appear to be promising areas for IDS to explore after the launch of the program.

Recommendation of program categorization

Recommended to commence.

**Carleton University Site Visit
New Undergraduate Program in Data Science
Date: April 30, 2024**

External Reviewers: Dr. Lisa Strug, University of Toronto
Dr. Thomas Loughin, Simon Fraser University

Internal Reviewer: Dr. Kevin Graham, Carleton University

Time	April 30, 2024	Location
8:45 – 9:00	Meeting with Dr. Hashmat Khan, Associate Vice-President (Academic Programs and Strategic Initiatives)	DT324
9:15 – 10:00	Meeting with the Chairs of the Department and/or Directors: Dr. Robert Burk (Mathematics and Statistics) Dr. Michel Barbeau (Computer Science)	HP5336
10:00 – 10:30	Department Tour with the Chairs	HP5336
10:45-11:15	Meeting with the Administrators/Staff: Mylien Reid, School Administrator Emily Burda, Undergraduate Advisor	HP5437
11:30 – 1:00	LUNCH with Internal Reviewer, Faculty members and staff Maria DeRosa Robert Burk (Mathematics and Statistics) Michel Barbeau (Computer Science) Jit Bose Olga Baysal Julia Wallace Doug Howe Dave Campbell Ethan Hermer Jeffrey Smirle	FOS Board room (HP3230)
1:15 -1:45	Meeting with Dr. Maria DeRosa, Dean, Faculty of Science	HP3230
2:00 – 2:30	Meeting with Dr. Pauline Rankin, Provost and Vice-President (Academic) Dr. David Hornsby, Vice-Provost and Associate Vice-President (Academic)	503S Tory Building
2:45 – 3:45	Meeting with Faculty: Frank Dehne Dave Campbell Pat Farrell Yuhong Guo Olga Baysal Song Cai Sanjeena Dang	DT303

	Majid Komeili Shirley Mills Jason Nielson Ahmed El-Roby Matthew Holden Zinovi Rabinovich Koon-Ho Alan Tsang Junfeng Wen	
4:00 – 4:30	Closing Meeting with Dr. Hashmat Khan, Associate Vice-President (Academic Programs and Strategic Initiatives)	DT303
4:30 – 5:00	External Reviewers Report Preparation Meeting	DT303

Please note: The meeting time slots includes travel time between offices and breaks.

External Reviewer Biographies

Data Science Site Visit



Dr. Thomas Loughin
Simon Fraser University

Tom Loughin is a Professor in the Department of Statistics and Actuarial Science at Simon Fraser University in Burnaby, BC, Canada. He was Chair of the department from 2014-2019 before coming to his senses. He previously held a faculty position at Kansas State University for 13 years. At K-State he was partly funded by the College of Agriculture to provide statistical collaboration and consulting for faculty and students there. As a result, he has been active in statistical consulting, particularly the design and analysis of experiments, for most of his career. Tom has coauthored a book, *Analysis of Categorical Data with R*, with Chris Bilder that focuses on practical data analysis techniques for students and practitioners. His other research interests are in statistical learning techniques, particularly tree-based ensembles, and in sports analytics. Tom is a Fellow of the American Statistical Association and an accredited professional statistician, maintaining both P.Stat. (SSC), PStat® (ASA). He currently serves on the Accreditation Committee for the SSC and has held positions on the editorial boards of *Biometrics*, *Technometrics*, *The American Statistician*, and *Developmental Medicine and Child Neurology*. He has served on executive committees within the American Statistical Association, the Statistical Society of Canada, and the International Biometric Society. In particular, he is a former Chair of the ASA Section on Statistics in the Physical and Engineering Sciences (SPES) and president of the SSC Business and Industrial Statistics Section (BISS).



Dr. Lisa Strug
University of Toronto

Dr. Strug is Professor in the Departments of Statistical Sciences, Computer Science and cross-appointed in Biostatistics at the University of Toronto and is a Senior Scientist in the Program in Genetics and Genome Biology at the Hospital for Sick Children. Dr. Strug is the inaugural Director of the Data Sciences Institute (DSI), a tri-campus, multi-divisional, multi-institutional, multi-disciplinary hub for data science activity at the University of Toronto and affiliated Research Institutes. Dr. Strug holds several other leadership positions at the University of Toronto including the Director of the Canadian Statistical Sciences Institute Ontario Region (CANSSI Ontario), and at the Hospital for Sick Children as Associate Director of the Centre for Applied Genomics and the Lead of the Canadian Cystic Fibrosis Gene Modifier Consortium and the Biology of Juvenile Myoclonic Epilepsy International Consortium. She is a statistical geneticist and her research focuses on the development of novel statistical approaches to analyze and integrate multi-omics data to identify genetic contributors to complex human disease. She has received several honours including the Tier 1 Canada Research Chair in Genome Data Science.

Program(s) being reviewed:	Data Science
Date of review:	2024-04-30 site visit
Names and Emails of External Reviewers:	Lisa Strug (lisa.strug@utoronto.ca) Tom Loughin (tloughin@sfu.ca)
Date of Report:	2024-05-02

Preamble and Overview

On April 30th Professors Tom Loughin and Lisa Strug visited Carleton University for a site visit of the proposed undergraduate degree in Data Science that has been co-developed by the School of Mathematics and Statistics (SMS) the School of Computer Science (SCS) and will be administered by the Institute for Data Science (IDS) within the Faculty of Science. The visit included individual meetings with the SCS and SMS chairs, administrative staff within SCS, the Dean of Science, the VPA and AVPA, and faculty from the three relevant units.

The undergraduate program in the IDS will be joined by a PhD program and a Master's in Data Science program that is recognized by the Vector Institute. Initially the undergraduate program in Data Science can leverage the staff support, the student rooms and student help centers available to students in SCS and SMS programs. The undergraduate curriculum also largely leverages existing courses offered by the two schools. The schools have an established track record of working together to create and deliver joint programming, which provides high confidence that they will deliver on this degree program.

Criteria for a new program

The **program's objectives** are clear: with the exploding nature of data across all disciplines there is an opportunity to develop an undergraduate Data Science program to equip students with the tools to leverage data for decision making and discovery, providing tools that are highly valued in the work place and creating a program with future opportunities to partner with other units across the university towards joint programming to advance data science tailored to individual disciplines.

The **program's requirements** mostly leverage existing courses in statistics and computer science that span the tools necessary for students to thrive in data science roles in the workforce, with a relatively small number of new courses targeting relevant topics or presenting traditional material from a data-centric perspective. The structure of this 4-year proposed program provides a lot of flexibility. Students can choose an AI stream, a Statistics stream or a general stream. The general stream enables sufficient room to minor in any other discipline, enabling students to be flexible in customizing their undergraduate experiences. The program structure can seamlessly combine with other disciplines to realize future ambitions in disciplinary-specific joint programming.

Carleton University has a strong history of training in the cognate units of data science: statistics, mathematics and computer science. An established and strengthening relationship with Statistics Canada (including a strong letter of support and commitment) serves as both an attraction for students as well as future employment opportunities.

The model for delivery is proposed as hybrid in the document. Given the nature of leveraging existing courses, delivery initially will follow established approaches. A hybrid delivery model is best reserved after pedagogical innovation which is an opportunity for future expansion.

The program requirements were developed in consultation with international data science bodies and standards, and **Assessment** of the program will continue to be informed by international recommendations. The IDS currently has an industry advisory board, and there are plans for a program-specific external advisory committee to ensure the curriculum continues to meet the needs of industry, government and not-for-profits; this will also ensure the program is achieving its proposed objectives. The proposal could benefit from a general plan for community outreach and engagement.

The **admission requirements** are clearly articulated and are grade-based. The program is designed in such a flexible way so as to provide the necessary pre-requisites for students to enter into graduate programs in statistics, computer science or discipline-specific graduate programs, depending on how they choose to stream or minor. Strong support from academic advisors will be necessary to take advantage of this clever programming design. It will be imperative to quickly develop strong staff support with expertise specific to the undergraduate Data Science program—that is, with strong, specific knowledge of both computer science and statistical science course offerings, electives and standards across other disciplines for minors—to allow students to take maximal advantage of the opportunity this program provides. Additional **resources** for these Data Science academic advisor specialists should be considered early on in the program. They could also assist in the delivery of soft skills, an area that was not referred to in the document, but which would be an important addition to the curriculum.

The staged plan for enrollment growth is realistic. The **resources** in the Schools of Statistics and Mathematics and of Computer Science will be leveraged initially to provide ample student study space, classroom resources and existing taught courses. A plan for the hiring of 7 additional tenure-track faculty to support the growth, in a staged fashion, is an important component of the plan to enable success and planned growth. Given the unique nature of data science programming from statistical science and computer science, namely the data-focus, some consideration should be made to additional resources or governance that can ensure existing courses will deliver the curriculum in a data-centric model with context-specific examples by instructors with this academic focus. Space seems ample for the early years of the program, but a plan for additional space should be considered early to ensure space needs are addressed in a timely fashion given the huge potential for growth of this program.

The **faculty** affiliated with this program are of the highest quality and include individuals in field-specific national leadership roles, with strong connections to Statistics Canada and/or with Industry, and who have already developed a Vector-Recognized Data Science master's program. There is no doubt that the faculty affiliated with the design and delivery of this initiative will execute a high-quality program.

Additional Comments:

We were both very satisfied with the site visit. The self-study document was thorough and informative, although there were naturally things we had questions about or needed clarification on. During the visit, we had access to all key personnel we needed to hear from and had all of our questions answered.

In our opinion, this is a well-thought-out program with sufficient internal and external support to quickly rise to its potential and thrive in the longer term. The discipline is dynamic, but the expected demand for data science (DS) should be sufficient to support growth of this program and others related to it as discussed below.

One comment about the document that might be amended: It mentions that the program will be offered as “hybrid”, but the reality is that there is no design or plan for what that means beyond leaving course-delivery details to each individual instructor. We suggest that the final program proposal eliminate reference to “hybrid” delivery.

Summary of Recommendations

Use the chart below to summarize your overall recommendations for the program.

Recommendation	Category (<i>Weakness, Concern, Opportunity</i>)
1) We had several interesting conversations with program faculty and others in the Dean’s staff who acknowledge the vital role that “soft skills” play in the development and placement of DS graduates in the workforce. However, the program has no concrete plan for providing training in these areas. While co-op placement preparation may help some of the program’s students to develop some of their more generic skills, the program should more carefully consider the specific non-technical skills that DS graduates need to thrive in the workplace, and they should develop some form of required coursework or seminar on the subject.	Weakness
2) We suggest approaching the IDS and/or program advisory board to play a role in the development and/or delivery of soft-skills instruction. Many organizations actively seek	Opportunity

<p>such opportunities for engagement with local universities, so this could be a win-win.</p>	
<p>3) The new program and unit will eventually have its own administration and advising staff to support students. In the interim these duties will be handled by existing SCS staff, possibly as an overload. SCS staff have demonstrated ability to multitask and to advise students in joint programs with SMS in the past. However, growth in their own programs has already resulted in corresponding increases in their administrative and advising burdens. Considering the unique nature of the DS program, it requires careful and special attention to ensure a high-quality student experience throughout. We recommend that the transition to dedicated IDS staff be planned and executed in an established timeline, and not be left with an indefinite time frame that risks imposing a problematic burden on SCS staff, with potential negative impacts on student experience. This plan should include onboarding of the Science Student Success Centre, which will need creative leadership from IDS to support new students until senior program students are available to start the peer mentorship cycle.</p>	<p>Concern</p>
<p>4) The new program will make heavy use of existing instructional and student support space dedicated to support current CS students. As DS and other CS programs grow, there are real concerns that this space will not be adequate to meet all demands. There are hopes that a separate data science building could be constructed, which would be ideal. In the interim, assuming that the program grows in line with its targets, these students and the new faculty hires related to the program will need space dedicated to their needs. These needs can already be projected; hence, suitable student study and social areas, as well as faculty office space, should be identified as soon as is reasonable.</p>	<p>Concern</p>

<p>5) The IDS and other program faculty have an impressive record of networking and developing external relationships with colleagues in university, government, and industrial organizations. The IDS has an external advisory board, and there is a stated plan to create a separate external advisory committee for the program. To a large degree, the program depends on resources provided by these relationships, in the form of capstone, honours, and undergraduate research projects and co-op placements. These relationships are largely developed haphazardly by individuals; there is no specific concerted effort to cultivate further relationships and expand opportunities for students, or to regularly “mine” those relationships for tangible project topics and data sets. This could become a critical issue if the program grows as projected and the need for more projects soars. We recommend that the IDS formalize the process of cultivating relationships with internal and external organizations that can provide input, projects, and other opportunities for students. Some process or structure should be put in place to ensure that this burden does not fall on a small number of faculty members without coordination and, hence, risk falling short of demand. Possibly the new program administrator could fill a dual role as business development officer, or part of one faculty member’s formal assignment could be dedicated to the process of developing relationships and coordinating student projects. (Note that this is also an opportunity to deliberately cultivate relationships where some fraction of them will likely result in great benefits to the program, the unit, and the university.)</p>	<p>Concern</p>
<p>6) Courses for the program are offered in two separate schools and will initially be taught by existing faculty in the two cooperating schools, not all of whom may be specifically data scientists. We understand that these schools have a history of cooperation and work well</p>	<p>Concern</p>

<p>together. Nonetheless, combining course requirements from multiple units creates possible risks relating to (a) scheduling conflicts for students, especially those late in their programs who may not have future opportunities to take required courses, and (b) courses being taught in ways that do not meet the specific needs of this particular student population (e.g., not using appropriate languages or software, focus on abstract or theoretical issues instead of data-focused topics). Understanding the complexities of course scheduling and teaching assignments, we encourage directors and administrators of the schools to carefully coordinate their course-related scheduling and assignments to ensure that the program needs are suitably met. The eventual administrator for IDS may be able to assist with this coordination. The planned faculty hiring to support the program growth should be carried out at a sufficient pace to ensure that teaching expertise is aligned with course offerings.</p>	
<p>7) This program is unique in that the subject of its focus—data—is ubiquitous in every facet of industry, commerce, government, science, and indeed, life. The opportunities are virtually unparalleled for this program to expand in numerous known, and yet-to-be-discovered, directions. The letters of support for the program from other units within Carleton conveyed not only unanimous support for the program, but also hope that the respective units could collaborate with the program to create more opportunities for their students. While it makes sense to focus on getting the core program and associated concentrations running effectively at first, we encourage the IDS and affiliated personnel to proactively explore and develop collaborations with many other academic units around campus as soon as possible, preferably before the next cyclical review. Possibilities include (1) additional concentrations in DS relating to disciplines that are particularly closely aligned with DS, (2)</p>	<p>Opportunity</p>

<p>courses supporting new concentrations in DS that can be offered to other programs that wish to develop their own concentrations in DS, and (3) minors in DS for students in other disciplines.</p>	
<p>8) The future for data science remains very bright, and this program offers the foundation for further program development. In particular, the program description says that the IDS will explore a fully online or formally hybrid version of the program. We agree that exploring an online option is worthwhile, as this could expand its reach and offer options for students who are not in Ottawa. Additional online development, such as certificate programs and other short re-education programs in data science could have massive interest, especially among the many professionals with government organizations in Ottawa. We encourage the IDS to think big about the nature of instruction in DS, both in format and in terms of potential new audiences, while maintaining focus in the short term on ensuring that the present program is offered in its current format with very high quality.</p>	<p>Opportunity</p>
<p>9) With the expansion of the IDS and pending integration of faculty members from complementary disciplines, this unit has potential for leadership in the DS discipline that many similar programs don't have. We encourage the leaders and developers of this program to consider development of courses in addition to those currently available or planned, such as data visualization or statistics in Python. This could also include leadership in studying and developing courses in new areas in DS, beyond anything we might think of in the moment.</p>	<p>Opportunity</p>

**Bachelor of Data Science
Unit Response to External Reviewers' Report & Implementation Plan
Programs Being Reviewed: Undergraduate Programs**

Note: This document is forwarded to Senate, the Quality Council and posted on the Vice- Provost's external website.

Introduction & General Comments

Please include any general comments regarding the External Reviewers' Report.

The School of Computer Science and the School of Mathematics and Statistics was pleased to receive the Reviewers' very positive External Reviewer's report on May 7, 2024. This report was shared with the Bachelor of Data Science Steering Committee, and we are committed to the continual improvement of our programs to enhance the student, staff, and faculty experience. This document contains both a response to the External Reviewers' Report and an Implementation Plan (Section B) which have been created in consultation with Dr. Maria DeRosa, the Dean of Science.

For each recommendation one of the following responses must be selected:

Agreed to unconditionally: used when the unit agrees to and is able to take action on the recommendation without further consultation with any other parties internal or external to the unit.

Agreed to if additional resources permit: used when the unit agrees with the recommendation, however action can only be taken if additional resources are made available. Units must describe the resources needed to implement the recommendation and provide an explanation demonstrating how they plan to obtain those resources. In these cases, discussions with the Deans will normally be required and therefore identified as an action item.

Agreed to in principle: used when the unit agrees with the recommendation, however action is dependent on something other than resources. Units must describe these dependencies and determine what actions, if any, will be taken.

Not agreed to: used when the unit does not agree with the recommendation and therefore will not be taking further action. A rationale must be provided to indicate why the unit does not agree (no action should be associated with this response).

Calendar Changes

If any of the action items you intend to implement will result in calendar changes, please describe what those changes will be. To submit a formal calendar change, please do so using the Courseleaf system.

UNIT RESPONSE AND IMPLEMENTATION PLAN

Programs Being Reviewed: Bachelor of Data Science

Prepared by (name/position/unit/date): Ethan Hermer/Professional Programs Officer/Faculty of Science/May 10, 2024

External Reviewer Recommendation & Categorization	Unit Response: 1- Agreed to unconditionally 2- Agreed to if additional resources permit (describe resources) 3- Agreed to in principle 4- Not agreed to Rationales are required for categories 2, 3 & 4	Action Item	Owner	Timeline	Will the action described require calendar changes? (Y or N)
<p>1. Weakness- We had several interesting conversations with program faculty and others in the Dean’s staff who acknowledge the vital role that “soft skills” play in the development and placement of DS graduates in the workforce. However, the program has no concrete plan for providing training in these areas. While co-op placement preparation may help some of the program’s students to develop some of their more generic skills, the program should more carefully consider the specific non-technical skills that DS graduates need to thrive in the workplace, and they should develop some form of required coursework or seminar on the subject.</p>	<p><i>Agreed to unconditionally</i></p>	<p><i>Soft skill development, specifically communication and data visualization, is a key aspect of the program and has been embedded in the curriculum within the Communication Skills for Data Scientists (DATA 2200) course. Furthermore, we will endeavor to include soft skill training in pre-existing curriculum.</i></p> <p><i>Additionally, we will also explore the possibility of utilizing a portfolio, an “Employability Passport” or other supplementary approach to ensure students in the program acquire the soft skills they need to thrive in the workplace.</i></p> <p><i>The Faculty of Science (FoS) will explore leveraging current training offerings through the Science Student Success Centre (SSSC), and the Centre for Student Academic Support. Furthermore, FoS will explore producing a series of workshops with SSSC on the necessary soft skills and</i></p>	<p><i>Associate Dean, Undergraduate Affairs, Faculty of Science</i></p> <p><i>Associate Dean, Student Recruitment, Wellness and Success, Faculty of Science</i></p>	<p><i>We will start exploring this possibility by September 2024.</i></p>	<p><i>Y, if new courses are deemed necessary, we will submit a calendar change proposal in the 2025-26 modification cycle.</i></p>

		<i>make these courses mandatory for Data Science students.</i>			
2. Opportunity-We suggest approaching the IDS and/or program advisory board to play a role in the development and/or delivery of soft-skills instruction. Many organizations actively seek such opportunities for engagement with local universities, so this could be a win-win.	<i>Agreed to unconditionally</i>	<i>As this program will be housed in IDS, their faculty and the Industrial Board will develop the delivery of soft-skills instruction.</i>	<i>Director, Carleton Institute for Data Science Professional Programs Officer, Faculty of Science</i>	<i>We will start exploring this possibility by September 2024.</i>	<i>N</i>
3. Concern- The new program and unit will eventually have its own administration and advising staff to support students. In the interim these duties will be handled by existing SCS staff, possibly as an overload. SCS staff have demonstrated ability to multitask and to advise students in joint programs with SMS in the past. However, growth in their own programs has already resulted in corresponding increases in their administrative and advising burdens. Considering the unique nature of the DS program, it requires careful and special attention to ensure a high-quality student experience throughout. We recommend that the transition to dedicated IDS staff be planned and executed in an established timeline, and not be left with an indefinite time frame that risks imposing	<i>Agreed to unconditionally</i>	<i>As part of our hiring plan, we will be hiring administration, advising, and lab coordinator personnel before the first year. There will be additional staff hired in year three. The Faculty of Science will provide bridging support as necessary for the Data Science program's administrative loads. The Faculty of Science will prioritize access to SSSC programming to meet this goal and work with the SSSC to find appropriate peer mentors at the onset of the program.</i>	<i>Dean, Faculty of Science Associate Dean, Student Recruitment, Wellness and Success.</i>	<i>Hiring will begin after program approval (tentatively July 2024). Discussions with SSSC will start September 2024.</i>	<i>N</i>

<p>a problematic burden on SCS staff, with potential negative impacts on student experience. This plan should include onboarding of the Science Student Success Centre, which will need creative leadership from IDS to support new students until senior program students are available to start the peer mentorship cycle.</p>					
<p>4. Concern- The new program will make heavy use of existing instructional and student support space dedicated to support current CS students. As DS and other CS programs grow, there are real concerns that this space will not be adequate to meet all demands. There are hopes that a separate data science building could be constructed, which would be ideal. In the interim, assuming that the program grows in line with its targets, these students and the new faculty hires related to the program will need space dedicated to their needs. These needs can already be projected; hence, suitable student study and social areas, as well as faculty office space, should be identified as soon as is reasonable.</p>	<p><i>Agreed to in principle</i></p>	<p><i>We will utilize existing space for the program until year three of the program. In year three, we will pursue space allocation for tutorial space, and offices for faculty members based on the program reaching its enrolment targets.</i></p> <p><i>Additionally, the Faculty of Science has been identified as having priority in space allocation. We will continue to advocate for space on an ongoing basis and allocate it accordingly as the program grows.</i></p>	<p><i>Dean, Faculty of Science</i></p> <p><i>Director, Operations, Faculty of Science</i></p>	<p><i>In Winter 2027, the Faculty of Science will revisit the program's space needs and allocate space accordingly.</i></p>	<p><i>N</i></p>
<p>5. Concern- The IDS and other program faculty have an impressive record of networking and developing external relationships with colleagues in university, government, and industrial organizations. The IDS has an external advisory board, and there is a stated plan to create a</p>	<p><i>Agreed to unconditionally</i></p>	<p><i>Carleton University and the Faculty of Science take external outreach seriously, and there is a formalized process for cultivating relationships with internal and external organizations. Although no individual unit in the Faculty of Science has their own Business Development</i></p>	<p><i>Director, External Affairs, Faculty of Science</i></p>	<p><i>Ongoing</i></p>	<p><i>N</i></p>

<p>separate external advisory committee for the program. To a large degree, the program depends on resources provided by these relationships, in the form of capstone, honours, and undergraduate research projects and co-op placements. These relationships are largely developed haphazardly by individuals; there is no specific concerted effort to cultivate further relationships and expand opportunities for students, or to regularly “mine” those relationships for tangible project topics and data sets. This could become a critical issue if the program grows as projected and the need for more projects soars. We recommend that the IDS formalize the process of cultivating relationships with internal and external organizations that can provide input, projects, and other opportunities for students. Some process or structure should be put in place to ensure that this burden does not fall on a small number of faculty members without coordination and, hence, risk falling short of demand. Possibly the new program administrator could fill a dual role as business development officer, or part of one faculty member’s formal assignment could be dedicated to the process of developing relationships and coordinating student projects. (Note that this is also an opportunity to deliberately cultivate relationships where some fraction of them will likely result in great</p>		<p><i>positions, this work is the mandate of the Director, External Affairs, and the Professional Programs Officer in the Faculty of Science. Through these positions, many industry and government connections have been formed, and events such as Data Day and other events are organized to facilitate connections with faculty. FoS also fosters strong ties with the community through its Alumni Relations Office. The Science Student Success Centre utilizes these professional connections to bring in speakers for career development events.</i> The Institute for Data Science has an Industrial Advisory Board that will be leveraged by this undergraduate program. Additionally, StatsCan is a partner in the creation of this program.</p> <p>Carleton University also has the Co-op Education Office, the Centre for Community Engagement, and Industry and Partnership Services, which facilitate collaboration with community partners through student placements, outreach, and project management. Currently, the Faculty of Science leverages its own campuswide initiatives and faculty support and these resources will be available for the Bachelors of Data Science faculty members as well.</p>			
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<p>benefits to the program, the unit, and the university.)</p>					
<p>6. Concern- Courses for the program are offered in two separate schools and will initially be taught by existing faculty in the two cooperating schools, not all of whom may be specifically data scientists. We understand that these schools have a history of cooperation and work well together. Nonetheless, combining course requirements from multiple units creates possible risks relating to (a) scheduling conflicts for students, especially those late in their programs who may not have future opportunities to take required courses, and (b) courses being taught in ways that do not meet the specific needs of this particular student population (e.g., not using appropriate languages or software, focus on abstract or theoretical issues instead of data-focused topics). Understanding the complexities of course scheduling and teaching assignments, we encourage directors and administrators of the schools to carefully coordinate their course-related scheduling and assignments to ensure that the program needs are suitably met. The eventual administrator for IDS may be able to assist with this coordination. The planned faculty hiring to support the</p>	<p><i>Agreed to unconditionally</i></p>	<p>The Directors of the School of Computer Science and the School of Mathematics and Statistics have been part of the program creation process since the beginning. They will continue to work together to carefully coordinate course-related scheduling and assignments to ensure the program's needs are met. Additionally, when the program's governance is formed, there will be a curriculum committee to also ensure this outcome.</p>	<p><i>Director, School of Computer Science</i></p> <p><i>Director, School of Mathematics and Statistics</i></p> <p><i>Director, Carleton Institute for Data Science</i></p>	<p><i>The Directors of both Schools will continue to follow the Carleton University timelines for scheduling courses throughout the life of the program (e.g., start discussion March 2025 for Fall 2025 course schedules).</i></p>	<p>N</p>

<p>program growth should be carried out at a sufficient pace to ensure that teaching expertise is aligned with course offerings.</p>					
<p>7. Opportunity-This program is unique in that the subject of its focus—data—is ubiquitous in every facet of industry, commerce, government, science, and indeed, life. The opportunities are virtually unparalleled for this program to expand in numerous known, and yet-to-be-discovered, directions. The letters of support for the program from other units within Carleton conveyed not only unanimous support for the program, but also hope that the respective units could collaborate with the program to create more opportunities for their students. While it makes sense to focus on getting the core program and associated concentrations running effectively at first, we encourage the IDS and affiliated personnel to <u>proactively</u> explore and develop collaborations with many other academic units around campus as soon as possible, preferably before the next cyclical review. Possibilities include (1) additional concentrations in DS relating to disciplines that are particularly closely aligned with DS, (2) courses supporting new concentrations in DS that can be offered to other programs that wish to develop their own concentrations in DS,</p>	<p><i>Agreed to in principle</i></p>	<p><i>Throughout the program creation process, we have proactively started the process of developing collaborations with other academic units around campus.</i></p> <p><i>1) As part of this process, we will start exploring the possibility of creating concentrations in Data Science with units that are closely aligned with Data Science. Many units have expressed interest in this possibility.</i></p> <p><i>2) During the Concentration exploration process, we will determine the needs for new curriculum.</i></p> <p><i>3) During the Concentration exploration process, we will also discuss the creation of a minor or other degrees.</i></p>	<p><i>Associate Dean, Undergraduate Affairs, Faculty of Science</i></p> <p><i>Professional Programs Officer, Faculty of Science</i></p>	<p><i>We will start exploring this possibility by September 2024</i></p>	<p><i>Y, if new courses, concentrations, or minors are developed, we will submit a calendar change proposal in the 2025-26 modification cycle.</i></p>

<p>and (3) minors in DS for students in other disciplines.</p>					
<p>8. Opportunity- The future for data science remains very bright, and this program offers the foundation for further program development. In particular, the program description says that the IDS will explore a fully online or formally hybrid version of the program. We agree that exploring an online option is worthwhile, as this could expand its reach and offer options for students who are not in Ottawa. Additional online development, such as certificate programs and other short re-education programs in data science could have massive interest, especially among the many professionals with government organizations in Ottawa. We encourage the IDS to think big about the nature of instruction in DS, both in format and in terms of potential new audiences, while maintaining focus in the short term on ensuring that the present program is offered in its current format with very high quality.</p>	<p><i>Agreed to unconditionally</i></p>	<p><i>We are actively exploring the possibility of offering certificate programs and other professional development programs in Data Science. We will also explore running these courses online as well.</i></p> <p><i>In 2025 Summer, we will strike a committee to explore the online data science option. We are excited by the opportunity to develop a program that can cater to students outside of Ottawa, while providing a similarly enriching experience for those who want to pursue Data Science.</i></p>	<p><i>Associate Dean, Undergraduate Affairs, Faculty of Science</i></p> <p><i>Professional Programs Officer, Faculty of Science</i></p>	<p><i>We will formally start exploring certificate and professional development courses July 2024.</i></p> <p><i>We will strike up a committee by September 2025 to explore the possibility of an online version of the Bachelor of Data Science.</i></p>	<p><i>Y, if new certificates, or an online program is created, we will submit a calendar change proposal in the 2026-27 modification cycle.</i></p>
<p>9. Opportunity- With the expansion of the IDS and pending integration of faculty members from complementary disciplines, this unit has potential for leadership in the DS discipline that many similar programs don't have. We</p>	<p><i>Agreed to unconditionally</i></p>	<p><i>Communication Skills for Data Scientists (DATA 2200) contains material on data visualization. However, we completely agree that courses will need to be developed to bolster our data science offerings and to keep up with modern</i></p>	<p><i>Director, School of Computer Science</i></p>	<p><i>Programming reviews will be completed yearly before October of each year as part of</i></p>	<p><i>Y, if new courses are deemed necessary, we will submit a calendar</i></p>

<p>encourage the leaders and developers of this program to consider development of courses in addition to those currently available or planned, such as data visualization or statistics in Python. This could also include leadership in studying and developing courses in new areas in DS, beyond anything we might think of in the moment.</p>		<p><i>trends in technology and practice. We will utilize Special Topics courses to pilot courses on topics in emerging areas in data science and formalize them as they take hold in the field. We believe that flexibility is necessary in Data Science programming to maintain relevance.</i></p>	<p><i>Director, School of Mathematics and Statistics</i></p> <p><i>Director, Carleton Institute for Data Science</i></p>	<p><i>the ongoing curriculum review process.</i></p>	<p><i>change proposal in the 2025-26 modification cycle.</i></p>
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Dean's Response
Programs Being Reviewed: Bachelor of Data Science
Date: May 9th 2024
Version: 1

Instruction

The table below has been pre-populated with the external reviewer recommendations. Please complete the Dean's Response column by providing a separate response to each of the external reviewers' recommendations, as required by the QAF (5.3.1).

Dean's Response Programs Being Reviewed: Bachelor of Data Science Prepared by: Maria DeRosa	
External Reviewer Recommendation & Categorization	Dean's response A response is required for each recommendation listed.
<p>1. Weakness- We had several interesting conversations with program faculty and others in the Dean's staff who acknowledge the vital role that "soft skills" play in the development and placement of DS graduates in the workforce. However, the program has no concrete plan for providing training in these areas. While co-op placement preparation may help some of the program's students to develop some of their more generic skills, the program should more carefully consider the specific non-technical skills that DS graduates need to thrive in the workplace, and they should develop some form of required coursework or seminar on the subject.</p>	<p>I wholeheartedly support the integration of soft skill development into the university experience of all science students, in particular, the Data Science undergraduate students. In fact, our Science strategic plan has a specific action item related to leveraging our Science Student Success Centre and our Community Engagement and Outreach Officer to give students the opportunity to enhance these skills through interactions with community members, industry, etc. at networking forums, job shadowing, etc. In addition to the skills that will be fostered in <i>Communication Skills for Data Scientists (DATA 2200)</i>, we will use existing training provided through the SSSC as well as new programming if necessary to enhance the holistic education of our students to include these soft skills that will improve their employability.</p>
<p>2. Opportunity-We suggest approaching the IDS and/or program advisory board to play a role in the development and/or delivery of soft-skills instruction. Many organizations actively seek such opportunities for engagement with local universities, so this could be a win-win.</p>	<p>A second action item in our strategic plan states that we aim to: "Dedicate resources for outreach activities to foster partnerships in research and training with government, hospitals, NGO's, industry, embassies, museums, and others". Our partnership with the IDS external advisory board is a well-established and successful example of our commitment to this goal. I fully support the idea of engaging with the advisory</p>

	board both in the conception of any new soft-skills enhancing experiences and in the delivery where applicable.
<p>3. Concern- The new program and unit will eventually have its own administration and advising staff to support students. In the interim these duties will be handled by existing SCS staff, possibly as an overload. SCS staff have demonstrated ability to multitask and to advise students in joint programs with SMS in the past. However, growth in their own programs has already resulted in corresponding increases in their administrative and advising burdens. Considering the unique nature of the DS program, it requires careful and special attention to ensure a high-quality student experience throughout. We recommend that the transition to dedicated IDS staff be planned and executed in an established timeline, and not be left with an indefinite time frame that risks imposing a problematic burden on SCS staff, with potential negative impacts on student experience. This plan should include onboarding of the Science Student Success Centre, which will need creative leadership from IDS to support new students until senior program students are available to start the peer mentorship cycle.</p>	<p>I fully support the hiring plan that has been proposed for this new program, and will advocate for resources through the yearly budget allocation process concomitant with the program reaching its expected and reasonable enrollment targets. I also recognize the important role of the SSSC in the peer mentorship of these students and will prioritize access to the centre and its programming for these students.</p>
<p>4. Concern- The new program will make heavy use of existing instructional and student support space dedicated to support current CS students. As DS and other CS programs grow, there are real concerns that this space will not be adequate to meet all demands. There are hopes that a separate data science building could be constructed, which would be ideal. In the interim, assuming that the program grows in line with its targets, these students and the new faculty hires related to the program will need space dedicated to their needs. These needs can already be projected; hence, suitable student study and social areas, as well as faculty office space, should be identified as soon as is reasonable.</p>	<p>I recognize the importance of student space to their overall experience in all our programs. Further, as the program grows towards its projected targets, additional faculty space will be needed. The Faculty of Science is developing a cohesive plan to address space issues across the Faculty. The space needs of new programs such as data science will be considered and prioritized within this plan, in consultation with the unit's space committee. I will continue to advocate for space on an ongoing basis and allocate it appropriately as Data Science reaches its enrolment targets.</p>

<p>5. Concern- The IDS and other program faculty have an impressive record of networking and developing external relationships with colleagues in university, government, and industrial organizations. The IDS has an external advisory board, and there is a stated plan to create a separate external advisory committee for the program. To a large degree, the program depends on resources provided by these relationships, in the form of capstone, honours, and undergraduate research projects and co-op placements. These relationships are largely developed haphazardly by individuals; there is no specific concerted effort to cultivate further relationships and expand opportunities for students, or to regularly “mine” those relationships for tangible project topics and data sets. This could become a critical issue if the program grows as projected and the need for more projects soars. We recommend that the IDS formalize the process of cultivating relationships with internal and external organizations that can provide input, projects, and other opportunities for students. Some process or structure should be put in place to ensure that this burden does not fall on a small number of faculty members without coordination and, hence, risk falling short of demand. Possibly the new program administrator could fill a dual role as business development officer, or part of one faculty member’s formal assignment could be dedicated to the process of developing relationships and coordinating student projects. (Note that this is also an opportunity to deliberately cultivate relationships where some fraction of them will likely result in great benefits to the program, the unit, and the university.)</p>	<p>I am cognizant that relationship building with internal and external stakeholders can be a burden on faculty members when it lacks support systems and coordination. The office of the Dean of Science has several positions with the mandate to support this internal and external outreach including the Director of External Affairs, the Professional Programs Officer, and the Community Engagement and Outreach Officer. In Data Science in particular, initiatives such as Data Day, which celebrated its tenth anniversary this year, have been very successful at cultivating new partnerships and supporting existing relationships. The MOU with Stats Can is another example where we have attempted to provide formal structure and opportunities for engagement. We also have the full support of centralized offices such as Co-op, the Centre for Community Engagement, and Industry and Partnerships Services in these endeavors. Using this model, we have a strong foundation in place for scaling up engagement to support the new undergraduate program. We will review and assess the success of our process yearly with our internal and external boards and refine it as necessary to ensure a wealth of opportunities are available to our students and that faculty burden can be mitigated.</p>
<p>6. Concern- Courses for the program are offered in two separate schools and will initially be taught by existing faculty in the two cooperating schools, not all of whom may be specifically data scientists. We understand that these schools have a history of cooperation and work well together. Nonetheless, combining course requirements from multiple units creates possible risks</p>	<p>The degree to which our units are collaborative and supportive is a point of pride within our Faculty. I will continue to support collaboration between units in FoS and I will continue to work with the Directors of the School of Computer Science, the School of Mathematics and Statistics, and the IDS to ensure this continues. Coordination between units and course scheduling is routinely done for many of the programs within our faculty, particularly interdisciplinary programs. The shared graduate degree and the collaborative graduate</p>

<p>relating to (a) scheduling conflicts for students, especially those late in their programs who may not have future opportunities to take required courses, and (b) courses being taught in ways that do not meet the specific needs of this particular student population (e.g., not using appropriate languages or software, focus on abstract or theoretical issues instead of data-focused topics). Understanding the complexities of course scheduling and teaching assignments, we encourage directors and administrators of the schools to carefully coordinate their course-related scheduling and assignments to ensure that the program needs are suitably met. The eventual administrator for IDS may be able to assist with this coordination. The planned faculty hiring to support the program growth should be carried out at a sufficient pace to ensure that teaching expertise is aligned with course offerings.</p>	<p>specialization in Data Science is evidence that these units have a history of working together successfully that we will leverage as we introduce the undergraduate program.</p>
<p>7. Opportunity-This program is unique in that the subject of its focus—data—is ubiquitous in every facet of industry, commerce, government, science, and indeed, life. The opportunities are virtually unparalleled for this program to expand in numerous known, and yet-to-be-discovered, directions. The letters of support for the program from other units within Carleton conveyed not only unanimous support for the program, but also hope that the respective units could collaborate with the program to create more opportunities for their students. While it makes sense to focus on getting the core program and associated concentrations running effectively at first, we encourage the IDS and affiliated personnel to proactively explore and develop collaborations with many other academic units around campus as soon as possible, preferably before the next cyclical review. Possibilities include (1) additional concentrations in DS relating to disciplines that are particularly closely aligned with DS, (2) courses supporting new concentrations in DS that can be offered to other programs that wish to develop</p>	<p>Data Science is an area where I view incredible potential for interdisciplinary collaboration across all science units and indeed across the entire campus. I support the exploration of new data science concentrations and minors. We already have interest from every Faculty and the Professional Programs Officer in the Office of the Dean of Science will support these discussions.</p>

<p>their own concentrations in DS, and (3) minors in DS for students in other disciplines.</p>	
<p>8. Opportunity- The future for data science remains very bright, and this program offers the foundation for further program development. In particular, the program description says that the IDS will explore a fully online or formally hybrid version of the program. We agree that exploring an online option is worthwhile, as this could expand its reach and offer options for students who are not in Ottawa. Additional online development, such as certificate programs and other short re-education programs in data science could have massive interest, especially among the many professionals with government organizations in Ottawa. We encourage the IDS to think big about the nature of instruction in DS, both in format and in terms of potential new audiences, while maintaining focus in the short term on ensuring that the present program is offered in its current format with very high quality.</p>	<p>This opportunity aligns well with our strategic plan’s action item to: “Increase the suite of micro-credential offerings ...” I fully support the creation of certificates and other professional development programs with Data Science. The Professional Programs Officer in the Office of the Dean of Science will support the development of these programs.</p> <p>The possibility of an online Data Science degree is also of great interest to the Faculty of Science and we are exploring the opportunity to provide an enriching and practical Data Science education for different type of learners, be it those who are trying to balance work and school, or those who are unable or uninterested to come to Ottawa.</p>
<p>9. Opportunity- With the expansion of the IDS and pending integration of faculty members from complementary disciplines, this unit has potential for leadership in the DS discipline that many similar programs don’t have. We encourage the leaders and developers of this program to consider development of courses in addition to those currently available or planned, such as data visualization or statistics in Python. This could also include leadership in studying and developing courses in new areas in DS, beyond anything we might think of in the moment.</p>	<p>“Future-proofing” this program is very important given the rapidly evolving landscape of data science. I support the plan to utilize the Special Topics course to pilot new and emerging areas of Data Science offerings.</p>

Date: May 24, 2024

To: Dr. Robert Burk, Director, School of Mathematics and Statistics
Dr. Michel Barbeau, Director, School of Computer Science

From: Dr. David Hornsby, Vice-Provost and Associate Vice-President (Academic);
Chair, Senate Quality Assurance and Planning Committee

Cc: Dr. Pauline Rankin, Provost and Vice-President (Academic)
Dr. Hashmat Kahn, Associate Vice-President (Academic Programs and Strategic Initiatives)
Dr. Maria DeRosa, Dean, Faculty of Science
Dr. Julia Wallace, Associate Dean (Undergraduate Affairs), Faculty of Science
Dr. Ethan Hermer, Professional Programs Officer, Faculty of Science
Christina Noja, Manager, Office of Academic Programs and Strategic Initiatives
Dr. Robyn Green, Program Officer, Office of Academic Programs and Strategic Initiatives
Dr. Lizzie Yan, Program Assessment Specialist, Office of Academic Programs and Strategic Initiatives

RE: Outcome of New Program Proposal

The Senate Quality Assurance and Planning Committee (SQAPC) met on **May 23rd, 2024** to consider the unit's response to the External Reviewers' report for the following new program proposal:

- Bachelors of Data Science

In accordance with article 3.5.8 of Carleton's Institutional Quality Assurance Process, SQAPC has determined the outcome of the programs as "**Recommended to commence**".

The External Reviewers' Report made a number of recommendations, which the committee felt were appropriately addressed.

The Committee wishes to thank the unit for their submission and congratulate the unit on a successful new program proposal. The next stage in the new program approval process is the submission of the new program brief to Carleton University Senate (**June 7th, 2024**). Before the program can be advertised and officially commence, approval from both the Ontario Universities' Council on Quality Assurance and the Ministry of Advanced Education and Skills Development is required.

Please do not hesitate to contact me should you have any questions or concerns.

Sincerely,



Professor David J Hornsby, BA (Hons), MA, PhD (Cantab)
Vice-Provost and Associate Vice-President (Academic)
Professor of International Affairs



Carleton
University

Faculty
of Science

FACULTY OF SCIENCE
3230 HERZBERG LABORATORIES
CARLETON UNIVERSITY
1125 COLONEL BY DRIVE
OTTAWA, ONTARIO, K1S 5B6

May 13, 2024

Re: Letter of Support for the Bachelor of Data Science

To whom it may concern,

I am delighted to offer my full support for the proposed Bachelor of Data Science. Within our Faculty and beyond, we recognize the critical importance of data science in driving innovation, informed decision-making, and economic growth across various sectors. This program builds upon the foundation of our successful Collaborative Specialization in Data Science and our Data Science, Analytics, and Artificial Intelligence graduate programs, and leverages our internal and external partnerships that have stemmed from a decade of outreach and engagement on the topic within our Institute of Data Science. This degree is a collaboration between the School of Computer Science and the School of Mathematics and Statistics, and has been supported by StatsCan who agreed to consult on program development and will take part in data science coursework.

The Faculty of Science sees a real opportunity for Carleton to train highly skilled data scientists who can think analytically, creatively, and leverage AI and big data to aid in decision making. The demand for data science professionals is rapidly increasing, with applications spanning fields such as healthcare, finance, technology, and government. The program will cover data wrangling, inferential statistics, analytics, AI, big data, and data ethics. Concentrations in AI or statistics will be available for those students seeking further specialization and the non-concentration path gives ample room for minors to broaden the applicability of their degree. The proposed program has received strong support from the entire university and all relevant units. This initiative is timely and aligns with the strategic vision of the university to provide cutting-edge education and prepare students for the challenges of the modern world. I am confident that the program will produce graduates who will make significant contributions to the field of data science and beyond. I therefore strongly support the proposal of this new program.

Sincerely,

Maria DeRosa, Ph.D.
Dean, Faculty of Science
Carleton University

New Program Proposal

Date Submitted: 05/16/24 11:17 am

Viewing: **TBD-2250 : Data Science B.D.S.
Honours**

Last edit: 05/16/24 2:12 pm

Last modified by: nataliephelan

[Changes proposed by: ethanhermer](#)

In Workflow

1. DATA ChairDir UG
2. SCI Dean
3. SCI FCC
4. SCI FBoard
5. PRE SCCASP
6. SCCASP
7. SQAPC
8. Senate
9. PRE CalEditor
10. CalEditor

Approval Path

1. 05/16/24 2:16 pm
Ethan Hermer
(ethanhermer):
Approved for DATA
ChairDir UG
2. 05/21/24 8:30 am
Julia Wallace
(juliawallace): Approved
for SCI Dean
3. 05/21/24 9:35 am
Julia Wallace
(juliawallace): Approved
for SCI FCC
4. 05/21/24 9:35 am
Julia Wallace
(juliawallace): Approved
for SCI FBoard

Effective Date	2025-26
Workflow	majormod
Program Code	TBD-2250
Level	Undergraduate
Faculty	Faculty of Science
Academic Unit	Institute of Data Science
Degree	
Title	Data Science B.D.S. Honours

Program Requirements

Data Science

B.D.S. Honours (20.0 credits)

A. Credits Included in the Major CGPA (12.5 credits)

1. 2.0 credits in:		2.0
MATH 1007 [0.5]	Elementary Calculus I	
MATH 1104 [0.5]	Linear Algebra for Engineering or Science	
MATH 1805 [0.5]	Discrete Structures I	
MATH 2007 [0.5]	Elementary Calculus II	
2. 1.0 credit in:		1.0
DATA 2200 [0.0]	Communication Skills for Data Scientists	
PHIL 2106 [0.5]	Information Ethics	
3. 4.5 credits in:		4.5
COMP 1405 [0.5]	Introduction to Computer Science I	
COMP 1406 [0.5]	Introduction to Computer Science II	
COMP 2109 [0.5]	Introduction to Security and Privacy	
COMP 2401 [0.5]	Introduction to Systems Programming	
COMP 2402 [0.5]	Abstract Data Types and Algorithms	
COMP 2404 [0.5]	Introduction to Software Engineering	
COMP 2406 [0.5]	Fundamentals of Web Applications	
COMP 3105 [0.5]	Introduction to Machine Learning	
COMP 4107 [0.5]	Neural Networks	
4. 0.5 credits from:		0.5
STAT 2507 [0.5]	Introduction to Statistical Modeling I	
STAT 2517 [0.0]	Data Modelling I	
STAT 2559 [0.5]	Basics of Statistical Modeling (Honours)	
5. 0.5 credits from:		0.5
STAT 2509 [0.5]	Introduction to Statistical Modeling II	
STAT 2519 [0.0]	Data Modelling II	
STAT 2655 [0.5]	Introduction to Probability with Applications (Honours)	
6. 2.5 credits in:		2.5
STAT 1500 [0.5]	Introduction to Statistical Computing	
STAT 2500 [0.0]	Data Wrangling in R	
STAT 3500 [0.0]	Statistical Programming in R	
STAT 3503 [0.5]	Regression Analysis	
STAT 4601 [0.5]	Data Mining I (Honours)	
7. 1.0 credit from:		1.0
COMP 4102 [0.5]	Computer Vision	
COMP 4115 [0.5]	Introduction to Natural Language Processing	
COMP 4116 [0.0]	Multiagent Systems	
COMP 4117 [0.0]	Reinforcement Learning	
STAT 3504 [0.5]	Analysis of Variance and Experimental Design	
STAT 3507 [0.5]	Sampling Methodology	

STAT 4502 [0.5]	Survey Sampling (Honours)	
STAT 4503 [0.5]	Applied Multivariate Analysis (Honours)	
STAT 4504 [0.5]	Statistical Design and Analysis of Experiments (Honours)	
STAT 4604 [0.5]	Statistical Computing (Honours)	
STAT 4607 [0.5]	Bayesian Statistical Analysis (Honours)	
8. 0.5 credits in COMP or STAT at the 4000-level		0.5
B. Credits Not Included in the Major CGPA (7.5 credits)		
9. 7.5 credits in free electives.		7.5
Total Credits		20.0

New Resources No New Resources

Summary New program Bachelor of Data Science for launch in 25-26.

Rationale In our data driven world, there is a clear need for individuals who can formulate questions, design the collection and storage of data, write reliable and fast code for wrangling data sets, utilize inferential statistics, machine learning and Artificial Intelligence (AI) to analyze data, and present the translated results in a responsible, reproducible and actionable way. In response to this need, we are creating a Bachelor of Data Science to provide undergraduate students with the computer science and statistics background necessary to extract value and insights from data using a data science workflow. Building on the success of the graduate Data Science programs, the School of Computer Science and the School of Mathematics and Statistics created this program with input from StatCan.

Transition/Implementation

Program reviewer
comments

New Program Proposal

Date Submitted: 05/16/24 11:44 am

Viewing: **TBD-2251 : Concentration in Artificial Intelligence - B.D.S. Honours**

Last edit: 05/16/24 2:05 pm

Last modified by: nataliephelan

[Changes proposed by: ethanhermer](#)

In Workflow

1. DATA ChairDir UG
2. SCI Dean
3. SCI FCC
4. SCI FBoard
5. PRE SCCASP
6. SCCASP
7. SQAPC
8. Senate
9. PRE CalEditor
10. CalEditor

Approval Path

1. 05/16/24 2:09 pm
Ethan Hermer
(ethanhermer):
Approved for DATA
ChairDir UG
2. 05/21/24 8:30 am
Julia Wallace
(juliawallace): Approved
for SCI Dean
3. 05/21/24 9:35 am
Julia Wallace
(juliawallace): Approved
for SCI FCC
4. 05/21/24 9:35 am
Julia Wallace
(juliawallace): Approved
for SCI FBoard

Effective Date	2025-26
Workflow	majormod
Program Code	TBD-2251
Level	Undergraduate
Faculty	Faculty of Science
Academic Unit	Institute of Data Science
Degree	
Title	Concentration in Artificial Intelligence - B.D.S. Honours

Program Requirements

Concentration in Artificial Intelligence (3.5 credits)

1. 2.0 credit in:		2.0
COMP 2804 [0.5]	Discrete Structures II	
COMP 3005 [0.5]	Database Management Systems	
COMP 3106 [0.5]	Introduction to Artificial Intelligence	
COMP 3804 [0.5]	Design and Analysis of Algorithms I	
2. 1.5 credits from:		1.5
COMP 3801 [0.5]	Algorithms for Modern Data Sets	
COMP 4102 [0.5]	Computer Vision	
COMP 4115 [0.5]	Introduction to Natural Language Processing	
COMP 4116 [0.0]	Multiagent Systems	
COMP 4117 [0.0]	Reinforcement Learning	
COMP 4804 [0.5]	Design and Analysis of Algorithms II	
COMP 4905 [0.5]	Honours Project	
COMP 4906 [1.0]	Honours Thesis	
Total Credits		3.5

New Resources No New Resources

Summary Assoc with NP Bachelor of Data Science, TBD-2250

Rationale Data Science is a multidisciplinary field. However, some students may want to focus their expertise. Students who wish to bolster their computer science and artificial intelligence theory can complete an AI Concentration. This concentration provides students with a strong background in artificial intelligence as well as advanced algorithms, computer vision, natural language processing, or reinforcement learning. Additionally, students can apply this theory in an honours project or thesis.

Transition/Implementation TBD

Program reviewer comments

New Program Proposal

Date Submitted: 05/16/24 11:44 am

Viewing: **TBD-2252 : Concentration in Statistics
- B.D.S. Honours**

Last edit: 05/16/24 11:44 am

Last modified by: ethanhermer

[Changes proposed by: ethanhermer](#)

In Workflow

1. DATA ChairDir UG
2. SCI Dean
3. SCI FCC
4. SCI FBoard
5. PRE SCCASP
6. SCCASP
7. SQAPC
8. Senate
9. PRE CalEditor
10. CalEditor

Approval Path

1. 05/16/24 1:12 pm
Ethan Hermer
(ethanhermer):
Approved for DATA
ChairDir UG
2. 05/21/24 8:30 am
Julia Wallace
(juliawallace): Approved
for SCI Dean
3. 05/21/24 9:35 am
Julia Wallace
(juliawallace): Approved
for SCI FCC
4. 05/21/24 9:35 am
Julia Wallace
(juliawallace): Approved
for SCI FBoard

Effective Date	2025-26
Workflow	majormod
Program Code	TBD-2252
Level	Undergraduate
Faculty	Faculty of Science
Academic Unit	Institute of Data Science
Degree	
Title	Concentration in Statistics - B.D.S. Honours

Program Requirements

Concentration in Statistics (4.0 credits)

1. 2.0 credits in:		2.0
STAT 3210 [0.0]	Inferential Data Science Foundations I	
STAT 3553 [0.5]	Regression Modeling (Honours)	
STAT 4321 [0.0]	Inferential Data Science Foundations II	
STAT 4322 [0.0]	Learning from Big Data	
2. 1.0 credit from:		1.0
STAT 3504 [0.5]	Analysis of Variance and Experimental Design	
STAT 4502 [0.5]	Survey Sampling (Honours)	
STAT 4503 [0.5]	Applied Multivariate Analysis (Honours)	
STAT 4504 [0.5]	Statistical Design and Analysis of Experiments (Honours)	
STAT 4607 [0.5]	Bayesian Statistical Analysis (Honours)	
3. 1.0 credit from:		1.0
DATA 4848 [1.0], or		
STAT 4905 [0.5] and 0.5 credits in STAT at the 4000-level		
Total Credits		4.0

New Resources No New Resources

Summary Assoc with NP Bachelor of Data Science TBD-2250

Rationale Data Science is a multidisciplinary field. However, some students may want to further their expertise. Students who wish to focus on inferential statistics in a practical context can complete a Statistics Concentration. This concentration provides students with a strong theoretical background in inferential statistics, including applied multivariate analysis, survey sampling, statistical design in the experimental context, and Bayesian statistical analysis. These theoretical skills are solidified with an honours project or a consulting project where students will practically apply their knowledge to either an industry or academic question.

Transition/Implementation TBD

Program reviewer comments

New Course Proposal

Date Submitted: 05/09/24 2:14 pm

Viewing: **DATA 4848 : Consulting Project**

Last edit: 05/16/24 2:09 pm

[Changes proposed by: nataliephelan](#)

Programs referencing this course [Concentration in Statistics - B.D.S. Honours](#)

In Workflow

1. DATA ChairDir UG
2. SCI FCC
3. SCI FBoard
4. PRE SCCASP
5. SCCASP
6. SQAPC
7. Senate
8. PRE CalEditor
9. Banner

Approval Path

1. 05/16/24 2:17 pm
Ethan Hermer
(ethanhermer):
Approved for DATA
ChairDir UG
2. 05/21/24 9:14 am
Julia Wallace
(juliawallace): Approved
for SCI FCC
3. 05/21/24 9:35 am
Julia Wallace
(juliawallace): Approved
for SCI FBoard

Effective Date	2025-26
Workflow	majormod
New Resources	No New Resources
Level	Undergraduate
Course Code	DATA
Course Number	4848
Title	Consulting Project
Title (short)	Consulting Project

Faculty	Faculty of Science
Academic Unit	Institute of Data Science
Credit Value	1.0

Special/Selected Topics	Not Applicable
Significant Experiential Learning	Applied Research Project
Course Description	This course is designed to give students some practical experience as a data science consultant through classroom discussion of issues in consulting and participation in real consulting projects.
Prerequisite(s)	fourth-year standing in the Bachelor of Data Science program.
Class Format	TBD
Precluded Courses	
Also listed as	
Piggybacked Courses	

Grade Mode	Standard Letter Grade
Schedule Type	*Research Project *May constitute a major modification under Carleton's IQAP. Please consult https://carleton.ca/viceprovost/major-minor-modifications/ for more details.
Unpaid Placement	No
Summary	Assoc with NP Bachelor of Data Science B.D.S. (TBD-2250). New capstone course for Data Science.
Rationale for new course	

Course reviewer comments

Carleton
University



Office of the Vice-Provost and
Associate Vice-President (Academic)

Institutional Quality Assurance Process

Bachelors of Data Science

New Program Approval Template

(Volume II)

March 2024

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Contact

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Top Skills

Academic Leadership.
Interdisciplinary
Research.
Data Science.
Parallel Computing.

Honours-Awards

Chancellor's Professor
Designation.
Fellow, IBM Centre
For Advanced Studies.
IBM Canada Research
Impact Of The Year
Award.
3 University Research
Achievement Awards.

Publications

187 publications in
refereed journals and
refereed conference
proceedings with more
than 5,000 citations

Grants

\$2,042,000 personal
research grants.
\$2,674,000 personal
compute grants.
\$41,017,000 group
research grants.

Frank Dehne, PhD

Chancellor's Professor of Computer Science
Carleton University, Ottawa, Canada

Summary

Founding Director, Institute for Data Science

My appointment as Fellow of the IBM Centre For Advanced Studies helped Carleton University be the first university in Canada to receive a \$1,000,000 IBM startup grant in 2015 for a new data science research centre. I became the Founding Director of the new Carleton University Institute for Data Science (CUIDS) with six newly hired professors, a secretary, new research labs and cloud infrastructure. Our new institute occupies the entire top floor of the Herzberg Annex building. I initiated and led the creation of an interdisciplinary Master's program in which students from 17 departments in the Sciences, Engineering, Business, Arts, and Social Sciences learn to collaborate on interdisciplinary data science projects. Within seven years, enrolment grew to more than 250 Master's students. CUIDS has become the third largest graduate program at Carleton and is now front-and-centre in the university's strategic plan. In 2022, the university approved a PhD program in data science. More details below.

Director (Head), School of Computer Science

Reporting to the Provost for all academic program development matters, and reporting for all financial and operational matters to the Dean of Science, I was responsible for: (i) an academic staff of more than 30 professors, five administrative staff, four technical support staff and over 100 teaching assistants; (ii) an undergraduate program with over 500 Computer Science majors; (iii) graduate programs with over 100 Master's and over 50 PhD students; and (iv) the development and operation of more than 60 courses. As outlined below, I initiated and led a major expansion and reorganization of the School and its academic programs.

Interdisciplinary Research: Data Science & Parallel Computing

I specialize in interdisciplinary and collaborative research in data science and parallel computing. We use cloud computing systems, cluster computing, multi-core processors, and GPUs to create high-performance computing systems for solving data-intensive and computationally hard problems in business data analytics, bioinformatics, and computational engineering. For my research collaboration with IBM on parallel systems for business data analytics, I was appointed Fellow of the IBM Centre For Advanced Studies in Toronto. I served on the editorial boards of IEEE Transactions on Computers and several other scientific journals, and I served as program committee member for many international conferences including the premier conferences in parallel computing, IEEE IPDPS and ACM SPAA. More details below.

Experience (in reverse chronological order)

Chancellor's Professor of Computer Science

2009 – Present. Carleton University, Ottawa, Canada.

I specialize in interdisciplinary and collaborative research in data science and parallel computing. We use cloud computing systems, cluster computing, multi-core processors and GPUs to create high-performance computing systems for solving data-intensive and computationally hard problems in business data analytics, bioinformatics, and computational engineering.

For example, I co-lead together with Professor Ashkan Golshani from the Institute for Biochemistry an interdisciplinary research group on computational proteomics and computational drug design. We developed the first high-performance computing system (named PIPE) for high-precision protein to protein interaction prediction and the design of new synthetic peptides with specific interaction properties. Our computational method is based on a novel machine learning algorithm that utilizes in-depth knowledge from experimental protein to protein interaction detection results in Professor Golshani's lab. PIPE has won international acclaim and has enabled new biomedical research. We collaborated with (i) the Ottawa Hospital Research Institute on new synthetic peptides for muscular dystrophy stem cell therapy; (ii) with the Department of Biochemistry at the University of Regina on designing anti Zika virus peptides; (iii) with the School of Medicine at WITS University in Johannesburg on new methods to explain evolutionary transitions; and (iv) with Agriculture Canada on the development of new soy bean plants that withstand cold climates. Most recently our group designed, via large-scale computation, a new synthetic peptide to block the interaction between the COVID spike protein and the human ACE2 receptor. Our novel peptide was synthesized and tested at the Ottawa Hospital Research Institute and the National Microbiology Laboratory in Winnipeg (on live COVID viruses). Both lab tests were successful.

Founding Director, Institute for Data Science

2015 – 2022. Carleton University, Ottawa, Canada.

My collaboration with the IBM Centre For Advanced Studies outlined below helped Carleton University be the first university in Canada to receive a \$1M startup grant from IBM for the establishment of a data science research centre in 2015. I became the Founding Director of the Carleton University Institute for Data Science (CUIDS). We had in-depth discussions with colleagues across campus, IBM, other corporate partners in Ottawa (Shopify, Mindbridge, Intersect, Kx Systems) and federal government agencies interested in data science (Statistics Canada, Bank of Canada, Defence Research and Development Canada) on the design of a collaborative interdisciplinary graduate program of high academic quality and high relevance for industry and government. A strong consensus emerged that the greatest need was for students from technology programs in Science & Engineering to develop the ability to collaborate

with students from Business, Arts, Social Science, and Natural Sciences, and vice versa. Thus emerged the idea to create a graduate program where students learn hands-on how to collaborate with students from very different disciplines by doing collaborative interdisciplinary data science projects.

I initiated and led negotiations with 17 departments across campus: Biology, Biomedical Engineering, Business, Chemistry, Cognitive Science, Communication, Computer Science, Economics, Electrical and Computer Engineering, Geography, Health Sciences, History, Information Technology, International Affairs, Physics, Psychology, Public Policy & Administration. Needless to say, it was not easy to negotiate a common structure for a collaborative graduate program between such a large number of very diverse departments. Our program consists of a common core and additional discipline specific courses for each field. At the heart of the common core, required for all students from all disciplines, is the DATA5000 data science interdisciplinary project. All students are organized into project groups of two students, each: one student from Computer Science, Engineering or IT, and the other student from the Natural Sciences, Business, Arts or Social Science. Each project group has a different project topic. For example, a Computer Science and Business student may collaborate on a supply chain analytics project. The Business student provides the business knowledge and data, and the Computer Science student provides the technical skills to build a software solution. Similarly, a Geography student and a Computer Engineering student could collaborate on a smart city or climate change problem. A Communications student and an IT student could collaborate on a Twitter analytics question. Many of these projects are supported by our industry and government partners mentioned above, who provide real life research questions and data.

At the end of each academic year, CUIDS organizes Data Day, our main annual outreach event with typically 500 to 800 attendees from academia, industry and government. In addition to technical presentations and panel discussions, every DATA5000 project group presents their project results. This event provides a great environment for our students to network with potential employers, as well as opportunities for our professors to network with potential industry and government collaborators.

Our interdisciplinary data science program is in very high demand, and admission criteria are among the highest on campus. Within seven years, enrolment grew to over 250 Master's students. CUIDS has become the third largest graduate program at Carleton University and is now front-and-centre in the university's strategic plan. In 2022, the university approved a PhD program in data science.

Fellow, IBM Centre For Advanced Studies

2010 – 2020. IBM Research, Toronto, Canada.

I am interested in interdisciplinary research projects that involve large data sets and computationally hard problems. One such example is large scale business data analytics (“big data”). In 2008, IBM purchased Cognos Corporation in Ottawa and

established Ottawa as IBM's main centre for data analytics in Canada. When installing big data systems for their clients, IBM encountered technical difficulties because their software tools had performance issues on very large data sets. That led to discussions between IBM/Cognos and my research lab at Carleton University. The data analytics operations that created these performance issues were complex aggregate (group-by) queries on large data sets, with the additional challenge that those data sets were highly dynamic. IBM funded a research project in my lab to address this problem. Our solution and delivered prototype won an IBM Innovation Impact Of The Year Award, and I was appointed Fellow of the IBM Centre For Advanced Studies in Toronto, Canada.

Member, Board of Governors

2011-2014. Concordia University, Edmonton, Canada.

Director (Head), School of Computer Science

2000 – 2003 and 2006 – 2008. Carleton University, Ottawa, Canada.

Professor of Information Technology

2003 – 2005. Griffith University, Brisbane, Australia.

Member, University Senate

2000 – 2003, 2006 – 2008. Carleton University, Ottawa, Canada.

Chair, Selection Committee, Dean of Science

2002. Carleton University, Ottawa, Canada.

Professor of Computer Science (tenured)

Associate Professor of Computer Science (tenured)

Assistant Professor Of Computer Science

1997 – 2009, 1990 – 1997, and 1986 – 1990, respectively.

Carleton University, Ottawa, Canada.

Publications

I have authored or co-authored 187 papers in refereed journals and refereed conference proceedings. These papers have received more than 5,000 citations.

Publication list: carleton.ca/dehne/publications

International Research Community

I have served on the editorial boards of IEEE Transaction on Computers and several other scientific journals. I have also served on the ACM Symposium on Parallel Algorithms and Architectures (SPAA) Steering Committee, EURO-PAR Advisory Board, and IEEE Technical Committee on Parallel Processing (TCPP). Over the years, I have served on a large number of program committees for international conferences

including the premier conferences in parallel computing, the IEEE IPDPS International Parallel and Distributed Processing Symposium (in 2009, 2019, and 2022) and the ACM SPAA Symposium on Parallelism in Algorithms and Architectures (in 2001, 2007, 2011, and 2017).

List of editorial boards: carleton.ca/dehne/editorial-boards

List of program committees: carleton.ca/dehne/program-committees

Research Grants

I have received a total of \$2,042,000 in personal research grants from various granting agencies. Since I require massive compute resources for my research, I also received several large compute time allocation grants at national supercomputing centres, totalling \$2,674,000 (compute time equivalent). In addition, I participated in several large interdisciplinary and multi-university research group projects that received a total funding of \$41,017,000.

List of research grants and awards: carleton.ca/dehne/grants-and-awards

Honours and Awards

Chancellor's Professor Designation.

In 2009, the President of Carleton University awarded me the honorary designation *Chancellor's Professor of Computer Science*. Such appointments are for “scholarly activities of outstanding merit” and reserved for the top 10% of full professors.

Fellow, IBM Centre For Advanced Studies.

In 2010, I was appointed *Fellow of the IBM Center For Advanced Studies* (Toronto, Canada) in recognition of my research work for IBM outlined above.

IBM Canada Research Impact Of The Year Award.

In 2012, I received an *IBM Canada Research Impact Of The Year Award* in recognition of my research work for IBM outlined above.

Three University Research Achievement Awards.

Each year, 800+ Carleton University professors from all disciplines compete for 10 *Carleton University Research Achievement Awards*. I have won this award three times: in 1993, 1999 and 2012.

Education

The Julius Maximilians University of Würzburg, Germany

Doctor of Philosophy (PhD), Computer Science

1983 – 1986 (Grade: *summa cum laude*)

The University of Würzburg was founded in 1402 and is one of Germany's oldest universities. A total of 14 Nobel Laureates in Science and Medicine have researched and taught at the University of Würzburg.

RWTH Aachen University, Germany

Bachelor's and Master's Degree, Computer Science

1978 – 1983 (Grade: *with distinction*)

RWTH Aachen University is known as the “MIT of Germany” and specializes in Engineering, Science, and Medicine. The RWTH Aachen has Germany's leading automotive engineering school and a supercomputing institute with some of Europe's largest parallel computers.

Dr. David Alexander Campbell
Professor, School of Mathematics and Statistics and
School of Computer Science,
Carleton University
DaveCampbell@cunet.carleton.ca

Employment

2019 - Professor, Carleton University; School of Mathematics and Statistics and School of Computer Science
2021 - 2023 Assistant Director, Data Science Applications, Bank of Canada
2019 - 2024 Adjunct Professor, Department of Statistics and Actuarial Science SFU
2013 - 2019 Associate Professor, Simon Fraser University
2007 - 2013 Assistant Professor, Simon Fraser University

Education

2003 - 2007 PhD Statistics, McGill University, Canada
2002 - 2003 MSc Statistics, Dalhousie University, Canada
2002 B.Sc. Environmetrics, Simon Fraser University, Canada

Academic Roles

2017 - 2019 Coordinator, SFU Data Science Program
2015 - 2019 Co-organizer Vancouver Learn Data Science Meetup Group
2014 - 2019 SFU Steering Committee member, Environmental Science Program
2013 - 2014 Visiting researcher, University of Manitoba Department of Statistics

Peer Reviewed Publications (Trainees are in bold)

1. Carleton, W. C., Campbell, D., and Collard, M. (2021) "Rainfall, temperature, and Classic Maya conflict: A comparison of hypotheses using Bayesian time-series analysis", PLOS ONE
2. **Wang**, R.C.C. Campbell, D., Green, J., Cuperlovic-Culf, M. (2021) "Automatic 1D 1H NMR metabolite quantification for bioreactor monitoring", Metabolites
3. **McDonald, S.**, Campbell, D. (2021) "A Review of Uncertainty Quantification for Density Estimation", Statistics Surveys, Vol. 15 (2021) 1–71, doi.org/10.1214/21-SS130

4. **Baitz, H. A., Jones, P.W.,** Campbell, D., Jones, A.A., Gicas, K.M., Giesbrecht, C.J. , Thornton, W.L., Barone, C.C., **Wang, N. Y.,** Panenka, W.J., Lang, D.J., Vila-Rodriguez, F., Leonova, O., Barr, A.M. , Procyszyn, R.M., Buchanan, T., Rauscher, A., Macewan, G.W. , Honer , W.G. and Thornton, A.E. (2021) “Component processes of decision making in a community sample of precariously housed persons: associations with learning and memory, and health-risk behaviours”, *Frontiers in Psychology*, doi: 10.3389/fpsyg.2021.571423
5. Carleton, W. C., Campbell, D., and Collard, M. (2021) “A reassessment of the impact of temperature change on European conflict during the second millennium CE using a bespoke Bayesian time-series model”, *Climatic Change*, Vol 165
6. Chkrebti, O., and Campbell, D. (2019) “Adaptive step-size selection for state-space based probabilistic differential equation solvers” *Statistics and Computing*
7. **Stojkova, B. J.** and Campbell, D., (2019) “Incremental Mixture Importance Sampling with Shotgun Optimization” *Journal of Computational and Graphical Statistics*, 28:4, 806-820, DOI: 10.1080/10618600.2019.1592756
8. **Heeney, N.D.,** Habib, F., Brar, G., Krahn, G., Campbell, D., Sanatani, S., and V.E. Claydon, (2019) “Validation of Finger Blood Pressure Monitoring in Children”, *Blood Pressure Monitoring*
9. **Jodie-A. Warren, T.D. Pulindu Ratnasekera,** David A. Campbell, Gail S. Anderson, (2018) “Hyperspectral measurements of immature *Lucilia sericata* (Meigen) (Diptera: Calliphoridae) raised on different food substrates” *PLOS ONE* <https://doi.org/10.1371/journal.pone.0192786>
10. **Carleton, W.C.,** Campbell, D. and Collard, M. (2018) “Chronological uncertainty severely complicates the identification of cyclical processes in radiocarbon-dated time-series.” *Palaeogeography, Palaeoclimatology, Palaeoecology*.
11. **Carleton, W. C.,** Campbell, D. and M. Collard. (2018) , “Radiocarbon dating uncertainty and the reliability of the PEWMA method of time-series analysis for research on long-term human-environment interaction” *PLoS ONE* 13(1): e0191055, doi:10.1371/journal.pone.0191055
12. **Jodie-A. Warren, T.D. Pulindu Ratnasekera,** David A. Campbell, Gail S. Anderson, (2017) “Initial investigations of spectral measurements to estimate the time within stages of *Protophormia terraenovae* (Robineau-Desvoidy) (Diptera: Calliphoridae)” *Forensic Science International*
13. **Warren, Jodie-A, Ratnasekera, T. D. Pulindu,** Campbell, David A, Anderson, Gail S, Rivers, David, Wallace, John R, “Spectral Signatures of Immature *Lucilia sericata* (Meigen) (Diptera: Calliphoridae)” *Insects*, 2017, Vol.8(2)
14. **Carleton, W. C.,** Campbell, D., and Collard, M. (2017) “Increasing temperature exacerbated Classic Maya conflict over the long term” *Quaternary Science Reviews*
15. **Chkrebti, O.,** Campbell, D., Calderhead, B., Girolami, M. (2016) “Bayesian Solution Uncertainty Quantification for Differential Equations”, *Bayesian Analysis (Discussion paper with rejoinder)* 11(4) 1239-1299
16. **Golchi, S.** and Campbell, D. (2016) “Sequentially Constrained Monte Carlo”, *Computational Statistics and Data Analysis* , vol. 97
17. **Lo, J.,** Campbell, D., Kennedy, C, Gobas, F. (2015) “Somatic and Gastro-Intestinal In-Vivo Biotransformation Rates of Hydrophobic Chemicals in Fish” *Environmental Toxicology and Chemistry*.
18. **Justin C. Lo, Daniel J. Letinski,** Thomas F. Parkerton, David A. Campbell, and Frank A. P. C. Gobas (2015) “In Vivo Biotransformation Rates of Organic Chemicals in Fish: Relationship with

Bioconcentration and Biomagnification Factors”, Environmental Science & Technology doi: 10.1021/acs.est.6b03602

19. **Justin C. Lo, Gayatri N. Allard**, S. Victoria Otton, David A. Campbell and Frank A.P.C. Gobas (2015) “Concentration dependence of biotransformation in fish liver S9: Optimizing substrate concentrations to estimate hepatic clearance for bioaccumulation assessment” Environmental Toxicology and Chemistry doi:10.1002/etc.3117
20. **Golchi, S.** Bingham, D., Chipman, H., Campbell, D. (2015) “Monotone Function Estimation for Computer Experiments” Journal of Uncertainty Quantification
21. **Cameron, E., Chkrebtti, O.**, Campbell, D., Bayne, E. (2015) “Trans-Dimensional Approximate Bayesian Computation for inference on models of invasive species” Computational Statistics and Data Analysis
22. **Carleton, W. C.**, Campbell, D., and Collard, M. (2014) “A Reassessment of the Impact of Drought Cycles on the Classic Maya.” Quaternary Science 105 doi:10.1016/j.quascirev.2014.09.032.
23. Campbell, D., and Subhash L. (2013) "An ANOVA Test for Parameter Estimability Using Data Cloning with Application to Statistical Inference for Dynamic Systems." Computational Statistics and Data Analysis doi:10.1016/j.csda.2013.09.013.
24. Campbell, D., **Chkrebtti, O.** (2013) “Maximum Profile Likelihood Estimation of Differential Equation Parameters through Model Based Smoothing State Estimates”, Mathematical Biosciences, doi:10.1016/j.mbs.2013.03.011
25. Campbell, D., Hooker, G., McAuley, K. (2012), "Parameter Estimation in Differential Equation Models With Constrained Variables", Journal of Chemometrics (doi: 10.1002/cem.2416)
26. **Lee, Y.S.**, Otton, S. V., Campbell, D. A., Moore, M., Kennedy, C. J., Gobas, F. A., (2011) “Measuring in-vitro Biotransformation Rates of Super Hydrophobic Chemicals in Rat Liver S9 Fractions Using Thin-Film Sorbent-Phase Dosing” Environmental Science & Technology doi:10.1021/es203338h
27. Campbell, D. and Steele, R. (2011), “Smooth Functional Tempering for Nonlinear Differential Equation Models”, Statistics and Computing, doi:10.1007/s11222-011-9234-3
28. Hutchins, S. and Campbell, D. (2009), "Estimating the Time to Reach a Target Frequency in Singing" Annals of the New York Academy of Sciences, Volume 1169, Number 1, July 2009 , pp. 116-120
29. Ramsay, J. O., Hooker, G., Campbell, D., and Cao, J. (2007), "Parameter Estimation for Differential Equations: A Generalized Smoothing Approach (with Discussion)," Journal of the Royal Statistical Society Series B, 69, 741-796.

Submitted Publications (trainees are in bold)

30. **Stojkova, B. J.** and Campbell, D., “Simulated Tempering without Normalizing Constants”
31. **Nguyen Hong Duc, P.**, Campbell, D, Dowd, M., and Joy, R. “Functional Data Analysis to Describe and Classify Southern Resident Killer Whale Calls”
32. **Wang, R.C.C.** Campbell, D., Cuperlovic-Culf , M. “A surrogate signal model for automated 1D 1H NMR compound quantification”

Non-Refereed Works

- Campbell, D. (2010) Discussion for “Riemann manifold Langevin and Hamiltonian Monte Carlo methods” by Girolami and Calderhead, *J. R. Statist. Soc. B* (2011) 73, Part 2, pp. 1–37
- Campbell, D. (2009) Biometrics book review of "Simulation and Inference for Stochastic Differential Equations with R Examples" 65(1) p 336
- D. Campbell, J. Cao, G. Hooker, and J. Ramsay, (2008) "Parameter Cascading for High Dimensional Models", chapter in "Functional and Operational Statistics" edited by Sophie Daro-Niang and Frédéric Ferraty, Springer

Invited Talks

1. July 2023. “Estimating the Effects of Economic Indicators on the Language Used in the Business Outlook Survey”, ISI meeting, Ottawa
2. July 2022. “Likelihood Challenges in Fitting Models” Ottawa Mathematics Conference, Keynote Speaker
3. July 2022. “Statistical Sentiment Analysis Techniques” AI4 Public Health
4. Nov 2021 “Testing Covariate Effects For Differences in Text Reviews of Canadian Beers”, Statistical Society of Ottawa seminar
5. Oct 2021 “Synthetic Data: A New Regulatory Tool”, Discussant, Rotman School of Management, University of Toronto
6. Sept 2021. “Covariate Effects and Hypothesis Testing in Text”, Statistics Canada
7. July 2021 “Environmental Data Science”, 6th Canadian Conference in Applied Statistics, Concordia University
8. March 2021 “Ill-Posed Problems in Dynamic Systems”, University of Alberta Statistics Seminar
9. March 2021 “Overcoming Statistical Challenges from Multimodal Likelihoods”, McMaster Statistics Seminar
10. July 2020 “Sequential Graphical Monte Carlo for Simultaneous Model Selection and Parameter Estimation”, AI4Design, National Research Council
11. Feb 2020 “Solving Statistical Multimodality By Exploiting Structure”, McGill University Biostatistics Seminar
12. Jan 2020 “Approximate Bayesian Computing for An Invasive Species Model”, Statistics Canada, Ottawa
13. Nov 2019 “Text Models for Job Adverts in Data Science”, Art of the Possible, Winnipeg
14. May 2019 “Functional Data Analysis for Assessing Convergence of Sampled Densities” SSC, Calgary
15. Apr 2019 “Data, Statistics, and Mathematical Modelling: a Significant Merger” BC Centre for Disease Control, Machine Learning for Precision Public Health Seminar

16. Nov 2018 “Testing for Statistical Identifiability” BIRS, meeting on Mathematical and Statistical Challenges in Bridging Model Development, Parameter Identification and Model Selection in the Biological Sciences
17. Aug 2018 “High Dimensional MCMC Diagnostics” JSM, Vancouver
18. June 2018 “Interacting with Industry” Statistical Society of Canada Meeting, Montreal
19. Apr 2018 “Probabilistic Numerics as a Fast Diagnostic” SIAM UQ meeting, Orange County, California
20. Oct 2017 “State Space Models for Climate and Conflict”, Statistical Society of Ottawa
21. Aug 2017 “New Perspectives on State Space Models” Workshop on State Space Models, Casa Mathematica Oaxaca Mexico
22. July 2017 “The Great Canadian Earthworm Invasion” Society of Mathematical Biology Meeting, Salt Lake City
23. Feb 2017 “Integrating via Laplace Approximation Diagnostics and Alternative Integration” Uncertainty Quantification Workshop, University of Pittsburgh
24. Feb 2017 The University of British Columbia, Department of Statistics Seminar “Probabilistic Differential Equation Solvers”
25. Jan 2017 moj.io Vancouver Data Science Seminar “ Extracting Value from 2.5 Million Car Records”
26. Jan 2017 splunk.com Vancouver, Machine Learning Seminar, “It’s Easy to Get an Answer but Hard to Tell if That Answer is Good”
27. Nov 2016 Department of Statistics, The Ohio State University “Statistical Model Relaxations”
28. Nov 2016 Mathematical Biosciences Institute, Columbus Ohio “Diagnostics for Fast Model Estimates”
29. Sept 2016 CANSSI workshop on State Space Models, Department of Fisheries and Oceans Research Station in Mont-Joli Quebec “Integrating via Laplace Approximation Diagnostics and Alternative Integration”
30. May 2016 Statistical Society of Canada, St. Catharines “Integrated Nested Laplace Approximation Diagnostics and Alternative Integration”
31. Feb 2016 California Institute of Technology Department of Computational and Mathematical Science seminar “Probabilistic Numerics and Solving Differential Equation”
32. June 2015 Data Science / Machine Learning / Use R Vancouver Meetup (held at Hootsuite in Vancouver), “The Great Canadian Worm Invasion”
33. March 2015 SIAM Computer Science and Engineering meeting, Salt Lake City Utah “Sequentially constrained Monte Carlo”
34. Jan 2015 UBC-Okanagan Unit five seminar series “Approximate Bayesian Computation and Invasive Species”
35. Oct 2014 SFU-UBC joint seminar, “Finding Statistics Jobs in Industry”
36. May 2014 University of Manitoba department of statistics seminar, “A Smoothing Based Method for Probabilistically Solving Differential Equations”

37. April 2014 SIAM Uncertainty Quantification meeting, Savannah Georgia, “Probabilistic Solutions to Incorrect Models with Model Discrepancies Where Inference must be Dealt with Using Emulators”
38. Nov 2013 University of Alberta, “MCMC tools for Data Cloning”
39. Nov 2013 BIRS workshop on Cyclic Populations, Banff International Research Station, “Probabilistic Solutions of Differential Equation Models”
40. Nov 2013 International Graduate Training Centre Summit, Banff International Research Station, “Effective Networking for Building Collaborations”
41. Sept 2013 Department of Statistics seminar series, University of Manitoba, “What can your data actually tell you about your parameters?”
42. Aug 2013 Joint Statistical Society Meeting, “An ANOVA test for Parameter Identifiability”
43. June 2013 Statistical Society of Canada meeting, “Inferring Nonlinear Differential Equation Models from Non-Parametric Functional Estimators”
44. April 2013 Department of Statistics and Actuarial Science seminar series, Simon Fraser University “An ANOVA Test for Parameter Identifiability”
45. Feb 2013 Workshop on Models and Methods in Ecology and Epidemiology, Montreal, “A Data Cloning Based Test for Parameter Identifiability”
46. June 2012 Laboratoire Statistique et Génome, Université d'Evry, France, Seminar, “Parameter Estimability and Statistical Inference for Dynamical Systems using Data Cloning”
47. Feb 2012 Recent Advances in Statistical Inference for Mathematical Biology Workshop “Incremental Mixture Important Sampling with Distributionally Relaxed Optimization and Application to Differential Equation Models”
48. June 2011 Statistics and Applied Mathematical Sciences Institute, Analysis of Object Data Transition Workshop, “Parameter Estimation Using Locally Enforced Models”
49. April 2011 Virginia Technical University Statistics Seminar, Blacksburg Virginia, USA “Parameter Estimation in Over Parameterized Differential Equation Models”
50. Dec 2010 Meeting of the International Chinese Statistical Association, Guangzhou China “The Role of Functional Data Analysis in Bayesian Model Selection.”
51. Aug 2010 Joint Statistical Society Meeting, Vancouver “Trans-Dimensional MCMC; Simplifying Model Selection by Jumping Through Function Spaces”
52. June 2010 Interface 2010, Seattle , “Simplified trans-dimensional model jumping with MCMC for complicated models.”
53. June 2010 Ecole Nationale Supérieure d'Informatique pour l'Industrie et l'Entreprise (ENSIIE), Université d'Evry, France. “Reversible Jump MCMC with Simple Model Transitions.”
54. May 2010 Société Française de Statistique, Marseilles, France. “Functional Data Analysis Methods as a Tool for Population MCMC Inference.”
55. May 2010 Institut de Mathématiques de Toulouse, Université Paul Sabatier, Toulouse, France. “Reversible Jump MCMC for Dynamic Systems.”
56. June 2009 Institut de Mathématiques de Toulouse, Université Paul Sabatier, Toulouse, France. “Population MCMC for inference in nonlinear models.”

- 57. June 2009 Workshop on Statistical Methods for Dynamic System Models, Eindhoven, the Netherlands. “Bayesian Methods for Nonlinear Differential Equation Models.”
- 58. June 2009 Workshop on Parameter Estimation for Dynamical Systems, Vancouver, Canada, “Smooth Functional Tempering for Nonlinear Differential Equation Models”
- 59. Dec 2008 International Association for Statistical Computing World Conference, Yokohama, Japan. “Bayesian Collocation Tempering for Nonlinear Differential Equation Models: Using Functional Data Methods to Improve Bayesian Inference”
- 60. Sept 2008 Second Graduate Research Summit of the International Graduate Training Centre in Mathematical Biology, Banff, Canada. “What Dynamic System Modelers Need to Know about Data and Statistics: Difficulties and Delights”
- 61. May 2008 Opening Meeting of the PIMS Collaborative Research Group on Bayesian Modeling and Computation for Networks, Semiahmoo, Washington. “MCMC Methods for Dynamic Systems Models : Bayesian Methods For Nonlinear Models”
- 62. April 2008 MITACS Workshop on Methodology of Validation and Verification, Banff Canada. “A Generalized Smoothing Approach to Parameter Estimation for Non-Linear Epidemiological Models”
- 63. Feb 2008 UBC statistics seminar series, Vancouver, Canada. “Collocation Tempering for Parameter Estimation from Differential Equation Models.”
- 64. Feb 2008 Canada-Mexico Statistics Meeting, Guanajuato Mexico. “Estimating Parameters from Differential Equation Models.”
- 65. Nov 2007 Mathematical Biology Seminar Series, University of Alberta, Edmonton, Canada. “MCMC Methods for Dynamic Systems Models: Bayesian Methods for Nonlinear Models”
- 66. Aug 2007 Joint Statistical Meeting, Salt Lake City, Utah. “Collocation Tempering for Differential Equation Models”
- 67. July 2007 Workshop on Statistical Methods for Modeling Dynamic Systems, Montreal Canada. “MCMC Methods for Differential Equation Models.”
- 68. May 2007 Ordinary Meeting of the Royal Statistical Society, London, England. “Parameter Estimation for Differential Equations:Generalized Smoothing Approach.”

Invited Panel Discussant

- Nov 2023 “The Role of Statistics for Public Good and Good Governance”, CANSSI Showcase
- May 2023 “Government and Academic Careers in Data Science and Statistics” Canadian Statistics Student Conference
- June 2022 “Collaborations and Consultations in an Academic World” Statistical Society of Canada
- June 2021 “Jobs in Statistics and Data Science” Ninth Annual Canadian Statistics Student Conference
- November 2019 “Ecosystems of Innovation”, Art of the Possible, Winnipeg

June 2018 “Alternative Funding Sources”, New Researchers Committee Panel Discussion, SSC, Montreal

August 2018 “Data Science Collaborations with Industry” JSM, Vancouver

October 2018 “Unlocking the Positive Potential of Big Data” Discovery Foundation Speaker Series, Sponsored by Coast Capital Savings Venture Connection, Vancouver

Research/Project Funding - Received

Contract/Grant: Grant **Submitted:** 2021 **Period:** 2021-2022
Project Title: Firsts for Women in Statistics in Canada
Funding: Statistical Society of Canada **Type:** External **Total:** \$5,000
Involvement: Principal Investigator

Contract/Grant: Research Grant **Submitted:** 2020 **Period:** 2020-2022
Project Title: Building Neural Networks for Classification of Killer Whale Calls
Funding: Department of Fisheries and Oceans **Type:** External **Total:** \$568,179
Involvement: Co-Investigator

Contract/Grant: Research Grant **Submitted:** 2020 **Period:** 2020-2022
Project Title: AI for simulation of Biological Systems
Funding: National Research Council of Canada / Artificial Intelligence for Design Project **Type:** External **Annual:** \$72,000 **Total:** \$144,000
Involvement: Principal Investigator

Contract/Grant: Research Grant **Submitted:** 2019 **Period:** 2019-2020
Project Title: Predicting Escalation to Violence using Social Media Posting of an Active Hate Group.
Funding: Next Big Question in Big Data Fund **Type:** Internal **Annual:** \$25,000
Total: \$25,000
Involvement: Principal Investigator

Contract/Grant: Research Grant **Submitted:** 2019 **Period:** 2019-2022
Project Title: Developing a real-time forecasting system for southern resident killer whales
Funding: Ocean and Freshwater Science Contribution Program - Department of Fisheries and Oceans **Type:** External **Annual:** \$206,667 **Total:** \$620,000
Involvement: Co- Investigator

Contract/Grant: Research Grant **Submitted:** 2018 **Period:** 2019-2024
Project Title: Uncertainty in Statistical Computing
Funding: NSERC Discovery **Type:** External **Annual:** \$36,000 **Total:** \$180,000
Involvement: Principal Investigator

Contract/Grant: Research Grant **Submitted:** 2017 **Period:** 2017-2020
Project Title: E-Community Health and Toxicity
Funding: MITACS Cluster **Type:** External **Total:** \$1,693,332
Involvement: Co-Investigator

Contract/Grant: Research Grant **Submitted:** 2017 **Period:** 2017
Project Title: Webpage Customer Persona Discovery and Push Notification Guidelines

Funding: MITACS Accelerate **Type:** External **Total:** \$15,000
Involvement: Principal Investigator

Contract/Grant: Research Grant **Submitted:** 2017 **Period:** 2017
Project Title: Statistical Models for Irregularly Sized Objects
Funding: NSERC Engage **Type:** External **Total:** \$25,000
Involvement: Principal Investigator

Contract/Grant: Teaching and Learning Development Grant **Awarded:** 2016 **Period:** 2016-2017
Project Title: Design and Piloting Data Wrangling Projects for a New Data Science Course (STAT 240)
Funding: SFU **Type:** Internal **Total:** \$5000
Involvement: Principal Investigator

Contract/Grant: Post-Doc funding Grant **Awarded:** 2016 **Period:** 2016-2017
Project Title: Statistical and Physiological Beat Modelling of Seismocardiogram Signal
Funding: MITACS Engage **Type:** External **Total:** \$55000
Involvement: Principal Investigator

Contract/Grant: Conference Grant **Awarded:** 2015 **Period:** 2017
Project Title: Conference on New perspectives on State Space Models
Funding: BIRS CMO **Type:** External **Total:** Conference accommodation and meals for 42 participants
Involvement: Principal Investigator
Institution of Co-Investigator(s): Marie Auger-Methe (Dalhousie University), Len Thomas (University of St. Andrews)

Contract/Grant: Research Grant **Awarded:** 2014 **Period:** 2014-2017
Project Title: Advancements to State-Space Models
Funding: CANSSI **Type:** External **Total:** \$200,000
Involvement: Co-Investigator
Institution of Co-Investigator(s): Dalhousie University, Fisheries and Oceans Canada

Contract/Grant: Research Grant **Awarded:** 2015 **Period:** 2015
Project Title: Modeling User Behaviour Over Time from Chat Messages
Funding: MITACS **Type:** External **Total:** \$15000
Involvement: Principal Investigator

Contract/Grant: Research Grant **Awarded:** 2014 **Period:** 2014 - 2019
Project Title: Inference for Dynamic System Models
Funding: NSERC Discovery **Type:** External **Annual:** \$11000 **Total:** \$55000
Involvement: Principal Investigator

Contract/Grant: Research Grant **Awarded:** 2008 **Period:** 2010 - 2012
Project Title: Advanced Parameter Estimation Tools for Building Mathematical Models of Chemical Processes
Funding: MITACS **Type:** External **Total:** \$102,000
Involvement: Co-Investigator
Institution of Co-Investigator(s): David Campbell, (Simon Fraser University), Thomas Harris, (Queen's University), Kim McAuley, (Principal investigator, Queen's University), James McLellan, (Queen's University), James Ramsay, (McGill University)

Contract/Grant: Research Grant **Awarded:** 2008 **Period:** 2008 - 2013
Project Title: Statistics for Dynamic System Models
Funding: NSERC Discovery **Type:** External **Annual:** \$12000 **Total:** \$60000
Involvement: Principal Investigator

Contract/Grant: Research Grant **Awarded:** 2008 **Period:** 2008 - 2010
Project Title: Functional Data Analysis of Time Frequency Representations
Funding: President's Research Funds **Type:** Internal **Total:** \$10000
Involvement: Principal Investigator

Contract/Grant: Research Grant **Awarded:** 2008 **Period:** 2009 - 2010
Project Title: Advanced Parameter Estimation Tools for Building Mathematical Models of Chemical Processes
Funding: MITACS **Type:** External **Total:** \$82,175.50
Involvement: Co-Investigator
Institution of Co-Investigator(s): David Campbell, (Simon Fraser University), Thomas Harris, (Queen's University), Kim McAuley, (Principal investigator, Queen's University), James McLellan, (Queen's University), James Ramsay, (McGill University)

Contract/Grant: **Awarded:** 2007 **Period:** 2007 - 2010
Project Title: Startup research funds
Funding: Startup Grant **Type:** Internal **Total:** \$30000
Involvement: Principal Investigator

Contract/Grant: Conference Grant **Awarded:** 2008 **Period:** 2009 - 2009
Project Title: Workshop on Statistical Methods for Dynamic System Models
Funding: MITACS **Type:** External **Total:** \$15000
Involvement: Principal Investigator
Institution of Co-Investigator(s): David Campbell, Simon Fraser University, Jiguo Cao, Simon Fraser University, Giles Hooker, Cornell University, Subhash Lele, University of Alberta, Ramsay, McGill University

Contract/Grant: Conference Grant **Awarded:** 2008 **Period:** 2009 - 2009
Project Title: Workshop on Statistical Methods for Dynamic System Models
Funding: PIMS **Type:** External **Total:** \$15000
Involvement: Principal Investigator
Institution of Co-Investigator(s): David Campbell, Simon Fraser University, Jiguo Cao, Simon Fraser University, Giles Hooker, Cornell University, Subhash Lele, University of Alberta, Jim Ramsay, McGill University

Contract/Grant: Conference Grant **Awarded:** 2008 **Period:** 2009 - 2009
Project Title: Workshop on Statistical Methods for Dynamic System Models
Funding: SFU, Vice-President Academic's Conference Fund **Type:** Internal **Total:** \$2000
Involvement: Principal Investigator
Institution of Co-Investigator(s): David Campbell, Simon Fraser University, Cao, Simon Fraser University, Hooker, Cornell University, Lele, University of Alberta, Ramsay, McGill University

Contract/Grant: teaching grant **Awarded:** 2008 **Period:** 2009 - 2009

Project Title: PIMS International Graduate Training Center course on statistics for dynamic system models

Funding: PIMS **Type:** External **Total:** \$4800

Involvement: Principal Investigator **Collaboration:** Funding is to cover half of the accommodation expenses of 8 PIMS math-bio graduate students to participate in my Stat 890: Special Topics; Statistics for Dynamic System Models course to be taught in May 2009.

Semesterly Teaching Activity at Carleton University

Semester	Course	Number	Enrollment
Winter 2025		STAT 2559	
Winter 2025	Fundamentals in Data Science and Analytics	DATA 5001	
Fall 2024	Statistical Computing (Honours)	STAT 4604	
Winter 2024	Fundamentals in Data Science and Analytics	DATA 5001	25
Winter 2023	Fundamentals in Data Science and Analytics	DATA 5001	12
Fall 2021	Modern Applied and Computational Statistics	STAT 5702	15
Winter 2021	Modern Applied and Computational Statistics	STAT 5702	15
Fall 2020	Statistical Computing (Honours)	STAT 4604	10
Fall 2020	Regression Analysis	STAT 3503	80
Winter 2020	Statistical Language Models	STAT 5901	10

Semesterly Teaching Activity at Simon Fraser University

Semester	Course	Number	Enrollment
2019-1	Introduction to Data Science	STAT 240	100
2018-3	Data Science Seminar	DATA 180 / 481	26
2018-1	Introduction to Data Science	STAT 240	64
2017-3	Data Science Seminar	DATA 180 / 481	18
2017-3	Statistics for the Social Sciences	Stat 203	28
2017-1	Introduction to Data Science	STAT 240	44
2016-3	Management and System Science Seminar	MSSC 180 / MSSC 481	4
2016-3	Intermediate Probability and Statistics	Stat 285	55

2016-1	Statistical Computing	Stat 853	23
2015-3	Intermediate Probability and Statistics	Stat 285	40
2015-3	Management and System Science Seminar	MSSC 180 / MSSC 481	10
2015-1	Stochastic Processes	Stat 380	40
2014-3	Management and System Science Seminar	MSSC 180 / MSSC 481	7
2014-3	Statistics for the Social Sciences	Stat 203	66
2013-1	Statistical Computing	Stat 890	15
2012-3	Statistics for the Social Sciences	Stat 203	111
2012-3	Intermediate Probability and Statistics	Stat 285	54
2012-1	Introduction to Probability and Statistics	Stat 270	14
2012-1	Stats/life Sciences	Stat 201	40
2011-3	Statistics for the Social Sciences	Stat 203	65
2010-3	Statistics for the Social Sciences	Stat 203	100
2010-3	Intermediate Probability and Statistics	Stat 285	40
2010-1	Introduction to Probability and Statistics	Stat 270	28
2010-1	Statistics for the Life Sciences	Stat 201	48
2009-3	Statistics for the Social Sciences	Stat 203	102
2009-2	Statistics for Dynamic System Models	Stat 890	12
2009-1	Stochastic Processes	Stat 380	21
2007-3	Stats/life Sciences	Stat 201	26

Graduate and Post-Doctoral Trainees

Name	Degree	Project/Thesis Title	Began	Completed
Lim, Jin Hee	M.Sc	Forecasting Movie Attendance of Individual Movie Showings: a Hierarchical Bayes Approach	2010-9	2012-7
Chkrebtti, Oksana	Ph.D.	Uncertainty Quantification in Numerical Methods	2011-9	2013-11
Zhang, Fan	M.Sc (Co-Supervised)	Use of Genetic Algorithms for Optimal Investment Strategies	2010-9	2013-4
Golchi, Shirin	Ph.D. (Co-Supervised)	Bayesian Computational Methods and Applications	2011-9	2014-4
Ratnasekera, Pulindu	M.Sc	Errors in Covariates for Time Series Models	2012-9	2014-8

Carleton, Chris	Ph.D. (Co-Supervised)	Linking Climate Indicators to Mayan Cultural Events	2011-9	2017-11
Ratnasekera, Pulindu	Ph.D.		2015-9	
Zhou, Haoxuan	M.Sc	Bayesian Integration for Assessing the Quality of the Laplace Approximation	2015-9	2017-12
Biljana Jonoska Stojkova	Ph.D.	Bayesian Methods for Multi-Modal Posterior Topologies	2012-9	2017-12
Farzad Khosrow-khavar	Post-Doc	Statistical and Physiological Beat Modelling of Seismocardiogram Signal	2016-8	2017--8
Lo, Justin	Ph.D. (Co-Supervised)	Metabolic Rates of Toxin Elimination in Rainbow Trout,	2010-9	2018-8
Jennifer Parkhouse	M.Sc (Co-Supervised)	Masquerade Detection: A Topic Model Based Approach	2015-9	2019-4
André Lukas Schorlemmer	Post-Doc	Community Health and Toxic Behaviour in Online Games	2018-9	2019-8
Maude Lachaine-Loiselle	M.Sc	Interpretable Machine Learning for Webpage Modelling	2017-9	
Gabe Phelan	M.Sc	New Perspectives on Non-negative Matrix Factorization for Grouped Topic Models	2018-9	2020-8
Lucas Wu	Ph.D. (Co-Supervised)	Dimension Expansion and Image Warping in Basketball Analytics	2018-9	
Shaun McDonald	Ph.D.	Density Estimators as Regression Covariates	2017-9	2022-9
Adam Shen	M.Sc	Tales of a Coronavirus Pandemic: Topic Modelling with Short-Text Data	2019-9	2021-4
Roy Wang	Post-Doc (Co-Supervised)	Identification of Chemicals from Nuclear Magnetic Resonance	2020-4	2023-6
Prince Peprah Osei	Post-Doc	Uncertainty Quantification and Behavioural Insight for Eagles from Nest Camera Videos	2021-6	2023-6
Paul Nguyen Hong Duc	Post-Doc	Detection of Whales from Acoustic Hydrophones	2021-1	2023-5
Alex Lehmann	M.Math	Topic Modeling for Intellectual Property Research: Comparing Methods Through Simulation and Application	2021-9	2023-8
Alex Lehmann	Ph.D.		2023-9	
Adam Shen	Ph.D.		2021-9	
Cristina Agatep	M.Math		2021-09	
Anja Wu	MSc		2023-9	
Colin Jones	Ph.D.		2022-9	
Mario Beauchamp	M.Comp Sci		2023-9	

Undergraduate Trainees

Name	Program	Project/Thesis Title	Began	Completed
Tony Tu	RA		2021-4	2021-8
Alex Lehmann	Honours thesis supervisor	Resampling Diagnostics: Bootstrap, Shiny, and Democratizing Data Science	2021-4	2021-8
Junpu Xie	SAPP	Accessing Canadian Open Data	2020-5	2020-8
Jeeheon Kim	RA	Firsts for Women in Statistics in Canada	2021-5	2021-12
Marieta-rita Osezua	Carleton Journalism RA	Diversity in Statistical Sciences	2020-5	2020-8
Korede Adegboye	Honours thesis supervisor	Climate Change Across Canada	2020-1	2020-4
Christopher Wang	RA	Identifying Whale Calls from Audio Signals	2020-1	2020-4
Josh Kim	RA @ SFU	Image Classification and Segmentation	2019-1	2019-4
Tia Alexander	RA @ SFU	Smoothing census track count data	2013-5	2013-12
Yu Zhang	RA @ SFU	Incorporating Dynamic R output into HTML	2012-5	2012-12
Lim, Jin Hee	RA @ SFU	Forecasting Movie Attendance of Individual Movie Showings: a Hierarchical Bayes Approach	2010-0	2010-9

Serving on a Committee of a Thesis/Dissertation/or Major Project

- 2023 Shafiqullah Qureshi (PhD, Carleton Economics)
- 2022 Loïc Muhirwa (MSc, U Ottawa)
Faezeh Yazdi (PhD, SFU)
- 2021 Peter L'Oiseau (MSc, Carleton)
- 2020 Sichen Liu (MSc, SFU)
Jiaping Liu (MSc, UOttawa)
Kevin Raina (Msc, UOttawa)
Alexander Imbrogno (Msc, Carleton)
- 2019 Grace Hsu (MSc, SFU)
Bdour Al-Zeer (MSc, SFU Computer Science)
- 2018 Yunlong Nie (PhD, SFU),
Nishant Kambhatla (MSc, SFU Computer Science)

- Lillian Wang (MSc, SFU)
- William Carlquist (PhD, UBC Math)
- 2017 Derek Qiu (MSc, SFU),
Steven Wu (MSc, SFU),
Trevor Thompson (MSc, SFU),
Michael Johnson (MSc, SFU),
Terry Tang (MSc, SFU)
- 2016 Zhelun Wu (MSc, SFU Computer Science)
- 2013 Jorge Rodriguez (MSc, SFU),
Ruth Joy (PhD, SFU)
- 2011 Kelly Burkett (PhD, SFU),
Jing Cai (MSc, SFU)
- 2010 Jervyn Ang (MSc, SFU),
Matthew Pratola (PhD, SFU)

New Course Development

- 2023 DATA 5001: Taught the first offering of this interdisciplinary course with an outline heavily influenced by the Vector Institute.
- 2017 **Stat 240: Course Design**, I designed and implemented the course. The course has four components; using SQL to access databases, using the Twitter API to obtain text data from twitter.com, scraping data from webpages, and dashboarding using Shiny Apps. In all cases the goal is to acquire, access, clean, and present data.

New Program Development

- 2016-2017 **Developed the Data Science BSc program** by first scraping job adverts for data science positions to determine the skills demanded by employers. Then worked with representatives in Business, Computer Science, and Mathematics to select courses. The program entered the SFU calendar in Fall 2017.

Workshops and External Teaching

- 2022 “Statistical Language Modelling with R”, CANSSI Prairie Summit, University of Manitoba
- 2021 “Data Science for Managers” a 9 week course for Statistics Canada
- 2020 Co-taught the Statistical Society of Canada Data Science and Analytics Section Workshop on “Text Data”

- 2019 Co-taught a Machine Learning for the Digital Humanities Summer Institute, Victoria, BC
- 2018 Faculty of Science Teaching Award, the nomination was put forward by students.
- 2018 Taught a Short Course on Mixed Effects Models for Fraser Health

Service to the University

Departmental Committees

- 2024 Hiring committee, Statistics (Carleton)
- 2023 Tenure and Promotion Committee, Health Science (Carleton)
- 2019 Organizer CANSSI Case Study Competition, National and Ottawa Regional Competitions Ottawa Area (Carleton)
- 2018 Stats/Act Sci/Data Sci Day Presenter (SFU)
- 2018 SFU Student Welcome Summit Instructor (SFU)
- 2018 Represented SFU at the BC Tech Fest (SFU)
- 2017-2019 Coordinator, Data Science Program (SFU)
- 2014-present Environmental Science Steering Committee (SFU)
- 2016,'17,'18 Judge for OppFest, the SFU Charles Chang Innovation and Entrepreneurship competition
- 2015,'17,& '19 Department of Statistics and Actuarial Science Undergraduate Case Study Competition. Included finding data, industrial judges, and prize money. (SFU)
- 2014 - 2017 Director of Management and System Science Program (SFU)

Service to the Academic Community

- 2019 - 2024 CANSSI Provincial Advisory Committee Member
- 2023 External Reviewer; Tenure and Promotion University of Guelph.
- 2023 Organizer Case Study Competition at the SSC meeting: Understanding how Canada's economy might be impacted by climate change.
- 2022 External Program Reviewer; MSc, Phd Statistics degrees Laval University
- 2020- 2021 Past-President, SSC Data Science and Analytics Section
- 2019- 2020 President, SSC Data Science and Analytics Section
- 2019 Ministry of Education Degree Quality Assessment Board panelist for a Master of Science in Data Science proposal

2016 - 2022	Associate Editor SIAM / ASA Journal of Uncertainty Quantification
2016 - 2022	SSC Public Relations Officer, SSC Executive and SSC Board member, where I oversaw the transition from a print to digital Edition of Liaison, was part of the negotiation team for the publication agreement for the Canadian Journal of Statistics.
2015 - 2019	Co-organizer Learn Data Science Meetup Group; bi-weekly reading group with industry https://www.meetup.com/LearnDataScience/events/
2017, 2019	Grant review panelist, National Science Foundation; Computational and Data-enabled Science and Engineering. Alexandria Virginia.
2017	BIRS-CMO workshop co-organiser “Conference on New perspectives on State Space Models” (17w5120), Oxaca, Mexico
2016	Worked with Dave Higdon to produce a Charter for the ASA Interest Group on Uncertainty Quantification
2013-2015	SSC Case Study Competition Committee
2008	principal organizer for the Workshop on Statistical Methods for Dynamic System Models, June 4-6 2009
Spring 2008	Fellowship Application Reviewer, PIMS Review Panel for the International Graduate Training Centre in Mathematical Biology for 2008
2008	Assist in Development Applied Statistics and Operations Research
Grant Reviewer	NSERC and MITACS grant reviewer (x10)

Service to the Community At Large

February 2010	Winter Olympic Host Volunteer at Canada Hockey Place
2009 & 2012	Science Fair Judge, South Fraser Regional Science Fair
2015	Statistics and Earthquakes Outreach for the SD 36 Gifted Students Program

Patrick John Farrell
B.Eng, M.Eng, M.B.A., Ph.D, P.Stat

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Carleton University
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I. Academic Qualifications

Educational History

P.Stat., Professionally Accredited by the Board of Directors of the Statistical Society of Canada, 2004.

Ph.D., McGill University, Montreal, Quebec, Canada, 1992. Thesis: *Empirical Bayes Estimation of Small Area Proportions*.

M.B.A. in Management Science and Accounting, McGill University, Montreal, Quebec, Canada, 1987.

M.Eng. in Chemical Engineering, McGill University, Montreal, Quebec, Canada, 1983. Thesis: *Thermal Conductivity and Diffusivity Measurements*.

B.Eng. in Chemical Engineering, McGill University, Montreal, Quebec, Canada, 1981.

Secondary and primary school studies completed in Longueuil and St. Lambert, Quebec, Canada.

Educational Awards and Honours

SSHRC Doctoral Scholarship (1988 - 1991).

FCAR Doctoral Scholarship (1988 - 1989).

McGill Alma Mater Doctoral Scholarship (1987 - 1989).

NSERC Masters Scholarship (1982 -1983).

McConnell Undergraduate Entrance Scholarship (1978 - 1979).

Lemoyne d'Iberville High School Leaving Scholarship (1976).

Lemoyne d'Iberville High School *Reach for the Top* Team (1975 - 1976).

Employment History

2015 - : Special Advisor, Office of the Dean of the Faculty of Science, Carleton University.

2007 - 2015 : Director, School of Mathematics and Statistics, Carleton University.

2005 - : Professor, School of Mathematics and Statistics, Carleton University.

2000 - 2005: Associate Professor, School of Mathematics and Statistics, Carleton University.

1998 - 2000: Associate Professor, Department of Mathematics and Statistics, Acadia University.

1996 - 1998: Assistant Professor, Department of Mathematics and Statistics, Acadia University.

1996 - 2004: Adjunct Professor, Department of Statistics and Actuarial Science, University of Waterloo.

1992 - 1996: Assistant Professor, Department of Mathematics and Statistics, University of Waterloo.

1991 - 1992: Lecturer, Department of Decision Sciences & MIS, Concordia University.

1987 - 1991: Lecturer, Faculty of Management, Department of Management Science, McGill University.

II. Performance as a Teacher

Courses Taught

The names of courses taught are identified below at the most recent teaching. I have reworked most of them considerably on each teaching. Course evaluations are available upon request.

- 2023 - 2024: STAT 4502 (*Survey Sampling*), STAT 5602 (*Analysis of Categorical Data*); Both taught online.
- 2021 - 2023: Administrative Leave.
- 2020 - 2021: STAT 2559 (*Basics of Statistical Modeling*), STAT 2655 (*Introduction to Probability with Applications*), STAT 3553 (*Regression Modeling*), STAT 4502; All taught online.
- 2019 - 2020: STAT 2606 (*Business Statistics I*; Twice), STAT 2607 (*Business Statistics II*), STAT 4502, STAT 5602; All taught online.
- 2018 - 2019: STAT 2559, STAT 2606 (Twice), STAT 2607, STAT 4502; All taught online.
- 2017 - 2018: STAT 2606 (Twice), STAT 2607, STAT 2655, STAT 4502; All taught online.
- 2016 - 2017: STAT 2606 (Twice), STAT 2607, STAT 2655; All taught online.
- 2015 - 2016: STAT 2606, STAT 2607; Both taught online.
- 2011 - 2015: No Teaching due to administrative responsibilities.
- 2010 - 2011: Sabbatical.
- 2009 - 2010: STAT 4502.
- 2008 - 2009: STAT 4502.
- 2007 - 2008: STAT 4502.
- 2006 - 2007: STAT 2559, STAT 3503 (*Regression Analysis*), STAT 3504 (*Analysis of Variance and Experimental Design*), STAT 4502.
- 2005 - 2006: STAT 3503, STAT 3504, STAT 4502, STAT 5602.
- 2004 - 2005: Sabbatical.
- 2003 - 2004: STAT 2507 (*Introduction to Statistics*), STAT 3503, STAT 3504, STAT 4502.
- 2002 - 2003: STAT 2507, STAT 2559, STAT 4502, STAT 5602.
- 2001 - 2002: STAT 2507, STAT 2559, STAT 4502.
- 2000 - 2001: BUSI 3304 (*Business Forecasting*), STAT 2507, STAT 2606, STAT 5602.
- 1999 - 2000: MATH 2213 (*Applied Probability for Science and Engineering*), MATH 2233 (*Statistics for Life Sciences 1*), MATH 2243 (*Statistics for Life Sciences 2*), MATH 3283 (*Time Series*)
- 1998 - 1999: MATH 1213 (*Statistics for Business 1*), MATH 1223 (*Statistics for Business 2*), MATH 2233, MATH 2243, MATH 3263 (*Sampling*).
- 1997 - 1998: MATH 1213, MATH 1223, MATH 2233, MATH 2243, MATH 3603 (*Operational Research 1* - filled in for a colleague on sick leave).
- 1996 - 1997: MATH 2233 (Twice), MATH 2243, MATH 3263.
- 1995 - 1996: STAT 231 (*Statistics: Empirical Problem Solving, A Lab Course*, Twice), STAT 311 (*Regression and Forecasting for Accounting*, Twice).
- 1994 - 1995: STAT 231, STAT 311 (Twice), STAT 332 (*Sampling*).
- 1993 - 1994: STAT 231, STAT 311 (Twice), STAT 331 (*Applied Linear Models*).
- 1992 - 1993: STAT 231, STAT 311 (Twice), STAT 332.
- 1991 - 1992: DESC243 (*Statistics for Business 1*, Twice), DESC244 (*Statistics for Business 2*, 4 Times).
- 1990 - 1991: Course #280-271 (*Statistics for Business 1*), Course #280-272 (*Statistics for Business 2*).
- 1989 - 1990: Course #280-271 (Twice), Course #280-272.
- 1988 - 1989: Course #280-271, Course #280-272.
- 1987 - 1988: Course #280-271, Course #280-272, Course #280-373 (*Operations Research*).

Course Development and Design

Developing an online version of STAT 4603/5504 (2023-24).

Developed an online version of STAT 2601 (2022).

Developed an online version of STAT 4504 (2021-22).

Developed an online version of STAT 3553. Lectures were provided entirely with pre-recorded videos uploaded to a course webpage, and supplemented by slides and assignments. Online labs illustrating course content using statistical software were given (2020).

Developed an online version of STAT 5602. Lectures were provided entirely with pre-recorded videos uploaded to a course webpage, and supplemented by slides and assignments (2019-20).

Developed an online version of STAT 2559. Lectures were provided entirely with pre-recorded videos uploaded to a course webpage, and supplemented by slides and assignments. Live labs illustrating course content using statistical software were given (2019).

Developed an online version of STAT 4502. Lectures were provided entirely with pre-recorded videos uploaded to a course webpage, and supplemented by slides and assignments (2017-18).

Developed an online version of STAT 2655. Lectures were provided entirely with pre-recorded videos uploaded to a course webpage, and supplemented by slides and practice exercises. Live tutorials were given (2016 - 17).

Developed online versions of STAT 2606 and STAT 2607 (with Wayne Horn). Lectures were provided entirely with pre-recorded videos uploaded to a course webpage, and supplemented by slides and practice exercises (2015 - 20).

Developed a computer lab component for STAT 2507, STAT 2606 (with Ann Woodside), STAT 2559, STAT 3503, and STAT 3504 (2000 - 2007).

Co-ordinator for STAT 2507 (2000 - 04).

ACADIA UNIVERSITY: Worked jointly with Paul Cabilio in revising the first and second year statistics course curriculum. This revision includes the development of a weekly studio laboratory component for MATH 1213, MATH 1223, MATH 2213, MATH 2223 (*Applied Statistics for Science*), MATH 2233, and MATH 2243. This work was supported through a grant from the Teaching Innovation Fund (1996 - 2000).

ACADIA UNIVERSITY: Co-ordinator for MATH 2233 (1996 - 98), and MATH 2243 (1996 - 98). Joint co-ordinator with Paul Cabilio for MATH 1213 (1997 - 98), MATH 1223 (1997 - 98), MATH 2213 (1999 - 2000), MATH 2233 (1998 - 2000), and MATH 2243 (1998 - 2000) and with Joe Masaro for MATH 1213 (1998 - 99) and MATH 1223 (1998 - 99). This co-ordination included the supervision of lab instructors/demonstrators, and involved weekly meetings to discuss lectures and assignments, as well as to give direction to the lab instructors.

UNIVERSITY OF WATERLOO: Worked jointly with a number of instructors in the development of STAT 231, a Statistics course taught using a hands-on laboratory style approach; Developed computer laboratory components for STAT 311 and STAT 331; Development jointly with a number of instructors of a tutorial/laboratory component for STAT 332 (1993 - 96).

Preparation of Laboratory and Course Material

Developed course packages containing notes/computer labs for BUSI 3304, STAT 2507, STAT 2559, STAT 2606, STAT 2655, STAT 3503, STAT 3553, STAT 3504, STAT 4502, and STAT 5602.

Developed jointly with Paul Cabilio course packages containing computer labs for MATH 1213, MATH 1223, MATH 2213, MATH 2223, MATH 2233, and MATH 2243.

Co-author with Paul Cabilio and Joe Masaro on the Exercise Book portions of the course packages for MATH 1213 and MATH 1223 entitled *Statistics: Data Analysis and Methods, A Workbook Approach, Parts I and II*.

Developed course packages containing notes for MATH 2213 (with Paul Cabilio), MATH 2223 (with Paul Cabilio), MATH 2233 (one jointly with Paul Cabilio, another by myself), MATH 2243 (one jointly with Paul Cabilio, another with Joe Masaro), MATH 3263, STAT 231, STAT 311, STAT 331, STAT 332, Course #280-271, Course #280-272.

Acknowledged for contributions to *Instructor's Manual to Accompany "Applied Statistics, Third Edition"*, by John Neter, William Wasserman, and G.A. Whitmore, Boston: Allyn and Bacon Inc., 1987.

Supervision of Students

1. Postdoctoral Students

Khan, Selim (2023 - 24), “Evidence Integration and Value of Information”, MITACS Accelerate, Carleton University.

Farhat, Nawal (2021 - 24), “Evidence Integration and Value of Information”, MITACS Accelerate, Carleton University.

Taher, Mohamed (2021 - 23), “Evidence Integration and Value of Information”, MITACS Accelerate, Carleton University.

Hagiwara, Shintaro (2021 - 23), “Evidence Integration and Value of Information”, MITACS Accelerate, Carleton University.

Sivathayalan, Ahalya (2016), “Statistical Analysis of Prostate Brachytherapy Treatment Data”, MITACS Accelerate, Carleton University.

Mallick, Taslim (2012), “Accounting for Missing Data in Longitudinal Studies with Binary Responses”, Carleton University.

Singh, Sarjinder (2001 - 02), “Studies in Survey Sampling Relating to Calibration, Small Area Estimation, and Missing Data”, July 1, 2001 to June 30, 2002, NSERC Postdoctoral Student, Carleton University.

2. Doctoral Students

Pouliot, Jessica (2024 -), Thesis TBA, Carleton University.

Hagiwara, Shintaro (2020), “Dose-Response Modelling and Optimization of Quantitative High-Throughput Screening Assays”, Carleton University.

Qian, Wei (2018), “Analysing Correlated Data from Surveys with Complex Design”, Carleton University (with J.N.K. Rao).

Sivathayalan, Ahalya (2015), “Statistical Properties of the Signal to Noise Crossover Dose based on the Hill Model as a Point of Departure for Population Health Risk Assessment”, Carleton University (with D. Krewski).

Rogers-Stewart, Katrina (2015), “Dose-response Modeling for Ordinal Outcome Data”, Carleton University (with J. Nielsen).

Gravel, Chris (2015), “On the Correction for Misclassification Bias in Electronic Health Data using Validation Sample Approaches”, 2 MITACS Accelerate Internships, Carleton University (with D. Krewski).

Zhang, Zhengmin (2008), “Estimation in Mixture Models”, Carleton University (with A.K.Md.E. Saleh).

Sashegyi, Andreas (1998), “Models for Correlated Non-Gaussian Responses”, University of Waterloo (with K.S. Brown).

Cadigan, Noel (1996), “Influence Diagnostics for Normal and Logistic Regression Models”, Three NSERC Research Assistantships, University of Waterloo.

3. Master’s Students

Thesis

O’Neill, Erica (2022 -), Thesis TBA, Carleton University.

Ward, Alicia (2024), Comparing Machine Reading Substitution to Alternative Statistical Treatment Methods for Left-Censored Data: Considerations to Limit Bias in the Maternal Infant Research on Environmental Chemicals (MIREC) Study, Carleton University.

Alami, Abdallah (2023), Statistical Perspectives on the Use of Pharmacovigilance Data and Electronic Health Records to Verify Predicted Chemical Hazards of Drugs from *In-Vitro* Toxicological Data, MITACS Accelerate, Carleton University (with P. Villeneuve).

Agberien, Valentine (2021), Unsupervised Machine Learning as a Tool for Exploratory Analysis of Acoustic Telemetry Data: A Case Study with Northern Pike in Toronto Harbour, Carleton University (with S. Cooke).

Hagiwara, Shintaro (2014), “Theoretical Considerations in the Estimation of the Signal to Noise Crossover Dose”, Carleton University (with D. Krewski).

Milton, Brittany (2014), “Characterization of Exposure-Response Relationships with Application to a Copper Database”, MITACS Accelerate, Carleton University (with D. Krewski).

Zhuo, Lan (2010), “An Overview of Statistical Methods for Active Pharmacovigilance with Applications to Diabetes Patients”, Carleton University (with D. Krewski).

Almaskut, Ahmed (2009), “The Influence of Particulate Matter on the Environmental Burden of Disease in Canada”, Carleton University (with D. Krewski). Awarded University Medal for Outstanding Graduate Work - Master’s Level.

Gravel, Chris (2008), “Statistical Methods for Signal Detection in Pharmacovigilance”, Carleton University (with D. Krewski).

Bernick, Jordan (2007), “A Statistical Test for a Parameter Describing the Association in Correlated Binary Data”, Carleton University.

Rogers-Stewart, Katrina (2006), “Generating Longitudinally Correlated Binary Data”, Carleton University. Awarded University Medal for Outstanding Graduate Work - Master’s Level.

Naczka, Katarzyna (2004), “Assessing Tests for Multivariate Normality”, Carleton University (with M. Salibian-Barrera).

Thuppal, Sri Vidya (2004), “Evaluation of Outbreak Detection Algorithms: An Empirical and a Simulation Study”, Carleton University (with S.E. Mills).

Chong, Glenn (1994), “Robust Estimators in Astrophysics”, University of Waterloo.

Huang, Xiao (1994), “Hierarchical Bayes Estimation of Small Area Proportions”, NSERC Research Assistantship, University of Waterloo.

4. Honours Project Undergraduate Students

Levie, Simon (Winter 2024), “Models for the Prediction of Concussions in NFL Games”, Carleton University.

Noel, Molly (Winter 2024), “Estimation of Census Undercoverage and Overcoverage”, Carleton University.

Situ, Nathan (Winter 2024), “Comparing Imputation Methods with Varying Nonresponse”, Carleton University.

Thompson, Mason (Winter 2024), “Predicting Making the Playoffs for NHL Goaltenders Using Logistic Regression”, Carleton University.

Ferrington, Alex (Fall 2023), Separating Music from Noise: Unveiling Music Theory Through Signal Processing of Sound Waves, Carleton University.

Namukwaya, Marion (Winter 2023), “A Comparison of Simple Random Sampling and Regression-Based Estimators in the Presence of Nonresponse”, Carleton University.

Thompson, Mitchell (Winter 2023), “Creating a Metric for Player Value in Major League Baseball using Principal Components Analysis”, Carleton University.

Perez Yanez, Yunuen (Fall 2022), “Modelling the Number of Driver Claims using Poisson Regression”, Carleton University.

Sivathayalan, Janani (Fall 2022), “Comparison of Design and Model-Based Estimators for a Population Proportion”, Carleton University.

Xu, Jiawei (Winter 2021), “Analysis and ARIMA-Based Forecasts of COVID-19 Daily Confirmed Cases for Selected Canadian Provinces”, Carleton University.

Xie, Junpu (Fall 2020), “COVID-19 Confirmed Cases Estimates based on GLM Poisson Loglinear Model”, Carleton University.

Chartier, Danielle (Summer 2020), “Modelling the Probability of Making an Insurance Claim Based on Logistic Regression”, Carleton University.

Davis, Madeleine (Winter 2020), “Using Network Analysis for Disease Outbreak Analysis for African Swine Fever Virus”, Carleton University.

Wu, Daisy (Winter 2020), “Stock Market Analysis and Predictions Using a Time Series Approach”, Carleton University.

Doan, Thai (Winter 2019), “Modelling the Choice of Surgery for Rectal Cancer Using Logistic Regression and ROC Curves”, Carleton University.

Fitzpatrick, Liam (Winter 2019), “Statistical Tests for Relative Reciprocity and Relative Interchange”, Carleton University.

Nath, Shashank (Winter 2019), “A Comparison of Two Ratio Estimators and a Regression Estimator for a Finite Population Mean”, Carleton University.

Rogers, Brianne (Winter 2019), “Model-Based Estimation for a Relative Difference in Proportions”, Carleton University.

Pickles, Kailey (Summer 2018), “Stratum Estimates of the Probability of an Insurance Claim Based on Logistic Regression”, Carleton University.

Burr, Benjamin (Winter 2018), “Logistic Regression for Simultaneously Modelling Excess and Deficiency”, Carleton University.

Byars, Meaghan (Winter 2018), “An Introduction to Various Machine Learning Methods from an Undergraduate Statistics Student’s Perspective”, Carleton University.

Wilson, Jessica (Winter 2018), “Credit Scoring Using Logistic Regression and ROC Curves”, Carleton University.

Archdeacon, Briana (2017), “Credit Scoring Models for Small Business Loans”, Carleton Undergraduate Research Opportunities Program (CUROP), May 1 to August 31, 2017, Carleton University.

Cho, Tina (2016), “An Analysis of Retention in Introductory Statistics Courses”, NSERC Undergraduate Student Research Award, May 1 to August 31, 2016, Carleton University.

Campbell, Catherine (2015), “Model-based Estimation for a Finite Population Proportion”, Carleton University.

Barnhart, Brennan (2014), “Applying the Box-Jenkins Method to Forecast Inflation”, Carleton University.

Hagiwara, Shintaro (2012), “Nonresponse Error in Survey Sampling”, Carleton University.

Heaven, Alicia (2011), “Statistical Inference for the Biological Inbreeding Coefficient”, Carleton University.

Lundy, Erin (2010), “Individual and Joint Inference for Relative Differences in Means”, Carleton University.

Zhang, Lan (2010), “Inference for Comparing Two Coefficients of Variation”, Carleton University.

Colterman, Helen (2009), “Application of Logistic Regression to Insurance Claims”, Carleton University.

Deluca, Sarah (2009), “Assessing the Ability of a Diagnostic Test to Predict the Probability of Success in Business Calculus”, Carleton University.

Heisel, David (2009), “The Application of Multiple and Logistic Regression to Assess Baseball Teams”, Carleton University.

Lamonde, Andre (2008), “Logistic Regression-Based Predictions for NHL Outcomes”, Carleton University.

Alam, Sarah (2007), “Logistic Regression-Based Inference for a Relative Difference in Proportions”, Carleton University.

Hyndman, Ryan (2007), “Statistical Inference for Cronbach’s Alpha”, Carleton University.

Mulder, Devin (2006), “An Evaluation of Efficiency and Coverage Properties of the Stratified Random Sample Mean”, Honours B.Sc. Project, Carleton University.

Gravel, Chris (2005), “Regression-Based Inference for a Relative Difference”, Honours B.Sc. Project, Carleton University.

Bush, Scott (2004), “Inference for a Parameter Based on a Ratio of Random Variables”, NSERC Undergraduate Student Research Award, May 1 to August 31, 2004, Carleton University.

Ding, Changshen (2004), “A Study on the Use of the Sample Ratio as an Estimator of the Population Ratio”, Honours B.Sc. Project, Carleton University.

Rogers-Stewart, Katrina (2004), “A Comprehensive Study of Tests for Normality and Symmetry: Extending the Spiegelhalter Test”, Honours B.Sc. Project, Carleton University. Awarded Senate Medal.

Virginie, David (2004), “Logistic Regression Analysis and Its Applications to Health Sciences”, Honours B.Sc. Project, Carleton University.

Rogers-Stewart, Katrina (2003), “Assessment of a Test for Normality that uses Higher Order Moments”, NSERC Undergraduate Student Research Award, May 1 to August 31, 2003, Carleton University.

Situ, Jerry (2002), “A Comparison of Mean, Regression, Hot-Deck, and Nearest Neighbour Imputation in the Presence of Outliers”, Honours B.Sc. Project, Carleton University. Awarded Governor General’s Medal - Bachelor’s Level, Standing at Head of Graduating Class.

Wei, Wei (2002), “The Prediction of Mutual Fund Prices”, NSERC Undergraduate Student Research Award, May 1 to August 31, 2002, Carleton University.

Wamboldt, Margo (2000), “Logistic Regression and Bootstrapping as Applied to Cancer Data”, Honours B.Sc. Project, Acadia University.

Wamboldt, Margo (1999), “The Application of Logistic Regression to a Cancer Data Set”, Summer Research Award, May 1 to August 31, 1999, Acadia University.

Sampson, Trina (1999), “The Power of Various Tests of Normality”, Honours B.Sc. Project, Acadia University.

Gray, Tim (1998), “Canadian Retail Sales: A Time Series Analysis”, Honours B.Sc. Project, Acadia University.

Gray, Tim (1997), “The Prediction of Retail Sales for Canadian Trade Groups”, NSERC Undergraduate Student Research Award, May 1 to August 31, 1997, Acadia University.

Co-supervised (with Paul Cabilio) Ben Baird, Christine Brown, and Mary MacLachlan from May 1, 1999 to August 31, 1999; Bill MacLellan, Trina Sampson, Kelly Thomas, and Margo Wamboldt from May 1 to August 31, 1998; and Bethany Giddings from May 1 to June 30, 1997. These eight undergraduates assisted with development of studio laboratories for MATH 1213, MATH 1223, MATH 2213, MATH 2223, MATH 2233, and MATH 2243.

III. Research and Scholarly Activity

Book Manuscripts

Cabilio, P., Farrell, P.J., and Partridge, V. (2002), “Applied Probability and Statistics for Science and Engineering: Studio Labs”.

Cabilio, P., Farrell, P.J., and Partridge, V. (2002), “Statistics for Life Sciences: Studio Labs”.

Cabilio, P., Farrell, P.J., and Partridge, V. (2002), “Statistics for Business and Behavioural Sciences: Studio Labs”.

Publications in Refereed Journals

[1] Alami, A., Villeneuve, P.J., Farrell, P.J., Mattison, D., Farhat, N., Haddad, N., Wilson, K., Gravel, C.A., Crispo, J.A.G., Perez-Lloret, S., and Krewski, D. (2023), “Myocarditis and Pericarditis Post mRNA COVID-19 Vaccination: Insights from a Pharmacovigilance Perspective”, *Journal of Clinical Medicine*, Special Issue *Myocarditis in Clinical Practice*, 12(15), 4971, doi: 10.3390/jcm12154971.

[2] Alami, A., Krewski, D., Farhat, N., Mattison, D., Wilson, K., Gravel, C.A., Farrell, P.J., Crispo, J.A.G., Haddad, N., and Perez-Lloret, S. (2023), “Risk of Myocarditis and Pericarditis in mRNA COVID-19 Vaccinated and Unvaccinated Populations: A Systematic Review and Meta-Analysis”, *BMJ Open*, 13(6):e065687, doi:10.1136/bmjopen-2022-065687.

- [3] Hagiwara, S., Paoli, G.M., Price, P.S., Gwinn, M.R., Guiseppi-Elie, A., Farrell, P.J., Hubbell, B.J., Krewski, D., and Thomas, R.S. (2023), “A Value of Information Framework for Assessing the Trade-Offs Associated With Uncertainty, Duration, and Cost of Chemical Toxicity Testing”, *Risk Analysis*, 43(3), 498-515, doi: 10.1111/risa.13931.
- [4] Alami, A., Krewski, D., Mattison, D., Wilson, K., Gravel, C.A., Villeneuve, P.J., Farrell, P.J., Crispo, J.A.G., and Perez-Lloret, S. (2022), “Risk of Myocarditis and Pericarditis Among Young Adults Following mRNA COVID-19 Vaccinations”, *Vaccines*, 10(5), 722-730. Published May 5, 2022, doi: 10.3390/vaccines10050722.
- [5] Farrell, P.J., Aggett, P., Milton, B., Ramoju, S., Mattison, D., Birkett, N., and Krewski, D. (2022), “The Use of Categorical Regression in the Assessment of the Risks of Nutrient Deficiency and Excess”, *ALTEX – Alternatives to Animal Experimentation*, 39(4), 656-666. Published March 30, 2022, doi: 10.14573/altex.2012022.
- [6] Gravel, C.A., Farrell, P.J., and Krewski, D. (2019), “Conditional Validation Sampling for Consistent Risk Estimation with Binary Outcome Data Subject to Misclassification”, *Pharmacoepidemiology and Drug Safety*, 28(2), 227-233.
- [7] Farrell, P.J., Gravel, C.A., and Krewski, D. (2018), “Signal Detection in Pharmacovigilance”, Invited Paper, *Encyclopedia of Biopharmaceutical Statistics, 4th Edition*, Edited by S.C. Chow, Taylor & Francis Group, Boca Raton, 2068 - 2083.
- [8] Gravel, C.A., Dewanji, A., Farrell, P.J., and Krewski, D. (2018), “A Validation Sampling Approach for Unbiased Estimation of Adverse Drug Reaction Risk with Misclassified Right Censored Survival Data”, *Statistics in Medicine*, 37 (27), 3887 - 3903.
- [9] Milton, B., Farrell, P.J., Birkett, N., and Krewski, D. (2017), “Modeling U-Shaped Exposure-Response Relationships for Agents that Demonstrate Toxicity Due to Both Excess and Deficiency”, *Risk Analysis*, 37(2), 265-279.
- [10] Milton, B., Krewski, D., Mattison, D.R., Karyakina, N.A., Ramoju, S., Shilnikova, N., Birkett, N., Farrell, P.J., and McGough, D. (2017), “Modeling U-Shaped Dose-Response Curves for Manganese Using Categorical Regression”, *NeuroToxicology*, 58, 217-225.
- [11] Shasha, D., Lukens, J.N., Sivathalayan, A., Agarwal, M., Salant, R., Farrell, P.J., and Harrison, L.B. (2015), “Ten-Year Oncologic and Toxicity Outcomes After Low-Dose-Rate Brachytherapy for Prostate Cancer in HIV-Positive Men”, *International Journal of Radiation Oncology*, 93(3), E251.
- [12] Shasha, D., Salant, R., Sivathalayan, A., Farrell, P.J., Furhang, E.E., Shah, N., Mourad, W.F., and Harrison, L.B. (2015), “Fifteen-Year Oncologic and Functional Outcomes in 1742 Patients Treated With Low-Dose Rate Brachytherapy With or Without Supplemental Therapies for Clinically Localized Prostate Cancer”, *International Journal of Radiation Oncology*, 93(3), E245-E246.
- [13] Shasha, D., Salant, R., Sivathalayan, A., Farrell, P.J., Mourad, W.F., and Harrison, L.B. (2015), “Number of Intermediate and High Risk Factors Significantly Predicts Biochemical Survival and Prostate Cancer-Specific Survival After Low-Dose Rate Brachytherapy”, *International Journal of Radiation Oncology*, 93(3), E248-E249.
- [14] Shasha, D., Salant, R., Wong, A.T., Sivathalayan, A., Farrell, P.J., Mourad, W.F., and Harrison, L.B. (2015), “Gleason 8 Prostate Cancer has Significantly and Substantially Superior Survival Outcomes Versus Gleason 9-10 After I-125 Brachytherapy Integrated Trimodality Therapy”, *International Journal of Radiation Oncology*, 93(3), E246-E247.
- [15] Zhuo, L., Farrell, P.J., McNair, D., and Krewski, D. (2014), “An Overview of Statistical Methods for Active Pharmacovigilance with Applications to Diabetes Patients”, *Journal of Biopharmaceutical Statistics*, 24, 856 – 873.
- [16] Mallick, T.S., Farrell, P.J., and Sutradhar, B.C. (2013), “Remarks on Consistent Estimation of Regression Effects in Incomplete Longitudinal Binary Models”, *Springer Lecture Notes, 2012 International Symposium in Statistics on Longitudinal Data Analysis Subject to Outliers, Measurement Errors, and / or Missing Values*, Edited by B.C. Sutradhar, Springer-Verlag, New York, 117-138.

- [17] Almaskut, A., Farrell, P.J., and Krewski, D. (2012), “Statistical Methods for Estimating the Environmental Burden of Disease in Canada, with Applications to Mortality from Fine Particulate Matter”, *Environmetrics*, 23(4), 329-344.
- [18] Farrell, P.J., MacGibbon, B., Tomberlin, T.J., and Doreen, D. (2011), “A Bayesian Analysis of a Random Effects Small Business Loan Credit Scoring Model”, *Pakistan Journal of Statistics and Operation, Invited Paper, Special Issue on Variable Selection and Post Estimation in Regression Models*, 7(2), 433-449.
- [19] Farrell, P.J., Saleh, A.K.Md.E., and Zhang, Z. (2011), “Method of Moments Estimation in Finite Mixtures”, *Sankhya, Series A*, 73, 218-230.
- [20] Farrell, P.J., Groshen, S., MacGibbon, B., and Tomberlin, T.J. (2010), “Outlier Detection for a Hierarchical Bayes Model in a Study of Hospital Variation in Surgical Procedures”, *Statistical Methods in Medical Research*, 19, 601-619.
- [21] Farrell, P.J., MacGibbon, B., and Tomberlin, T.J. (2010), “A Comparison of Computational Approaches to Bayesian Small Area Estimation of Proportions in Hierarchical Logistic Models”, Submitted to the *Journal of Statistical Research, Special Volume in Honour of Professor Bradley Efron*, 44(1), 167-186.
- [22] Farrell, P.J., and Ould Haye, M. (2010), “Robust Regression with Infinite Moving Average Errors”, in *Dependence, with Applications in Statistics and Econometrics, Lecture Notes in Statistics*, Edited by P. Doukhan, G. Lang, D. Surgailis and G. Teyssiere, Springer-Verlag, New York, 143-156.
- [23] Farrell, P.J., and Saleh, A.K.Md.E. (2010), “Quasi-Empirical Bayes Estimation of the Parameters of an ARMA (p_1, p_2) Model: Subspace Restrictions”, Invited Paper, *Pakistan Journal of Statistics, 25th Anniversary*, 26, 135-149.
- [24] Farrell, P.J., and Singh, S. (2010), “Some Contributions to Jackknifing Two-Phase Sampling Estimators”, *Survey Methodology*, 36(1), 57 - 68.
- [25] Saleh, A.K.Md.E., and Farrell, P.J. (2009), “Two New Estimators of Distribution Functions”, *Journal of Statistical Research*, 43(1), 109-115.
- [26] Farrell, P.J., and Rogers-Stewart, K. (2008), “A Review and Comparison of Methods for Generating Longitudinally Correlated Binary Data”, *International Statistical Review*, 76(1), 28-38.
- [27] Farrell, P.J., MacGibbon, B., and Tomberlin, T.J. (2007), “Hierarchical Bayes Estimation for Time Series of Counts”, *Brazilian Journal of Probability and Statistics*, 21, 187-202.
- [28] Farrell, P.J., and Salibian-Barrera, M. (2007), “A Comparison of Several Robust Estimators for a Finite Population Mean”, Invited Paper in Honour of the 75th Birthday of Professor A.K.Md.Ehanes Saleh, *Journal of Statistical Studies*, 26, 29-43.
- [29] Farrell, P.J., Salibian-Barrera, M., and Naczka, K. (2007), “On Tests for Multivariate Normality and Associated Simulation Studies”, *Journal of Statistical Computation and Simulation*, 77(12), 1065-1080.
- [30] Ould Haye, M., and Farrell, P.J. (2007), “Linear Regression with Long Memory Errors”, Special Volume on the International Conference in Mathematics and Applications, *East-West Journal of Mathematics*, 203-212.
- [31] Sutradhar, B.C., and Farrell, P.J. (2007), “On Optimal Lag 1 Dependence Estimation for Dynamic Binary Models With Application to Asthma Data”, *Sankhya*, 69(3), 448-467.
- [32] Farrell, P.J., and Park, C.G. (2006), “A Likelihood Ratio Test for Ordered Group Effects in Binary and Continuous Outcomes”, *Biometrical Journal*, 48(5), 1-14.
- [33] Farrell, P.J., and Rogers-Stewart, K. (2006), “A Comprehensive Study of Tests for Normality and Symmetry: Extending the Spiegelhalter Test”, *Journal of Statistical Computation and Simulation*, 76, 803-816.
- [34] Farrell, P.J., and Sutradhar, B.C. (2006), “A Nonlinear Conditional Probability Model for Generating Correlated Binary Data”, *Statistics and Probability Letters*, 76, 353 - 361.

- [35] Cadigan, N.G., and Farrell, P.J. (2005), “Local Influence Diagnostics for the Retrospective Problem in Sequential Population Analysis”, *ICES Journal of Marine Science*, 62, 256 - 265.
- [36] Farrell, P.J., and Singh, S. (2005), “Model-Assisted Higher-Order Calibration of Estimators of Variance”, *Australian & New Zealand Journal of Statistics*, 47, 375 - 383.
- [37] MacNab, Y.C., Farrell, P.J., Gustafson, P., and Wen, S. (2004), “Estimation in Bayesian Disease Mapping”, *Biometrics*, 60, 865 - 873.
- [38] Sutradhar, B.C., and Farrell, P.J. (2004), “Analyzing Multivariate Longitudinal Binary Data: A Generalized Estimating Equations Approach”, *Canadian Journal of Statistics*, 32, 39 - 55.
- [39] Cadigan, N.G., and Farrell, P.J. (2002), “Generalized Local Influence with Applications to Fish Stock Cohort Analysis”, *Journal of the Royal Statistical Society, Series C*, 51, 469 - 483.
- [40] Farrell, P.J., and Stroud, T.W.F. (2002), “Random Balanced Resampling: A New Method for Estimating Variance Components in Unbalanced Designs”, *Journal of Statistical Computation and Simulation*, 181 - 194.
- [41] Cabilio, P., and Farrell, P.J. (2001), “A Computer-Based Lab Supplement to Courses in Introductory Statistics”, *American Statistician*, 55, 228 - 232.
- [42] Sashegyi, A.I., Brown, K.S., and Farrell, P.J. (2001), “On the Correspondence Between Population-Averaged Models and a Class of Cluster-Specific Models for Correlated Binary Data”, *Statistics and Probability Letters*, 52, 135 - 144.
- [43] Farrell, P.J. (2000), “Bayesian Inference for Small Area Proportions”, *Sankhya, Series B*, 62, 402 - 416.
- [44] Farrell, P.J., and Cadigan, N.G. (2000), “Local Influence in Binary Regression Models, and its Correspondence with Global Influence”, *Communications in Statistics - Theory and Methods*, 29(2), 349 - 368.
- [45] Sashegyi, A.I., Brown, K.S., and Farrell, P.J. (2000), “Application of a Generalized Random Effects Regression Model for Cluster-Correlated Longitudinal Data to a School-Based Smoking Prevention Trial”, *American Journal of Epidemiology*, 152, 1192 - 1200.
- [46] Sashegyi, A.I., Brown, K.S., and Farrell, P.J. (2000), “Estimation in an Empirical Bayes Model for Longitudinal and Cross-Sectionally Clustered Binary Data”, *Canadian Journal of Statistics*, 28, 45 - 64.
- [47] Cadigan, N.G., and Farrell, P.J. (1999), “Expected Local Influence in the Normal Linear Regression Model”, *Statistics and Probability Letters*, 41, 25 - 30.
- [48] Farrell, P.J. (1997), “Empirical Bayes Estimation of Small Area Proportions Based on Ordinal Outcome Variables”, *Survey Methodology*, 23(2), 119 - 126.
- [49] Farrell, P.J., Kusy, M., Thomas, R., and Tomberlin, T.J. (1997), “A Hybrid Methodology for Measuring Unit Costs in Multi-Branch Institutions”, *Canadian Journal of Administrative Science*, 14, 188 - 194.
- [50] Farrell, P.J., MacGibbon, B., and Tomberlin, T.J. (1997), “Bootstrap Adjustments for Empirical Bayes Interval Estimates of Small Area Proportions”, *Canadian Journal of Statistics*, 25, 75 - 89.
- [51] Farrell, P.J., MacGibbon, B., and Tomberlin, T.J. (1997), “Empirical Bayes Estimators of Small Area Proportions in Multistage Designs”, *Statistica Sinica*, 7, 1065 - 1083.
- [52] Farrell, P.J., MacGibbon, B., and Tomberlin, T.J. (1997), “Empirical Bayes Small Area Estimation Using Logistic Regression Models and Summary Statistics”, *Journal of Business and Economic Statistics*, 15, 101 - 108.
- [53] Farrell, P.J., MacGibbon, B., and Tomberlin, T.J. (1994), “Protection Against Outliers in Empirical Bayes Estimation”, *Canadian Journal of Statistics*, 22, 365 - 376.

Research Documents (Peer-Reviewed)

- [54] Cadigan, N.G., and Farrell, P.J. (2003), “Local Influence Diagnostics for the Retrospective Problem in Sequential Population Analysis”, Canadian Science Advisory Secretariat, Dept of Fisheries and Oceans, Document 2003/057.

Publications in Conference Proceedings

- [55] Farrell, P.J., and Singh, S. (2002), “Penalized Chi-Square Distance Function in Survey Sampling”, *Proceedings of the Section on Survey Methods*, American Statistical Association, 963 - 968.
- [56] Farrell, P.J., and Singh, S. (2002), “Re-Calibration of Higher-Order Calibration Weights”, *Proceedings of the Survey Methods Section*, Annual Meeting of the Statistical Society of Canada, August 2002.
- [57] Sashegyi, A.I., Brown, K.S., and Farrell, P.J. (1999), “Approximating Correlation Structures in Clustered Binary Data”, *Proceedings of the Survey Methods Section*, Annual Meeting of the Statistical Society of Canada, 193 - 198.
- [58] Sashegyi, A.I., Brown, K.S., and Farrell, P.J. (1997), “Simultaneous Modelling of Longitudinal and Cross-Sectional Dependence for Binary Outcomes”, *Proceedings of the Section on Statistics and the Environment*, American Statistical Association, August 1997.
- [59] Farrell, P.J. (1995), “A Hierarchical Bayes Approach for Estimating Small Area Proportions”, *Proceedings of the Survey Methods Section*, Annual Meeting of the Statistical Society of Canada, 63 - 68.
- [60] Farrell, P.J., MacGibbon, B., and Tomberlin, T.J. (1992), “Empirical Bayes Estimators of Small Area Proportions in Multistage Designs”, in *Statistical Issues in Public Policy Analysis*, Edited by J.N.K. Rao and N.G.N. Prasad, Carleton University and the University of Ottawa, Ontario, Canada, II-1 - II-31.

Written Work Submitted to Refereed Journals

- [61] Sivathalayan, A., Farrell, P.J., Krewski, D., and Sand, S. (2024), “An Empirical Comparison of the Signal-to-Noise Crossover Dose and the Benchmark Dose Using Datasets from the United States National Toxicology Program”, Submitted to *Risk Analysis*.

Written Work in Preparation to be Submitted to Refereed Journals

- [62] Hagiwara, S., Paoli, G.M., Price, P.S., Gwinn, M.R., Guiseppi-Elie, A., Farrell, P.J., Hubbell, B.J., Krewski, D., and Thomas, R.S. (2024), “Value of Information Case Study on the Human Health and Economic Trade-Offs Associated with the Timeliness, Uncertainty, and Costs of the Draft EPA Transcriptomic Assessment Product (ETAP)”.

Papers presented at Universities or before Learned Societies

- Sivathalayan, J., and Farrell, P.J. (2023), “Comparison of Design and Model-Based Estimators for a Population Proportion”, Technical Advances in Science, Medicine, and Engineering Conference, Toronto, Ontario, Canada, 2023.
- Milton, B., Farrell, P.J., Birkett, N., and Krewski, D. (2016), “Modeling U-Shaped Exposure-Response Relationships for Agents that Demonstrate Toxicity Due to Both Excess and Deficiency”, Society for Risk Analysis, Annual Meeting, San Diego, California, USA, December 2016.
- Milton, B., Krewski, D., Mattison, Birkett, N., Farrell, P.J., and McGough, D. (2016), “Modeling U-Shaped Dose-Response Curves for Manganese Using Categorical Regression”, International Manganese Institute, Manganese Showcase Symposium, Ottawa, Ontario, Canada, October 2015.
- Shasha, D., Lukens, J.N., Sivathalayan, A., Agarwal, M., Salant, R., Farrell, P.J., and Harrison, L.B. (2015), “Ten-Year Oncologic and Toxicity Outcomes After Low-Dose-Rate Brachytherapy for Prostate Cancer in HIV-Positive Men”, American Society for Radiation Oncology (ASTRO), 57th Annual Meeting, San Antonio, Texas, USA, October 2015.
- Shasha, D., Salant, R., Sivathalayan, A., Farrell, P.J., Furhang, E.E., Shah, N., Mourad, W.F., and Harrison, L.B. (2015), “Fifteen-Year Oncologic and Functional Outcomes in 1,742 Patients Treated With Low-Dose Rate Brachytherapy With or Without Supplemental Therapies for Clinically Localized Prostate Cancer”, American Society for Radiation Oncology (ASTRO), 57th Annual Meeting, San Antonio, Texas, USA, October 2015.
- Shasha, D., Salant, R., Sivathalayan, A., Farrell, P.J., Mourad, W.F., and Harrison, L.B. (2015), “Number of Intermediate and High Risk Factors Significantly Predicts Biochemical Survival and Prostate Cancer-Specific Survival After Low-Dose Rate Brachytherapy”, American Society for Radiation Oncology (ASTRO), 57th Annual Meeting, San Antonio, Texas, USA, October 2015.

Shasha, D., Salant, R., Wong, A.T., Sivathalayan, A., Farrell, P.J., Mourad, W.F., and Harrison, L.B. (2015), “Gleason 8 Prostate Cancer has Significantly and Substantially Superior Survival Outcomes Versus Gleason 9-10 After I-125 Brachytherapy Integrated Trimodality Therapy”, American Society for Radiation Oncology (ASTRO), 57th Annual Meeting, San Antonio, Texas, USA, October 2015.

Gravel, C., Farrell, P.J., Dewanji, A., and Krewski, D., “A Validation Sampling Approach for Unbiased Estimation in Misclassified Right Censored Continuous Time Survival Data”, Annual Meeting of the Statistical Society of Canada, Dalhousie University, Halifax, Nova Scotia, Canada, June 2015.

Sivathalayan, A., Farrell, P.J., and Krewski, D., “Empirical Comparison of the Signal to Noise Crossover Dose and the Benchmark Dose”, Annual Meeting of the Statistical Society of Canada, Dalhousie University, Halifax, Nova Scotia, Canada, June 2015.

Gravel, C., Farrell, P.J., and Krewski, D., “Resampling for Outcome Misclassification: Internal Validation Sampling Concerns”, Annual Meeting of the Statistical Society of Canada, University of Toronto, Toronto, Canada, May 2014.

Sivathalayan, A., Farrell, P.J., and Krewski, D., “Introduction and Assessment of a New Point of Departure for Human Exposure Guidelines”, Annual Meeting of the Statistical Society of Canada, University of Toronto, Toronto, Canada, May 2014.

Farrell, P.J., and Milton, B., “Modelling of Exposure-Response Relationships, With Application to a Copper Database”, University of Ottawa, Ottawa, Ontario, Canada, March 2014.

Gravel, C., Ghosh, P., Dewanji, A., Farrell, P.J., and Krewski, D., “Analysis of Electronic Health Records for Active Pharmacovigilance with Misclassification of the Study Variable”, Annual Meeting of the Statistical Society of Canada, University of Alberta, Edmonton, Alberta, Canada, May 2013.

Mallick, T.S., Farrell, P.J., and Sutradhar, B.C., “Covariance Matrix Adjustment for Generalized Quasilielihood Inference in Incomplete Longitudinal Binary Models”, International Symposium in Statistics on Longitudinal Data Analysis Subject to Outliers, Measurement Errors, and/or Missing Values, Memorial University, St. John’s, Newfoundland, Canada, July 16 – July 18, 2012.

Farrell, P.J., MacGibbon, B., Bartlett, G., and Tomberlin, T.J., “Jackknife Versus Bootstrap Methods in a Marginal Logistic Regression Model with Repeated Measures and a Complex Sampling Design”, Fields Symposium on the Analysis of Survey Data and Small Area Estimation in Honour of the 75th Birthday of Professor J.N.K. Rao, Carleton University, Ottawa, Ontario, Canada, May 2012.

Gravel, C., Farrell, P.J., and Krewski, D., “Statistical Methods for Active Pharmacovigilance”, Workshop on New Directions in Pharmacovigilance, McLaughlin Centre for Population Health Risk Assessment, University of Ottawa, Ottawa, Ontario, Canada, March 2011.

Rogers-Stewart, K., Farrell, P.J., and Nielsen, J., “Spatio-temporal Estimates as Predictors in a Hierarchical Model”, Annual Meeting of the Statistical Society of Canada, Universite Laval, Quebec, Quebec, Canada, May 2010.

Gravel, C., Farrell, P.J., Krewski, D., and McNair, D., “Statistical Methods for Signal Detection in Pharmacovigilance”, Joint Annual Meeting of the Canadian Society of Epidemiology and Biostatistics and the Association of Public Health Epidemiologists in Ontario, Fairmont Chateau Laurier Hotel, Ottawa, Ontario, Canada, May 2009.

Farrell, P.J., Saleh, A.K.Md.E., and Zhang, Z., “Moment Method Estimation of Mixture Distributions”, Annual Meeting of the Statistical Society of Canada, Ottawa Congress Centre, Ottawa, Ontario, Canada, May 2008.

Ould Haye, M., and Farrell, P.J., “Linear Regression with Long Memory Errors”, International Conference on Mathematics and Applications, Bangkok, Thailand, August 2007.

Rogers-Stewart, K., Sutradhar, B.C., and Farrell, P.J., “Generalized Quasilielihood Estimation of a Nonlinear Dynamic Model for Longitudinal Binary Data”, Annual Meeting of the Statistical Society of Canada, Memorial University, St. John’s, Newfoundland, Canada, June 2007.

Farrell, P.J., and Sutradhar, B.C., “A Nonlinear Conditional Probability Model for Nonstationary Longitudinal Binary Data”, Department of Statistics, University of British Columbia, Vancouver, British Columbia, February 2005.

Farrell, P.J., and Park C.G., “Testing for Ordered Group Effects in Bivariate Dichotomous and Continuous Outcomes”, Annual Meeting of the Statistical Society of Canada, University of Montreal, Montreal, Quebec, Canada, June 2004.

Cadigan, N.G., and Farrell, P.J., “Local Influence Diagnostics for the Retrospective Problem in Sequential Population Analyses of Fisheries Data”, Annual Meeting of the Statistical Society of Canada, Dalhousie University, Halifax, Nova Scotia, Canada, June 2003.

Farrell, P.J., and Singh, S., “Penalized Chi-Square Distance Function in Survey Sampling”, Annual Meeting of the American Statistical Association, New York, New York, USA, August 2002.

Farrell, P.J., and Singh, S., “Re-Calibration of Higher-Order Calibration Weights”, Annual Meeting of the Statistical Society of Canada, McMaster University, Hamilton, Ontario, Canada, May 2002.

Cabilio, P., and Farrell, P.J., “Computer Based Lab Methods in the Instruction of Probability and Statistics”, ED-MEDIA Conference on Educational Multimedia, Hypermedia & Telecommunications, Tampere, Finland, June 2001.

Cadigan, N.G., and Farrell, P.J., “Local Influence Diagnostics for Sequential Population Analysis”, Annual Meeting of the Statistical Society of Canada, Simon Fraser University, Burnaby, British Columbia, Canada, June 2001, and the Department of Mathematics and Statistics, Dalhousie University, Halifax, Nova Scotia, Canada, June 2001.

Farrell, P.J., and Stroud, T.W.F., “Balanced Bootstrap Samples: A New Method for Unbalanced Data”, Annual Meeting of the Statistical Society of Canada, University of Ottawa, Ottawa, Ontario, Canada, June 2000.

Farrell, P.J., “A Model for Cluster-Correlated Longitudinal Binary Data”, School of Mathematics and Statistics, Carleton University, Ottawa, Ontario, Canada, February 2000.

Farrell, P.J., “A Generalized Random Effects Logistic Regression Model for Cluster-Correlated Longitudinal Binary Data”, Department of Mathematics and Statistics, Queen's University, Kingston, Ontario, Canada, October 1999.

Cabilio, P., and Farrell, P.J., “A Lab Based Instruction Method for Introductory Statistics”, Annual Meeting of the Statistical Society of Canada, University of Regina, Regina, Saskatchewan, Canada, June 1999.

Sashegyi, A.I., Farrell, P.J., and Brown, K.S., “Approximating Correlation Structures in Clustered Binary Data Using Random Effects Models”, Annual Meeting of the Statistical Society of Canada, University of Regina, Regina, Saskatchewan, Canada, June 1999.

Sashegyi, A.I., Brown, K.S., and Farrell, P.J., “Simultaneous Modelling of Longitudinal and Cross-Sectional Dependence for Binary Outcomes”, Annual Meeting of the Statistical Society of Canada, Université de Sherbrooke, Sherbrooke, Quebec, June 1998, the Department of Statistics, Temple University, Philadelphia, Pennsylvania, March 1998, and the Annual Meeting of the American Statistical Association, Anaheim, California, August 1997.

Cadigan, N.G., and Farrell, P.J., “The Global Behavior of Local Influence Diagnostics in Some Binary Regression Examples”, Annual Meeting of the Statistical Society of Canada, University of New Brunswick, Fredericton, New Brunswick, Canada, June 1997.

Farrell, P.J., and Sprakman, G., “Trend and Seasonal Adjustment for Effective Budgeting”, Canadian Academic Accounting Association Conference, St. John's, Newfoundland, Canada, May 1997.

Farrell, P.J., “Hierarchical and Empirical Bayes Approaches for Estimating Small Area Proportions”, Department of Mathematics, Statistics, and Computer Science, Dalhousie University, Halifax, Nova Scotia, Canada, April 1997.

Farrell, P.J., “The Importance of Measurement”, Department of Mathematics and Statistics, Acadia University, Wolfville, Nova Scotia, Canada, April 1996, and the Department of Mathematics and Computing Sciences, St. Francis Xavier University, Antigonish, Nova Scotia, Canada, February 1996.

Farrell, P.J., “A Hierarchical Bayes Approach for Estimating Small Area Proportions”, Department of Mathematics and Computer Science, Georgia State University, Atlanta, Georgia, U.S.A., March 1996, the Annual Meeting of the Statistical Society of Canada, McGill University, Montreal, Quebec, Canada, July 1995, the Department of Mathematics and Statistics, Queen's University, Kingston, Ontario, Canada, March 1995, the Department of Statistics, University of British Columbia, Vancouver, British Columbia, Canada, March 1995, and the Department of Statistics and Actuarial Science, University of Waterloo, Waterloo, Ontario, Canada, March 1995.

Farrell, P.J., “Empirical Bayes Approaches for the Estimation of Small Area Proportions”, Department of Statistics, University of Manitoba, Winnipeg, Manitoba, Canada, December 1994.

Farrell, P.J., “Empirical Bayes Estimation of Proportions Associated With Discrete Small Area Outcome Variables”, Département de Mathématiques et d'Informatique, UQAM, Quebec, Canada, March 1994.

Farrell, P.J., MacGibbon, B., and Tomberlin, T.J., “Empirical Bayes Estimators of Small Area Proportions in Multistage Designs”, Department of Statistics, McMaster University, Hamilton, Ontario, Canada, October 1992, the Workshop on Statistical Issues in Public Policy Analysis, Carleton University, Ottawa, Ontario, Canada, May 1992, the Department of Statistics and Actuarial Science, University of Waterloo, Waterloo, Ontario, Canada, April 1992, and the Department of Mathematics and Statistics, Queen's University, Kingston, Ontario, Canada, February 1992.

Farrell, P.J., “An Empirical Bayes Approach for Estimating Small Area Proportions”, Department of Statistics and Actuarial Science, University of Waterloo, Waterloo, Ontario, Canada, February 1991, and the Faculty of Business Administration, University of New Brunswick, Fredericton, New Brunswick, Canada, February 1991.

Consulting Activities

Statistical consultant to numerous faculty and agencies including the Acadia Small Business Centre for Entrepreneurship, Cement Association of Canada, the Department of Education and Culture of the Government of Nova Scotia, Envirosphere, Farrington Lockwood Company Limited, and the National Research Council of Canada.

Director of the Statistical Consulting Centre, Department of Mathematics and Statistics, Acadia University, Wolfville, Nova Scotia, Canada, from July 1996 to July 2000.

Refereeing Activities

Editorial Board Member, *International Journal of Statistics and Systems* (2004 -).

Reviewer, *Mathematical Reviews* (2009 -), *NSERC Individual Research Grants*, *SSHRC Research Grants*.

Referee for numerous journals, including *American Journal of Epidemiology*, *American Statistician*, *Applied Statistics*, *Canadian Journal of Statistics*, *Communications in Statistics*, *Computational Statistics and Data Analysis*, *Current Medical Imaging Reviews*, *Haceteppe Journal of Mathematics and Statistics*, *Journal of Applied Mathematics and Physics*, *Journal of Business and Economic Statistics*, *Journal of the Korean Statistical Society*, *Journal of Multivariate Analysis*, *Journal of Official Statistics*, *Journal of the Royal Statistical Society (Series B)*, *Journal of Statistical Computation and Simulation*, *Journal of Survey Statistics and Methodology*, *METRON*, *Pakistan Journal of Statistics*, *Pakistan Journal of Statistics and Operation*, *Sankhya*, *Statistical Communications in Infectious Diseases*, *Statistics in Medicine*, *Statistica Sinica*, *Survey Methodology*, and *TEST*, *A Journal of the Spanish Statistical Society*.

Reviewer for Mendenhall III, W., Beaver, R.J., and Beaver, B.M. (2006), *Introduction to Probability and Statistics*, 12th Edition, Thomson Nelson.

Reviewer for Scheaffer, R.L, Mendenhall III, W., and Ott, R.L. (1996), *Elementary Survey Sampling*, 5th Edition, Duxbury Press. The review was conducted in July 2002 in order to make recommendations for a 6th Edition.

Reviewer for Sanders, D.H., Smidt, R.K., Adatia, A., and Larson, G.A. (2001), *Statistics: A First Course*, First Canadian Edition, McGraw-Hill Ryerson. The review was conducted in September 2001.

Reviewer for the proposed Masters degree program in Applied Mathematics at the Université de Moncton, 1997.

Referee, *ASB 96, the Atlantic Schools of Business Conference*, Moncton, New Brunswick.

Doctoral Thesis Committee Memberships

Taher, Mohamed (2021), “Systemic Quinolones and Risk of Adverse Reactions: Integrating Evidence from Clinical and Epidemiological Evidence Streams”, School of Epidemiology and Public Health, University of Ottawa.

Chatrchi, Golshid (2018), “Small Area Estimation: Informative Sampling and Two-Fold Models”, School of Mathematics and Statistics, Carleton University.

Hunter, Chad (2017), “A Study of the Prevalence of Patient Body Motion and its Subsequent Correction by Projection Consistency Conditions”, Department of Physics, Carleton University.

Salimi, Babak (2015), “Query-Answer Causality in Databases and its Connections with Reverse Reasoning Tasks in Data and Knowledge Management”, School of Computer Science, Carleton University.

Diallo, Mamadou, “Small Area Estimation: Skew-Normal Distributions and Time Series”, School of Mathematics and Statistics, Carleton University.

Winiszewska, Malgorzata (2014), “Statistical Inference in the Presence of Missing Data”, School of Mathematics and Statistics, Carleton University.

Cedzynski, Marzena (2012), “Pack Membership: A Study of Canada’s Competitive Position in International Food Markets”, Sprott School of Business, Carleton University.

Christensen, Steffen (2007), “Towards Scalable Genetic Programming”, School of Computer Science, Carleton University.

Dutta, Shantanu (2006), “Performance and Characteristics of Canadian Acquiring Firms”, Sprott School of Business, Carleton University.

Fuksa, Michel (2002), “Testing the Predictability of Stock Returns”, Sprott School of Business, Carleton University.

Tausi, Mauila (2002), “Estimating Function Variance Estimation in Complex Surveys and Combined Classification”, School of Mathematics and Statistics, Carleton University.

Master’s Thesis Committee Memberships

Van Bussel, Melissa (Winter 2021), “The Effect of Income on Postsecondary Persistence and Graduation in Canada”, School of Mathematics and Statistics, Carleton University.

Owen, Jimi (Winter 2020), “Poisson Regression with Link Estimation and Penalized Splines”, School of Mathematics and Statistics, Carleton University.

Ghaleb, Omar (Summer 2018), “Novel Solutions and Applications to Elevator-like Problems”, School of Computer Science, Carleton University.

Parsons, Zachary (Summer 2018), “Advanced Monte Carlo Dose Calculations for Eye Plaque Brachytherapy”, Department of Physics, Carleton University.

Dehghani, Parvin (Winter 2018), “The Analysis of Panel Data with a Flexible Frailty”, School of Mathematics and Statistics, Carleton University.

Beg, Nikolina (2015), “Model Based Penalized Smoothing for Panel Data Under a Markov Assumption”, School of Mathematics and Statistics, Carleton University.

Boudreau, Jonathan (2014), “Flexible Spline Based Models for the Analysis of Panel Data Under a Markov Assumption”, School of Mathematics and Statistics, Carleton University.

Nahmias, Stephanie (2014), “Empirical Study of Performance of Classification and Clustering Algorithms on Binary Data with Real-World Applications”, School of Mathematics and Statistics, Carleton University.

Said, Fares (2013), “Modelling Resource Intensity Weights (RIWs) at the Canadian Institute for Health Information (CIHI)”, School of Mathematics and Statistics, Carleton University.

Bejanov, Boyan (2011), “An Investigation into the Application of the Finite Element Method in Counting Process Models”, School of Mathematics and Statistics, Carleton University.

Sivathayalan, Ahalya (2009), “Comparison of Clustering and Classification Methods Combined with Dimension Reduction using Gene Expression Data”, School of Mathematics and Statistics, Carleton University.

Baral, Janardhan (2006), “The Effects of Model Misspecification When Fitting Generalized Linear Mixed Models”, School of Mathematics and Statistics, Carleton University.

Xu, Danyu (2003), “Mutual Funds Pattern Recognition Using Self-Organizing Maps”, School of Mathematics and Statistics, Carleton University.

Gaboury, Isabelle (2001), “Analysis of 2 x 2 Tables of Counts with Both Completely and Partially Cross-Classified Data”, School of Mathematics and Statistics, Carleton University.

Fontaine, Catherine (2000), “A Statistical Study of Canadian University Enrolments, Graduates, and the Future Professoriate: Analysis of Different Data Sources”, School of Mathematics and Statistics, Carleton University.

Moffitt, Scott (1997), “Use of the Biolog system to characterize size fractionated components of a heterotrophic estuarine community”, Department of Biology, Acadia University.

Service as an External Examiner

Prendergast, Tim (2013) “Interrupted Time Series Analysis Techniques in Pharmacovigilance”, MSc, Departement de mathematiques et statistique, Universite d’Ottawa.

Mariathas, Hensley Hubert (2012), “Family Based Spatial Correlation Model”, MSc, Department of Mathematics and Statistics, Memorial University of Newfoundland.

Cheam, Amay S.M. (2010), “Modelisation de la courbe ROC a partir des distributions de Pearson”, MSc, Departement de mathematiques et statistique, Universite d’Ottawa.

Tagore, Vickneswary (2006), “On Nonlinear Dynamic Binary Time Series”, MSc, Department of Mathematics and Statistics, Memorial University of Newfoundland.

Braimoh, Adebola (2003) “Analysing Longitudinal Data in the Presence of Missing Responses with Applications to SLID Data”, MSc, Department of Mathematics and Statistics, Memorial University of Newfoundland.

Bari, Wasimul (2003), “Analyzing Binary Longitudinal Data in Adaptive Clinical Trials”, MSc, Department of Mathematics and Statistics, Memorial University of Newfoundland.

Elkum, Naser (1997), “Statistical Methods in Canadian Cancer Data Set”, PhD, Department of Mathematics and Statistics, Queen’s University.

Honours Project Second Reader

Verma, Radha (2023), “Analysis on ChatGPT and Testing its Reliability”, Carleton University.

Verma, Ria (2023), “Forecasting Recession in Canada and its Impact on the Housing Market”, Carleton University.

Yordanov, Vince (2020), “Fitting Spatially Correlated Data with a Poisson Conditional Autoregressive Model”, Carleton University.

Bruce, Daniel (2009), “Modelling with Discrete Mixtures of P-Splines”, School of Mathematics and Statistics, Carleton University.

Titova, Olga (2007), “Detection and Estimation of Cohort and Period Effects in Canadian Breast Cancer Rates”, School of Mathematics and Statistics, Carleton University.

Rotundi, Michael (2006), “An Empirical Evaluation of Simple Outbreak Detection Algorithms”, School of Mathematics and Statistics, Carleton University.

Reader for the Honours theses of Crystal Linkletter (2000), Kelly Thomas (1999), and Jessica Tilley (1998), Department of Mathematics and Statistics, Acadia University.

Supervision of Highly-Qualified Personnel

Supervised Dianne J. Piaskoski (M.Sc., Statistics, Waterloo) from January 1, 1999 to April 30, 1999. Ms. Piaskoski provided computing assistance in joint research work with T.W.F. Stroud.

Honours, Grants, and Awards for Scholarly Activity

1. External Funding

2021 - 2024:	MITACS Accelerate Internship: Nawal Farhat, Shintaro Hagiwara, Selim Khan, and Mohamed Taher Industrial Partner: Risk Sciences International Evidence Integration and Value of Information	\$575,000
2020 - 2021:	MITACS Accelerate Internship: Abdallah Alami Industrial Partner: Risk Sciences International Statistical Perspectives on the Use of Pharmacovigilance Data and Electronic Health Records to Verify Predicted Chemical Hazards of Drugs from <i>In-Vitro</i> Toxicological Data	\$60,000
2015 - 2020:	Ontario Online Initiative Grant (with Wayne Horn) Development of a Two-Term Sequence of Introductory Statistics Courses for Business Students	\$75,000
2015 - 2016:	MITACS Accelerate Internship: Ahalya Sivathayalan Industrial Partner: Best Medical Canada Statistical Analysis of Prostate Brachytherapy Treatment Data	\$30,000
2013 - 2014:	MITACS Accelerate Internship: Chris Gravel Industrial Partner: Risk Sciences International Statistical Perspectives on Drug Safety Screening using Spontaneous Reporting Data and Electronic Health Records	\$45,000
2013 - 2014:	MITACS Accelerate Internship: Ahalya Sivathayalan Industrial Partner: Best Medical Canada Statistical Analysis of Prostate Brachytherapy Treatment Data	\$15,000
2013 - 2014:	MITACS Accelerate Internship: Brittany Milton Industrial Partner: Risk Sciences International Human Health Risk Assessment of Manganese and Inorganic Manganese Compounds and the Application of Categorical Regression in the Quantitative Risk Assessment of Manganese	\$30,000
2012:	Co-Applicant, NSERC Research Tools and Instruments I Grant	\$47,122
2012:	Fields Institute Grant for Symposium on the Analysis of Survey Data and Small Area Estimation in Honour of the 75 th Birthday of Professor J.N.K. Rao, May 30-June 1, 2012 (with J. Nielsen and S. Sinha)	\$10,000
2011 - 2017:	NSERC Individual Research Grant	\$12,000 per year
2010 - 2011:	MITACS Accelerate Internship: Chris Gravel Industrial Partner: Risk Sciences International Statistical Methods used in Passive Pharmacovigilance	\$15,000
2008:	Fields Institute Grant for Symposium on Dependent Data Structures, May 21-23, 2008 (with S.E. Mills, C.G. Park, and S. Sinha)	\$10,000
2006 - 2011:	NSERC Individual Research Grant	\$19,000 per year

2003:	Principal Applicant, NSERC Research Tools and Instruments I Grant (with C.G. Park)	\$36,068
2002 - 2006:	NSERC Individual Research Grant	\$19,000 per year
1998 - 2002:	NSERC Individual Research Grant	\$16,170 per year
1996 - 1998:	NSERC Individual Research Grant	\$13,900 per year
1993 - 1996:	NSERC Individual Research Grant	\$12,000 per year

2. Internal Funding

2019:	Co-Applicant, Multidisciplinary Research Catalyst Fund Early Detection of Various Forms of Cancer	\$20,000
2017 - 2021:	Research Grant, Dean of the Faculty of Science, Carleton University	\$20,000 per year
2014 - 2017:	Research Grant, Dean of the Faculty of Science, Carleton University	\$15,000 per year
2011 - 2014:	Research Grant, Dean of the Faculty of Science, Carleton University	\$10,000 per year
2007 - 2010:	Research Grant, Dean of the Faculty of Science, Carleton University	\$7,500 per year
2000 - 2001:	Start-Up Grant, Dean of the Faculty of Science, Carleton University	\$20,000
1992 - 1993:	Start-Up Grant, University of Waterloo	\$5,000

3. Research

Program Committee, International Symposium in Statistics (ISS) on Longitudinal Data Analysis Subject to Outliers, Measurement Errors, and/or Missing Values, July 16-18, 2012, Memorial University, St. John's, Newfoundland.

Program/Organizing Committee, Fields Symposium on the Analysis of Survey Data and Small Area Estimation in Honour of the 75th Birthday of Professor J.N.K. Rao, May 30-June 1, 2012, Carleton University, Ottawa, Ontario.

Program/Organizing Committee, Fields Symposium on Dependent Data Structures, May 21-23, 2008, Carleton University, Ottawa, Ontario, Canada.

Elected Member, International Statistical Institute, 2007 - .

Member, McLaughlin Centre for Population Health Risk Assessment, University of Ottawa, Ontario, Canada, 2007 - .

4. Statistical Society of Canada

Accreditation Appeals Committee, July 1, 2008 to June 30, 2010.

Membership Committee, July 1, 2007 to June 30, 2010.

Pierre Robillard Award Committee for Best Doctoral Thesis, July 1, 2006 to June 30, 2007.

Professionally Accredited by the Statistical Society of Canada Board of Directors, October 2004.

Statistical Society of Canada Executive, July 1, 2003 to June 30, 2005.

Statistical Society of Canada Board of Directors, July 1, 2003 to June 30, 2005.

Treasurer, Statistical Society of Canada, July 1, 2003 to June 30, 2005.

Finance Committee Chair, Statistical Society of Canada, July 1, 2003 to June 30, 2005.

Program Committee, Annual General Meeting, Statistical Society of Canada, July 1, 2003 to June 30, 2005.

Publications Committee, Statistical Society of Canada, July 1, 2003 to June 30, 2005.

Past-President, Survey Methods Section, Statistical Society of Canada, July 1, 2001 to June 30, 2002.

Elections Committee, Statistical Society of Canada, July 1, 2001 to June 30, 2002.

President, Survey Methods Section, Statistical Society of Canada, July 1, 2000 to June 30, 2001.

President-Elect, Survey Methods Section, Statistical Society of Canada, July 1, 2000 to June 30, 2001.

Carleton University Representative, Statistical Society of Canada, July 1, 2000 to June 30, 2003.

Acadia University Representative, Statistical Society of Canada, July 1, 1997 to June 30, 2000.

Organized an invited session for (1) the 2007 Annual Meeting on Generalized Quasi-Likelihood Inference, and (2) the 2003 Annual Meeting on Nonparametric Analysis in Natural Resources Surveys.

Organized and chaired as President of the Survey Methods Section, (1) a workshop in the analysis of survey data at the Annual General Meeting of the Statistical Society of Canada, (2) the Survey Methods invited address in honour of the retirement of J.N.K. Rao, and (3) the invited session in contrasting the 2001 Canadian and 2000 United States Censuses at the Annual General Meeting of the Statistical Society of Canada, Simon Fraser University, June 2001.

5. Teaching

Ontario Online Initiative Grant (with Wayne Horn); “Development of a Two-Term Sequence of Introductory Statistics Courses for Business Students”, 2015-20.

Faculty of Science Teaching Award, Carleton University, 2002.

Departmental grant from the Teaching Innovation Fund at Acadia University; a portion of the department’s initial application was written jointly by Paul Cabilio and myself, commenting on our experience with studio laboratories in first and second year statistics courses, and their implementation (1997 - 1999).

Written acknowledgement from the Associate Dean of Undergraduate Studies in the Faculty of Mathematics at the University of Waterloo for excellence in teaching (1992 - 1995).

IV. Service

Service to the University and Academic Communities

1. Committees

Carleton University

Learning Management System Advisory Group (2018 - 2020).

Hiring Committee, School of Computer Science, for a position in Data Science (2018 - 2019).

Senate Committee Member (2017 - 2020).

Hiring Committee, School of Computer Science, for three positions in Data Science (2017 - 2018).

Special Advisor, Office of the Dean of the Faculty of Science (November 16, 2015 -).

Major Initiatives: Online Course Development in the Faculty of Science and for the Community, including Statistics Canada, Development of Undergraduate and Graduate Programs in Data Science, Student Engagement and Retention.

Director, School of Mathematics and Statistics (July 1, 2007 to June 30, 2010, July 1, 2011 to November 15, 2015).

Major Initiatives: Accreditation of a Suite of Statistics Courses by the Statistical Society of Canada, Creation of an Actuarial Science concentration, Creation of a Mathematics and Statistics Consulting Centre, Introduction of an MSc Statistics degree, Development of Graduate Programs in Data Science.

Acting Associate Director (July 1, 2014 – June 30, 2015)

Acting Graduate Director (January 1, 2009 to May 31, 2009, July 1, 2013 to June 30, 2014).

Acting School Director (May 14-16, May 31-June 1, June 14-15, June 18-22, 2007).

Acting School Undergraduate Advisor during Ken Small’s Vacation (2003 - 2004, 2007 - 2010, 2011 - 2015).

School Council Representative, Carleton University Academic Staff Association (2000 - 2003).

Faculty Promotion and Tenure Committee (2003 - 2004, 2005 - 2007).

School Hiring Committee (2001 - 2002); Chair 2001 - 2002.

School Personnel Committee (2002 - 2007); Chair: 2003 - 2004, 2005 - 2007; Vice-Chair: 2002 - 2003.

School Recruiting Committee (2000 - 2001).

Search Committee for School Director (2001).

School Statistics Program Committee (2000 -); Vice-Chair: 2000 - 2002, Fall 2006; Chair: Winter 2006, Winter 2007.

School Undergraduate Curriculum Committee (2000 - 2002, Winter 2006, 2006 - 2007).

Acadia University

Course Evaluation Committee (1998 - 2000), Curriculum Committee (1998 - 2000, Chair in 1999 – 2000), Elections Officer (1997 - 2000), Electronic Commerce Degree Committee (1999 - 2000), Faculty Association Financial Benefits and Financial Information Committees (1998 - 2000).

Faculty of Pure and Applied Science, Acadia University

Departmental Review Committee, School of Engineering (1999), Elections and Nominating Officer (1998 - 2000), Scholarship and Awards Committee (1998 - 2000, Chair in 1999 – 2000), Engineering/Management Degree Committee (1996 - 1997).

Department of Mathematics and Statistics, Acadia University

Career Development Committee (1997 - 1998), Chair of Consulting Development Committee (1997 - 2000), Chair of Hiring Committee (1997 - 1998), Curriculum Committee (1997 - 1998, 1999 - 2000), Library Committee (1997 - 1998), Planning Committee (1997 - 2000), Recruiting Committee (1998 - 2000).

University, Faculty, and Department Committees at the University of Waterloo

Local Organizing Committee of the Annual Meeting of the Statistical Society of Canada (1996), Department of Statistics and Actuarial Science Teaching Resources Committee (1994 - 1996), University of Waterloo Library Committee (1992 - 1996).

2. Service in the form of Statistical Consulting

Director of the Statistical Consulting Centre, Department of Mathematics and Statistics, Acadia University, Wolfville, Nova Scotia, Canada (1996 - 2000).

Statistical consultant to numerous faculty and agencies including the Acadia Small Business Centre for Entrepreneurship, Cement Association of Canada, the Department of Education and Culture of the Government of Nova Scotia, Envirosphere, Farrington Lockwood Company Limited, the National Research Council of Canada, and Risk Sciences International (1997 - 2023).

3. Miscellaneous University Service

Chair, PhD defence of Abdulrahman Hijazi, “Network Traffic Characterization Using (p,n)-grams Packet Representation”, School of Computer Science, Carleton University (2014).

Chair, PhD defence of Nikolai Chepelev, “Identification of NRF1 (NFE2L1) as a Hypoxia-Inducible Factor and its Oxygen-Dependent Regulation *In Vitro* and *In Vivo*”, Department of Biology, Carleton University (2012).

Chair, PhD defence of Gholamreza Yousefi Moghaddam, “Transceiver Architecture for Short-Range Wireless Applications”, Department of Electronics, Carleton University (2009).

Chair, M.Sc. defence of Xiaobo Zhu, “Hybrid Model for Smoke and Fire Propagation in Complex Structures”, School of Mathematics and Statistics, Carleton University (2009).

Speaker, Zero to Infinity Math Conference, Carleton University (2009 - 2010).

Lecturer for mini-course for Ontario high school students, Carleton University (2006 - 2017).

Joint co-ordinator of NSERC site visit to the Department of Mathematics and Statistics, Acadia University (1999).

Participant in a session to inform the academic community at Acadia University about studio lab teaching at Rensselaer Polytechnic Institute (1997).

Referee for numerous undergraduate and graduate students (1992 - 2024).

4. Service to the Discipline of Statistics

Member of the American Statistical Association (2005 -) and the Statistical Society of Canada (1992 -).

Member of the Laboratory for Research in Statistics and Probability, Carleton University (2000 -).

Member of the Survey Research Centre, University of Waterloo (1999 -).

Local Organizing Committee for the Annual Meeting of the Statistical Society of Canada (1996).

Yuhong Guo

School of Computer Science, Carleton University

Email: yuhong.guo@carleton.edu

<http://people.scs.carleton.ca/~yuhongguo>

EDUCATION

Ph.D., Computing Science, University of Alberta, Canada, 2007

M.Eng., Computer Science, Nankai University, China, 2001

B.Sc., Computer Science, Nankai University, China, 1998

POSITIONS

Professor (tenured), 2020.07 – present

School of Computer Science, Carleton University, Canada

Associate Professor (tenured), 2016.07 – 2020.06

School of Computer Science, Carleton University, Canada

Canada Research Chair, 2016.07 – present

School of Computer Science, Carleton University, Canada

Associate Professor (tenured), 2015.07 – 2016.06

Department of Computer and Information Sciences, Temple University, USA

Assistant Professor, 2009.01 – 2015.06

Department of Computer and Information Sciences, Temple University, USA

Research Fellow, 2008.05 – 2008.12

Research School of Information Sciences and Engineering, Australian National University, Australia

Postdoctoral Fellow, 2008.01 – 2008.04

Department of Computing Science, University of Alberta, Canada

RESEARCH INTERESTS

Machine Learning, Artificial Intelligence, Computer Vision,
Natural Language Processing, Data Mining, Medical Data Analysis

AWARDS AND HONORS

Canada Research Chair in Machine Learning, Tier 2 (Renewal), 2022

Natural Sciences and Engineering Research Council of Canada

First Runner-up Student Machine Learning Paper Award (student co-author: Xuejun Han), 2021
The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery
in Databases (ECML/PKDD)

NeurIPS 2021 Outstanding Reviewer Award, 2021

Canada CIFAR AI Chair (Amii), 2021

Best Paper Award, 2020
Transferring and Adapting Source Knowledge in Computer Vision (TASK-CV) Workshop at ECCV-20

Discovery Accelerator Supplement, 2017
Natural Sciences and Engineering Research Council of Canada

Canada Research Chair in Machine Learning, Tier 2, 2016
Natural Sciences and Engineering Research Council of Canada

Chair Award for Outstanding Research, 2012
Department of Computer and Information Sciences, Temple University, USA

Outstanding Paper Award, 2012
Twenty-Sixth AAAI Conference on Artificial Intelligence (AAAI), Toronto, Canada

Best Student Paper Award (student co-author: Qin Liu), 2012
2012 International Conference on Cloud and Green Computing (CGC), Xiangtan, Hunan, China

NSERC Postdoctoral Fellowship, 2008
Natural Sciences and Engineering Research Council of Canada

Distinguished Paper Award, 2005
Nineteenth International Joint Conference on Artificial Intelligence (IJCAI), Edinburgh, UK

Ph.D. Research Award, 2005
Department of Computing Science, University of Alberta, Edmonton, AB, Canada

GRANTS

Yuhong Guo (PI). (Apr. 2023–Mar. 2028) “Overcoming Barriers to Machine Learning via Deeper Data Exploitation”. NSERC Discovery Grant, \$46,000/year.

Fei Richard Yu (PI), Mojtaba Ahmadi, Elizabeth Frances Judge, Joshua Marshall, Jonathan Wu, Yuriy Zabolotnyuk, Yuhong Guo, Ata Khan, Omair Shafiq, Halim Yanikomeroglu, and Weihua Zhuang (Co-PIs). (Sept. 2020–Aug. 2027) “NSERC CREATE for Building Trust in Connected Autonomous Vehicles”. NSERC CREATE Grant, \$1,650,000.

JianLi Wang (PI), Alain Lesage, Fatemeh Gholi Zadeh Kharrat, Genevieve Garipey, Caroline Sirois, Yuhong Guo, Christian Gagne, and Jean-Francois Pelletier (Co-PIs). (Mar. 2020–Mar. 2022) “Predicting Population Risk of Suicide using Health Administrative Data”. New Frontiers in Research Fund (NFRF), \$250,000.

Fei Richard Yu (PI), Halim Yanikomeroglu, Winnie Ye, Yuhong Guo, Omair Shafiq, Christopher Worswick, Stephanie Carvin, Helen Tang, Xiaoping Liu (Co-PIs). (Apr. 2019–Mar. 2020) “Connected Autonomous Vehicles Research Cluster (CAV-RC)”. Multidisciplinary Research Catalyst Fund, Carleton University. \$50,000.

Yuhong Guo (PI). (Mar. 2019–Apr. 2020) “Lifetime Learning-based Predictive Modeling Technologies for Prognostic and Health Management”. National Research Council of Canada, \$22,000

Yuhong Guo (PI). (Sept. 2018–Oct. 2018) “Ottawa Artificial Intelligence Alliance Workshop”. NSERC Connect Grant, \$9,664.

JianLi Wang (PI), Douglas Manual, Elizabeth Lin, Sanjay Rao, Yuhong Guo, and Abigail Ortiz (Co-PIs). (Feb. 2018–Feb. 2020) “Developing Multivariable Risk Prediction Algorithms for Heart Diseases among Individuals Treated for Mood/Anxiety Disorders using Administrative Health Databases in Ontario”. University Medical Research Funds, \$100,000.

Yuhong Guo (PI). (Nov. 2017–Apr. 2018) “Improving Static Code Analysis Using Machine Learning Methods”. NSERC Engagement Grant, \$25,000.

Yuhong Guo (PI). (Apr. 2017–Mar. 2022) “Collective Machine Learning for Semantic Data Interpretation”. NSERC Discovery Grant, \$42,000/year.

Yuhong Guo (PI). (Apr. 2017–Mar. 2020) “Collective Machine Learning for Semantic Data Interpretation”. NSERC Discovery Accelerator Supplement, \$40,000/year.

Eduard Dragut (PI) and Yuhong Guo (Co-PI). (Jan. 2016–Jan. 2019) “Streaming Architecture for Continuous Entity Linking in Social Media”. National Science Foundation, \$783,339, IIS-1546480, Collaborative Research.

Yuhong Guo (PI). (Aug. 2014–July 2017) “Improving Multi-label Classifiers by Learning Output Representations”. National Science Foundation, \$439,191, IIS-1422127.

Alexander Yates (PI) and Yuhong Guo (Co-PI). (Apr. 2011–Mar. 2016) “Learning Representations of Language for Domain Adaptation”. National Science Foundation, \$697,982, IIS-1065397, Medium Collaborative Research.

Alexander Yates (PI) and Yuhong Guo (Co-PI). (Apr. 2012–Mar. 2013) Research Experiences for Undergraduates (REU), supplemental grant to IIS-1065397, National Science Foundation, \$8,000.

PUBLICATIONS

Note: Trainees under my direct supervision are indicated by the superscript *. Other trainees are indicated by the superscript †.

There is a strong tradition of conference publication in the fields of machine learning, computer vision, and natural language processing. In these areas, top conferences represent some of the most prestigious and competitive publication venues.

Refereed Journal Articles

1. Zhengxia Zou, Keyan Chen, Zhenwei Shi, Yuhong Guo, and Jieping Ye. “Object Detection in 20 Years: A Survey”. *Proceedings of the IEEE*, Vol. 111, Issue 3, 2023.
2. Youfa Liu[†], Bo Du, Weiping Tu, Mingming Gong, Yuhong Guo, and Dacheng Tao. “LogDet Metric Based Domain Adaptation”. *IEEE Transactions on Neural Networks and Learning Systems (TNNLS)*, 1-15, Jan. 2020.
3. Mingli Zhang[†], Christian Desrosiers, Yuhong Guo, Budhachandra Khundrakpam, Noor Al-Sharif, Greg Kiar, Pedro Valdes-Sosa, Jean-Baptiste Poline, and Alan Evans. “Brain Status Modeling with Non-negative Projective Dictionary Learning”. *NeuroImage*, Vol. 206, 2020.
4. Zengmao Wang^{*}, Bo Du, and Yuhong Guo. “Domain Adaptation with Neural Embedding Match-

- ing”. *IEEE Transactions on Neural Networks and Learning Systems (TNNLS)*, 1-11, Sept. 2019.
5. He Zhao, Huiqi Li, Sebastian Maurer-Stroh, Yuhong Guo, Qiuju Deng and Li Cheng. “Supervised Segmentation of Un-annotated Retinal Fundus Images by Synthesis”. *IEEE Transactions on Medical Imaging*, 38(1): 46-56, 2019.
 6. Qin Liu, Yuhong Guo, Jie Wu and Guojun Wang. “Effective Query Grouping Strategy in Clouds”. *Journal of Computer Science and Technology*, 32(6): 1231-1249, 2017.
 7. Min Xiao* and Yuhong Guo. “Feature Space Independent Semi-Supervised Domain Adaptation via Kernel Matching”. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, Vol. 37, Issue 1, 54–66, 2014.
 8. Fei Huang[†], Arun Ahuja[†], Doug Downey, Yi Yang[†], Yuhong Guo and Alex Yates. “Learning Representations for Weakly Supervised Natural Language Processing Tasks”. *Computational Linguistics*, Vol. 40, No. 1, 85–120, 2014.
 9. Liang Lan[†], Nemanja Djuric[†], Yuhong Guo and Slobodan Vucetic. “MS – kNN: Protein Function Prediction by Integrating Multiple Data Sources”. *BMC Bioinform.*, Vol. 14 (suppl. 3): S8, 2013.
 10. Predrag Radivojac, Wyatt T Clark, Tal Ronnen Oron, Alexandra M Schnoes, Tobias Wittkop, Artem Sokolov, Kiley Graim, Christopher Funk, Karin Verspoor, Asa Ben-Hur, Gaurav Pandey, Jeffrey M Yunes, Ameet S Talwalkar, Susanna Repo, Michael L Souza, Damiano Piovesan, Rita Casadio, Zheng Wang, Jianlin Cheng, Hai Fang, Julian Gough, Patrik Koskinen, Petri Törönen, Jussi Nokso-Koivisto, Liisa Holm, Domenico Cozzetto, Daniel W A Buchan, Kevin Bryson, David T Jones, Bhakti Limaye, Harshal Inamdar, Avik Datta, Sunitha K Manjari, Rajendra Joshi, Meghana Chitale, Daisuke Kihara, Andreas M Lisewski, Serkan Erdin, Eric Venner, Olivier Lichtarge, Robert Rentzsch, Haixuan Yang, Alfonso E Romero, Prajwal Bhat, Alberto Paccanaro, Tobias Hamp, Rebecca Kassner, Stefan Seemayer, Esmeralda Vicedo, Christian Schaefer, Dominik Achten, Florian Auer, Ariane Böhm, Tatjana Braun, Maximilian Hecht, Mark Heron, Peter Hönigschmid, Thomas Hopf, Stefanie Kaufmann, Michael Kiening, Denis Krompass, Cedric Landerer, Yannick Mahlich, Manfred Roos, Jari Björne, Tapio Salakoski, Andrew Wong, Hagit Shatkay, Fanny Gatzmann, Ingolf Sommer, Mark N Wass, Michael J E Sternberg, Nives Škunca, Fran Supek, Matko Bošnjak, Pance Panov, Sašo Džeroski, Tomislav Šmuc, Yiannis A I Kourmpetis, Aalt D J van Dijk, Cajo J F ter Braak, Yuanpeng Zhou, Qingtian Gong, Xinran Dong, Weidong Tian, Marco Falda, Paolo Fontana, Enrico Lavezzo, Barbara Di Camillo, Stefano Toppo, Liang Lan, Nemanja Djuric, Yuhong Guo, Slobodan Vucetic, Amos Bairoch, Michal Linial, Patricia C Babbitt, Steven E Brenner, Christine Orengo, Burkhard Rost, Sean D Mooney, and Iddo Friedberg. “A Large-Scale Evaluation of Computational Protein Function Prediction”. *Nature Methods*, Vol. 10(3), 221–227, 2013.
 11. Vladimir Ouzienko[†], Yuhong Guo, and Zoran Obradovic. “A Decoupled Exponential Random Graph Model for Prediction of Structure and Attributes in Temporal Social Networks”. *Statistical Analysis and Data Mining Journal*, Vol. 4, Issue 5, 470–486, 2011.

Refereed Conference Papers

12. Marzi Heidari*, Abdullah Alchihabi*, Qing En*, and Yuhong Guo. “Adaptive Parametric Prototype Learning for Cross-Domain Few-Shot Classification”. In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2024. Acceptance Rate = 27.6%
13. Qing En* and Yuhong Guo. “Cross-model Mutual Learning for Exemplar-based Medical Image

- Segmentation”. In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2024. Acceptance Rate = 27.6%
14. Yan Yan* and Yuhong Guo. “Federated Partial Label Learning with Local-Adaptive Augmentation and Regularization”. In *AAAI Conference on Artificial Intelligence (AAAI)*, 2024. Acceptance Rate = 23.75%
 15. Abdullah Alchihabi*, Qing En*, and Yuhong Guo. “Efficient Low-Rank GNN Defense Against Structural Attacks”. In *IEEE International Conference On Knowledge Graph (ICKG)*, 2023.
 16. Xuejun Han* and Yuhong Guo. “Evolving Dictionary Representation for Few-shot Class-incremental Learning”. In *European Conference on Artificial Intelligence (ECAI)*, 2023. Acceptance Rate = 24%
 17. Abdullah Alchihabi* and Yuhong Guo. “GDM: Dual Mixup for Graph Classification with Limited Supervision”. In *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)*, 2023. Acceptance Rate = 24%
 18. Taoseef Ishtiak*, Qing En*, and Yuhong Guo. “Exemplar-FreeSOLO: Enhancing Unsupervised Instance Segmentation with Exemplars”. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2023. Acceptance Rate = 25.78%.
 19. Zainab Albujaasim*, Diana Inkpen, Xuejun Han*, and Yuhong Guo. “Improving Word Embedding Using Variational Dropout”. In *International FLAIRS Conference (FLAIRS-36)*, 2023.
 20. Yan Yan* and Yuhong Guo. “Mutual Partial Label Learning with Competitive Label Noise”. In *International Conference on Learning Representations (ICLR)*, 2023. Acceptance Rate = 31.8%
 21. Yan Yan* and Yuhong Guo. “Partial Label Unsupervised Domain Adaptation with Class-Prototype Alignment”. In *International Conference on Learning Representations (ICLR)*, 2023. Acceptance Rate = 31.8%
 22. Abdullah Alchihabi* and Yuhong Guo. “Learning Robust Graph Neural Networks with Limited Supervision”. In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2023.
 23. Hao Yan* and Yuhong Guo. “Dual Moving Average Pseudo-Labeling for Source-Free Inductive Domain Adaptation”. In *Proceedings of the British Machine Vision Conference (BMVC)*, 2022.
 24. Qing En* and Yuhong Guo. “Exemplar Learning for Medical Image Segmentation”. In *Proceedings of the British Machine Vision Conference (BMVC)*, 2022.
 25. Xuejun Han* and Yuhong Guo. “Overcoming Catastrophic Forgetting for Continual Learning via Feature Propagation”. In *Proceedings of the British Machine Vision Conference (BMVC)*, 2022.
 26. Zainab Albujaasim*, Diana Inkpen, and Yuhong Guo. “Word Embedding Interpretation Using Co-Clustering”. In *International Conference on Data Science and Cloud Computing (DSCC)*, 2022.
 27. Bingyu Liu*, Yuhong Guo, Jieping Ye, and Wenhong Deng. “Selective Pseudo-Labeling with Reinforcement Learning for Semi-Supervised Domain Adaptation”. In *Proceedings of the British Machine Vision Conference (BMVC)*, 2021. Acceptance Rate = 36%.
 28. Hao Yan*, Yuhong Guo, and Chunsheng Yang. “Source-free Unsupervised Domain Adaptation with Surrogate Data Generation”. In *Proceedings of the British Machine Vision Conference (BMVC)*, 2021. Acceptance Rate = 36%.

29. Xuejun Han* and Yuhong Guo. “Continual Learning with Dual Regularizations”. In *Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)*, 2021. Acceptance Rate = 21.5%. **(First Runner-up Student Machine Learning Paper Award)**
30. Chunsheng Yang, Yuhong Guo, Yubin Yang, and Xiaohua Yang. “Toward Lifetime Learning-based Predictive”. In *IEEE International Conference on Computer Supported Cooperative Work in Design (CSCWD)*, 2021.
31. Bingyu Liu*, Yuhong Guo, Jianan Jiang, Jian Tang, and Weihong Deng. “Multi-view Correlation based Black-box Adversarial Attack for 3D Object Detection”. In *Proceedings of the ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, 2021. Acceptance Rate = 15.4%.
32. Wentao Cui* and Yuhong Guo. “Parameterless Transductive Feature Re-representation for Few-Shot Learning”. In *Proceedings of the International Conference on Machine Learning (ICML)*, 2021. Acceptance Rate = 21.5%.
33. Yan Yan* and Yuhong Guo. “Multi-level Generative Models for Partial Label Learning with Non-random Label Noise”. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2021. Acceptance Rate = 13.9%.
34. Yan Yan* and Yuhong Guo. “Adversarial Partial Multi-Label Learning with Label Disambiguation”. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2021. Acceptance Rate = 21%.
35. Zhen Zhao*, Yuhong Guo, Haifeng Shen, and Jieping Ye. “Adaptive Object Detection with Dual Multi-Label Prediction”. In *Proceedings of the European Conference on Computer Vision (ECCV)*, 2020. Acceptance Rate = 27%.
36. Yaser Alwatter* and Yuhong Guo. “Inverse Visual Question Answering with Multi-Level Attentions”. In *Proceedings of the Asian Conference on Machine Learning (ACML)*, 2020. Acceptance Rate = 31%.
37. Vasileios Lioutas* and Yuhong Guo, “Time-aware Large Kernel Convolutions”. In *Proceedings of the International Conference on Machine Learning (ICML)*, 2020. Acceptance Rate = 21.8%.
38. Yan Yan* and Yuhong Guo. “Partial Label Learning with Batch Label Correction”. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2020. Acceptance Rate = 20.6%.
39. Yuan Wu* and Yuhong Guo. “Dual Adversarial Co-Learning for Multi-Domain Text Classification”. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2020. Acceptance Rate = 20.6%.
40. Meng Ye* and Yuhong Guo. “Multi-Label Zero Shot Learning with Transfer-Aware Label Embedding Projection”. In *Proceedings of the IEEE International Conference on Image Processing (ICIP)*, 2019.
41. Meng Ye* and Yuhong Guo. “Progressive Ensemble Networks for Zero Shot Recognition”. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2019. Acceptance Rate = 25.2%.
42. Chen Shen* and Yuhong Guo. “Unsupervised Heterogeneous Domain Adaptation with Sparse Feature Transformation”. In *Proceedings of the Asian Conference on Machine Learning (ACML)*, 2018. Acceptance Rate = 24.8%.

43. Mingli Zhang[†], Christian Desrosiers, Yuhong Guo, Caiming Zhang, Budhachandra Khundrakpam, and Alan Evans. “Brain Status Prediction with Non-negative Projective Dictionary Learning”. In *Proceedings of the International Conf. on Machine Learning in Medical Imaging (MLMI)*, 2018.
44. Zengmao Wang*, Yuhong Guo, and Bo Du. “Matrix Completion with Preference Ranking for Top-N Recommendation”. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2018. Acceptance Rate < 20.5%.
45. Kongming Liang*, Yuhong Guo, Hong Chang and Xilin Chen. “Visual Relationship Detection with Deep Structural Ranking”. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2018. Acceptance Rate < 25%.
46. Meng Ye* and Yuhong Guo. “Labelless Scene Classification with Semantic Matching”. In *Proceedings of the British Machine Vision Conference (BMVC)*, 2017. Acceptance Rate = 29.6%.
47. Kongming Liang*, Yuhong Guo, Hong Chang and Xilin Chen. “Incomplete Attribute Learning with Auxiliary Labels”. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2017. Acceptance Rate < 26%.
48. Feipeng Zhao* and Yuhong Guo. “Learning Discriminative Recommendation Systems with Side Information”. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2017. Acceptance Rate < 26%.
49. Meng Ye* and Yuhong Guo. “Zero-Shot Classification with Discriminative Semantic Representation Learning”. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2017. Acceptance Rate = 29.2%.
50. Yuhong Guo. “Convex Co-Embedding for Matrix Completion with Predictive Side Information”. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2017. Acceptance Rate < 25%.
51. Feipeng Zhao* and Yuhong Guo. “Improving Top-N Recommendation with Heterogeneous Loss”. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2016. Acceptance Rate < 25%.
52. Feipeng Zhao*, Min Xiao*, and Yuhong Guo. “Predictive Collaborative Filtering with Side Information”. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2016. Acceptance Rate < 25%.
53. Xin Li*, Yuhong Guo and Dale Schuurmans. “Semi-Supervised Zero-Shot Classification with Label Representation Learning”. In *Proceedings of the IEEE International Conference on Computer Vision (ICCV)*, 2015. Acceptance Rate = 30.3%.
54. Min Xiao* and Yuhong Guo. “Annotation Projection-based Representation Learning for Cross-lingual Dependency Parsing”. In *Proceedings of the Conference on Computational Natural Language Learning (CoNLL)*, 2015. Acceptance Rate = 29.9%.
55. Min Xiao* and Yuhong Guo. “Learning Hidden Markov Models with Distributed State Representations for Domain Adaptation”. In *Proceedings of the Annual Meeting of the Association for Computational Linguistics (ACL)*, 2015. Short Paper Acceptance Rate = 22.3%.
56. Min Xiao* and Yuhong Guo. “Semi-Supervised Subspace Co-Projection for Multi-Class Heterogeneous Domain Adaptation”. In *Proceedings of the European Conference on Machine Learning and*

- Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)*, 2015. Acceptance Rate = 23.2%.
57. Feipeng Zhao* and Yuhong Guo. “Semi-supervised Multi-label Learning with Incomplete Labels”. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2015. Acceptance Rate = 28.8%.
 58. Xin Li* and Yuhong Guo. “Multi-label Classification with Feature-aware Non-linear Label Space Transformation”. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2015. Acceptance Rate = 28.8%.
 59. Xin Li* and Feipeng Zhao* and Yuhong Guo. “Conditional Restricted Boltzmann Machines for Multi-label Learning with Incomplete Labels”. In *Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2015. Acceptance Rate = 28.7%.
 60. Xin Li* and Yuhong Guo. “Max-Margin Zero-Shot Learning for Multi-Class Classification”. In *Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2015. Acceptance Rate = 28.7%.
 61. Xin Li* and Yuhong Guo. “Multi-level Adaptive Active Learning for Scene Classification”. In *Proceedings of the European Conference on Computer Vision (ECCV)*, 2014. Acceptance Rate = 26.7%.
 62. Min Xiao* and Yuhong Guo. “Distributed Word Representation Learning for Cross-lingual Dependency Parsing”. In *Proceedings of the Conference on Computational Natural Language Learning (CoNLL)*, 2014. Acceptance Rate = 24.1%.
 63. Xin Li* and Yuhong Guo. “Bi-Directional Representation Learning for Multi-label Classification”. In *Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)*, 2014. Acceptance Rate = 23.8%.
 64. Xin Li*, Feipeng Zhao* and Yuhong Guo. “Multi-label Image Classification with A Probabilistic Label Enhancement Model”. In *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI)*, 2014. Acceptance Rate = 32%.
 65. Xin Li* and Yuhong Guo. “Latent Semantic Representation Learning for Scene Classification”. In *Proceedings of the International Conference on Machine Learning (ICML)*, 2014. Acceptance Rate = 25%.
 66. Min Xiao* and Yuhong Guo. “Semi-supervised Matrix Completion for Cross-Lingual Text Classification”. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2014. Acceptance Rate = 28%.
 67. Farzaneh Mirzazadeh[†], Yuhong Guo, and Dale Schuurmans. “Convex Co-embedding”. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2014. Acceptance Rate = 28%.
 68. Min Xiao* and Yuhong Guo. “A Novel Two-Step Method for Cross Language Representation Learning”. In *Advances in Neural Information Processing Systems (NIPS)*, 2013. Acceptance Rate = 25%.
 69. Yuhong Guo. “Robust Transfer Principal Component Analysis with Rank Constraints”. In *Advances in Neural Information Processing Systems (NIPS)*, 2013. Acceptance Rate = 25%.

70. Min Xiao*, Feipeng Zhao* and Yuhong Guo. “Learning Latent Word Representations for Domain Adaptation using Supervised Word Clustering”. In *Proceedings of the Conference on Empirical Methods on Natural Language Processing (EMNLP)*, 2013. Acceptance Rate = 27%.
71. Min Xiao* and Yuhong Guo. “Semi-Supervised Representation Learning for Cross-Lingual Text Classification”. In *Proceedings of the Conference on Empirical Methods on Natural Language Processing (EMNLP)*, 2013. Acceptance Rate = 27%.
72. Yuhong Guo and Dale Schuurmans. “Multi-label Classification with Output Kernels”. In *Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)*, 2013. Acceptance Rate = 25%.
73. Min Xiao* and Yuhong Guo. “Online Active Learning for Cost-Sensitive Domain Adaptation”. In *Proceedings of the Conference on Computational Natural Language Learning (CoNLL)*, 2013. Acceptance Rate = 25%.
74. Xin Li* and Yuhong Guo. “Active Learning with Multi-label SVM Classification”. In *Proc. of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2013. Acceptance Rate = 28%.
75. Yuhong Guo and Wei Xue*. “Probabilistic Multi-label Classification with Sparse Feature Learning”. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2013. Acceptance Rate = 28%.
76. Yuhong Guo. “Convex Subspace Representation Learning from Multi-view Data”. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2013. Acceptance Rate = 29%.
77. Xin Li* and Yuhong Guo. “Adaptive Active Learning for Image Classification”. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2013. Acceptance Rate = 25%.
78. Min Xiao* and Yuhong Guo. “Domain Adaptation for Sequence Labeling Tasks with a Probabilistic Language Adaptation Model”. In *Proceedings of the International Conference on Machine Learning (ICML)*, 2013. Acceptance Rate = 24%.
79. Min Xiao* and Yuhong Guo. “Multi-View AdaBoost for Multilingual Subjectivity Analysis”. In *Proceedings of the International Conference on Computational Linguistics (COLING)*, 2012. Long Paper Acceptance Rate = 19%.
80. Min Xiao*, Yuhong Guo and Alexander Yates. “Semi-supervised Representation Learning for Domain Adaptation using Dynamic Dependency Networks”. In *Proceedings of the International Conference on Computational Linguistics (COLING)*, 2012. Long Paper Acceptance Rate = 19%.
81. Qin Liu[†], Yuhong Guo, Jie Wu and Guojun Wang. “Dynamic Grouping Strategy in Cloud Computing”. In *Proceedings of the International Conference on Cloud and Green Computing (CGC)*, 2012. **(Best Student Paper Award)**
82. Suicheng Gu* and Yuhong Guo. “Max Margin Ratio Machine”. In *Proceedings of the Asian Conference on Machine Learning (ACML)*, 2012. Acceptance Rate = 27%.
83. Xin Li* and Yuhong Guo. “An Object Co-occurrence Assisted Hierarchical Model for Scene Understanding”. In *Proceedings of the British Machine Vision Conference (BMVC)*, 2012. Oral Acceptance Rate = 8%.

84. Yuhong Guo and Dale Schuurmans. “Semi-Supervised Multi-label Classification: A Simultaneous Large-margin, Subspace Learning Approach”. In *Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)*, 2012. Acceptance Rate = 24%.
85. Min Xiao* and Yuhong Guo. “Semi-Supervised Kernel Matching for Domain Adaptation”. In *Proc. of the AAAI Conference on Artificial Intelligence (AAAI)*, 2012. Acceptance Rate = 26%.
86. Suicheng Gu* and Yuhong Guo. “Learning SVM Classifiers with Indefinite Kernels”. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2012. Acceptance Rate = 26%. **(Outstanding Paper Award)**
87. Yuhong Guo and Min Xiao*. “Transductive Representation Learning for Cross-Lingual Text Classification”. In *Proceedings of the IEEE International Conference on Data Mining (ICDM)*, 2012. Acceptance Rate = 20%.
88. Yuhong Guo and Min Xiao*. “Cross Language Text Classification via Subspace Co-regularized Multi-view Learning”. In *Proceedings of the International Conference on Machine Learning (ICML)*, 2012. Acceptance Rate = 27%.
89. Yunsheng Wang[†], Yuhong Guo and Jie Wu. “Making Many People Happy: Greedy Solutions for Content Distribution”. In *Proceedings of the International Conference on Parallel Processing (ICPP)*, 2011. Acceptance Rate = 22%.
90. Yuhong Guo and Dale Schuurmans. “Adaptive Large Margin Training for Multilabel Classification”. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2011. Acceptance Rate = 25%.
91. Yuhong Guo and Suicheng Gu*. “Multilabel Classification using Conditional Dependency Networks”. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2011. Acceptance Rate = 30%.
92. Yuhong Guo. “Active Instance Sampling via Matrix Partition”. In *Advances in Neural Information Processing Systems (NIPS)*, 2010. Acceptance Rate = 24%.
93. Yi Shi[†], Yuhong Guo, Guohui Lin and Dale Schuurmans. “Kernel-based Gene Regulatory Network Inference”. In *Proceedings of the Annual International Conference on Computational Systems Bioinformatics (CSB)*, 2010. Acceptance Rate = 26%.
94. Kosta Ristovski[†], Debasish Das[†], Vladimir Ouzienko[†], Yuhong Guo and Zoran Obradovic. “Regression Learning with Multiple Noisy Oracles”. In *Proceedings of the European Conference on Artificial Intelligence (ECAI)*, 2010. Acceptance Rate = 22%.
95. Vladimir Ouzienko[†], Yuhong Guo and Zoran Obradovic. “Prediction of Attributes and Links in Temporal Social Networks”. In *Proceedings of the European Conference on Artificial Intelligence (ECAI)*, 2010. Short Paper, Acceptance Rate = 40%.
96. Yuhong Guo. “Max-Margin Multiple-Instance Learning via Semidefinite Programming”. In *Proceedings of the Asian Conference on Machine Learning (ACML)*, 2009. Acceptance Rate = 24%.
97. Yuhong Guo and Dale Schuurmans. “A Reformulation of Support Vector Machines for General Confidence Functions”. In *Proceedings of the Asian Conference on Machine Learning (ACML)*, 2009. Acceptance Rate = 24%.

98. Yuhong Guo. “Supervised Exponential Family Principal Component Analysis via Convex Optimization”. In *Advances in Neural Information Processing Systems (NIPS)*, 2008. Acceptance Rate = 25%.
99. Yuhong Guo and Dale Schuurmans. “Discriminative Batch Mode Active Learning”. In *Advances in Neural Information Processing Systems (NIPS)*, 2007. Acceptance Rate = 22%.
100. Yuhong Guo and Dale Schuurmans. “Convex Relaxations of Latent Variable Training”. In *Advances in Neural Information Processing Systems (NIPS)*, 2007. Acceptance Rate = 22%.
101. Yuhong Guo and Russ Greiner. “Optimistic Active Learning using Mutual Information”. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2007. Acceptance Rate = 35%.
102. Yuhong Guo and Dale Schuurmans. “Learning Gene Regulatory Networks via Globally Regularized Risk Minimization”. In *Proceedings of Annual RECOMB Satellite Workshop on Comparative Genomics (RECOMB-CG)*, 2007.
103. Yuhong Guo and Dale Schuurmans. “Convex Structure Learning for Bayesian Networks: Polynomial Feature Selection and Approximate Ordering”. In *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI)*, 2006. Acceptance Rate = 31%.
104. Yuhong Guo, Russ Greiner and Dale Schuurmans. “Learning Coordination Classifiers”. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2005. Acceptance Rate = 18%. **(Distinguished Paper Award)**
105. Yuhong Guo, Dana Wilkinson and Dale Schuurmans. “Maximum Margin Bayesian Networks”. In *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI)*, 2005. Acceptance Rate = 34%.
106. Yuhong Guo and Russ Greiner. “Discriminative Model Selection for Belief Net Structures”. In *Proc. of the AAAI Conference on Artificial Intelligence (AAAI)*, 2005. Acceptance Rate = 18%.

Refereed Workshop Papers

107. Hao Yan* and Y. Guo. “Context-Aware Self-Adaptation for Domain Generalization”. In *ICML Workshop on New Frontiers in Adversarial Machine Learning (AdvML-Frontiers)*, 2023.
108. Abdullah Alchihabi* and Yuhong Guo. “Dual GNNs: Learning Graph Neural Networks with Limited Supervision”. In *NeurIPS Workshop on Graph Learning for Industrial Applications (GLIndA)*, 2022.
109. Hanping Zhang* and Yuhong Guo. “Generalization of Reinforcement Learning with Policy-Aware Adversarial Data Augmentation”. In *DARL Workshop at ICML*, 2022.
110. Hao Yan*, Yuhong Guo, and Chunsheng Yang. “Augmented Self-Labeling for Source-Free Unsupervised Domain Adaptation”. In *NeurIPS Distribution Shifts (DistShift) Workshop*, 2021.
111. Zhen Zhao*, Yuhong Guo, and Jieping Ye. “Bi-Dimensional Feature Alignment for Cross-Domain Object Detection”. In *TASK-CV Workshop at ECCV 2020*. **(Best Paper Award)**
112. Meng Ye* and Yuhong Guo. “Labelless Scene Classification”. In *NIPS Workshop on Visually-Grounded Interaction and Language (ViGIL)*, 2017.

113. Yuhong Guo and Min Xiao*. “Cross Language Text Classification via Multi-view Subspace Learning”. In *NIPS Workshop on xLiTe: Cross-Lingual Technologies*, 2012.

Refereed Book Chapters

114. Dale Schuurmans, Finnegan Southey, Dana Wilkinson and Yuhong Guo. “Metric-based Approaches for Semi-supervised Regression and Classification”. In O. Chapelle, B. Schoelkopf, and A. Zien, editors, *Semi-Supervised Learning*, MIT Press, 2006.

Invited Papers

115. Yuhong Guo and Dale Schuurmans. “Efficient Global Optimization for Exponential Family PCA and Low-rank Matrix Factorization”. In *Allerton Conference on Communication, Control, and Computing (Allerton)*, 2008.

Refereed Abstracts

116. Liang Lan[†], Nemanja Djuric[†], Yuhong Guo and Slobodan Vucetic. “Protein Function Prediction by Integrating Different Data Sources”. Automated Function Prediction SIG 2011 featuring the CAFA Challenge: Critical Assessment of Function Annotations (AFP/CAFA), 2011.

TUTORIAL AND INVITED TALKS

“Information Sharing with Privac Preservation”.

Invited Talk at the Canadian AI Federated Learning Workshop, Oct. 2022.

“Empowering Machine Learning with Desirable Properties”.

Invited Talk at Noah’s Ark Lab, Huawei Canada, Jun. 2022.

“Empowering Learning with Desirable Properties”.

Invited Talk at AI-Week, Amii, Canada, May 2022.

“Learning with Overcomplete Noisy Labels”.

Invited Talk at ADP, March 2022

“Learning with Weak Supervision”.

Invited Talk at World Summit AI Americas (WSAI), 2021

“Adversarial Partial Label Learning — Learning with Overcomplete Noisy Labels”.

Invited Talk at the AI Seminar of CS Department, University of Alberta, March 2021.

“Zero-Shot Learning: Generalized Information Adaptation across Classes”.

Invited Talk at Waterloo University, 2020

“Partial Label Learning — Learning with Weak Supervision”.

Invited Talk at the Vector Institute, Toronto, Nov. 2019.

“Information Transfer with Text Descriptions”.

Invited Talk at the International Data Science Conference /NEXUS, U. of Manitoba, Nov. 2019.

“Computer Vision for Transportation”.

Tutorial at the IEEE International Conference on Multimedia and Expo (ICME), July 2019

“Zero-Shot Learning: Generalized Information Adaptation across Classes”.
Invited Talk at the ECE Department, University of Alberta, 2019

“Information Transfer using Text Descriptions”.
Invited Talk at the Ottawa-AI Workshop, Ottawa, 2018

“An Introduction to Domain Adaptation”.
Invited Talk at DiDiChuXing Inc., Beijing, China, 2018

“Zero-Shot Learning: Generalized Information Adaptation across Classes”.
Invited Talk at JingDong AI, Beijing, China, 2018

“Information Adaptation across Class Boundary”.
Invited Talk at Wuhan University, China, 2018

“Information Adaptation across Categories: Representation Learning for Zero-Shot Classification”.
Invited Talk at National Research Council Canada, Ottawa, 2017.

“Information Adaptation across Class Boundary”.
Invited Talk at Symposium on Machine Learning and Collective Intelligence:
The Future of International Collaboration, Ottawa, 2017.

“Information Adaptation across Class Boundary”.
Invited Talk at Seminar of the Institute for Data Science, Carleton University, 2017.

“Information Transfer across Classes: Semi-supervised Zero-Shot Learning”.
Invited Talk at National Key Lab. for Novel Software Technology, Nanjing University, 2015.

“Learning Bayesian Networks from Data via Convex Optimization”.
Invited Talk at Dept of Electrical and Computer Engineering, Temple University, 2010

“Supervised Dimensionality Reduction via Convex Optimization”.
Invited Talk at Dept of Statistics, Temple University, 2009

“Supervised Exponential Family Principal Component Analysis”.
Colloquium Talk at Dept of Computer and Information Sciences, Temple University, 2009

“Convex Techniques for Learning with Latent Variables”.
Yahoo Research Lab, 2008

“Convex Relaxations of Latent Variable Training”.
Australian National University, 2007

TEACHING

COMP4900 – Introduction to Natural Language Processing.

Role: Instructor (Winter 2024). Carleton University

COMP5116 – Machine Learning.

Role: Instructor (Fall 2021, Fall 2022, Fall 2023). Carleton University

COMP3106 – Introduction to Artificial Intelligence .

Role: Instructor (Winter 2022). Carleton University

COMP5900 – Introduction to Machine Learning.

Role: Instructor (Fall 2017, Fall 2018). Carleton University

COMP5900 – Data Representation Learning.

Role: Instructor (Winter 2017). Carleton University

CIS5538 – Text Mining and Language Processing.

Role: Instructor (Spring 2016). Temple University

CIS5590 – Data Representation Learning.

Role: Instructor (Spring 2014). Temple University

CIS2033 – Computational Probability and Statistics.

Role: Instructor (Spring-Fall 2015, Fall 2014, Spring-Fall 2013, Fall 2011-2012). Temple University

CIS8535 – Probabilistic Graphical Models.

Role: Instructor (Spring 2012, Fall 2010). Temple University

CIS3223/5501 – Data Structures and Algorithms.

Role: Instructor (Spring 2011, Spring 2010). Temple University

CIS8590 – Introduction to Probabilistic Graphical Models.

Role: Instructor (Fall 2009). Temple University

RESEARCH SUPERVISION

Postdoctoral Fellows

Qing En, Carleton University, Aug. 2021 – present

Yan Yan, Carleton University, Feb. 2022 – Feb. 2024

Suicheng Gu, Temple University, Oct. 2009 – Aug. 2010

Doctoral Students

In Progress:

Mozhan (Zeynab) Saeedi Dehshali, Carleton University, Jan. 2023 – present

Marzi Heidari, Carleton University, Sept. 2021 – present

Hanping Zhang, Carleton University, Sept. 2020 – present

Hao Yan, Carleton University, Sept. 2019 – present

Abdullah Alchihabi, Carleton University, Sept. 2019 – present

Completed:

Zainab Albujaasim, Carleton University, 2023

Dissertation: *Post-processing Techniques for Word Embedding.*

Now a Visiting Assistant Professor at Valparaiso University.

Xuejun Han, Carleton University, 2023

Dissertation: *Continual Learning for Classification Tasks.*

Now an Analyst at MUFG Bank.

Chen Shen (co-supervised), Temple University, 2020

Dissertation: *On Convolutional Neural Networks for Knowledge Graph Embedding and Completion.*

Now a Senior Research Engineer at Megagon Labs.

Meng Ye, Temple University, 2019
Dissertation: *Visual and Semantic Knowledge Transfer for Novel Tasks*.
Now an Advanced Computer Scientist at SRI International.

Feipeng Zhao, Temple University, 2017
Dissertation: *Learning Top-N Recommender Systems with Implicit Feedbacks*.
Now a Lead Data Scientist at ADP.

Min Xiao, Temple University, 2015
Dissertation: *Generalized Domain Adaptation for Sequence Labeling in NLP*.
Now a Senior Applied Scientist at Microsoft.

Xin Li, Temple University, 2015
Dissertation: *Multi-Label Learning Under Different Labeling Scenarios*.
Now a Principal Data Scientist at Ultimate Kronos Group.

Visiting PhD Students:

Yang Wei, Nanjing University of Science and Technology, Dec. 2019 – May 2021

Yan Yan, Northwestern Polytechnical University, Dec. 2018 – Jun. 2020

Zengmao Wang, Wuhan University, Sept. 2017 – Sept. 2018

Kongming Liang, University of Chinese Academy of Sciences, Sept. 2016 – Sept. 2017

Masters Students

In Progress:

Luke Budny (Co-supervised), Carleton University, Jan. 2024 – present

Omar Syed, Carleton University, Sept. 2023 – present

Completed:

Taoseef Ishtiak, Carleton University, April 2023
Thesis: *Enhancing Unsupervised Instance Segmentation with Exemplars*.

Vasileios Lioutas, Carleton University, May 2020
Thesis: *Sequence Modeling with Linear Complexity*.
Received the Senate Medal for Outstanding Academic Achievement Award.

Kevin Hua, Carleton University, April 2020
Project: *Unsupervised Domain Adaptation with Progressive Data Augmentation*.

Mahan Niknafs, Carleton University, April 2020
Thesis: *Learning Recommender Systems with Deep Structured Low Rank Matrix Approximation*.

Yaser Alwattar, Carleton University, Sept. 2019
Thesis: *Inverse Visual Question Answering with Multi-Level Attentions*.

Xinyuan Lu, Carleton University, Sept. 2019
Thesis: *Question Generation with Adaptive Copying Neural Networks*.

Olivier Hamel, Carleton University, Jan. 2019
Thesis: *Identifying Software Defects Using Neural Graph Classifiers*.

Xiangwei Meng, Temple University, Jan. 2015 – May 2015

Project: *Sentiment Analysis of Text Data*.

Wei Xue, Temple University, Sept. 2011 – May. 2012

Project: *Multi-label Classification with Sparse Feature Learning*.

Richard Hart, Temple University, Sept. 2011 – Dec. 2011

Project: *Application of Information Theory on Feature Selection*.

Other Supervision

Wentao Cui, Part-time graduate student at Carleton U, 2018 – 2021

Zhen Zhao, Graduate Student Intern, 2019 – 2020

Bingyu Liu, Graduate Student Intern, 2019 – 2020

Undergraduate Students

Carter Black, Carleton University, Sept. 2021 – Dec. 2021

Hammad Asad, Carleton University, Jan. 2017 – Apr. 2017

Chris Abbott, Carleton University, Jan. 2017 – Apr. 2017

Dabeluchi Ndubisi, Carleton University, Jan. 2017 – Apr. 2017

John P. Ihlenfeldt, Temple University, Jan. 2015 – May 2015

Bob Suhendra, Temple University, Sept. 2010 – Dec. 2010

Mike Bissell, Temple University, Sept. 2012 – Dec. 2012

Ph.D. Thesis Committees

Intisar Almuslim, University of Ottawa, 2024 (defended)

Youhao Yu, Carleton University, 2023 (defended)

Qianjia Huang, University of Ottawa, 2023 (proposal)

Omid Davoudi, Carleton University, 2022 (proposal)

Intisar Almuslim, University of Ottawa, 2021 (proposal)

Ce Peng, Carleton University, 2017 (defended)

Mostafa Milani, Carleton University, 2017 (defended)

Huanyang Zheng, Temple University, 2015 – 2016 (proposal)

Djordje Gligorijevic, Temple University, 2015 – 2016 (proposal)

Joseph Jupin, Temple University, 2013 – 2016 (defended)

Mehmet Cetin, Temple University, 2013 (defended)

Xueli Huang, Temple University, 2013 – 2015 (defended)

Avirup Sil, Temple University, 2012 – 2014 (defended)

Fei Huang, Temple University, 2011 – 2013 (defended)

External Examiner

Shangyu Chen, Nanyang Technological University, Singapore, 2020

Linwei Ye, Manitoba University, Canada, 2020

Zheng Li, The Hong Kong University of Science & Technology, China, 2020

Xuan Liu, Dalhousie University, Canada, 2020

Mingli Zhang, École de Technologie Supérieure, Canada, 2017

Master Thesis Committees

Patrick Baker, University of Ottawa, 2023 (defended)

Zixuan Liu, University of Ottawa, 2022 (defended)

Yansong Li, University of Ottawa, 2022 (defended)

Yahya Massoud, University of Ottawa, 2021 (defended)

Mohammad Nokhbeh Zaeem, Carleton University, 2021 (defended)

Md Aminur Rab Ratul, University of Ottawa, 2020 (defended)

Chang Duan, University of Ottawa, 2020 (defended)

Dhanvin Kolhatkar, University of Ottawa, 2020 (defended)

Guillaume Perrault-Archambault, University of Ottawa, 2020 (defended)

Jueya Li, Carleton University, 2018 (defended)

Zunaira Jamil, University of Ottawa, 2017 (defended)

Yue Dong, University of Ottawa, 2016 (defended)

Ozkan Kilic, Temple University, 2015 (defended)

PROFESSIONAL SERVICE

Journal Editor

Associate Editor, IEEE Trans. on Pattern Analysis and Machine Intell. (TPAMI), 2018 – present

Editorial Board Member, the Artificial Intelligence Journal, 2021 – present

Advisory Board

Digital Technologies Research Centre Advisory Board Member,
National Research Council Canada, June 2018 – present

Founding and Organizing Member

Founding Member of the Ottawa AI Alliance, 2018

Member of the Organizing Committee of the First Ottawa-AI Workshop, 2018

Workshop Program Co-Chairs/Co-Organizers

- ECML-PKDD-22 Workshop on *Multi-Label Learning: Current Trends and Open Challenges*, 2022.
- SDM-15 Workshop on *Heterogeneous Learning*, 2015.
- NIPS-14 Workshop on *Representation and Learning Methods for Complex Outputs*, 2014.
- SDM-14 Workshop on *Heterogeneous Learning*, 2014.
- NIPS-13 Workshop on *Output Representation Learning*, 2013.

Publicity Chair

- Asian Conference on Machine Learning (ACML), 2009

Grant Proposal Reviewer

- Mitacs Accelerate Grant Proposal review, 2023

Best Paper Selection Committee Member

- Paper Award Committee of the 16th Asian Conference on Computer Vision (ACCV), 2022
- Best Paper Selection committee of the Canadian AI Conference, 2020

Conference Area Chair/ Senior Program Committee Member

- AAAI Conference on Artificial Intelligence (AAAI), 2016 – 2024
- International Joint Conf. on Artificial Intelligence (IJCAI), 2015 – 2021
- European Conference on Artificial Intelligence (ECAI), 2023
- Asian Conference on Machine Learning (ACML), 2017–19, 2021

Conference Program Committee Member/ Reviewer

- International Conf. on Machine Learning (ICML), 2008–09, 2011–19, 2023
- Conf. on Uncertainty in Artificial Intelligence (UAI), 2007–08, 2011–20
- Annual Meeting of the Association for Comput. Linguistics (ACL), 2014-19
- IEEE International Conference on Data Mining (ICDM), 2015, 2018
- ACM SIGKDD Conf. on Know. Discovery and Data Mining (KDD), 2016
- European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases, Nectar Track (ECML-PKDD), 2015
- AAAI Conference on Artificial Intelligence (AAAI), 2008, 2015
- International Conference on Computational Linguistics (COLING), 2014
- IEEE/ASE Inter. Conf. on Big Data Science and Computing, 2013, 2014
- Advances in Neural Information Processing Systems (NIPS, NeurIPS), 2007–09, 2011–23
- IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2019
- IEEE International Conference on Computer Vision (ICCV), 2019

International Conference on Learning Representations (ICLR), 2018–21
Inter. Conference on Artificial Intelligence and Statistics (AISTATS), 2011, 2017–19
SIAM International Conference on Data Mining (SDM), 2009, 2013

UNIVERSITY SERVICE

Chair PhD Proposal Defence:

- Student (Abdelghny Orogat), Carleton University, 2023
- Student (Leah Zhang-Kennedy), Carleton University, 2016

PhD Comprehensive Exam Committee

- Student (Zhiyi Dong), OCICS, 2024
- Student (Cristovao Iglesias), OCICS, 2022
- Student (Ammar Rasid), OCICS, 2022
- Student (Qianjia Huang), OCICS, 2019
- Student (Intisar Almuslim), OCICS, 2018

Member of the Faculty (CRC) Hiring Committee, 2024
School of Computer Science, Carleton University

Member of the Faculty Hiring Committee, 2021
School of Computer Science, Carleton University

Member of the Faculty Hiring Committee, 2017 – 2018
School of Computer Science, Carleton University

Chair of the Award Committee, 2015 – 2016
Department of Computer and Information Sciences, Temple University

Representative Faculty Senator, 2015 – 2016
College of Science and Technology, Temple University

Member of the Junior Tenure Track Search Committee, 2015 – 2016
Department of Computer and Information Sciences, Temple University

Member of the CS Undergraduate Committee, 2013 – 2015
Department of Computer and Information Sciences, Temple University

Coordinator for the CIS Colloquium and Distinguished Lectures, 2012 – 2013
Department of Computer and Information Sciences, Temple University

Member of the Department Merit Committee, 2011 – 2011
Department of Computer and Information Sciences, Temple University

Member of the Award Committee, 2010 – 2012
Department of Computer and Information Sciences, Temple University

OLGA BAYSAL

1 Personal Information

School of Computer Science
Carleton University
1125 Colonel By Drive
Ottawa, ON K1S 5B6
Phone: +1 (613) 520-2600 ext.8668
Email: olga.baysal@carleton.ca
Website: olgabaysal.com

2 Education

Ph.D. in Computer Science School of Computer Science University of Waterloo, ON, Canada	2008 – 2014
MMath in Computer Science School of Computer Science University of Waterloo, ON, Canada	2005 – 2006
B.Sc. (Honours) in Computer Science Vyatka State University, Kirov, Russia	1996 – 2001

3 Recognition

- Distinguished Reviewer Award,
International Conference on Mining Software Repositories (MSR) 2021
- NSERC Postdoctoral Fellowship (\$80,000) 2014 – 2016
- Distinguished Paper Award,
Working Conference on Reverse Engineering (WCRE) 2013
- Doctoral Thesis Completion Award, University of Waterloo (\$5,000) 2013
- 2012 Graduate Cohort Workshop Travel Award, CRA-W, Bellevue, WA 2012
- David R. Cheriton Graduate Scholarship, University of Waterloo (\$20,000) 2011 – 2013
- Mining Challenge Award, Canadian Summer School on Practical
Analyses of Software Engineering Data (PASED), Montreal, QC 2011
- NSERC Postgraduate Scholarship (comparable to NSF Fellowship) (\$63,000) 2009 – 2012
- President's Graduate Scholarship, University of Waterloo (\$30,000) 2009 – 2012

- Center for Advanced Studies (CAS) Fellowship, IBM Canada (\$28,000) 2009
- Google Workshop for Women Engineers Travel Award,
Google Inc., Mountain View, CA 2009
- Math Faculty Graduate Award, University of Waterloo (\$5,300) 2008
- Graduate Entrance Scholarship, University of Waterloo (\$4,000) 2008
- The Ontario Volunteer Service Award (2002 – 2007),
Ontario Honours and Awards Secretariat 2007
- Departmental Scholarship, Faculty of Computer Science,
Vyatka State University, Kirov, Russia 1997 – 2001

4 Profile

Dr. Baysal is an Associate Professor and a Director of the Carleton University Institute for Data Science (CUIDS). During 2020–2022, she was a Graduate Director (Admission and Recruitment) at the School of Computer Science, Carleton University. Baysal received her MMath and PhD degrees in Computer Science from the University of Waterloo and completed a short NSERC Post-doctoral Fellowship at the University of Toronto. Her work lies within the field of AI4SE (Artificial Intelligence for Software Engineering) and is focused on applying AI, ML, and NLP techniques to tackle software engineering problems and providing ways to synthesize knowledge from the development artifacts such as reported issues, source code, community contributions and discussions, etc. Much of Baysal’s work focuses on understanding how software engineers create, use, and maintain software systems. She applies empirical software engineering techniques to study software development processes and leverages software analytics to support practitioners’ decision making.

Baysal has authored over 30 peer-reviewed publications, including at several top-tier software engineering venues, such as the International Conference on Software Engineering (ICSE), the International Symposium on the Foundations of Software Engineering (FSE), the IEEE Transactions on Software Engineering (TSE), the Springer Journal of Empirical Software Engineering (EMSE), and the IEEE Computer Society’s IEEE Software. She serves on numerous program committees including ICSE (Technical, SEET, Posters, Workshops, SRC), FSE (NIER), International Conference on Mining Software Repositories (MSR), International Conference on Software Maintenance and Evolution (ICSME), International Conference on Software Analysis, Evolution and Reengineering (SANER), the IEEE International Conference on Program Comprehension (ICPC) and the International Working Conference on Source Code Analysis & Manipulation (SCAM). She served as a program co-chair of various tracks at SE conferences, including co-chair of Data Showcase track for MSR 2020, co-chair of Artifacts track for FSE 2018, FSE 2016 and ICSME 2016; co-chair of the ACM Student Research Competition for ICSE 2018, co-chair of Tools Demo track for ICPC 2019, co-chair of Workshops track for SANER 2019, co-chair of NIER/Tool Demo track for the IEEE Working Conference on Software Visualization (VISSOFT) 2017, proceedings co-chair for the International Symposium on Empirical Software Engineering and Measurement (ESEM) 2017, publicity co-chair for SANER 2016, and program chair for MSR 2014 Mining Challenge. Baysal is a co-founder and PC co-chair of Software Analytics (SWAN) workshop (2015–2018). In her research, Baysal often collaborates with tech companies such as Mozilla, Google, and more recently Shopify and Ericsson to evaluate her research programs to ensure that they effectively address issues of industrial relevance. She established and directs the Software Analytics (SWAN) research group (currently 3 PhD and 8 MCS students; with 20 graduate and 30 undergraduate alumni).

5 Employment History

Associate Professor School of Computer Science Carleton University, ON, Canada	July 2020 – present
Director of the Carleton University Institute for Data Science Carleton University, ON, Canada	July 2022 – present
Graduate Director of Admission and Recruitment School of Computer Science Carleton University, ON, Canada	July 2020 – June 2022
Acting Director of the Carleton Institute for Data Science Carleton University, ON, Canada	Jan 2021 – June 2021
Assistant Professor School of Computer Science Carleton University, ON, Canada	Aug 2015 – June 2020
Adjunct Professor School of Computer Science University of Waterloo, ON, Canada	Jul 2016 – Jun 2018
Assistant Professor Department of Computer Science and Operations Research Université de Montréal, QC, Canada	Aug 2014 – Jul 2015
Visiting Professor Data Science Laboratory Ryerson University, ON, Canada	Sep 2014 – Aug 2015
Postdoctoral Fellow Department of Computer Science University of Toronto, ON, Canada	May 2014 – Aug 2014
Research Intern (CAS) IBM Toronto, Canada	May 2009 – Aug 2009
Research Assistant University of Waterloo, Canada	Jan 2008 – Apr 2014
Visiting Researcher Department of Computer Engineering Bogaziçi University, Turkey	May 2007 – Oct 2007
Research Assistant University of Waterloo, Canada	Jan 2005 – Dec 2006

Software Test Specialist
BlackBerry, Waterloo, Canada

Apr 2003 – Aug 2003

6 Research Funding History

- | | |
|--|-------------|
| • NSERC Discovery Grant “ Understanding and Leveraging Context in Code Review” (\$35,000 per year) | 2021 – 2026 |
| • Partnership with Ericsson on the project “Software quality monitoring using AI/ML techniques” (\$45,000) | 2021 – 2022 |
| • Mitacs Accelerate Program (\$40,000) | 2021 – 2022 |
| • Carleton’s Multidisciplinary Research Catalyst Fund for “Deciphering Digital Assets” project (\$40,000) | 2021 – 2022 |
| • NSERC Discovery Grant “Leveraging software analytics to maximize developer productivity during software maintenance” (\$18,000 per year) | 2015 – 2020 |
| • Startup Research Fund (\$75,000), Carleton University, Canada | 2015 – 2017 |
| • Startup Research Fund, Université de Montréal (\$20,000), Canada | 2014 – 2015 |

7 Activities

7.1 Student Supervision

Graduate Student Supervision

1. Sri Lakshmi Vadlamani, PhD DSA Student. September 2022 – present.
2. Michael MacInnis, PhD Student co-supervised by Dr. Michele Lanza, Software Institute - USI, Lugano, Switzerland. September 2021 – present.
3. Soroush Javdan, PhD Student. January 2021 – present.
4. Vivek Thaker, MCS-thesis. January 2023 – present.
5. Ozgun (Oz) Ozan Kilic, MCS-thesis (Data Science), September 2022 – present.
6. Mohammad Bin Yusuf, MCS-thesis (Data Science), September 2022 – present.
7. Raha Rashid, MCS-thesis (Data Science), September 2022 – present.
8. Esra Ersan, MCS-thesis (Data Science) Student. September 2021 – January 2024.
9. Aagyapal Kaur, MCS-project student co-supervised by Prof. Paula Branco, January 2023 – April 2023.
10. Megha Agarwal, MCS-project, September 2022 – April 2023.

11. Md Rezwan Hassan Khan, MCS-thesis (Data Science) Student. January 2021 – January 2023.
12. Heny Dave, MCS-project Student, March 2022 – December 2022.
13. Keerthana Muthu Subash, MCS-thesis Student. October 2021 – August 2022.
14. Lakshmi Prasanna Kumar, MCS-thesis (Data Science) Student. January 2021 – August 2022.
15. Geetika Sharma, MCS-thesis Student. January 2021 – August 2022 (switched to a project option).
16. Shriya Satish, MCS-project Student co-supervised with Dr. Paula Branco, University of Ottawa. January – April 2022.
17. Harikrishnan Narayanan, MCS-project Student. September 2021 – December 2021.
Position: Analytics and Machine Learning intern at Corning Incorporated, Montreal, Canada.
18. Razieh Tekieh, MCS-thesis Student, January 2020 – September 2021.
Position: On job market.
19. Lance Po-Kai Wang “Recommending GitHub Projects by Leveraging Developers’ Social Networks and Genetic Algorithm”, MCS-thesis (Data Science) Student, September 2019 – April 2021.
Position: Software Engineer at CleNET Technology Taipei, Taiwan.
20. Sri Lakshmi Vadlamani “Understanding and Predicting Software Developer Expertise in Stack Overflow and GitHub”, MCS-thesis (Data Science) Student, September 2019 – April 2021.
Position: Data Scientist at Ericsson Inc., Ottawa, Canada.
21. Davoud Saljoughi “Studying the Evolution of Bitcoin-related Topics Extracted from an Online Forum”, MCS-thesis Student, January 2020 – January 2021.
Position: Analyst/Data Specialist, Health Canada, Ottawa, Canada.
22. Khadija Osman “Studying the Health of the Bitcoin Ecosystem in GitHub”, MCS-thesis Student, Apr 2019 – Aug 2020.
Position: National Research Council Canada, Ottawa, ON.
23. Boneetha Bose “Synthetic Dataset Generation For Categorical and Continuous Data using SMOTE”, MCS-project Student (project), Jan 2019 – Aug 2020.
Position: Analytics and Data Science Associate, TD Canada, Montreal, Canada.
24. Saraj Singh Manes “Studying the Change History of Code Snippets on Stack Overflow and GitHub”, MCS-thesis (Data Science) Student, Sep 2018 – Apr 2020.
Position: Software Engineer at Hyperscience, Toronto, Canada.
25. Norbert Eke “Cross-Platform Software Developer Expertise Learning”, MCS-thesis (Data Science) Student, Dec 2018 – April 2020.
Position: Data Scientist at Migros Online, Zurich, Switzerland.
26. Raisul Islam Rashu “Studying How Cryptocurrency Development Characteristics in GitHub Affect Its Market Price and Developer Sentiment in Stack Overflow Discussions”, MCS-thesis Student, Nov 2018 – January 2020. Position: TBA.

27. Shruthi Nagaraj “Enabling Eye Tracking to Study the Use of Software Artifacts on Code Summarization”, MCS-thesis Student. Carleton University, Canada, Sep 2016 – Apr 2018.
Position: GMS L3 Senior Application Analyst, TravelClick.
28. Junaid Maqsood “Leveraging Insights from Mobile App Reviews to Support Release Planning and Maintenance”, MCS-thesis Student. Carleton University, Canada, Jan 2017 – Jan 2018.
Position: Director and CEO, OTIF Solutions, Pakistan.
29. Tresa Rose “Towards Understanding What Factors Affect Pull Request Merges”, MCS-thesis Student. Carleton University, Canada, Sep 2016 – Sep 2017.
Position: IM/IT Programmer at Employment and Social Development Canada, Ottawa, Canada.
30. Oleksii Kononenko “Towards Understanding and Improving Code Review Quality”, PhD Student, co-supervised with Dr. Michael W. Godfrey. University of Waterloo, Canada. Mar 2016 – Jun 2017.
Position: Software Engineer at Microsoft, Redmond, WA, USA.
31. Yaxin Cao “Investigating the Impact of Personal, Temporal and Participation Factors on Code Review Quality”, Master’s Student. Université de Montréal, Canada, Sep 2014 – Aug 2015.
Position: Product Manager at Jusfoun, Beijing, China.

Undergraduate Honours Project/Thesis Supervision

1. Hanna Kebedom, UG-thesis Student. Fall 2022–Winter 2023.
2. Leina Abdelwahab. UG-project Student. Summer 2022.
3. Ryan Ly “Evaluating Commit Message Quality”. UG-project Student. Winter 2022.
4. Emad Ryan “Git Together: Presenting GitHub in a Newcomer-friendly Fashion for Groups”. UG-project Student. Winter 2022.
5. Kieran Nagasuye “Autonomous Facial Recognition Drone”. UG-project Student. Winter 2022.
6. Martin Andrijasevic “Optimizing Data for the Automatic Generation of Pull Request Descriptions”, UG-project Student. Fall 2021.
7. Etienne Vivash “Summarizing bug reports of Android apps hosted on GitHub with NLP”, UG-project Student. Fall 2021.
8. April Yu, UG-project Student. Summer 2021.
9. Adam Spriggs “GitHub Repository Recommender using RepoPal”, UG-project Student. Winter 2021.
10. Fadel Chamseddine “Gitucator: A Beginner-Friendly Git Visualization Tool”, UG-project Student. Winter 2021.
11. Yizhang (Tiger) Cao “Website development for the SWAN Research Lab”, UG-project Student. Winter 2021.
12. Askar Ilemessov “Restaurant Recommendation website”, UG-project Student. Winter 2021.

13. Sebastian Gadzinski “Planters Handbook iOS Application”, UG-project Student. Winter 2021.
14. Richard Xia “Spoter: A MERN Sports Management Application”, UG-project Student. Winter 2021.
15. Eliza Moore “Developing a Data Crawler to Collect Data for Predicting Developer Expertise”, UG-project Student. Fall 2020.
16. Nathaniel Salami “Identifying Code Reuse in Online Code Snippets Using Clone Detection Tool”, UG-project Student. Fall 2020.
17. Josh Gorman “Wolkstack: Automating Cloud Infrastructure Management and Deployment for Web Applications”, UG-project Student. Fall 2020.
18. Taihe Chen “Summarizing bug reports of Android apps hosted on GitHub with NLP”, UG-project Student. Fall 2020.
19. Tianrui Ma “Automatic software component analyzer and visualizer on Git server”, UG-project Student. Fall 2020.
20. Raymond Jiang “GitMine: A Web App for Git Commit Searching and Stack Overflow Code Snippet Tracking”, UG-project Student. Fall 2020.
21. Majd Al Khany “GitHub Data Mining Interface for Code Revisions” UGR-project Student. May – Aug 2020.
22. David Kretz “Generating Hierarchical Data from JSON”, UGR-project Student. May – Aug 2020.
23. Joshua Arts “Benchmarking Competing GraphQL and REST APIs”, UGR-project Student. Jan – Apr 2020. Position: Software Developer, Shopify.
24. Mustafa Abdul-Fatah “Interactive Dashboard for Test Simulations Results”, UGR-project Student. Jan – Apr 2020. Position: Indoor Radio Software Developer at Ericsson.
25. Noah Beeney “Wikifier”, UGR-project Student. Jan – Apr 2020.
26. Alexei Tipenko “Profiling Stack Overflow Users Based on Badge Collection”, UGR-thesis Student. Sep 2019 – Apr 2020. Position: Software Developer Co-op, Ciena.
27. Benjamin Emdon “The Viability of GraphQL over REST for API Architecture”, UGR-thesis Student. Sept 2019–Apr 2020. Position: Software Engineer at GitHub.
28. Emma Seiling “AdoptMe, a Pet Adoption Mobile Application”, UGR-project Student. Sep – Dec 2019.
29. Lama Elnaggar “Evaluating and Assessing ETL Tools for Data Analysis and Visualization”, UGR-project Student. Sep – Dec 2019. Position: Programmer Analyst at Fisheries and Oceans Canada.
30. Aditya Bongale “The Effectiveness of Summarization on StackExchange”, UGR-project Student. March– Aug 2019.
31. Jackson Eyres “AMR Detector: Antimicrobial Resistance Detection in Bacterial Genomes” (co-supervised with Dr. Nicolas Rodrigue). Carleton University, Canada. Jan 2017 – Apr 2017. Position: Bioinformatician at Agriculture and Agri-Food Canada.

32. Hsiao-Kang Jao “Basketball Stats Analyzer”, UGR-project Student. Jan 2016 – Apr 2016. Position: Senior Analyst at Avanade, Ottawa, Canada.

7.2 Editorial Activities

7.2.1 Journal Reviewer

1. ACM Transactions on Software Engineering and Methodology (TOSEM), 2017, 2021
2. Journal on Empirical Software Engineering (EMSE), Springer, 2014, 2019
3. Software, IEEE Computer Society Press, 2014, 2018
4. Transactions on Software Engineering (TSE), IEEE Computer Society Press, 2014, 2015, 2016
5. Software Quality Journal (SQJ), Springer Journals, 2015
6. Journal of Systems and Software (JSS), 2015

7.2.2 Program Committees

1. Programming Experience (PX) Workshop, the International Conference on the Art, Science, and Engineering of Programming (Programming), March 11–14, 2024 Lund, Sweden.
2. Software Engineering Education and Training (SEET), the 46th International Conference on Software Engineering (ICSE), April 12-21, 2024, Lisbon, Portugal.
3. Demonstrations track, the 46th International Conference on Software Engineering (ICSE), April 12-21, 2024, Lisbon, Portugal.
4. 11th IEEE Working Conference on Software Visualization, October 1-2, 2023, Bogota, Columbia.
5. Software Engineering Education and Training (SEET), the 45th International Conference on Software Engineering (ICSE), May 14-20, 2023, Melbourne, Australia.
6. Technical track, the 45th International Conference on Software Engineering (ICSE), May 14-20, 2023, Melbourne, Australia.
7. Ideas, Visions and Reflections Track (IVR) track, the ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE), November 14–18, 2022, Singapore.
8. MSR Awards track, International Conference on Mining Software Repositories (MSR), May 23–24, 2022, Pittsburgh, USA.
9. Technical track, International Conference on Mining Software Repositories (MSR), May 23–24, 2022, Pittsburgh, USA.
10. Software Engineering Education and Training (SEET) track, the 44th International Conference on Software Engineering (ICSE), May 21–29, 2022, Pittsburgh, USA.
11. Technical track, the 44th International Conference on Software Engineering (ICSE), May 21–29, 2022, Pittsburgh, USA.

12. Research track, International Conference on Software Maintenance and Evolution (ICSME), Sept 27 - Oct 1, 2021, Luxembourg City.
13. ACM Student Research Competition Finals 2021.
14. Software and Big Data Analytics track, Euromicro Conference on Software Engineering and Advanced Applications (SEAA), September 1-3, 2021, Palermo, Italy.
15. Technical track, the 43d International Conference on Software Engineering (ICSE), May 2021, Madrid, Spain.
16. Technical track, International Conference on Mining Software Repositories (MSR), May 2021, Madrid, Spain.
17. Most Influential Paper, International Conference on Program Comprehension (ICPC), May 2021, Madrid, Spain.
18. Research track, International Conference on Software Maintenance and Evolution (ICSME), Sep 27-Oct 3 2020, Adelaide, Australia.
19. New Ideas track, International Conference on Software Maintenance and Evolution (ICSME), Sep 27-Oct 3 2020, Adelaide, Australia.
20. 3rd International Workshop on Software Health (SoHeal), ICSE 2020, July 2020 (virtual), Seoul, South Korea.
21. ACM Student Research Competition Finals 2020.
22. Research track, IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER), Feb 18-21, 2020, London, ON, Canada.
23. Late Breaking Ideas track, IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER), Feb 18-21, 2020, London, ON, Canada.
24. Late Breaking Ideas track, International Conference on Software Maintenance and Evolution (ICSME), September 30 - October 4, 2019, Cleveland, OH, USA.
25. Software and Big Data Analytics track, Euromicro Conference on Software Engineering and Advanced Applications (SEAA), August 28-30, 2019, Kallithea - Chalkidiki, Greece.
26. ACM Student Research Competition Finals 2019.
27. Data Showcase track, International Conference on Mining Software Repositories (MSR), May 26-27, 2019, Montreal, Canada.
28. Replications track, International Conference on Program Comprehension (ICPC), May 25-26, 2019, Montreal, Canada.
29. 2nd International Workshop on Software Health (SoHeal), ICSE May 2019, Montreal, Canada.
30. Joint 7th International Workshop on Conducting Empirical Studies in Industry (CESI 2019) and 6th International Workshop on Software Engineering Research and Industrial Practice (SER&IP 2019), May 28, 2019, Montreal, Canada.
31. Posters track, the 41st International Conference on Software Engineering (ICSE), May 25–31, 2019, Montreal, Canada.

32. Workshops track, the 41st International Conference on Software Engineering (ICSE), May 25–31, 2019, Montreal, Canada.
33. Student Research Competition (SRC) track, the 41st International Conference on Software Engineering (ICSE), May 25–31, 2019, Montreal, Canada.
34. New Ideas and Emerging Results (NIER) track, the 26th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE), November 2018, Lake Buena Vista, FL, USA.
35. Big Data Analytics track, The Euromicro Conference on Software Engineering and Advanced Applications (SEAA), Aug 25–29, 2018, Prague, Czech republic.
36. Technical Research track, IEEE/ACM International Conference on Program Comprehension (ICPC), May 2018, Gothenburg, Sweden.
37. Early Research Achievement track, IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER), March 2018, Campobasso, Italy.
38. 27th Annual International Conference on Computer Science and Software Engineering (CASCON), Nov 2017, Toronto, Canada.
39. Research Track, International Conference on Software Maintenance and Evolution (ICSME), Sept 2017, Shanghai, China.
40. Engineering Track, 17th IEEE International Working Conference on Source Code Analysis and Manipulation (SCAM), Sept 2017, Shanghai, China.
41. Artifacts Track, International Conference on Software Maintenance and Evolution (ICSME), Sept 2017, Shanghai, China.
42. Student Research Competition, International Conference on Software Engineering (ICSE), May 2017, Buenos Aires, Argentina.
43. Technical Research track, International Conference on Program Comprehension (ICPC), May 2017, Buenos Aires, Argentina.
44. IEEE 7th International Workshop on Empirical Software Engineering in Practice (IWESEP), March 2017, Tokyo, Japan.
45. Engineering Track, 16th IEEE International Working Conference on Source Code Analysis and Manipulation (SCAM), Oct 2016, Raleigh, North Carolina, USA.
46. International Conference on Software Maintenance and Evolution (ICSME), Oct 2016, Raleigh, North Carolina, USA.
47. Working Conference on Mining Software Repositories (MSR), May 2016, Austin, Texas, USA.
48. Data Track, Working Conference on Mining Software Repositories (MSR), May 2016, Austin, Texas, USA.
49. International Conference on Program Comprehension (ICPC), May 2016, Austin, Texas, USA.
50. International Workshop on Big Data Software Engineering (BIGDSE) May 2016, Austin, Texas, USA.

51. IEEE 7th International Workshop on Empirical Software Engineering in Practice (IWESEP) 2016, Osaka, Japan.
52. International Conference on Software Analysis, Evolution, and Reengineering (SANER) 2016, Osaka, Japan.
53. International Conference on Predictive Models and Data Analytics in Software Engineering (PROMISE) 2015, Beijing, China.
54. ERA track, IEEE International Conference on Software Maintenance and Evolution (ICSME) 2015, Bremen, Germany.
55. Tool Paper track, IEEE International Working Conference on Source Code Analysis and Manipulation (SCAM) 2015, Bremen, Germany.
56. Working Conference on Mining Software Repositories (MSR) 2015, Florence, Italy.
57. International Conference on Program Comprehension (ICPC) 2015, Florence, Italy.
58. Tool Demo Track, International Conference on Program Comprehension (ICPC) 2015, Florence, Italy.
59. International Workshop on Big Data Software Engineering (BIGDSE) 2015, Florence, Italy.
60. International Workshop on Software Engineering Education (SEED) 2015, Bangalore, India.
61. International Conference on Software Analysis, Evolution, and Reengineering (SANER) 2015, Montreal, QC, Canada.
62. Working Conference on Mining Software Repositories (MSR) 2014, Hyderabad, India.
63. Tool Demo Track, International Conference on Program Comprehension (ICPC) 2014, Hyderabad, India.
64. Workshop on Mining Unstructured Data (MUD) 2013, Koblenz, Germany.
65. Challenge Track, Working Conference on Mining Software Repositories (MSR) 2013, San Francisco, CA, USA.
66. Workshop on Mining Unstructured Data (MUD) 2012, Kingston, ON, Canada.
67. Challenge Track, Working Conference on Mining Software Repositories (MSR) 2012, Zurich, Switzerland.

7.2.3 Grant Reviewer

1. Mitacs, Canada, 2022.
2. Swiss National Science Foundation (SNSF), Switzerland, 2020.
3. Natural Sciences and Engineering Research Council of Canada (NSERC), Canada, 2020.
4. National Council of Science and Technology of Chile, Chile, 2017.
5. National Science Foundation (NSF), USA, 2017.
6. Natural Sciences and Engineering Research Council of Canada (NSERC), Canada, 2016.

7.2.4 Reviewer

1. IEEE International Conference on Software Maintenance (ICSM) 2013
2. Working Conference on Mining Software Repositories (MSR) 2012
3. IEEE International Conference on Software Maintenance (ICSM) 2011
4. Working Conference on Mining Software Repositories (MSR) 2011
5. Working Conference on Mining Software Repositories (MSR) 2009
6. IEEE International Working Conference on Source Code Analysis and Manipulation (SCAM) 2009
7. Working Conference on Mining Software Repositories (MSR) 2008
8. IEEE International Conference on Software Maintenance (ICSM) 2008

7.2.5 Panel Member

1. Workshop on Mining Unstructured Data (MUD) 2013, Koblenz, Germany
2. Workshop on Mining Unstructured Data (MUD) 2012, Kingston, ON, Canada

7.3 International Collaborations

- Dr. Patanamon (Pick) Thongtanunam, University of Melbourne, Australia.
Project: *Ethical AI principles in software engineering*
- Dr. Preetha Chatterjee, Drexel University, Philadelphia, PA, USA.
Project: *Mining chat conversations related to software development and engineering.*
- Dr. Michele Lanza, Software Institute - USI, Lugano, Switzerland.
Project: *Next generation of terminal-based development environments.*
- Dr. Bonita Sharif, Department of Computer Science and Engineering, University of Nebraska - Lincoln, Lincoln, Nebraska, USA.
Project: *Enabling eye tracking to study developers' code maintenance activities.*

7.4 Committee Memberships

7.4.1 Departmental and Institutional Committees

1. CUIDS Board member, Carleton University, Canada (July 2022 – present)
2. CUIDS Industrial Advisory Committee member, Carleton University, Canada (July 2022 – present)
3. Member of the Research Computing Committee, Carleton University, Canada (July 2022 – present)
4. Member of the Graduate Affairs (Data Science) committee, School of Computer Science, Carleton University, Canada (July 2022 – present)

5. Member of Women in Computer Science (WiCS), School of Computer Science, Carleton University, Canada (Sep 2015 – present)
6. Chair of the Graduate Admissions committee, School of Computer Science, Carleton University, Canada (Aug 2020 – June 2022)
7. Member of the Graduate Studies committee, School of Computer Science, Carleton University, Canada (Aug 2020 – June 2022)
8. Senate member (Computer Science), Carleton University, Canada (July 2019 – June 2022)
9. SCS representative on the Data Science and Analytics committee, Carleton University, Canada (May 2018 – April 2021)
10. Member of the Graduate Awards committee (Aug 2020 – September 2021)
11. Member of the SCS Hiring committee (Aug 2020 – March 2021)
12. Member of the Planning Committee, School of Computer Science, Carleton University, Canada (February 2019 – May 2020)
13. NSERC DG Internal Peer Reviewer Committee, School of Computer Science, Carleton University, Canada (Sep 2019 – July 2020)
14. Member of the CRC Hiring Committee, Faculty of Science, Carleton University, Canada (Aug 2019 – May 2020)
15. Member of the Data Science Hiring Committee, School of Computer Science, Carleton University, Canada (November 2018 – March 2019)
16. Member of the Tenure and Promotion Committee, School of Computer Science, Carleton University, Canada (Sep 2018 – Dec 2018)
17. Member of the Hiring Committee, School of Computer Science, Carleton University, Canada (November 2017 – March 2018)
18. Member of the Hiring Committee, Systems and Computer Engineering, Carleton University, Canada (Apr 2016 – December 2016)
19. Organizing Committee of the Research Data Retreat, Institute for Data Science, Carleton University, Canada (Jan 2016-April 2016)
20. Member of the Tenure and Promotion Committee, School of Computer Science, Carleton University, Canada (Sep 2015 – Dec 2015)
21. Member of Publicity Committee, Department of Computer Science and Operations Research (DIRO), Université de Montréal, QC, Canada (Sep 2014 – Jul 2015)
22. Member of Women in Computer Science (WiCS), David R. Cheriton School of Computer Science, University of Waterloo, Canada (Sep 2012 – Sep 2013)

7.4.2 Dissertation Committees – External Examiner

1. Mahta Amini (PhD proposal defence). Supervised by Dr. Zohreh Sharafi, Politechnique Montreal, Montreal, QC, March 27, 2024.
2. Yuxi Wang (MCS thesis defence) “Explainable Depression Detection Using Social Media”. Supervised by Dr. Diana Inkpen, University of Ottawa, ON, Canada, March 2024.
3. Mahta Amini (PhD Comprehensive Exam). Supervised by Dr. Zohreh Sharafi, Politechnique Montreal, Montreal, QC, February 2, 2024.
4. Shabnam Hassani (PhD Comprehensive Exam). Co-supervised by Dr. Mehrdad Sabetzadeh and Dr. Daniel Amyot. University of Ottawa, Canada, August 09, 2023.
5. Bahar Hadadi (PhD Comprehensive Exam). Supervised by Dr. Lionel Briand. University of Ottawa, Canada, March 27, 2023.
6. Ahmadreza Saboor (PhD Comprehensive Exam). Supervised by Dr. Lionel Briand. University of Ottawa, Canada, June 2022.
7. Jia Li (PhD Comprehensive Exam). Co-supervised by Dr. Shiva Nejati and Dr. Merhdad Sabetzadeh. University of Ottawa, Canada, June 22, 2022.
8. Mohamed Elshafei (PhD defence) “On the Impact and Detection of Biceps Muscle Fatigue in Wearable Sensors-Based Human Activity Recognition”. Supervised by Dr. Emad Shihab, Concordia University, Montreal, QC, Canada, May 17, 2022.
9. Sakina Fatima (PhD Comprehensive Exam). Supervised by Dr. Lionel Briand. University of Ottawa, Canada, March 31, 2022.
10. Anna Maria Eilertsen (PhD defence) “Improving the Usability of Refactoring Tools for Software Change Tasks”, University of Bergen, Norway, December 22, 2021. Co-supervised by Dr. Anya Helene Bagge, Department of Informatics, University of Bergen, and Dr. Gail Murphy, Faculty of Science, Computer Science, The University of British Columbia.
11. Ruba Skaik (PhD defence) “Predicting Depression Levels and Suicide Ideation within the Canadian Population from Social Media”. Supervised by Dr. Diana Inkpen, University of Ottawa, ON, Canada, May 2021.
12. Ruba Skaik (PhD proposal defence) “Predicting Depression Levels and Suicide Ideation within the Canadian Population from Social Media”. Supervised by Dr. Diana Inkpen, University of Ottawa, ON, Canada, Aug 2020.
13. Yajuan Jiang (PhD defence) “Mining Software Repositories for Release Engineers - Empirical Studies on Integration and Infrastructure-as-Code”. Supervised by Dr. Bram Adams, École Polytechnique de Montréal, QC, Canada, Aug 2016.
14. Carlos Arturo Gómez Teshima (Master’s defence) “Knowledge Curation in a Developer Community: A Study of Stack Overflow and Mailing Lists”. Supervised by Dr. Margaret-Anne Storey, University of Victoria, BC, Canada, Dec 2015

7.4.3 Dissertation Committees – Internal Examiner

1. Iymad Mansour (PhD Defence). Supervised by Dr. Rowan Thomson. Carleton University, Canada, July 14, 2023.
2. Alexis Amezaga Hechavarria (PhD Comprehensive Exam). Supervised by Dr. Omair Shafiq. Carleton University, Canada, April 2023.
3. Ritika Bhatia (MCS defence). Supervised by Dr. Ahmed El-Roby. Carleton University, Canada, May 05, 2022.
4. Ikram Hussein (PhD Comprehensive Exam). Supervised by Dr. David Mould. Carleton University, Canada, April 2021.
5. Rui Li (MCS defence) “An Investigation of Attention Mechanisms in Graph Convolution Networks applied to Link Prediction Problems”. Supervised by Dr. Tony White. Carleton University, Canada, September 2020.
6. Alisher Mansurov (PhD defence) “Investor and Firm Perspectives on Impression Management in Earnings Press Releases: Insights from TSX Venture Exchange Firms”. Supervised by Dr. Merridee Bujaki. The Sprott School of Business, Carleton University, Canada, December 2019.
7. Brian Carignan (MCS defence) “Improving Dialog Systems using Knowledge Graph Embeddings”. Supervised by Dr. Tony White. Carleton University, Canada, December 2017.
8. Karen Salas Hernandez (MCS defence) “Data Science Research to Support Stem Cell Therapy for Muscular Dystrophy”. Supervised by Dr. Frank Dehne. Carleton University, Canada, November 2017.
9. Hossein Mehrfard (PhD defence) “Towards Efficient Instrumentation for Reverse-Engineering Object Oriented Software through Static and Dynamic Analyses”. Supervised by Dr. Yvan Labiche. Carleton University, Canada, June 2017.
10. Nesa Asoudeh (PhD defence) “Test Generation from an Extended Finite State Machine as a Multiobjective Optimization Problem”. Supervised by Dr. Yvan Labiche. Carleton University, Canada, May 2016.
11. Omar Benomar (PhD defence) “A Unified Framework for the Comprehension of Software’s Time Dimension”. Co-supervised by Dr. Houari Sahraoui and Dr. Pierre Poulin, Université de Montréal, QC, Canada, Mar 2015.
12. Ali Ouni (PhD defence) “A Mono- and Multi-objective Approach for Recommending Software Refactoring”. Supervised by Dr. Houari Sahraoui, Université de Montréal, QC, Canada, 2014.

7.4.4 Defence Chair

1. Isabelle Liu. Supervised by Dr. Ahmed El-Roby, Carleton University, Canada, April 2022.
2. Tommy Reddad “Encoding Arguments”. Supervised by Dr. Patrick Morin, Dr. Prosenjit Bose, and Dr. Vida Dujmovic, Carleton University, Canada, November 2015.
3. Stephanie Hurtado “An Eye-Tracking Evaluation of Driver Distraction and Road Signs”. Supervised by Dr. Sonia Chiasson, Carleton University, Canada, September 2015.

7.4.5 Conference Organizing Committees

1. Local arrangements co-chair, the International Conference on Software Engineering (ICSE 2025), Ottawa, Canada.
2. PC co-chair of the Reserach track, the International Conference on Program Comprehension (ICPC), April 12-21, 2024, Lisbon, Portugal.
3. Junior PC co-chair, International Conference on Mining Software Repositories (MSR), May 15-16, 2023, Melbourne, Australia.
4. PC co-chair of the Engineering track, the 22nd IEEE International Working Conference on Source Code Analysis and Manipulation (SCAM 2022), October 3-4, 2022, Limassol, Cyprus.
5. PC co-chair of the ACM Student Research Competition track, the 37th IEEE/ACM International Conference on Automated Software Engineering (ASE 2022), Sep 26–Oct 1 2022, Ann Arbor, Michigan, United States.
6. Program co-chair and co-organizer, Consortium for Software Engineering Research (CSER 2021 Spring) meeting, May 14, 2021, Ottawa, Canada.
7. Data Showcase PC co-chair, International Conference on Mining Software Repositories (MSR), May 25-26, 2020, Seoul, South Korea.
8. Tools Demo track PC co-chair of the International Conference on Program Comprehension (ICPC), May 25-26, 2019, Montreal, Canada.
9. Workshops track PC co-chair of the International Conference on Software Analysis, Evolution, and Reengineering (SANER), February 24-27, 2019, Hangzhou, China.
10. Workshop co-organizer and PC co-chair “4th International Workshop on Software Analytics (SWAN 2018)”, co-located with the International Symposium on the Foundations of Software Engineering (FSE), November 05, 2018, Lake Buena Vista, FL, USA.
11. Artifacts track PC co-chair, The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE 2018), 2018, Lake Buena Vista, Florida, USA.
12. PC co-chair of the ACM Student Research Competition, the 40th International Conference on Software Engineering (ICSE 2018), May 27 – 3 June 2018, Gothenburg, Sweden.
13. PC co-chair of the NIER/Tool Demo track, the fifth IEEE Working Conference on Software Visualization (VISSOFT 2017), 2017 Shanghai, China.
14. Proceedings co-chair, the ACM/IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM 2017), 2017, Toronto, Canada.
15. Workshop co-organizer and PC co-chair “3rd International Workshop on Software Analytics (SWAN 2017)”, co-located with the International Symposium on the Foundations of Software Engineering (FSE), September 04, 2017, Paderborn, Germany.
16. Artifacts track PC co-chair, the International Symposium on the Foundations of Software Engineering (FSE), 2016, Seattle, USA.

17. Workshop co-organizer and PC co-chair “2nd International Workshop on Software Analytics (SWAN 2016)”, co-located with the International Symposium on the Foundations of Software Engineering (FSE), 2016, Seattle, USA.
18. Artifacts track co-chair, the International Conference on Software Maintenance and Evolution (ICSME 2016), 2016, Raleigh, USA.
19. Publicity chair for North America, the International Conference on Software Analysis, Evolution, and Reengineering (SANER), 2016, Osaka, Japan.
20. Co-organizer of technical briefings “Software Analytics: Challenges and Opportunities”, International Conference on Software Engineering (ICSE), Austin, TX, USA, May 2016.
21. Workshop co-organizer “Software Analytics”, The Canadian Celebration of Women in Computing (CAN-CWiC), January 22–23, 2016, Ottawa, ON, Canada.
22. Workshop co-organizer “Experience Driven Analytics”, Annual International Conference of Computer Science and Software Engineering (CASCON), November 02, 2015, Markham, ON, Canada.
23. Workshop co-chair “International Workshop on Software Analytics (SWAN 2015)”, co-located with the International Conference on Software Analysis, Evolution, and Reengineering (SANER) 2015, Montreal, QC, Canada.
24. Program chair of the Challenge Track, Working Conference on Mining Software Repositories (MSR) 2014, Hyderabad, India.
25. Workshop co-organizer “Improving Development Intelligence”, Annual International Conference of Computer Science and Software Engineering (CASCON-2009), November 02–05, 2009, Markham, Ontario, Canada.

7.4.6 Memberships and Certificates

- ACM Society Member, 2014 – present
- IEEE Society Member, 2011 – present
- TESOL/TESL Certificate, Oxford Seminars, Wilfrid Laurier University, Waterloo, 2006

8 Contributions

8.1 Presentations

8.1.1 Conference Presentations

1. “Keep the Ball Rolling: Analyzing Release Cadence in GitHub” at the conference on Mining Software Repositories (MSR), the Mining Challenge track, Melbourne, Australia, May 16, 2023.
2. “Software Analytics: Challenges and Opportunities”, technical session at the Canadian Celebration of Women in Computing (CAN-CWiC), Ottawa, ON, Canada, January 23, 2016.

3. "Mining Code Review Data: When Quality Matters" at the CASCON 2015 Data Science Workshop: "Experience Driven Analytics", November 02, 2015.
4. "Investigating Code Review Quality: Do People and Participation Matter?", a Research Talk at the Consortium for Software Engineering (CSER) Meeting, Markham, ON, Canada, November 1, 2015.
5. "No Issue Left Behind: Reducing Information Overload in Issue Tracking". The International Symposium on the Foundations of Software Engineering (FSE-14), Hong Kong, November 20, 2014.
6. "Improving Developer Situational Awareness with Software Analytics", a New Faculty Talk (invited) at the Consortium for Software Engineering Research (CSER), Markham, ON, November 02, 2014.
7. "The Influence of Non-Technical Factors on Code Review". The 20th Working Conference on Reverse Engineering (WCRE-13), Koblenz, Germany, October 16, 2013.
8. "Situational Awareness: Personalizing Issue Tracking Systems". The New Ideas and Emerging Results (NIER) Track at the 35th International Conference on Software Engineering (ICSE-13), San Francisco, CA, USA, May 23, 2013.
9. "Informing Development Decisions: From Data To Information". The Doctoral Symposium at the 35th International Conference on Software Engineering (ICSE-2013), San Francisco, CA, USA, May 21, 2013.
10. "Extracting Artifact Lifecycle Models From Metadata History". The 2013 ICSE Workshop on Data Analysis Patterns in Software Engineering (DAPSE-13), San Francisco, CA, USA, May 21, 2013.
11. "The MSR Cookbook: Mining a Decade of Research". The 10th IEEE Intl. Working Conf. on Mining Software Repositories (MSR-13), San Francisco, May 19, 2013.
12. "The Secret Life of Patches: A Firefox Case Study". The 19th Working Conference on Reverse Engineering (WCRE-12), Kingston, ON, Canada, October 18, 2012.
13. "Revisiting Bug Triage and Resolution Practices". The 2012 ICSE Workshop on User Evaluation for Software Engineering Researchers (USER-12), Zurich, Switzerland, June 5, 2012.
14. "Mining Usage Data and Development Artifacts". The 2012 IEEE Working Conference on Mining Software Repositories (MSR-12), Zurich, Switzerland, June 2, 2012.
15. "A Bug You Like: A Framework for Automated Assignment of Bugs". The 17th IEEE Intl. Conference on Program Comprehension (ICPC-09), May 17, 2009, Vancouver, BC.

8.1.2 Industry Talks

16. "System-based Monitoring Using AI/ML Techniques", an invited talk, Ericsson-Carleton Symposium, March 21, 2022 (via Zoom).
17. "Data Science at Carleton", an invited talk, Department of Canadian Heritage, Government of Canada, Ottawa, January 19, 2022 (via Zoom).
18. "Data Challenges", an invited talk at the Data Club with the City of Ottawa, Ottawa, December 09, 2021 (via Zoom).

19. “Data Science: Teaching and Research Perspectives”, Ottawa Women in Data Science Meetup, IBM, Ottawa, March 10, 2020.
20. “Mining Software Repositories (Software Analytics)”, R&D Talk at MindBridge AI, Ottawa, May 17, 2019.
21. “Mining Software Repositories”, R&D Talk at First Derivatives, Ottawa, May 30, 2017.
22. “Code Review Quality: Evidence vs. Belief”, R&D Talk at Shopify, Ottawa, July 28, 2016.
23. “Developer Dashboards: The Need For Qualitative Analytics”, Mozilla Toronto Office, September 06, 2013.
24. “WebKit Code Review: Main Findings”, Google Waterloo Office, April 10, 2013.
25. “The Minervan Project: Improving Development Intelligence”, IBM Toronto Office, April 01, 2009.

8.1.3 Other Talks

26. Invited to participate and give a talk at the No. 192 NII Shonan meeting “Augmented Software Visualization”, November 27–30, 2023, Tokyo, Japan.
27. “Mining Software Repositories”, research panel talk at the Data Day 6.0, Carleton University, March 26, 2019.
28. “Software Analytics: Challenges and Opportunities”, research panel talk at the Data Day 3.0, Carleton University, March 29, 2016.
29. “Leveraging Software Analytics to Support Development Decisions”, Research talk at the Department of Computer Science, University of Victoria, March 30, 2015.
30. “Leveraging Data Analytics to Support Software Development Decisions”, Research talk at the Department of Computer Science, Carleton University, February 27, 2015.
31. “Software Analytics for Developers: the Good, the Bad and the Ugly”, Research talk at the Department of Computer Science and Software Engineering, Concordia University, January 26, 2015.
32. “Supporting Development Decisions with Software Analytics”, Research talk at the Department of Computer Science, University of Toronto, May 14, 2014.
33. “Software Analytics to Support Development Decisions”, Research talk at the Department of Computer Science and Operations Research, University of Montreal, February 10, 2014.
34. “Informing Software Development: From Data to Decisions”, Research talk at the Data Science Laboratory, Ryerson University, June 13, 2013.
35. “Situational Awareness: Personalizing Issue Tracking Systems” (poster). Consortium for Software Engineering (CSER) Meeting, Markham, ON, Canada, November 17, 2013.
36. “The Influence of Non-Technical Factors on Code Review”, Software Engineering Seminar, School of Computer Science, University of Waterloo, September 25, 2013.
37. “Personalizing Issue Trackers” (poster). Cheriton Symposium, School of Computer Science, University of Waterloo, September 13, 2013.

38. “The Secret Life of Patches”. Software Engineering Seminar, School of Computer Science, University of Waterloo, October 10, 2012.
39. “The Secret Life of Patches” (poster). Cheriton Symposium, School of Computer Science, University of Waterloo, September 21, 2012.
40. “Mining Usage Data and Development Artifacts”. Software Engineering Seminar, School of Computer Science, University of Waterloo, March 14, 2012.
41. “A Tale of Two Browsers”. Research Seminar at the SWAG lab, University of Waterloo, March 28, 2011.
42. “Attaching Social Interactions to the Release History of a Software System”. Research talk at the Computer Engineering Department, Bogazici University, Istanbul, Turkey, May 17, 2007.
43. “Finding the Core Architecture of an Evolving Software System”. Technology Showcase at the 15th Annual International Conference of Computer Science and Software Engineering (CASCON 2005), Richmond Hill, ON, Canada, October 17–20, 2005.
44. “Finding the Core Architecture Across Releases”. Consortium for Software Engineering (CSER) Meeting, University of Ottawa, Ottawa, ON, Canada, May 01, 2005.

8.2 Publications

8.2.1 Peer-reviewed Journals

1. Sri Lakshmi Vadlamani, Omair Shafiq, and **Olga Baysal**. “Using Machine Learning to Analyze and Predict Entry Patterns of Low-Cost Airlines: A Study of Southwest Airlines” (accepted to the Elsevier Journal on Machine Learning with Applications, September 2022).
2. Norbert Eke and **Olga Baysal**. “Software Developer Expertise Learning”. (under review)
3. Gias Uddin, **Olga Baysal**, Latifa Guerrouj, and Foutse Khomh. “Understanding How and Why Developers Seek and Analyze API-related Opinions”. IEEE Transactions on Software Engineering (TSE), March 04, 2019 and Invited talk at the 27th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE) (Journal First Publication), Tallinn, Estonia, 26-30 August 2019.
4. **Olga Baysal**, Oleksii Kononenko, Reid Holmes, and Michael W. Godfrey. “Investigating Technical and Non-Technical Factors Influencing Modern Code Review”. Accepted as an invited paper (revised and extended version of our WCRE-13 paper) to a special issue of the Empirical Software Engineering Journal (EMSE), June 2016, Vol. 21, pp. 932–959.
5. **Olga Baysal**, Reid Holmes, and Michael W. Godfrey. “Developer Dashboards: The Need For Qualitative Analytics”. *IEEE Software*, 30(4), pp. 46–52, July-August 2013 issue on the theme “Software Analytics: So What?”.

8.2.2 Book Chapters

6. **Olga Baysal**. “A Tailored Suit: The Big Opportunity in Personalizing Issue Tracking”, a chapter in the book “Perspectives on Data Science for Software Engineering”, Tim Menzies, Laurie Williams, and Thomas Zimmermann (eds.), Morgan Kaufmann, 2016, pp. 107–110.

7. **Olga Baysal**, Oleksii Kononenko, Reid Holmes, and Michael W. Godfrey. “Synthesizing Knowledge from Software Development Artifacts”, a chapter in the book “The Art and Science of Analyzing Software Data”, Christian Bird, Tim Menzies, and Thomas Zimmermann (eds.), Morgan Kaufmann, 2015.

8.2.3 Conference Proceedings

8. Oz Kilic, Nathaniel Bowness, and **Olga Baysal**. “Keep the Ball Rolling: Analyzing Release Cadence in GitHub”. In Proc. of the International Conference on Mining Software Repositories (MSR), the Mining Challenge track, Melbourne, Australia, May 15–16, 2023. **Awarded Best Mining Challenge Paper Award.**
9. Michael MacInnis, **Olga Baysal**, and Michele Lanza. “Terminals All the Way Down”. In Proc. of the 2022 IEEE/ACM 44th International Conference on Software Engineering: New Ideas and Emerging Results (ICSE-NIER), Pittsburgh, PA, USA, May 21–29, 2022.
10. Keerthana Muthu Subash, Lakshmi Prasanna Kumar, Sri Lakshmi Vadlamani, Preetha Chatterjee, and **Olga Baysal**. “DISCO: A Dataset of Discord Chat Conversations for Software Engineering Research”. In Proc. of the International Conference on Mining Software Repositories (MSR), the Data/Tool Showcase track, Pittsburgh, PA, USA, May 23–24, 2022.
11. Amirhossein Naghshzan, Latifa Guerrouj, and **Olga Baysal**. “Leveraging Unsupervised Learning to Summarize Code Entities Discussed in Stack Overflow.” In Proc. of the International Working Conference on Source Code Analysis & Manipulation (SCAM), Luxembourg City, September 27–28, 2021.
12. Sri Lakshmi Vadlamani, Benjamin Emdon, Joshua Arts, and **Olga Baysal**. “Can GraphQL Replace REST? A Study of Their Efficiency and Viability”. In Proc. of the 8th International Workshop on Software Engineering Research and Industrial Practice (SER&IP), Madrid, Spain, June 04, 2021.
13. Khadija Osman and **Olga Baysal**. “Health is Wealth: Evaluating the Health of the Bitcoin Ecosystem in GitHub”. In Proc. of the 4th International Workshop on Software Health in Projects, Ecosystems and Communities (SoHeal), Madrid, Spain, May 29, 2021.
14. Saraj Singh Manes and **Olga Baysal**. “Studying the Change Histories of Stack Overflow and GitHub Snippets”. In Proc. of the International conference on Mining Software Repositories (MSR), Madrid, Spain, May 17–19, 2021.
15. Sri Lakshmi Vadlamani and **Olga Baysal**. “Studying Software Developer Expertise and Contributions in Stack Overflow and GitHub”. In Proc. of the 36th IEEE International Conference on Software Maintenance and Evolution (ICSME), September 27–October 03, 2020, Adelaide, Australia.
16. Jonathan Saddler, Cole Peterson, Sanjana Sama, Shruthi Nagaraj, **Olga Baysal**, Latifa Guerrouj, and Bonita Sharif. “Studying Developer Reading Behavior on StackOverflow During API Summarization Tasks”. In Proc. of the 27th IEEE Int. Conf. on Software Analysis, Evolution and Reengineering (SANER), London, ON, Canada, February 2020.
17. Jingyi Shen, **Olga Baysal**, and M. Omair Shafiq. “Evaluating The Performance of Machine Learning Sentiment Analysis Algorithms in Software Engineering”. In Proc. of the 5th International Conference on Cloud and Big Data Computing (CBDCOM), Fukuoka, Japan, August 2019.

18. Saraj Singh Manes and **Olga Baysal**. “How Often and What StackOverflow Posts Do Developers Reference in Their GitHub Projects?” (short paper for MSR Mining Challenge). In Proc. of the 16th International Conference on Mining Software Repositories (MSR), Montreal, Canada, May 2019.
19. Christopher Bellman, Ahmad Seet, and **Olga Baysal**. “Studying Developer Build Issues and Debugger Usage via Timeline Analysis in Visual Studio IDE” (short paper for MSR Mining Challenge). In Proc. of the 15th International Conference on Mining Software Repositories (MSR), Gothenburg, Sweden, May 2018.
20. Oleksii Kononenko, Tresa Rose, **Olga Baysal**, Michael W. Godfrey, Dennis Theisen, and Bart de Water. “Studying Pull Request Merges: A Case of Shopify’s Active Merchant”. In Proc. of the 40th International Conference on Software Engineering (ICSE), Gothenburg, Sweden, May 2018. [Acceptance rate: 31/131 or 24%]
21. Ekaba Bisong, Eric Tran and **Olga Baysal**. “Built to Last or Built Too Fast? Evaluating Prediction Models for Build Times” (short paper for MSR Mining Challenge). In Proc. of the Working Conference on Mining Software Repositories (MSR), Buenos Aires, Argentina, May 2017.
22. Oleksii Kononenko, **Olga Baysal**, and Michael W. Godfrey. “Code Review Quality: How Developers See It”. In Proc. of the 38th ACM/IEEE International Conference on Software Engineering (ICSE), Austin, TX, May 2016. [Acceptance rate: 101/530 or 19%]
23. Latifa Guerrouj and **Olga Baysal**. “Investigating the Android Apps’ Success: An Empirical Study” (short paper). In Proc. of the International Conference on Program Comprehension (ICPC), Austin, TX, May 2016.
24. Kenny Byrd, Alisher Mansurov, and **Olga Baysal**. “Mining Twitter Data For Influenza Detection and Surveillance”. In Proc. of the ICSE 2016 Workshop on Software Engineering in Healthcare Systems (SEHS), Austin, TX, May 2016.
25. Haifa Alharthi, Djedjiga Outioua, and **Olga Baysal**. “Predicting Questions’ Scores on Stack Overflow”. In Proc. of the ICSE 2016 Workshop on Crowd Sourcing in Software Engineering (CSI-SE), Austin, TX, May 2016.
26. Oleksii Kononenko, **Olga Baysal**, Latifa Guerrouj, Yaxin Cao, and Michael W. Godfrey. “Investigating Code Review Quality: Do People and Participation Matter?”. In Proc. of the 31st IEEE Intl. Conference on Software Maintenance and Evolution (ICSME), Bremen, Germany, Sept. 29-Oct. 1, 2015.
27. **Olga Baysal**, Reid Holmes, and Michael W. Godfrey. “No Issue Left Behind: Reducing Information Overload in Issue Tracking”. In Proc. of the International Symposium on the Foundations of Software Engineering (FSE), 2014. pp. 666–677
28. Oleksii Kononenko, **Olga Baysal**, Reid Holmes, and Michael W. Godfrey. “DASHboards: Enhancing Developer Situational Awareness”. In Proc. of Formal Demonstrations Track at the 36th ACM/IEEE International Conference on Software Engineering (ICSE), Hyderabad, India, June, 2014. pp. 552–555
29. Oleksii Kononenko, **Olga Baysal**, Reid Holmes, and Michael W. Godfrey. “Mining Modern Repositories with Elasticsearch”. In Proc. of the 11th IEEE International Working Conference on Mining Software Repositories (MSR), Hyderabad, India, June, 2014. pp. 328–331

30. **Olga Baysal**, Oleksii Kononenko, Reid Holmes, and Michael W. Godfrey. “The Influence of Non-Technical Factors on Code Review”. In Proc. of the 20th Working Conference on Reverse Engineering (WCRE), Koblenz, Germany, October 2013. pp. 122–131 [Acceptance rate: 38/97 or 39% for full papers]. Awarded **Distinguished Paper Award**.
31. **Olga Baysal**, Reid Holmes, and Michael W. Godfrey. “Situational Awareness: Personalizing Issue Tracking Systems”. In Proc. of the New Ideas and Emerging Results (NIER) Track at the 35th ACM/IEEE International Conference on Software Engineering (ICSE), San Francisco, CA, USA, May 22-24, 2013. pp. 1185–1188 [Acceptance rate: 31/143 or 22%]
32. **Olga Baysal**. “Informing Development Decisions: From Data To Information”. In Proc. of the 35th ACM/IEEE International Conference on Software Engineering (ICSE), Doctoral Symposium, San Francisco, CA, USA, May 21, 2013. pp. 1407–1410
33. **Olga Baysal**, Oleksii Kononenko, Reid Holmes, and Michael W. Godfrey. “Extracting Artifact Lifecycle Models From Metadata History”. In Proc. of the 2013 ICSE Workshop on Data Analysis Patterns in Software Engineering (DAPSE), San Francisco, CA, USA, May 21, 2013. pp. 17–19
34. Hadi Hemmati, Sarah Nadi, **Olga Baysal**, Oleksii Kononenko, Wei Wang, Reid Holmes, and Michael W. Godfrey. “The MSR Cookbook: Mining a Decade of Research”. In Proc. of the 10th IEEE International Working Conference on Mining Software Repositories (MSR), San Francisco, May 2013. pp. 343–352 [Acceptance rate: 31/81 or 38% for full papers]
35. **Olga Baysal**, Oleksii Kononenko, Reid Holmes and Michael W. Godfrey. “The Secret Life of Patches: A Firefox Case Study”. In Proc. of the 19th Working Conference on Reverse Engineering (WCRE), Kingston, ON, Canada, October 2012. pp. 447–455 [Acceptance rate: 43/118 or 36% for full papers]
36. **Olga Baysal**, Reid Holmes, and Michael W. Godfrey. “Revisiting Bug Triage and Resolution Practices” (position paper). In Proc. of the 2012 ICSE Workshop on User evaluation for Software Engineering Researchers (USER), Zurich, Switzerland, June 5, 2012. pp. 29–30
37. **Olga Baysal**, Reid Holmes, and Michael W. Godfrey. “Mining Usage Data and Development Artifacts”. In Proc. of the 2012 IEEE International Working Conference on Mining Software Repositories (MSR), Zurich, Switzerland, June 2012. pp. 343–352 [Acceptance rate: 18/64 or 28% for full papers].
38. **Olga Baysal**, Ian Davis, and Michael W. Godfrey. “A Tale of Two Browsers” (short paper for MSR Challenge). In Proc. of the 8th Working Conference on Mining Software Repositories (MSR). Honolulu, Hawaii, USA, May 21–22, 2011. pp. 238–241
39. **Olga Baysal**, Michael W. Godfrey, and Robin Cohen. “A Bug You Like: A Framework for Automated Assignment of Bugs” (poster paper). In Proc. of the 17th IEEE International Conference on Program Comprehension (ICPC), Vancouver, BC, May 17–19, 2009. pp. 297–298
40. Carol J Fung, **Olga Baysal**, Jie Zhang, Issam Aib, and Raouf Boutaba. “Trust Management for Host-based Collaborative Intrusion Detection”. In Proc. of the 19th IFIP/IEEE International Workshop on Distributed Systems: Operations and Management (DSOM), Samos Island, Greece, September 22-26, 2008. pp. 109–122 [Acceptance rate: 36.8%].
41. **Olga Baysal** and Andrew J. Malton. “Correlating Social Interactions to Release History During Software Evolution”. In Proc. of the International Workshop on Mining Software Repositories (MSR), Minneapolis, MN, USA, May 19–20, 2007. 7 pages [Acceptance rate: 38%].

42. Raihan Al-Ekram, Archana Adma, and **Olga Baysal**. "diffX: An Algorithm to Detect Changes in Multi-Version XML Documents". In Proc. of the 15th Annual International Conference of Computer Science and Software Engineering (CASCON), October 2005, Richmond Hill, ON, Canada. pp. 1–11 [Acceptance rate: 27%].

8.2.4 Technical Report

43. *CS-2012-10*, School of Computer Science, University of Waterloo, October 2012. 35 pages "A Qualitative Study of Mozilla's Process Management Practices", Olga Baysal and Reid Holmes.
<http://www.cs.uwaterloo.ca/research/tr/2012/CS-2012-10.pdf>

8.2.5 Theses

- *Doctoral Dissertation*, School of Computer Science, University of Waterloo 2014
"Supporting Development Decisions with Software Analytics"

- *Master's Thesis*, School of Computer Science, University of Waterloo 2006
"Attaching Social Interactions Surrounding Software Changes to the Release History of an Evolving Software System"

Curriculum Vitae

Song Cai

School of Mathematics and Statistics
Carleton University
Ottawa, ON Canada, K1S 5B6

Phone: 613-520-2600 x 2423
Email: scai@math.carleton.ca
Homepage: <http://people.math.carleton.ca/~scai>

A. Employment and Education

Academic Employment

Jul. 2019–present, Associate Professor, Carleton University

Jul. 2014–Jun. 2019, Assistant Professor, Carleton University

Postgraduate Education

May 2014	Ph.D.	Statistics	University of British Columbia
May 2010	M.Sc.	Statistics	University of British Columbia
May 2008	M.Sc.	Atmospheric Science	University of British Columbia

Professional Training

Oct. 2016 Certificate in University Teaching (CUT) Carleton University

B. Scholarly Research

Research Interests

Non-parametric and semi-parametric statistical methods: empirical likelihood, density ratio modelling, bootstrap

Big data analytics: distributed statistical computing with big data, analysis of monitoring-sensor data

Survey sampling: analysis of complex surveys with missing data, small area estimation

Environmental statistics: spatial-temporal modelling of environmental health data

Research Grants

<i>Grant</i>	<i>Year</i>	<i>Source</i>	<i>Total Amount</i>	<i>Competitive</i>
CANSSI Collaborative Research Team Project (CANSSI-CRT)	2020–2023	CANSSI	\$180,000 (team)	Yes
Multidisciplinary Research Catalyst Fund (MRCF)	2019–2020	Carleton U.	\$20,000 (team)	Yes
NSERC Discovery Grant	2017–2024	NSERC	\$133,000 (\$19,000/yr.)	Yes
New Faculty Supplement Award	2015–2017	Carleton U.	\$10,000	Yes
Start-up Grant	2014	Carleton U.	\$32,000	No

Publications

Papers in Preparation

*He, H., Haziza, D., and Cai, S. (2024). Statistical inference under density ratio models with data missing at random

*Reynolds, E. and Cai, S. (2024). Adaptive group lasso for selecting basis functions in density ratio models

Articles in Refereed Journals

Cai, S., Rao, J. N. K. (2022). Selection of auxiliary variables for three-fold linking models in small area estimation: a simple and effective method. *Stats*, 5(1), 128–183.

Cai, S., Rao, J. N. K., Dumitrescu, L., and *Chatrchi G. (2020). Effective transformation-based variable selection under two-fold subarea models in small area estimation. *Statistics in Transition New Series*, 21(4), 68–83.

Cai, S., Qin, Y., Rao, J. N. K., and Winiszewska, M. (2019). Empirical likelihood confidence intervals under imputation for missing survey data from stratified simple random sampling. *The Canadian Journal of Statistics*, 47(2), 281–301.

Cai, S. and Rao, J. N. K. (2019). Empirical likelihood inference for missing survey data under unequal probability sampling design. *Survey Methodology*, 45(1), 145–164.

Cai, S. and Chen, J. (2018). Empirical likelihood inference for multiple censored samples. *The Canadian Journal of Statistics*, 46(2), 212–232.

Cai, S., Chen, J., and Zidek, J. V. (2017). Hypothesis testing in the presence of multiple samples under density ratio models. *Statistica Sinica*, 27(2), 761–783.

Cai, S., Zidek, J. V., Newlands, N., and Neilsen, D. (2014). Statistical modeling and forecasting of fruit crop phenology under climate change. *Environmetrics*, 25(8), 621–629.

Wen, S., Cai, S., Tang, J., and Cai, Q. (2003). Three-dimensional hydrodynamic model of Xiamen waters. *Acta Oceanologica Sinica*, 22(2), 151–170.

Cai, S. and Li, X. (2003). Climatic variability of monthly average global and hemispheric air temperatures in recent 150 years. *Acta Scientiarum Naturalium, Universitatis Pekinensis*, 39, 347–355.

Articles in Refereed Conference Proceedings

Cai, S. and Chen, J. (2016). Empirical likelihood inference under density ratio models based on Type I censored samples: hypothesis testing and quantile estimation. In *Advanced Statistical Methods in Data Science*, 123–151, Springer, New York.

Cai, S., Hsieh, W. W., and Cannon, A. J. (2008). A comparison of Bayesian and conditional density models in probabilistic ozone forecasting. In *Proceedings of the 2008 IEEE World Congress on Computational Intelligence*, 2310–2314, Hong Kong.

Technical Reports (Non-refereed)

Cai, S., Zidek, J. V., and Newlands, N. (2010). Predicting sequences of progressive events times with time-dependent covariates. *Technical Report 259*, Department of Statistics, The University of British Columbia, Vancouver, British Columbia, Canada.

Cai, S., Zidek, J. V., and Newlands, N. (2010). Predicting phenological events using event-history analysis. *Technical Report 260*, Department of Statistics, The University of British Columbia, Vancouver, British Columbia, Canada.

Conference and Seminar Presentations

Invited Talks

(Sep. 22, 2021) Joint with Rao, J. N. K., Selection of auxiliary variables for two-fold subarea-level linking models in small area estimation: A simple method. *SAE 2021: Conference on Big Data for Small Area Estimation* (virtual conference due to COVID-19), Naples, Italy.

(Aug. 10, 2019) Simple and effective variable selection under two-fold subarea models in small area estimation. *International Chinese Statistical Association—Canada Chapter 2019 Symposium*, Kingston, Ontario, Canada.

(Jul. 4, 2018) Efficient empirical likelihood inference under adjusted fractional imputation for missing data. *2018 International Chinese Statistical Association China Conference with the Focus on Data Science*, Qingdao, Shandong, China.

(Jun. 1, 2018) Small area estimation under unmatched two-fold subarea models. *Centre de Recherches Mathématiques (CRM) Conference 2018: Statistical Inference for Complex Surveys*, Université de Montréal, Montreal, Quebec, Canada.

(Nov. 3, 2017) Empirical likelihood confidence intervals under imputation for missing survey data. *Probability-Statistics Day for Celebrating the 25th Anniversary of the Fields Institute*, School of Mathematics and Statistics, Carleton University, Ottawa, Ontario, Canada.

(May 26, 2017) Empirical likelihood confidence intervals under imputation for missing survey data. *Rao Conference 2017: Contemporary Theory and Practice of Survey Sampling*, Yun-An Auditorium, Kunming, Yunnan, China.

(Mar. 24, 2017) Empirical likelihood inference based on estimating equations for complex surveys with data missing at random. *Probability & Statistics Seminar*, Department of Mathematics and Statistics, University of Ottawa, Ottawa, Ontario, Canada.

(Dec. 23, 2016) Empirical likelihood inference based on estimating equations for complex surveys with data missing at random. Department of Statistics and Actuarial Science, Faculty of Economics and Management, Eastern China Normal University, Shanghai, China.

(Dec. 22, 2016) Empirical likelihood inference based on estimating equations for complex surveys with data missing at random. *The 10th International Chinese Statistical Association International Conference on Global Growth of Modern Statistics in the 21st Century*, Shanghai, China.

(May 30, 2016) Empirical likelihood inference based on estimating equations for complex surveys with missing data. *Statistical Society of Canada 2016 Annual Meeting*, St. Catharines, Ontario, Canada.

(Aug. 6, 2015) Empirical likelihood inference for Type I censored multiple samples under semiparametric density ratio models. *International Chinese Statistical Association—Canada Chapter 2015 Symposium*, Calgary, Alberta, Canada.

(Jan. 17, 2014) Empirical likelihood inference under density ratio models based on Type I censored multiple samples: applications to long term monitoring of lumber quality. School of Mathematics and Statistics, Carleton University, Ottawa, Ontario, Canada.

(Jan. 17, 2014) Risk assessment for optimal decision-making: concepts and examples. School of Mathematics and Statistics, Carleton University, Ottawa, Ontario, Canada.

(Oct. 10, 2013) Empirical likelihood inference under density ratio models based on Type I censored multiple samples: applications to long term monitoring of lumber quality. Department of Statistics, The University of Manitoba, Winnipeg, Manitoba, Canada.

Contributed Talks

- (May 31, 2023) Joint with *He, H. and Haziza, D., Efficient and robust empirical likelihood approach for estimating equations with missing data. *Statistical Society of Canada 2023 Annual Meeting*, Ottawa, Ontario, Canada.
- (Aug. 12, 2021) Variable selection under three-fold sub-subarea models in small area estimation. *Joint Statistical Meetings (JSM), 2021*, Virtual Conference.
- (Aug. 10, 2019) Variable selection under two-fold subarea models in small area estimation. *Statistical Society of Canada 2019 Annual Meeting*, Calgary, Alberta, Canada.
- (Jul. 31, 2018) Empirical-best-prediction estimation of small area means under unmatched two-fold subarea models. *The 2018 Joint Statistical Meetings*, Vancouver, British Columbia, Canada.
- (Jun. 5, 2018) Empirical Bayes estimation of small area means under unmatched two-fold subarea Models. *Statistical Society of Canada 2018 Annual Meeting*, Montreal, Quebec, Canada.
- (Nov. 28, 2014) Memory-efficient computing algorithms for L_1 -type regression estimators based on big data. *Probability & Statistics Seminar*, School of Mathematics and Statistics, Carleton University, Ottawa, Ontario, Canada.
- (May 27, 2014) Quantile estimation under density ratio models based on Type I censored multiple samples. *Statistical Society of Canada 2014 Annual Meeting*, Toronto, Ontario, Canada.
- (Apr. 15, 2014) Hypothesis testing under density ratio models in the presence of Type I censored multiple samples. Department of Statistics, The University of British Columbia, Vancouver, British Columbia, Canada.
- (Aug. 5, 2013) Empirical likelihood inference based on Type I censored multiple samples under semiparametric density ratio models. *The 2013 Joint Statistical Meetings*, Montreal, Quebec, Canada.
- (May 29, 2013) Dual empirical likelihood ratio test under semiparametric density ratio models for multiple samples. *Statistical Society of Canada 2013 Annual Meeting*, Edmonton, Alberta, Canada.
- (Jun. 4, 2012) Two algorithms for large-scale L_1 -type estimation in regression. *Statistical Society of Canada 2012 Annual Meeting*, Guelph, Ontario, Canada.
- (Apr. 13, 2010) Stochastic process based regression modelling of time-to-event data: application to phenological data. Department of Statistics, The University of British Columbia, Vancouver, British Columbia, Canada.

Research Software

- drmdel*: Dual empirical likelihood inference under density ratio models for multiple samples, C programs with R interface. The `drmdel` R package is published on the comprehensive R archive network (CRAN): <http://cran.r-project.org/web/packages/drmdel/>.
- l1optsubgrad*: Two memory-efficient algorithms for large-scale L_1 -type optimization based on subgradient method, C programs with R interface.
- phenopred*: Predicting phenological events with time-dependent covariates based on a discrete stochastic model, R program.

C. Teaching

Courses Taught in 2023–2024 Academic Year

Winter 2024

STAT 5702W: Modern Applied and Computational Statistics

STAT 5603W: Reliability and Survival Analysis

Fall 2023

STAT 4503A/5509F: Applied Multivariate Analysis/Multivariate Analysis

STAT 5503F: Linear Models

Summer 2023

STAT 3503A: Regression Analysis

Courses Taught in Previous Academic Years

Graduate Courses

STAT 5603W: Reliability and Survival Analysis (*twice*: Winters of 2022 and 2020)

STAT 5602W: Analysis of Categorical Data (Winter of 2022)

STAT 5503F: Linear Models (*Four times*: Falls of 2021, 2019, 2017 and 2015)

STAT 5502W: Sampling Theory and Methods (*three times*: Winters of 2023, 2019 and 2017)

STAT 5506W: Robust Statistical Inference (Winter of 2016)

MATH 5900K: Spatio-temporal Modelling in Environmental Studies (Fall of 2014)

Graduate and undergraduate cross-listed courses

STAT 4503A/5509: Applied Multivariate Analysis/Multivariate Analysis (*Five times*: Falls of 2022, 2021 and 2019, Winters of 2019 and 2018)

STAT 4603A/5504F: Time Series and Forecasting/Stochastic Processes and Time Series Analysis (*three times*: Falls of 2022, 2018 and 2016)

Undergraduate Courses

STAT 4607F: Bayesian Statistical Analysis (Fall of 2018)

STAT 4604A: Statistical Computing (*twice*: Winters of 2017 and 2015)

STAT 4500A: Parametric Estimation (Fall of 2017)

STAT 3509A: Mathematical Statistics (*twice*: Winters of 2018 and 2016)

STAT 3508A: Elements of Probability Theory (Fall of 2016)

STAT 2509: Introduction to Statistical Modelling II (*twice*: Winters of 2023 (2509C) and 2020 (2509B))

STAT 2507: Introduction to Statistical Modelling I (Fall of 2015 (2507B))

D. Research-Student Supervision

Ongoing (3)

<i>Type</i>	<i>Student</i>	<i>Expected Date</i>	<i>Period of Supervision</i>	<i>Co-Supervisor(s)</i>
PhD	He, H.	Aug. 2026	Sep. 2020–present	Dr. David Haziza
	Sung, Y. (part time)	Aug. 2026	Sep. 2018–present	NA
MSc (thesis)	Reynolds, E.	Aug 2024	Sep. 2022–present	Dr. J.N.K Rao

Completed (16)

<i>Type</i>	<i>Student</i>	<i>Completion Date</i>	<i>Co-Supervisor(s)</i>	<i>*First Position</i>
PhD	Chatrchi, G.	Jan. 2019	Dr. J. N. K. Rao	Methodologist, Stats. Can.
MSc (thesis)	Shen, A.	May 2021	Dr. D. Campbell	Ph.D., Carleton U.
	Imbrogno, A.	Sep. 2020	NA	Methodologist, Stats. Can.
	Hockey, D.	May 2016	Dr. S. Mills	Research Analyst, RCMP
MSc (project)	Gjika, E.	Apr. 2023	Dr. J.N.K Rao	Data Scientist, Vretta Inc.
	Van Bussel, M.	May 2021	Dr. S. Mills	Analyst, Statistics Canada
	Alrashede, A.	Aug. 2020	Dr. J. N. K. Rao	NA
	Yang, P.	May 2019	Dr. K. Cheung	NA
	Chen, Y.	Jul. 2016	NA	PhD, UWaterloo
Honours	McCalla, S.	Jan. 2020	NA	NA
	Xu, X.	May. 2019	NA	NA
	Park, Y.	Dec. 2018	NA	Quality Assurance Assistant, CIHI
	Baranzika, M.	Aug. 2018	NA	Disability Claims Processor, GWL
	Wang, H.	Apr. 2018	Dr. N. Rodrigue	Methodologist, Stats. Can.
	Guillemette, J.	Aug. 2017	NA	MSc, CU
	Tang, C.	Apr. 2017	NA	NA

**First Position:* the first position after graduation

D. Administrative and Professional Services

School Committees and Duties

Service Summary

<i>Year</i>	<i>Committees and Duties</i>
Jun. 2023–May 2024:	Hiring Committee; Cyclical Program Review Committee
Jun. 2022–May 2023:	Vice Chair, Personnel Committee
Jun. 2019–May 2020	Vice Chair, Personnel Committee; Vice Chair, Research committee; Chair, Computer Resource Committee; Vice Chair, Stats Program Committee (starting Jan 17. 2020); Undergraduate Program Committee (starting Jan 17. 2020)
Jun. 2018–May 2019	Planning Committee; Graduate Institute Advisory Committee; Computing Resources Committee
Jun. 2017–May 2018	Undergraduate Recruitment Committee; Planning Committee
Jun. 2016–May 2017	Undergraduate Recruitment Committee; Computing Resources Committee
Jun. 2015–May 2016	Personnel Committee; Library Representative

Thesis/Project Examination Committees

2023–2024 Academic year

MSc Thesis Defences: 2

Honours Project Presentations: 2

Previous Academic years

PhD Thesis Defenses: 10

MSc Thesis Defences: 17

MSc Project Presentations: 10

Honours Project Presentations: 19

Services to the Profession

Editorial Activities

Associate Editor, *Survey Methodology*, Aug. 2019–Jan. 2023

Guest Editor, *Survey Methodology*, Sep. 2017–Dec. 2018

Journal Paper Reviews

Annals of the Institute of Mathematical Statistics: 1 paper

TEST: 1 paper

Canadian Journal of Statistics: 3 papers

Scandinavian Journal of Statistics: 1 paper

Biometrics: 1 paper

Statistical Theory and Related Fields: 1 paper

Communications in Statistics: 1 paper

Journal of the Korean Statistical Society: 1 paper

Journal of Applied Statistics: 2 papers

Journal of Survey Statistics and Methodology: 1 paper

Survey Methodology: 6 papers

Statistica Sinica: 1 paper

Referee, *ICSA Springer book series*, Mar. 2016–present, 1 paper

Computational Statistics and Data Analysis: 2 papers

Statistical Methods & Applications: 1 paper

Conference Organization

Session organizer, Session 34: Recent Developments in Empirical Likelihood Methods, *International Chinese Statistical Association—Canada Chapter 2017 Symposium: Frontiers of Big Data and Statistical Sciences*, August 18–20, 2017.

Professional Memberships

Member, International Chinese Statistical Association, 2014–present.

Member, American Statistical Association, 2013–2015.

Member, Statistical Society of Canada, 2009–present.

Sanjeena (Subedi) Dang

Canada Research Chair in Data Science and Analytics; Associate Professor
School of Mathematics and Statistics, Carleton University, Ottawa, ON K1S 5B6
sanjeena.dang@carleton.ca · <http://www.sanjeena.com> · Canadian Citizen

Academic Appointments

- Associate Professor & Canada Research Chair in Data Science and Analytics, School of Mathematics and Statistics, Carleton University (July, 2022 – present).
- Assistant Professor & Canada Research Chair in Data Science and Analytics, School of Mathematics and Statistics, Carleton University (July, 2021 – June, 2020).
- Assistant Professor, Dept. of Mathematical Sciences, Binghamton University [Carnegie Classification: R1 Doctoral University - Very High Research Activity] (Aug, 2016–June 2021).
 - Note: Parental leave: Feb 2018 – Aug 2018.
- Assistant Professor, Department of Mathematics and Statistics, University of Guelph (Aug, 2013–Aug 2016; Contractually limited position).
 - Note: Parental leave: Aug 2015 – Apr 2016.
- Associated Graduate Faculty, Bioinformatics Graduate Program, University of Guelph (Jan, 2013–July, 2013).
- Postdoctoral Fellow, Department of Mathematics and Statistics, University of Guelph, ON (Sept, 2012–July, 2013).
- Visiting Research Fellow, University of Catania, Catania, Italy (Feb, 2013, Sept, 2012, April, 2012).

Other Appointments

- Associated Graduate Faculty, Bioinformatics Graduate Program, University of Guelph (Dec 2022 – present).

Research Interests

Computational Statistics, Biostatistics, Bioinformatics, Machine Learning, Classification, Clustering, High dimensional data, Mixture Models, Model Selection, Variational Approximations.

Education

- Ph.D. in Statistics, 2012, Department of Mathematics & Statistics, University of Guelph.
Title: *Variational Approximations and Other Topics in Mixture Models*.
Supervisor: Dr. Paul McNicholas.
- M.Sc. in Statistics, 2009, Department of Mathematics & Statistics, University of Guelph.
Title: *Genome Selection for Predicting the Estimated Breeding Value of Canadian Holstein Cattle*.
Supervisors: Drs. Zeny Feng and Rob Deardon.
- B.Sc. (Hons.) in Biological Science, 2008, College of Biological Science, University of Guelph.

Awards

- Canada Research Chair in Data Science and Analytics. 2021-2026 (the nomination was unanimously supported by the College of Reviewers).
- Chikio Hayashi Award (an international award given to a promising early career researcher in the area of classification by the International Federation of Classification Societies in recognition of their research excellence). 2019.
- Classification Society Dissertation Award (Honourable Mention). 2013.

- Travel Grants, Department of Economics & Business, University of Catania, Italy. 2012, 2013.
- NSERC Postgraduate Scholarship. 2010–12.
- Statistics Graduate Scholarship (highest GPA), University of Guelph. 2010.
- Dean’s Tri-Council Scholarships, University of Guelph. 2010–12.
- Ontario Graduate Scholarship (declined). 2010.
- Ontario Graduate Scholarship in Science & Technology. 2009.
- Dean’s Scholarship, University of Guelph. 2008, 2009, 2010, 2011.

Other Training/Workshop

- Capital EAP: Unconscious Bias and Inclusion, SUNY RF Learning and Development, Jan 2021.
- Applied Computational Genomics Course, University of Carleton, Ottawa, August 2010.
- MITACS-PIMS Graduate Industrial Modelling Camp, University of Calgary, May 2009.
- MITACS-PIMS Industrial Problem Solving Workshop, University of Calgary, May 2009.

Research Funding

Over \$3.5M (CAD) in research funding —\$1.6M as principal investigator (PI), co-principal investigator (co-PI), co-applicant(co-A), and co-investigator (co-I), and additional \$1.91M as key collaborator.

Grant Detail	Amount	Period
NSERC Alliance (Role: Co-applicant) <u>Funded by:</u> Natural Sciences and Engineering Council of Canada (NSERC)	\$136,000 (CAD)	2024-2026
New Frontiers in Research Fund - Exploration (NFRF-E) (Role: Co-applicant) <u>Funded by:</u> Natural Sciences and Engineering Council of Canada (NSERC)	\$250,000 (CAD)	2022-2024
Canada Research Chair in Data Science and Analytics Program (Role: Principal Investigator) <u>Funded by:</u> Natural Sciences and Engineering Council of Canada (NSERC)	\$600,000 (CAD)	2021 - 2026
Discovery Grant (5 years) (Role: Principal Investigator) <u>Funded by:</u> NSERC	\$105,000 (CAD)	2021 - 2026
Start-up Research Support (Role: Principal Investigator) <u>Funded by:</u> Carleton University	\$145,000 (CAD)	2021 - Present
A variational approach for clustering high dimensional discrete data (Role: Principal Investigator) <u>Funded by:</u> Simons Foundation	\$42,000 (USD)	2020 - 2021 ¹
Grant for organizing Fields-CQAM thematic program on Data Science and Optimization (Role: Co-Organizer) <u>Funded by:</u> The Fields Institute for Research in Mathematical Sciences.	\$100,000 (CAD)	2019 - 2019.

Continued on next page...

Grant Detail	Amount	Period
Seed Grant: Discovery of a Microbiome Biomarker for Inflammatory Bowel Disease (Role: Co-Principal Investigator) <u>Funded by:</u> Binghamton University Watson-United Health Services Collaboration Seed Grant Program	\$18,000 (USD)	2019 - 2020.
Seed Grant: Using Data Science to Decipher Processing-Structure-Property-Performance Relationships of Additively Manufactured Metals (Role: Co-Principal Investigator) <u>Funded by:</u> Data Science Transdisciplinary Areas of Excellence (TAE), Binghamton University	\$15,000 (USD)	2019 - 2020.
Course Development Grant (Role: Principal Investigator) <u>Funded by:</u> Data Science TAE, Binghamton University	\$10,000 (USD)	2019 - 2019
R01: Engineering a Small Intestinal Microbiome to Evaluate Food Additive Exposure (Role: Statistical Consultant & Key Collaborator) <u>Funded by:</u> National Institutes of Health (NIH)	\$1,530,363 (USD)	2018 - 2023
R15: Laboratory Selection for <i>Drosophila Melanogaster</i> Genetic Variants that Confer Increased Survival on a Diabetogenic Diet (Role: Co-Investigator) <u>Funded by:</u> NIH	\$298,501 (USD)	2018 - 2021
Start-up Research Support (Role: Principal Investigator) <u>Funded by:</u> Binghamton University	\$15,000 (USD)	2016 - 2021
Discovery Grant (5 years) (Role: Principal Investigator) <u>Funded by:</u> NSERC	\$75,000 (CAD)	2014 - 2017 ²
Start-up Research Support (Role: Principal Investigator) <u>Funded by:</u> University of Guelph	\$30,000 (CAD)	2013 - 2016

Note: ¹ The grant awarded for 2020 - 2025 was terminated early due to accepting position at Carleton University.
² The grant awarded for 2014 - 2019 was terminated early for due to accepting position at Binghamton University.

Referred Journal Articles: Appeared/To Appear

Note: I primarily publish under my maiden name **Subedi** and have underlined the names of trainees.

Accepted for Publication

1. Tu, W., Browne, R., and **Subedi, S.** ‘A mixture of logistic skew-normal multinomial models’. *Computational Statistics and Data Analysis* (To Appear).

Published and To Appear

1. Tu, W. and Subedi, S. (2023) Logistic Normal Multinomial Factor Analyzers for Clustering Microbiome Data. *Journal of Classification*. **40**(2)638–667.
2. Fang, Y. and Subedi, S. (2023) Variational inference of logistic-normal multinomial mixture model for clustering microbiome data. *Scientific Reports* **13**, 14758

3. Tu, W. and **Subedi, S.** (2023) ‘Penalized logistic normal multinomial factor analyzers for high dimensional compositional data’. *Journal of Statistical Research*. **56**(2)185–216.
4. **Subedi, S.** (2023) ‘Clustering Matrix Variate Longitudinal Count Data’. *Analytics*. **2**(2), 426–437.
5. Silva, A., Qin, X., Rothstein, S. J., McNicholas, P. D., and **Subedi, S.** (2023) ‘Finite Mixtures of Matrix Variate Poisson-Log-normal Distributions for Three-Way Count Data’. *Bioinformatics*. **39**(5) btad167.
6. **Subedi, S.** (2023) ‘Clustering matrix variate longitudinal count data’. *Analytics* **2**(2), 426–437.
7. Ciobani, C., McNairn, C., Nyiri, B., Chauhan, V., **Subedi, S.**, and Murugkar, S. (2023) ‘Exploring the use of Raman spectroscopy and covariate-adjusted multivariate analysis for the detection of irradiated blood’. *Radiation Research* **199**(4) 396–405.
8. Beausoleil-Morrison, A., McNairn, C., Qin, X., Ciobnau, C., Altwasser, K., **Subedi, S.**, Chauhan, V., and Murugkar, S. (2023) “Application of Raman spectroscopy and multivariate analysis to detect ionizing radiation changes in blood plasma”. *SPIE Conference Proceedings* **12373** 45–51.
9. Fang, Y., Karlis, D., and **Subedi, S.** (2022) ‘An infinite mixture of multivariate normal-inverse Gaussian distributions for clustering of skewed data’. *Journal of Classification*. **39**, 510–552.
10. Yu, J., Tu, W., Payne, A., Rudyk, C., Cuadros Sanchez, S., Khilji, S., Kumarathasan, P., Subedi, S., Haley, B., Wong, A. and Anghel, C., (2022) ‘Adverse Outcome Pathways and Linkages to Transcriptomic Effects Relevant to Ionizing Radiation Injury’. *International Journal of Radiation Biology*. **98**(12) 1789–1801.
11. Tu, W. and **Subedi, S.**, (2022) ‘A family of mixture models for biclustering’. *Statistical Analysis and Data mining*. **15**(2) 206–224.
12. **Subedi, S.** and McNicholas, P. D., (2021) ‘A variational approximations-DIC rubric for parameter estimation and mixture model selection within a family setting’. *Journal of Classification*. **38** 89–108.
13. **Subedi, S.**, Neish, D., Bak, S., and Feng, Z., (2020) ‘Cluster analysis of microbiome data via mixtures of Dirichlet-multinomial regression models’. *Journal of Royal Statistical Society: Series C*. **69**(5) 1163–1187.
14. **Subedi, S.** and Browne, R.P., (2020) ‘A parsimonious family of multivariate Poisson-lognormal distributions for clustering multivariate count data’. *Stat* **9**(1) e310.
15. Malik, M., **Subedi, S.**, Marques, C.N.H., and Mahler, G., (2020) ‘Bacteria remediate the effects of food additives on intestinal function in an in vitro model of the gastrointestinal tract’. *Frontiers in Nutrition*. **7** 131.
16. Silva, A., Rothstein, S. J., McNicholas, P. D., **Subedi, S.**, (2019) ‘A multivariate Poisson-lognormal mixture model for clustering transcriptome sequencing data’. *BMC Bioinformatics*. **20**(1) 394.
17. **Dang, S.** and Vialaneix, N., (2018) ‘Cutting edge bioinformatics and biostatistics approaches are bringing precision medicine and nutrition to a new era’. *Lifestyle Genomics*. 1–4.
18. Flaherty, E. J., Lum, G. B., DeEll, J. R., **Subedi, S.**, Shelp, B. J., and Bozzo, G. G., (2018) ‘Metabolic Alterations in Postharvest Pear Fruit As Influenced by 1-Methylcyclopropene and Controlled Atmosphere Storage’. *Journal of Agricultural Food and Chemistry*. **66**(49) 12989-12999.
19. Brikis, C.J., Zarei, A., Chiu, G.Z., Deyman, K. L., Liu, J., Trobacher, C. P., Hoover, G.J., **Subedi, S.**, DeEll, J. R., Bozzo, G. G., and Shelp, B.J., (2018) ‘Targeted quantitative profiling of metabolites and gene transcripts associated with 4-aminobutyrate (GABA) in apple fruit stored under multiple abiotic stresses’. *Horticulture Research*. **5**(1) 61.
20. Liu, J., Abdelmagid, S. A., Pinelli, C. J., Monk, J.M., Liddle, D.M., Hillyer, L. M., Hucik, B., Silva, A., **Subedi, S.**, Wood, G. A., Robinson, L. E., Muller, W. J., and Ma, D. W.L., (2017) ‘Marine fish

- oil is more potent than plant based n-3 polyunsaturated fatty acids in the prevention of mammary tumours’. *The Journal of Nutritional Biochemistry*. **55** 41–52
21. Carbonara, J., **Dang, S.**, Gelsomini, F., Kanev, K., Sperhac, J., and Walters, L., (2017) ‘A multifaceted approach towards education in data analytics’. *Recent Advances in Technology Research and Education: Proceedings of the 16th International Conference on Global Research and Education Inter-Academia 2017*. **660** 307.
 22. Coutin, J. A. F., Munholland, S., Silva, A., **Subedi, S.**, Lukens, L., Crosby, W. L., and Bozzo, G. G., (2017) ‘Proanthocyanidin accumulation and transcriptional responses in the seed coat of cranberry beans (*Phaseolus vulgaris L.*) with different susceptibility to postharvest darkening’. *BMC Plant Biology*. **17**(1), 89.
 23. Lum, G. B., DeEll, J. R., Hoover, G. J., **Subedi, S.**, Shelp, B. J., and Bozzo, G. G., (2017) ‘1-Methylcyclopropene and controlled atmosphere modulate oxidative stress metabolism and reduce senescence-related disorders in stored pear fruit’. *Postharvest Biology and Technology*. **129**, 52-63.
 24. Roke, K., Walton, K., Klingel, S. L., Harnett, A., Subedi, S., Haines, J., and Mutch, D. M., (2017) ‘Evaluating changes in omega-3 fatty acid intake after receiving personal FADS1 genetic information: A randomized nutrigenetic intervention’. *Nutrients*. **9**(3), 240.
 25. Sung, Y., Feng, Z., **Subedi, S.**, (2016) ‘A genome-wide association study of multiple longitudinal traits with related subjects’. *Stat*. **5**(1),22–44.
 26. Lum, G. B., Brikis, C. J., Deyman, K. L., **Subedi, S.**, DeEll, J. R., Shelp, B. J., and Bozzo, G. B., (2016) ‘Pre-storage conditioning ameliorates the negative impact of 1-methylcyclopropene on physiological injury and alters the response of antioxidants and γ -aminobutyrate in ‘Honeycrisp’ apples exposed to controlled-atmosphere conditions’. *Postharvest Biology and Technology*. **116**,115–128.
 27. McNicholas, P. D. and **Subedi, S.**, (2016) Discussion of “Perils and potentials of self-selected entry to epidemiological studies and surveys”. *Journal of the Royal Statistical Society: Series A*. **179**(2), 362–363.
 28. **Subedi, S.**, Punzo, A., Ingrassia, S., and McNicholas, P. D., (2015) ‘Cluster-weighted *t*-factor analyzers for robust model-based clustering and dimension reduction’. *Statistical Methods & Applications*. **24**(4), 623–649.
 29. **Subedi, S.** and McNicholas, P. D., (2015) Discussion of “Analysis of forensic DNA mixtures with artefacts”. *Journal of the Royal Statistical Society: Series C*. **64**(1), 43–44.
 30. Misyura, M., Guevara, D., **Subedi, S.**, Hudson, D., McNicholas, P. D., Colasanti, J., and Rothstein, S., (2014) ‘Nitrogen limitation and high density stress responses in rice suggest a role for ethylene in intraspecific competition’. *BMC Genomics*. **15**(1), 681.
 31. **Subedi, S.** and McNicholas, P. D., (2014) ‘Variational Bayes approximations for clustering via mixtures of normal inverse Gaussian distributions’. *Advances in Data Analysis and Classification*. **8**(2), 167–193.
 32. Makhmudova, A., Williams, D., Brewer, D., Massey, S., Patterson, J., Silva, A., Vassall, K., Liu, F., **Subedi, S.**, Harauz, G., Siu, K. W. M., Tetlow, I. J., and Emes, M. J., (2014) ‘Identification of Multiple Phosphorylation Sites on Maize Endosperm Starch Branching Enzyme IIb, a Key Enzyme in Amylopectin Biosynthesis’. *Journal of Biological Chemistry*. **289**(13), 9233–9246.
 33. **Subedi, S.**, Punzo, A., Ingrassia, S., and McNicholas, P.D., (2013) ‘Clustering and classification via cluster-weighted factor analyzers’. *Advances in Data Analysis and Classification*. **7**(1), 5–40.
 34. Humbert, S., **Subedi, S.**, Zeng, B., Bi, Y., Chen, X., Zhu, T., McNicholas, P.D., and Rothstein, S.J., (2013) ‘Genome-wide expression profiling of maize in response to individual and combined water and nitrogen stresses’. *BMC Genomics*. **14**(3).

35. **Subedi, S.**, Feng, Z. Z., Deardon, R., and Schenkel, F., (2013) ‘SNP selection for predicting a quantitative trait’. *Journal of Applied Statistics*. **40**(3), 600–613.
36. McNicholas, P. D. and **Subedi, S.**, (2012) ‘Clustering gene expression time course data using mixtures of multivariate t -distributions’. *Journal of Statistical Planning and Inference*. **142**(5), 1114–1127.
37. Feng, Z, Yang, X., **Subedi, S.**, and McNicholas, P. D., (2012) ‘The LASSO and sparse least square regression methods for SNP selection in predicting quantitative traits’. *IEEE Transactions on Computational Biology and Bioinformatics*. **9**(2), 629–636.
38. Andrews, J. L., McNicholas, P. D., and **Subedi, S.**, (2011) ‘Model-based classification via mixtures of multivariate t -distributions’. *Computational Statistics and Data Analysis*. **55**(1), 520–529.

Forthcoming Journal Articles

39. Rundell, T.B., Brunelli, M., Alvi, A., Safian, G., Capobianco, C., Tu, W., **Subedi, S.**, Fiumera, A. and Musselman, L.P., Polygenic adaptation to overnutrition in *Drosophila melanogaster* reveals a role for cholinergic signaling in longevity. Submitted to *Genetics*.
40. Livochkaa, A., Browne, R., and **Subedi, S.** Estimation of Gaussian bi-clusters with general block-diagonal covariance matrix and applications. Submitted to *Journal of Classification*.
41. Fang, Y., Franczak, B. C., and **Subedi, S.** (2023). ‘Tackling the infinite likelihood problem when fitting mixtures of shifted asymmetric Laplace distributions’. Submitted to *Statistics and Computing*.
42. Fang, Y., Karlis, D., and **Subedi, S.** ‘A Bayesian Approach for Clustering Skewed Data Using Mixtures of Multivariate Normal-Inverse Gaussian Distributions’. In preparation.
43. Tu, W., Fang, Y., and **Subedi, S.** ‘Logistic Normal Multinomial Biclustering Mixture Model for Microbiome Count Data”. In preparation.

Presentations & Seminars (Oral presentation unless specified)

1. “Clustering high dimensional count data”, Dalhousie University, Canada (Feb 2024) *Invited*.
2. “A parsimonious family of mixtures of multivariate Poisson log-normal factor analyzers for clustering count data”, Thompson Rivers University, Kamloops, Canada (Jan 2024) *Invited*.
3. “A parsimonious family of mixtures of multivariate Poisson log-normal factor analyzers for clustering count data”, Università di Roma, Rome, Italy (Nov 2023). *Invited*.
4. “Integrating multiomics datasets within adverse outcome pathways”, The 20th International Conference on the use of Computers in Radiation Therapy, Montreal, Canada (Aug 2023) *Invited*.
5. “Some recent advances in cluster analysis”, Meeting of the Minds, Ottawa, Canada (Aug 2023) *Invited, Key Note*.
6. “Clustering high-dimensional count data”, The 6th International Conference on Econometrics and Statistics, Tokyo, Japan (Aug 2023) *Invited*.
7. “Clustering Matrix-Variate Discrete Data”, The 2023 annual meeting of The Classification Society, Rochester, US. (June 2023) *Invited*.
8. “Clustering Matrix-Variate Discrete Data”, Statistical Society of Canada’s 2023 Annual Meeting, Ottawa, Canada (June 2023). *Invited*.
9. Speaker on the Career Panel, The eleventh annual Canadian Statistics Student Conference, Ottawa, Canada (May 2023). *Invited*.
10. “How did you identify your job path?” - presentation for NFRF grant’s student team as a part of EDI mentorship plan, Ottawa, Canada (Mar 2023) *Invited*.
11. “Everyone needs math” - presentation for Grade 3-4 children on the importance of Math and what Math can be used for, International Languages Program at Roy Kennedy Public School, Ottawa-Carleton District School Board, Ottawa, Canada (Feb 2022). *Invited*.

12. “Cluster analysis of microbiome data via mixtures of Dirichlet-multinomial regression models”, Colloquium - School of Mathematics and Statistics, Carleton University, Canada. (Jan 2023). *Invited.*
13. CMStatistics 2022 Hybrid Conference, London, England (Dec 2022). *Invited.*
14. 2022 CMS Winter Meeting, Toronto, Canada (Dec 2022). *Invited.*
15. ‘Clustering high-dimensional microbiome data’ The 17th Conference of the International Federation of Classification Societies, Porto, Portugal (Aug 2022). *Invited.*
16. ‘Clustering matrix-variate count data’, UP-STAT 2022 Hybrid Conference, Buffalo, USA (May 2022). *Invited.*
17. Panel Discussion, Data Day 8.0, Carleton University, Canada (Mar 2022). *Invited.*
18. ‘Clustering multivariate counts from modern biological datasets’, Statistics Seminar, University of Victoria, Canada (Feb 2022). *Invited.*
19. ‘Modeling Multivariate Counts from Modern Biological Datasets’, Bioinformatics Seminar Series, University of Guelph, Canada (Feb 2022). *Invited.*
20. Science Lab Tour presentation for Science Student Success Centre, Carleton University, Canada (Jan 2022). *Invited.*
21. ‘Modeling Multivariate Counts from Modern Biological Data’, Statistics Seminar Series, McMaster University, Canada (Nov 2021). *Invited.*
22. ‘Clustering high dimensional microbiome data’, Statistics 2021 Canada, 6th Canadian Conference in Applied Statistics Virtual Meeting, Canada (July 2021). *Invited.*
23. ‘Clustering multivariate count data using a family of mixtures of multivariate Poisson log-normal distributions’, Statistical Society of Canada’s 2021 Annual Meeting, Virtual Meeting, Canada (June 2021). *Invited.*
24. ‘Clustering multivariate count data using a family of mixtures of multivariate Poisson log-normal distributions’, Statistical Society of Canada’s 2020 Annual Meeting (The event was cancelled due to COVID travel restrictions), Ottawa, Canada (May 2020). *Invited.*
25. ‘Mixtures of Dirichlet-Multinomial Regression Models for Microbiome Data’, Conference on Data Science, The Fields Institute, Toronto, Canada (Nov 2019). *Invited.*
26. ‘Clustering multivariate count data using a family of mixtures of multivariate Poisson log-normal distributions’, The 16th Conference of the International Federation of Classification Societies, Thessaloniki, Greece (Aug 2019). *Invited.*
27. ‘Mixtures of cluster-weighted models with latent factor analyzer structure’, The 16th Conference of the International Federation of Classification Societies, Thessaloniki, Greece (Aug 2019). *Invited.*
28. ‘Clustering skewed data using mixtures of multivariate normal-inverse Gaussian distributions’, The 33rd New England Statistics Symposium, Hartford, USA (May 2019). *Invited.*
29. ‘Clustering skewed data using mixtures of multivariate normal-inverse Gaussian distributions’, University of Buffalo, USA. (Seminar – May 2019). *Invited.*
30. ‘A Bayesian Approach for Clustering Skewed Data Using Mixtures of Multivariate Normal-Inverse Gaussian Distributions’, 2018 Joint Statistical Meetings, Vancouver, Canada (Aug 2018). *Invited.*
31. ‘Clustering skewed data using mixtures of multivariate normal-inverse Gaussian distributions using a Bayesian framework’, The 2018 Classification Society’s Annual Meeting, USA (June 2018). *Invited.*
32. ‘An introduction to R, the open-source language for statistical computation and graphics’, Workshop for Binghamton University library, Binghamton, USA (Jan 2019). *Invited.*
33. ‘Regression-based mixture models for microbiome data’, The IV AMMCS International Conference, Waterloo, Canada (Aug 2017). *Invited.*

34. Regression-based mixture model for clustering high dimensional data, Syracuse University, USA (Seminar – April 2017). *Invited.*
35. ‘Mixture Model-based Approaches for Exploratory Analysis of Biological Data’, Harpur College Dean’s Speaker Series for Biological Sciences, Binghamton University, USA (Seminar – Nov 2016). *Invited.*
36. ‘Mixtures of Dirichlet-Multinomial Regression Models for Microbiome Data’, 2016 International Conference on Statistical Distributions and Applications, Niagra Falls, Canada (Oct 2016). *Invited.*
37. ‘Model-based clustering for microbiome data’, Laurentian University, Canada (Seminar – Mar 2016). *Invited.*
38. Model-based Clustering in Bioinformatics, Wayne State University, USA (Jan 2016). *Invited.*
39. ‘Mixture Model-based Approaches for Exploratory Analysis of Biological Data’, University of Victoria, Canada (Seminar – Jan 2016). *Invited.*
40. Model-based clustering: some recent work and biological applications’, Wilfrid Laurier University, Canada (Seminar – Nov 2015). *Invited.*
41. ‘New developments in model-based clustering and applications to biological data, McGill University, Canada (Seminar – Oct 2015). *Invited.*
42. ‘Mixtures of cluster-weighted models with latent factor analyzer structure’, 6th International Conference of the ERCIM, London, England (Dec 2013). *Invited.*
43. ‘Clustering in Bioinformatics’, OMAF and MRA RCSD Division Day, Ontario Ministry of Agriculture and Food, Guelph, Canada.(Nov 2013). *Invited.*
44. ‘Cluster-weighted t-factor analyzers for clustering high dimensional data’, The 2013 conference of the International Federation of Classification Societies, Tilburg, Netherlands (July 2013).
45. ‘Model-based clustering using eigen-decomposed covariance structure in a variational Bayes framework’, Classification Society 2013 Annual Meeting. Milwaukee, USA (June 2013). *Invited.*
46. ‘Cluster-weighted factor analyzers’, Statistical Society of Canada Annual Meeting. Edmonton, Canada (May 2013).
47. ‘Clustering and classification of biological data’, University of Calgary, Canada. (Seminar – April 2013). *Invited.*
48. ‘Cluster-weighted modeling for high dimensional data’, University of Catania, Italy (Seminar – 2013). *Invited.*
49. ‘Variational Bayes approximations for model-based clustering using mixtures of multivariate normal inverse Gaussian distributions’, MBC² – Workshop on Model Based Clustering and Classification, Catania, Italy (Sept 2012).
50. ‘Variational Bayes approximations for parameter estimation and model selection’, 19th Summer Meeting of the University of Washington Working Group in Model-Based Clustering, Guelph, Canada (Seminar – July 2012). *Invited.*
51. ‘Variational Approximations for Flexible Mixture Model-Based Clustering’, Statistical Society of Canada Annual Meeting, Guelph, Canada (June 2012).
52. ‘Clustering and classification using variational Bayes approximations for a family of Gaussian mixture models’, University of Catania, Italy. (Seminar – May 2012) *Invited.*
53. ‘Model-Based Clustering using Mixture of Normal Inverse Gaussian Models’, 8th International Meeting of the Classification and Data Analysis Group (CLADAG), Pavia, Italy (Sept 2011).
54. ‘Variational Bayes Approximations for Model-based Clustering using Mixtures of Normal Inverse Gaussian Distributions’, Poster presentation, 18th Summer Meeting of the University of Washington Working Group in Model-Based Clustering, Glasgow, Scotland (July 2011).

55. ‘The Presence and Volume of Brown Fat in Humans: A Case Study’, Poster presentation, Statistical Society of Canada Annual Meeting, Wolfville, Canada (June 2011).
56. ‘Variational Bayes approximations for the model-based clustering and classification of longitudinal data’, Computational Statistics Seminar Series, University of Guelph, Canada (Seminar – Jan 2011).
57. ‘Variational Bayes approximations for the model-based clustering and classification of longitudinal data’, 4th CSDA International Conference on Computational and Financial Econometrics (CFE 10) and 3rd International Conference of the ERCIM (European Research Consortium for Informatics and Mathematics) Working Group on Computing & Statistics (ERCIM 10), London, England (Dec 2010).
58. ‘Parameter estimation for model-based clustering and classification of longitudinal data’, Poster presentation, 17th Summer Meeting of the University of Washington Working Group in Model-Based Clustering, Grenoble, France (July 2010).
59. ‘Parameter estimation for model-based clustering of longitudinal data’, Poster presentation, Statistical Society of Canada Annual Meeting, Quebec City, Canada (May 2010).
60. ‘Genome selection for predicting the EBVs of the Holstein cattle in North America’, Poster presentation, 2008 Statistical Genetics of Livestock in the Post-Genomic Era Symposium, University of Wisconsin-Madison, Madison, USA (May 2009).
61. ‘Ultra structural characterization of amyloplasts using 14-3-3 proteins’, Poster presentation, 2008 Ontario Biology Day, University of Guelph, Guelph, Canada (April 2008).
62. ‘Stability of starch biosynthetic enzyme complexes in maize endosperm’, Poster presentation, Eastern Regional Meeting of the Canadian Society of Plant Physiologists, McMaster University, Hamilton, Canada (Dec 2006).

Highly Qualified Personnel (HQP) Supervision:

I have mentored 32 students (current: 7 graduate students, and 2 undergraduate, past: 1 postdoctoral fellow, 18 graduate & 4 undergraduate). Evidence of effective mentorship include

- Eleven publications and five submitted/in preparation manuscripts co-authored with HQP.
- Invitations to HQP by prominent researchers to give presentations at various scientific meetings such as the Data Science Conference by the Field’s Institute, annual meeting of the Classification Society, etc.
- Prestigious scholarships and awards received by HQP such as CANSSI Ontario STAGE HostSeq Project Fellowship, NSERC-USRA, Queen Elizabeth II Graduate Scholarship in Science & Technology, Arthur Richmond Memorial Scholarship, Ontario Graduate Fellowship, travel awards (from the Field’s Institute, the IEEE Computational Intelligence Society, and the Statistical Society of Canada) and the 2019 Distinguished Dissertation Award by the Classification Society (an award given to an outstanding PhD dissertation related to clustering and classification).
- Current career trajectories of HQP: All three past PhD students currently hold professional positions: one is an Assistant Professor at Binghamton University, one is a senior analyst at Canadian Institute for Health Information , and one is a data analyst at University of Toronto. Past Master’s students are currently employed in professional positions (e.g., data scientist, analyst, researcher, and senior IT engineer) for such organizations as the Center for Population Health, Genome Technology and Informatics at Biogen, and the Department of Fisheries and Oceans, or are currently pursuing doctoral studies

Current trainees:

1. Wenshu Dai, Mathematical Sciences (Research area: Statistics), Binghamton University (PhD).
2. Xiaoke Qin, Statistics, Carleton University (PhD).
3. Andrea Payne, Data Science and Analytics, Carleton University (MSc).

4. Darshak Patel, Data Science and Analytics, Carleton University (MSc).
5. David Schneiderman, Statistics, Carleton University (MSc).
6. Nishita Sharif, Bioinformatics, University of Guelph (MBinf) - co-advised.
7. Keira de Bruijn, Bioinformatics, University of Guelph (MBinf) - co-advised.
8. Kevin Giddings, Statistics, Carleton University (NSERC USRA).
9. Evan Chance, Statistics, Carleton University (Undergraduate thesis for BSc).

Past Postdoctoral fellow and Ph.D. Students:

1. Wangshu Tu (Postdoctoral fellow), Statistics, Carleton University (Completed 2022).
Current Position: Senior analyst at Canadian Institute for Health Information.
2. Wangshu Tu (Ph.D. student), Mathematical Sciences, Binghamton University (Completed 2021).
Dissertation title: Model-based clustering approaches for microbiome data.
3. Yuan Fang (Ph.D. student), Mathematical Sciences, Binghamton University (Completed 2020)
Dissertation title: Model-based clustering approaches for non-Gaussian Data.
4. Anjali Silva (Ph.D. student), Bioinformatics, University of Guelph (Completed 2018)
Award: Winner of 2019 Distinguished Dissertation Award by the Classification Society (International)
Dissertation title: Bayesian clustering approaches for discrete data.

Past Master's & Undergraduate Student Supervision

11 Masters in Bioinformatics; 2 M.Sc. in Statistics; 1 M.Sc. in Bioinformatics; 2 B.Sc. in Statistics, 1 B.Sc. in Actuarial Sciences, 1 NSERC-USRA.

Student Advisory/Examination Committees

Graduate Thesis Examination Committees

Internal (Carleton): 1 M.Sc. in Statistics.

Internal (Binghamton): 3 Ph.D. in Mathematical Sciences.

Internal (Guelph): 4 Ph.D. in Statistics; 3 M.Sc. in Statistics; 1 M.Sc. in Bioinformatics.

External: 1 Ph.D. in Public Health (University of Alberta); 2 M.Sc. in Computational Sciences (Laurentian University).

Graduate Advisory Committees

Ottawa-Carleton Institute of Mathematics and Statistics: 2 Ph.D. in Statistics.

Binghamton: 2 Ph.D. in Biomedical Engineering; 1 Ph.D. in Biological Sciences.

Guelph: 2 Ph.D. in Statistics; 1 Ph.D. in Plant Agriculture; 1 Ph.D. in Molecular and Cellular Biology; 1 M.Sc. in Statistics; 1 M.Sc. in Molecular and Cellular Biology.

Graduate Ph.D. Qualifying/ Candidacy Examination Committees

Binghamton: 4 in Mathematical Sciences; 2 in Biomedical Engineering, 1 in Biological Sciences.

Guelph: 3 in Statistics; 1 in Bioinformatics; 3 in Plant Agriculture; 1 in Molecular and Cellular Biology.

Teaching Experience

I have taught graduate level statistics courses (5 times); undergraduate level statistics courses (9 times); and graduate level bioinformatics courses (6 times).

Academic Service and Leadership

Service at the University

Semesters	University	Role, Committee
F23-present	Carleton	Member, Science EDI Committee (School of Mathematics and Statistics).
F23-present	Carleton	Co-ordinator, School of Mathematics and Statistics Colloquium.
F23-present	Carleton	Statistics Program Committee (School of Mathematics and Statistics).
F23-present	Carleton	Member, Research Committee (School of Mathematics and Statistics).
F23-present	Carleton	Member, Research Computing Committee.
F22-present	Carleton	Mentor, Queen Elizabeth Scholar – West Africa program.
W23	Carleton	Chair, Hiring Committee, School of Mathematics and Statistics.
W23	Carleton	Faculty representative, Undergraduate Research Mixer by Carleton University's Science Student Success Centre.
W23	Carleton	Member, Scientific Program Committee, Data Day 9.0.
W23	Carleton	Judge for Student Poster Session, Data Day 9.0.
W23-present	Carleton	EDI Champion, NFRF-E Research grant "From physics to biology: Connecting cellular-level energy deposition with biological response in radiation medicine".
F22-S23	Carleton	Member, Priority Committee (School of Mathematics and Statistics).
F22-S23t	Carleton	Member, Personnel Committee (School of Mathematics and Statistics).
F22-S23	Carleton	Member, Math Program Committee (School of Mathematics and Statistics).
F22-W23	Carleton	Co-ordinator, Statistics & Probability Seminar Series.
S22	Carleton	CU Development Grants adjudication committee – NSERC stream.
S21-S22	Carleton	Member, Statistics Program Committee.
S21-S21	Binghamton	Member, Computational Biology Faculty Hiring Committee.
F19-S21	Binghamton	Member, Health Science TAE Steering Committee.
F18-S21	Binghamton	Co-ordinator, Data Science Seminar Series.
F17-S21	Binghamton	Faculty Advisor (89 students), Undergraduate Advising Committee.
S17	Binghamton	Co-ordinator, Statistics Seminar Series.
F16-S21	Binghamton	Member, Actuarial Science Committee; Statistics Committee.
F16, F17, F18	Binghamton	Member, Personnel Hiring Committee.
F13-S16	Guelph	Member, M.Binf. Applicant Review Committee.
F13-S16	Guelph	Co-ordinator, Bioinformatics Seminar Series/ Workshops.
F13-S16	Guelph	Bioinformatics Outreach Program.
F13-S16	Guelph	Member, Bioinformatics Program Committee.
F14-S15	Guelph	Member, Mathematics & Statistics Outreach/ Liaison Committee.
W15, W14	Guelph	Member, Committee for President's or Chancellors' Scholarships.
F11-S12	Guelph	Member, Graduate Admission and Progress Committee.
F09-S11	Guelph	Member, Graduate Committee.

Service Outside the University

Role	Details
Associate Editor	<i>Journal of Classification</i> (2023–present).
Treasurer	<i>International Federation of the Classification Society</i> (2023–present).
STEM Mentor	Girls SySTEM mentorship program (2022)
Chair	Organizing Committee for CANSSI’s Distinguished Lecture Series in Statistical Sciences (2023–2024).
Member	Organizing Committee for CANSSI’s Distinguished Lecture Series in Statistical Sciences (2022–2024).
Session chair	Session at the <i>The 6th International Conference on Econometrics and Statistics</i> (2023).
Session chair	Session at the <i>Classification Society Annual Meeting</i> (2023).
Session chair	Session at the <i>17th Conference of the International Federation of Classification Societies</i> (2022).
Session chair	Session at the <i>Classification Society Annual Meeting</i> (2022).
Member	BISS Awards evaluation subcommittee at the <i>Statistical Society of Canada’s annual meeting</i> (2022).
Member	Scientific Program Committee, <i>Classification Society Annual Meeting</i> (2022).
Organizer/chair	Session at the <i>Statistical Society of Canada’s annual meeting</i> (2022).
President	<i>Business and Industrial Section, Statistical Society of Canada</i> (2020–2021).
Chair	<i>Distinguished Dissertation Award Committee of the Classification Society</i> (2020, 2021).
Co-organizer	<i>Fields-CQAM thematic program on Data Science and Optimization</i> (2019).
Organizer/chair	Session at the <i>AMS Fall Eastern Sectional Meeting</i> (2019).
Member	Scientific Program Committee, <i>16th Conference of the International Federation of Classification Societies</i> (2018–2019).
Associate Editor	<i>Lifestyle Genomics</i> (2017–present).
Board of Directors	Elected member of the Board of Directors, <i>Classification Society</i> (2017–2019, 2020–2022, 2023–2025).
Organizer/chair	Session at the <i>Statistical Society of Canada’s annual meeting</i> (2017).
Session chair	Session at the <i>Classification Society Annual Meeting</i> (2017).
Secretary	<i>Business and Industrial Section, Statistical Society of Canada</i> (2016–2019).
Referee (Grants)	<i>Mitacs Accelerate Grant 2019</i> (1 application); <i>NSERC Discovery Grant 2022</i> (1 application); <i>NSERC Discovery Grant 2019</i> (1 application); <i>NSERC Discovery Grant 2018</i> (1 application); <i>NSERC Discovery Grant 2017</i> (3 applications); <i>NSERC Discovery Grant 2016</i> (2 applications); <i>NSERC Discovery Grant 2015</i> (1 application).
Referee (Journals)	<i>Environmetrics</i> ; <i>Advances in Data Analysis and Classification</i> ; <i>Journal of the Royal Statistical Society</i> ; <i>Artificial Intelligence in Medicine</i> ; <i>Mutation Research - Genetic Toxicology and Environmental Mutagenesis</i> ; <i>Journal of Statistical Computation and Simulation</i> ; <i>Bioinformatics</i> ; <i>Computational Statistics and Data Analysis</i> ; <i>Statistics and Computing</i> ; <i>Journal of Applied Statistics</i> ; <i>Lifestyle Genomics</i> ; <i>Statistics and Probability Letters</i> ; <i>Scientific Reports</i> .

CONTACT INFORMATION School of Computer Science, HP5436, Carleton University, 1125 Colonel By Drive, Ottawa, ON, Canada K1S 5B6
Phone: +1-289-339-1801
Email: majid.komeili@carleton.ca

EMPLOYMENT Associate Professor, from July 2023
School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

Assistant Professor (Tenure-Track), July 2018-June 2023
School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

Postdoctoral Fellow, October 2017-June 2018
Vector Institute/ Toronto Rehabilitation Institute, Toronto, Ontario, Canada.
Supervisor: Dr. Frank Rudzicz.

EDUCATION Ph.D. in Electrical and Computer Engineering, 2012-2017
University of Toronto, Toronto, Ontario, Canada.

M.Sc. in Electrical and Computer Engineering, 2006- 2008
Tarbiat Modares University, Tehran, Iran.

B.Sc. in Electrical and Computer Engineering, 2001-2006
Iran University of Science and Technology, Tehran, Iran.

HONORS AND AWARDS

- Nominated for a Faculty Graduate Mentoring Awards (FGMAs) at Carleton University in 2022. I was among the top 60.
- School of Graduate Studies Conference Grant, \$1130, University of Toronto, 2016.
- Edward S. Rogers Sr. Department of Electrical and Computer Engineering Fellowship, \$61,000, University of Toronto, 2012-2016.
- Research Scholarship Award (PhD), \$62,500, University of Toronto, 2012-2016.
- Travel Award, \$3,000 USD, Graduate Summer School: Deep Learning, Feature Learning, Institute for Pure and Applied Mathematics, University of California, Los Angeles, USA, 2012.
- Tuition Bursary Award (PhD), (the whole tuition fee of the program was waived), Ministry of Science Research and Technology, Iran, 2008-2012, Declined.
- Best Paper Award in IEEE International Symposium on Telecommunications, Tehran, Iran, 2008.
- Tuition Bursary Award (MSc), (the whole tuition fee of the program was waived), Ministry of Science, Research and Technology, Tehran, Iran, 2006-2008.
- Education & Research Award for M.Sc. Thesis, \$1,500 USD, Iran Telecommunication Research Center, Tehran, Iran, 2007.
- Tuition Bursary Award (B.Sc.), (the whole tuition fee of the program was waived), Ministry of Science, Research and Technology, Tehran, Iran, 2001-2006.
- Ranked in the top 0.1% among more than 500,000 participants in the Nationwide university entrance exam (aka undergraduate Konkour"), Iran, 2002.

- Recognized as Exceptional Talent, National Organization for Development of Exceptional Talents (NODET), Iran, 2001.

**RESEARCH
FUNDING
(SUCCESSFUL
GRANTS)**

- F.1 Carleton University Start up fund,
Amount: \$65,000
Role: Principal Applicant,
Portion of funding directly applicable to my research: 100%,
Funding Source: Carleton University
Date: July 2018,
Status: Awarded.
- F.2 Digital Tools for Documentation and Renewal of Global Endangered Languages,
Amount: \$50,000
Role: Collaborator, (PI: Erik Anonby, and Kumiko Murasugi from School of Linguistics and Language Studies, and other collaborators)
Portion of funding directly applicable to my research: 0
Funding Source: Multidisciplinary Research Catalyst Fund (MRCF), Carleton University,
Date: 2019,
Status: Awarded.
- F.3 ODS research support, Main Applicant, \$5,000, Carleton University, Ottawa, 2019.
Amount: \$5,000
Role: Principal Applicant,
Portion of funding directly applicable to my research: 100%,
Funding Source: Carleton University,
Date: 2019,
Status: Awarded.
- F.4 ODS/OVPRI research support,
Amount: \$10,000
Role: PI,
Portion of funding directly applicable to my research: 100%,
Funding Source: Carleton University,
Date: 2019,
Status: Awarded.
- F.5 Advances in Explainable AI,
Amount: \$5,000 USD
Role: PI,
Portion of funding directly applicable to my research: 100%,
Funding Source: Google Cloud Platform Education grant,
Date: 2019,
Status: Awarded.
- F.6 Machine Learning Methods that Make Sense to Humans,
Amount: \$12,500
Role: PI,
Portion of funding directly applicable to my research: 100%,
Funding Source: Natural Sciences and Engineering Research Council of Canada (NSERC)-Discovery Launch Supplement,
Date: 2020-2026,
Status: Awarded.

- F.7 Machine Learning Methods that Make Sense to Humans
Amount: \$174,000
Role: PI,
Portion of funding directly applicable to my research: 100%,
Funding Source: Natural Sciences and Engineering Research Council of Canada (NSERC)-Discovery Grants,
Date: 2020-2026,
Status: Awarded.
- F.8 Interpretable Machine Learning for Predictive Analytics in Employee Benefits Insurance,
Amount: \$90,000
Role: PI,
Portion of funding directly applicable to my research: 100%,
Funding Source: MITACS Accelerate,
Date: 2020-2021,
Status: Awarded.
- F.9 Auto-generating Tactile from Image for Low vision and Blind Individuals,
Amount: \$68,000,
Role: PI,
Portion of funding directly applicable to my research: 100%,
Funding Source: NSERC Alliance Grants,
Date: 2020-2022,
Status: Awarded.
- F.10 Machine Learning for Explainability and Accessibility,
Amount: \$28,363
Role: PI,
Portion of funding directly applicable to my research: 100%,
Funding Source: Resources for Research Groups (RRG) Compute Canada Grants,
Date: 2021-2022,
Status: Awarded.
- F.11 A Cultural Typology of Vaccine Misinformation,
Amount: \$62,060
Role: Co-applicant (with Michael Christensen (PI) from department of law and legal studies, and Sarah Everts (co-applicant) from School of Journalism and Communication),
Portion of funding directly applicable to my research: 40%,
Funding Source: SSHRC Insight Development Grants,
Date: 2021-2023,
Status: Awarded.
- F.12 Machine Learning for Explainability and Accessibility,
Amount: \$20,848
Role: PI,
Portion of funding directly applicable to my research: 100%,
Funding Source: Resources for Research Groups (RRG) Compute Canada Grants,
Date: 2022-2023,
Status: Awarded.
- F.13 AI in Assessment of Functional Limitations and Disability Services for Postsecondary Education,
Amount: \$250,000
Role: Co-PI, (with Boris Vukovic (PI) from School of Industrial Design, Jutta Treviranus from OCAD University, Jessie Gunnell from READ Initiative, Adrian Chan from Systems and Computer Engineering, Katie Aubrecht from St. Francis Xavier University, Behdin Nowrouzi-Kia from University of Toronto, Cris

Brady from Algonquin College, Fraser, Kathleen from NRC, Sonia Tanguay from Carleton PMC, Darlene O'Riordan from Algonquin College),

Portion of funding directly applicable to my research: 70%,

Funding Source: New Frontiers in Research Fund – Exploration (NFRF-E),

Date: 2022-2024,

Status: Awarded.

F.14 Machine Learning for Explainability and Accessibility,

Amount: \$19,187,

Role: PI,

Portion of funding directly applicable to my research: 100%,

Funding Source: Resources for Research Groups (RRG) Compute Canada Grants,

Date: 2023-2024,

Status: Awarded.

F.15 Explainable AI for Predicting Chronic Homelessness,

Amount: \$45,000

Role: PI, (with Olga Baysal)

Portion of funding directly applicable to my research: 100%,

Funding Source: MITACS Accelerate,

Date: 2023-2024,

Status: Awarded.

F.16 Artificial Intelligence in Real-Time Perioperative ECG Monitoring,

Amount: \$30,000

Role: Co-applicant, (with Homer Yang, MD (PI) from Western University, Manoj M. Lalu, MD, from The Ottawa Hospital, and Adrian Chan from Carleton)

Portion of funding directly applicable to my research: 50%,

Funding Source: Canadian Anesthesiologists' Society (CAS),

Date: 2023-2025

Status: Awarded.

F.17 Multilingual Machine Translation for Transforming Response to Refugees and Forced Migration,

Amount: \$75,000

Role: Collaborator, (with Jackie Lo (PI) from NRC, and James Milner from Carleton),

Portion of funding directly applicable to my research: 0%,

Funding Source: NRC Postdoctoral Fellowship (PDF) Program,

Date: 2023-2025

Status: Awarded.

F.18 Towards Making Graphics Accessible to Blind People,

Amount: \$180,000

Role: PI,

Portion of funding directly applicable to my research: 100%,

Funding Source: Joint NSERC Alliance-MITACS Accelerate grants,

Status: Awarded.

SUBMITTED GRANTS

- F.19 The Visual Culture of Health Misinformation,
Amount: \$291,700
Role: co-applicant,
Portion of funding directly applicable to my research: 35%,
Funding Source: Social Sciences and Humanities Research Council of Canada (SSHRC),
Status: Submitted.
- F.20 Accessibility Virtual Assistant (AVA) for Barrier-Free Higher Education,
Amount: \$220,700
Role: co-PI,
Portion of funding directly applicable to my research: 60%,
Funding Source: Microsoft Generative AI for Accessibility Grant,
Status: Submitted.
- F.21 Ethical AI for Barrier-Free Higher Education,
Amount: \$75,000 USD
Role: co-PI,
Portion of funding directly applicable to my research: 25%,
Funding Source: Spencer Foundation (USA),
Status: Submitted.
- F.22 Accelerating and Standardizing Assessment of Acute Lung Injury using an Artificial Intelligence-based Approach,
Amount: \$700,000
Role: co-applicant,
Portion of funding directly applicable to my research: 35%,
Funding Source: Canadian Institutes of Health Research (CIHR),
Status: Submitted.
- F.23 Reimagining responses to forced migration through the Local Engagement Refugee Research Network,
Amount: \$2,500,000
Role: co-applicant,
Portion of funding directly applicable to my research: 10%,
Funding Source: SSHRC Partnership Grant,
Status: Submitted

TALKS AND MEDIA COVERAGE**Invited Talks**

- “Is your AI smart enough to explain how it thinks and makes decisions?”, IEEE EMBS Ottawa section, November 2022.
- Panelist at the Global-IQX Annual Conference 2021: Reimagining Employee Benefits. September 2021.
- “Multiview Feature Selection for Single-view Classification”, CUIDS Data Science Distinguished Speaker Series, March 2021.
- “Transfer Learning and Interpretable Machine Learning”, Mind Bridge Inc, Ottawa, Canada, May 2019.
- “Machine Learning, Transfer Learning and Interpretable Machine Learning”, Data Day 6.0, Carleton University, Ottawa, Canada, March 2019.
- “User Authentication and Liveliness Detection in Smartphones”, Huawei’s handset division, Toronto, Ontario, Canada, November 2018.

- “Assessment of Alzheimer's Disease Using Speech”, Layer 6 Inc. and Vector Institute meeting with media, Toronto, Ontario, Canada, June 2018
- “Machine Learning for Medical Data”, Data Science and Data Analytics Distinguished Speaker Seminar Series, Institute for Data Science, Ottawa, Ontario, Canada, February 2018.
- “Machine Learning for Biomedical Signal Processing”, University of Waterloo, Waterloo, Ontario, Canada, June 2017.

Research-related Media Coverage

- “Communicating Visual Information to the Vision Impaired”, Carleton Newsroom, 2022. My project which is funded by NSERC-Alliance [F9] was featured in the Carleton Newsroom. The news article can be found [here](#).
- “New Frontiers Funding for Research Using AI to Provide Better Supports for Students with Disabilities”, 2022. Our work featured in the Carleton Research News. It is about the project funded by an NFRF-E grant for which I am a Co-PI [F13]. The news article can be found [here](#).

TEACHING

COMP4102A, “Computer Vision”, Winter 2024, School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

DATA 5000W “Data Science Seminar”, Winter 2024 School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

COMP 5900E “Advanced Machine Learning”, Fall 2023 School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

DATA 5000V “Data Science Seminar”, Winter 2023 School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

COMP 5900F “Advanced Machine Learning”, Fall 2022 School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

DATA 5000W “Data Science Seminar”, Winter 2022 School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

COMP 5900F “Advanced Machine Learning”, Fall 2021 School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

COMP 4105A “Introduction to Machine Learning”, Fall 2021, School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

COMP 5900V, “Advanced Machine Learning”, Winter 2021. I had 30 participants including 10 from uOttawa and 20 from Carleton University.

DATA 5000W, “Data Science Seminar”, Winter 2021 School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

COMP 4900A, “Introduction to Machine Learning”, Fall 2020, School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

COMP 4900B “Introduction to Machine Learning”, Winter 2020, School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

DATA 5000Y “Data Science Seminar”, Winter 2020, Institute for Data Science, School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

COMP 5900X “Advanced Machine Learning”, Fall 2019, School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

COMP 5900 “Machine Learning for Health”, Winter 2019, School of Computer Science, Carleton University, Ottawa, Ontario, Canada.

Teaching Workshops

- Certificate in Teaching Fundamentals (TF), Center for Teaching Support and Innovation, University of Toronto, 2016-2017.
- Prospective Professors in Training (PPIT) program, University of Toronto, 2016 - 2017.
- Engaging Your Students Using Poll Everywhere, workshop at the EDC, Carleton University, August 2018.
- Introduction to cuLearn, Part 1: The Basics, workshop at the EDC, Carleton University, August 2018.
- CuLearn Course Showcase: Make you cuLearn course ROCK! workshop at the EDC, August 2019.
- Managing TAs and Building a Teaching Team, workshop at the EDC, Carleton University, August 2018.
- Leveraging cuLearn Assignments and Rubrics to Enhance Assessment Practices, workshop at the EDC, Carleton University, August 2018.
- New Contract Instructor Orientation – Winter 2019, Carleton University.
- Equity-Driven and Inclusive Classrooms: Computer Science, 2022.

SUPERVISION Postdocs

S.1 Abbas Akkasi, Computer Science, from June 2023.

PhD students

S.2 Seyyed Omid Davoudi, Computer Science, from September 2019, co-supervisor Frank Dehne.

S.3 Mohammad Reza Zarei, Computer Science, from Fall 2021, co-supervisor Frank Dehne.

S.4 Adnan Khan, Computer Science, from Fall 2023.

S.5 Mohammadali Sefidi Esfahani, Computer Science, from Fall 2024.

S.6 Amir Sartipi, Computer Science, from Fall 2024.

Masters' students

- S.7 Mitchell Chatterjee, MCS thesis, from Fall 2022.
- S.8 Rakshil Kevadiya, MCS thesis, from Fall 2022.
- S.9 Alireza Choubineh, MCS thesis, from January 2023.
- S.10 Hoda Vafaeseefat, MCS thesis, from Fall 2024

Undergrad Students

- S.11 Safa Al-Howaid, Honors Project, Winter 2024.

Research Assistants

- S.12 Mohammad Mahdi Heydari Dastjerdi, from Fall 2022.

Past Graduate Students

- S.13 Galen O'Shea, MCS thesis, graduated in April 2023.
- S.14 Aatreyi Pranavbhai Mehta, MCS project, graduated in April 2023.
- S.15 Mohammad Mahdi Heydari Dastjerdi, MCS thesis, graduated in September 2022.
- S.16 Mohamad Nokhbe Zaeem, MCS thesis, Carleton University, graduated in April 2021, VSAI scholarship¹.
- S.17 Abhijeet Chauhan, MCS thesis, Carleton University, graduated in August 2020.
- S.18 Siraj Ahmed, Master of Applied Science thesis, graduated in November 2020, (co-supervisor, Jeongwon Park: supervisor), EECS, University of Ottawa.

Past Undergrad/Summer students

- S.19 David Hobson, Winter 2023, Honors Thesis.
- S.20 Kailash Balakrishnan, Winter 2023, Honors Project.
- S.21 Jesse Mendoza, Fall 2022, I-CUREUS
- S.22 Jesse Mendoza, Summer 2022, Honors Project.
- S.23 Hilaire Djani, Winter 2022, Honors Thesis.
- S.24 Tim Elliott, Winter 2022, Honors Project.
- S.25 Juntong He, Winter 2022, Honors Project.
- S.26 Qixiang Luan, Winter 2022, Honors Project.
- S.27 Michael Kazman, Fall 2021, Honors Project.
- S.28 Adrian Ong, Fall 2021, Honors Project.
- S.29 Jimmy Woo, Summer 2021, Honors Project.
- S.30 Iustin Nicolaev, Summer 2021, Honors Project.

¹ Vector Scholarships in Artificial Intelligence VSAI valued 17.5K. Mohamad was nominated by School of Computer Science. He was one of the three successful applicants from Carleton.

- S.31 Jiahe Geng, Winter 2021, Honors Project.
- S.32 Yingjie Song, Winter 2021, Honors Project.
- S.33 Kirk Zhen, Winter 2021, Honors Project.
- S.34 Hien Le, Fall 2020, Honors Project.
- S.35 YanPeng Gao, Fall 2020, Honors Project.
- S.36 Tri Cao, Fall 2020, Honors Project.
- S.37 Yuhua Chen, Fall 2020, Honors Project.
- S.38 Vee Nguyen, Summer 2020, Honors Project.
- S.39 Jacob Danovitch, Fall 2019-Winter 2020, Honors Thesis.
- S.40 Lauren Wise, Winter 2020, Honors Project.
- S.41 Maxim Kuzmenko, Winter 2020, Honors Project.
- S.42 Layne Koftinow-Mikan, Fall 2019, Honors Project.
- S.43 Xiyi Liu, Fall 2019, Honors Project.
- S.44 Galen O'Shea, Summer 2019, Honors Project.
- S.45 Lucas Colwell, Summer 2019, DSRI internship.
- S.46 Kyle Causton, Summer 2019, Honors Project.
- S.47 Yu Yamanaka, Winter 2019, Honors Project.
- S.48 Selasi Kudolo, Winter 2019, Honors Project.
- S.49 Luc Gruska, Winter 2019, Honors Project.
- S.50 Liheng He, Winter 2019, Honors Project.

**SERVICE AT
UNIVERSITY
LEVEL**

- Hiring Committee, FED CRC in Accessibility and Digital Technologies, Winter and Summer 2023.
- NSERC Discovery Grants Review Committee, School of Computer Science (2022).
- Lead efforts for creating a research cluster at Carleton university on the topic of AI.
- MCS Application Automation committee, Winter 2020.
- Graduate Admission committee, School of Computer Science (2020 – 2022).
- AI/ML Stream Committee, School of Computer Science, 2020-2021.
- Hiring Committee for the faculty position in AI/ML, School of Computer Science, Winter 2020.
- Judge, Data Day Poster competition, April 2019.
- Reviewing Co-op reports, School of Computer Science (2019 – present).
- Judge for the poster presentations at the Ward's Summer Student Research day 2017 at Bloorview Research Institute-Holland Bloorview Kids Rehabilitation Hospital, Toronto, Canada.

PhD/master's Committees

PhD defense	Master's thesis defense	Chairing defense sessions	PhD Comprehensive exam	PhD proposal	Master's Project defense
6	19	8	15	7	3

- A1. External Examiner of PhD thesis defense, Evan Crothers, EECS, University of Ottawa, February 2024.
- A2. Internal Examiner of PhD proposal, Abdullah Alchihabi, Carleton University, December 2023.
- A3. Chair of PhD Comprehensive Exam, Michael McInnis, School of Computer Science, Carleton University, December 2023.
- A4. External Examiner of PhD thesis defense, Md Atiqur Rahman, EECS, University of Ottawa, November 2023.
- A5. Internal Examiner of PhD thesis defense, Zainab Albujaasim, SCS, Carleton University, June 2023.
- A6. External Examiner of master's thesis defense, Shahriar Shayesteh, EECS, University of Ottawa, June 2023.
- A7. External Examiner of master's thesis defense, Dipeeka Luitel, EECS, University of Ottawa, May 2023.
- A8. Chair of PhD Comprehensive Exam, Khaled Jawhar, School of Computer Science, Carleton University, April 2023.
- A9. External Examiner of PhD proposal, Evan Crothers, University of Ottawa, March 2023.
- A10. Internal Examiner of PhD proposal, Zainab Albujaasim, Carleton University, February 2023.
- A11. Internal Examiner of master's project, Heny Dave, School of Computer Science, Carleton University, December 2022.
- A12. PhD Comprehensive exam committee, Dimo Angelov, EECS, University of Ottawa, December 2022.
- A13. External Examiner of master's thesis defense, Hadi Amiri, EECS, University of Ottawa, November 2022.
- A14. Internal Examiner of master's thesis defense, Lakshmi Prasanna Kumar, School of Computer Science, Carleton University, September 2022.
- A15. PhD Comprehensive exam committee, Yanran Guan, School of Computer Science, Carleton University, June 2022.
- A16. Chair of master's thesis defense, Ritika Bhatia, School of Computer Science, Carleton University, May 2022.
- A17. Internal Examiner of master's thesis defense, Ummey Tanin, School of Computer Science, Carleton University, May 2022.
- A18. PhD Comprehensive exam committee, Soroosh Javdan, SCS, Carleton University, May 2022.
- A19. Internal Examiner of master's thesis defense, Fathima Nizwana Yusuf, School of Computer Science, Carleton University, April 2022.

- A20. PhD Comprehensive exam committee, Libo (Ethan) Long, EECS, University of Ottawa, April 2022.
- A21. Examiner of PhD thesis defense, Mohamed Abdelazez, Systems and Computer Engineering, Carleton University, January 2022.
- A22. Internal Examiner of master's project, Pooja Kirankumar, School of Computer Science, Carleton University, January 2021.
- A23. PhD Comprehensive exam committee, Bin Xiao, EECS, University of Ottawa, January 2022.
- A24. Internal Examiner of master's project, Harikrishnan Narayanan, School of Computer Science, Carleton University, December 2021.
- A25. External Examiner of master's thesis defense, Kun Yuan, EECS, University of Ottawa, December 2021.
- A26. PhD Comprehensive exam committee, Runzhi Tian, EECS, University of Ottawa, September 2021.
- A27. External Examiner of master's thesis defense, James Dickens, EECS, University of Ottawa, July 2021.
- A28. Chair of master's thesis defense, Lin Kyi, School of Computer Science, Carleton University, July 2021.
- A29. External Examiner of master's thesis defense, Wenbin Zhang, EECS, University of Ottawa, May 2021.
- A30. PhD Comprehensive exam committee, Yingjun Dai, School of Computer Science, Carleton University, April 2021.
- A31. Examiner of PhD thesis defense, Tayebah Lofti Mahyari, Systems and Computer Engineering, Carleton University, April 2021.
- A32. PhD Comprehensive exam committee, Michael Genkin, School of Computer Science, Carleton University, November 2020.
- A33. External Examiner of master's thesis defense, Diana Luci, EECS, University of Ottawa, November 2020.
- A34. Internal Examiner of master's thesis defense, Khadija Osman, School of Computer Science, Carleton University, August 2020.
- A35. Internal Examiner of master's thesis defense, Aditya Mahashvari, School of Computer Science, Carleton University, August 2020.
- A36. External Examiner of master's thesis defense, Thankgod Obasi, School of Information Technology, Carleton University, July 2020.
- A37. Chair of master's thesis defense, Mehak Mustafa, School of Computer Science, Carleton University, July 2020.
- A38. External Examiner of PhD proposal, Chao Sun, University of Ottawa, July 2020.
- A39. External Examiner of master's thesis defense, Weizhao (Ken) Xin, EECS, University of Ottawa, June 2020.
- A40. Chair of master's thesis defense, Saraj Manes, School of Computer Science, Carleton University, May 2020.

- A41. Internal Examiner of master's thesis defense, Mahan Niknafs Kermani, School of Computer Science, Carleton University, April 2020.
- A42. Internal Examiner of master's thesis defense, Norbert Eke, School of Computer Science, Carleton University, April 2020.
- A43. Chair of master's thesis defense, Raisul Rashu, School of Computer Science, Carleton University, January 2020.
- A44. PhD Comprehensive exam committee, Yuan Wu, School of Computer Science, Carleton University, November 2019.
- A45. Internal Examiner of master's thesis defense, Xinyuan Lu, School of Computer Science, Carleton University, September 2019.
- A46. Examiner of PhD thesis defense, John Harvey, Systems and Computer Engineering, Carleton University, May 2019.
- A47. Chair of master's thesis defense, Lester Mundt, School of Computer Science, Carleton University, April 2019.

**SERVICE AT
REGIONAL
LEVEL**

Data Day 8.0 (2022)

- Help search for a suitable virtual platform to host the event.
- Co-organizer of the poster fair and competition.
- Co-organizer of the AI and Healthcare panel.

Data Day 8.1 Emerging Trends + Talent Showcase (2022)

- I was a co-organizer of this event which was held at HUB350 Kanata North Tech Park.

**SERVICE AT
NATIONAL
LEVEL**

Cascade AI: Pan Canadian Conference on Responsible AI (2022)

- This was a multi-city event on the topic of Responsible AI in collaboration with colleagues at the Northeastern University who had previously organized a similar event in U.S. Dr. Olga Baysal and I were the primary contacts representing Ottawa in this national event which was held online on May 31, 2022.

**OTHER
SERVICES**

Program Committees

- Program Committee member in the International Conference on Learning Representations (ICLR 2024), November 2023.
- Program Committee member in the International Conference on Learning Representations (ICLR 2023), November 2022.
- Program Committee member in the Conference on Neural Information Processing Systems (NeurIPS 2022).
- Program Committee member in the International Conference on Learning Representations (ICLR 2022), November 2021.
- Program Committee member in the IEEE International Conference on Systems, Man, and Cybernetics (SMC 2021), June 2021.
- Program Committee member in the International Conference on Learning Representations (ICLR 2021),

- Program Committee member in the AAAI Conference on Artificial Intelligence (AAAI 2021)
- Program Committee member in the Conference on Computer Vision and Pattern Recognition (CVPR 2021).
- Reviewer of IEEE Transactions on Cybernetics, IEEE Transactions on Information Forensics & Security, Journal of IET image processing and Journal of Iranian Society of Machine Vision and Image Processing.

Proposal Reviews for Granting Agencies

- NSERC Discovery Grants, External Reviewer, December 2023.
- JELF-CFI Reviewer: In August 2022, Canada Foundation for Innovation (CFI) invited me to review a proposal submitted to the John R. Evans Leaders Fund (JELF). I reviewed the JELF-CFI application number CFI43589.
- NFRF-E Reviewer: I was invited to participate in the review process for the 2022 Exploration competition of the New Frontiers in Research Fund.
- MITACS Reviewer: Since 2020 I have reviewed 6 MITACS grant applications.

JOURNAL PUBLICATIONS

- J.1 David G. Hobson, Majid Komeili. (2024). A Step towards Automated and Generalizable Tactile Map Generation using Computer Vision and Generative Adversarial Networks. ACM Transactions on Accessible (Submitted).
- J.2 M.R. Zarei, M. Komeili. (2024). Interpretable Few-shot Learning with Online Attribute Selection”, Neurocomputing (Submitted).
- J.3 Mohammad Amin Choukali, Mehdi Chehel Amirani, Morteza Valizadeh, Ata Abbasi and Majid Komeili. (2024). Pseudo-Class Part Prototype Networks for Interpretable Breast Cancer Classification. Scientific Reports, (Submitted).
- J.4 Omid Davoodi, Shayan Mohammadzadehsamakosh, Majid Komeili. (2023). “On the Interpretability of Part-Prototype Based Classifiers: A Human Centric Analysis”, Nature Scientific Reports, 13, 23088, <https://doi.org/10.1038/s41598-023-49854-z>.
- J.5 S. Ahmed, **M. Komeili**, J. Park, (2022), “Predictive Modelling of Parkinson’s Disease Progression Based on RNA-Sequence with Densely Connected Deep Recurrent Neural Networks”, Nature Scientific Reports, 12, 21469 (2022). <https://doi.org/10.1038/s41598-022-25454-1>.
- J.6 K. C. Fraser, **M. Komeili**, (2021), “Measuring Cognitive Status from Speech in a Smart Home Environment”, IEEE Instrumentation and Measurement Magazine, vol. 4, no. 26, pp. 13-26.
- J.7 **M. Komeili**, N. Armanfard, D. Hatzinakos, (2021), “Multiview Feature Selection for Single-view Classification”, IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 43 no. 10, pp. 3573-3586. (IF=24.3)
- J.8 **M. Komeili**, C. Pou-Prom, D. Liaqat, K. C. Fraser, M. Yancheva, F. Rudzicz, (2019) “Talk2Me: Automated Linguistic Data Collection for Personal Assessment”, PLoS One 14(4): e0216375. (IF=3.75)
- J.9 N. Armanfard, **M. Komeili**, J. P. Reilly, J. F. Connolly, (2019), “A Machine Learning Framework for Automatic and Continuous MMN Detection with Preliminary Results

for Coma Outcome Prediction”, IEEE Journal of Biomedical and Health Informatics, vol. 23, no. 4, pp. 1794 - 1804. (IF=7.02)

- J.10 S. J. Haghighi, **M. Komeili**, D. Hatzinakos, H. El-Beheiry, (2018), “40-Hz ASSR for Measuring Depth of Anaesthesia During Induction Phase”, IEEE Journal of Biomedical and Health Informatics, vol. 22, issue 6, pp. 1871 - 1882. (IF=7.02)
- J.11 **M. Komeili**, W. Louis, N. Armanfard, D. Hatzinakos, (2018), “Feature Selection for Non-Stationary Data: Application to Human Recognition using Medical Biometrics”, IEEE Transactions on Cybernetics, vol. 48, issue 5, pp. 1446 - 1459. (IF=19.1)
- J.12 N. Armanfard, J. P. Reilly, **M. Komeili**, (2018), “Logistic Localized Modeling of the Sample Space for Feature Selection and Classification”, IEEE Transactions on Neural Networks and Learning Systems, vol. 29, issue 5, pp. 1396 - 1413. (IF=14.25)
- J.13 **M. Komeili**, N. Armanfard, D. Hatzinakos, (2018), “Liveness Detection and Automatic Template Updating using Fusion of ECG and Fingerprint”, IEEE Transactions on Information Forensics & Security, vol. 13, issue 7, pp. 1810 - 1822. (IF=7.23)
- J.14 N. Armanfard, J. P. Reilly, **M. Komeili**, (2016), “Local Feature Selection for Data Classification”, IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 38, no. 6, pp. 1217-1227. (IF=24.3)
- J.15 W. Louis, **M. Komeili**, D. Hatzinakos, (2016), “Continuous Authentication using One Dimensional Multi-Resolution Local Binary Patterns”, IEEE Transactions on Information Forensics & Security, vol. 11, no. 12, pp 2818-2832. (IF=7.23)
- J.16 N. Armanfard, **M. Komeili**, E. Kabir, (2012), “TED: A Texture-Edge Descriptor for Pedestrian Detection in Video Sequences”, Pattern Recognition, vol. 45, no.3, pp. 983-992. (IF=7.7)
- J.17 N. Armanfard, **M. Komeili**, E. Kabir, (2010), “A Novel Descriptor for Pedestrian Detection in Video Sequences”, International Journal of Information & Communication Technology, vol.2, no.2, pp. 1-8.
- J.18 **M. Komeili**, N. Armanfard, E. Kabir, (2009), “A Fuzzy Approach for Measuring Features Reliabilities in Particle Filtering Framework”, International Journal of Information & Communication Technology, vol. 1, no. 4, pp. 107-115.

CONFERENCES PUBLICATIONS

- C.1 Abbas Akkasi, Kathleen C. Fraser, and **M. Komeili**. (2023), “Reference-free Summarization Evaluation with Large Language Models”, IJCNLP-AACL Workshop on Evaluation and Comparison for NLP systems.
- C.2 Mai Shaaban, Abbas Akkasi, Adnan Khan, **M. Komeili**, Mohammad Yaqub. (2023). Fine-Tuned Large Language Models for Symptom Recognition from Spanish Clinical Text. BioCreative.
- C.3 G. O'Shea*, **M. Komeili**, (2023), “Toward Super-Resolution for Appearance-Based Gaze Estimation”, NeurIPS Gaze Meets ML Workshop.
- C.4 M. R. Zarei*, M. Christensen, S. Everts, **M. Komeili** (2023), “Vax-Culture: A Dataset for Studying Vaccine Discourse on Twitter”, International Joint Conference on Neural Networks, Queensland, Australia.
- C.5 MR. Zarei*, **M. Komeili**, (2022), “Interpretable Concept-based Prototypical Networks for Few-Shot Learning”, 29th IEEE International Conference on Image Processing ICIP, Bordeaux, France, DOI: 10.1109/ICIP46576.2022.9897572.

- C.6 O. Davoudi*, **M. Komeili**, (2022), “Toward Faithful Case-based Reasoning through Learning Prototypes in a Nearest Neighbor-friendly Space”, Published in International Conference on Learning Representations ICLR, virtual conference only.
- C.7 M. Nokhbeh Zaeem*, **M. Komeili**, (2021), “Cause and Effect: Concept-based Explanation of Neural Networks”, IEEE International Conference on Systems, Man, and Cybernetics (SMC), Melbourne, Australia, DOI: 10.1109/SMC52423.2021.9658985.
- C.8 O. Davoudi*, **M. Komeili**, (2021), “Feature-Based Interpretable Reinforcement Learning based on State-Transition Models”, IEEE International Conference on Systems, Man, and Cybernetics (SMC), Melbourne, Australia, DOI: 10.1109/SMC52423.2021.9658917.
- C.9 Abhijeet Chauhan*, Omid Davoudi*, **M. Komeili**, (2021), “Multi-scale Deep Nearest Neighbors”, Accepted in the International Joint Conference on Neural Networks, Shenzhen, China, DOI: 10.1109/IJCNN52387.2021.9534282.
- C.10 A. Kushki, **M. Komeili**, S. Panahandeh, E. Anagnostou, J. Lerch. (2018), “Examining Associations Between Brain Morphology and Social Function in ASD, ADHD, OCD, and typical development using Machine Learning: Analysis of POND Network Data”, INSAR 2018, International Society for Autism Research, Netherlands.
- C.11 N. Armanfard, **M. Komeili**, A. Mihailidis (2018), “Development of a Smart Home Package for Unobtrusive Physiological Monitoring”, IEEE Engineering in Medicine and Biology Conference (EMBC), United States.
- C.12 **M. Komeili**, W. Louis, N. Armanfard, D. Hatzinakos, (2016), “Human Recognition using Electrocardiogram Signals: From Rest to Exercise”, Electrical and Computer Engineering (CCECE), IEEE 29th Canadian Conference on, Vancouver, Canada.
- C.13 N. Armanfard, **M. Komeili**, J. P. Reilly, John F. Connolly, (2016), “Automatic and continuous assessment of ERPs for Mismatch Negativity detection”, IEEE Engineering in Medicine and Biology Conference (EMBC), 38th Annual International Conference of the, Orlando, FL, USA.
- C.14 S. J. Haghghi, **M. Komeili**, D. Hatzinakos, (2016), “Predicting the Depth of Anaesthesia with 40-Hz ASSR”, Electrical and Computer Engineering (CCECE), IEEE 29th Canadian Conference on, Vancouver, Canada.
- C.15 N. Armanfard, **M. Komeili**, J. P. Reilly, L. Pino, (2016), “Vigilance lapse identification using sparse EEG electrode arrays”, Electrical and Computer Engineering (CCECE), IEEE 29th Canadian Conference on, Vancouver, Canada.
- C.16 W. Louis, **M. Komeili**, D. Hatzinakos, (2016), “Real-time Heartbeat Outlier Removal in Electrocardiogram (ECG) Biometric System”, Electrical and Computer Engineering (CCECE), IEEE 29th Canadian Conference on, Vancouver, Canada.
- C.17 **M. Komeili**, N. Armanfard, D. Hatzinakos, A. N. Venetsanopoulos, (2015), “Feature Selection from Multisession Electrocardiogram Signals for Identity Verification”, Electrical and Computer Engineering (CCECE), 2015 IEEE 28th Canadian Conference on, Halifax, Canada.
- C.18 **M. Komeili**, N. Armanfard, M. Valizadeh, E. Kabir, (2009), “Robust Proposal Distribution for Adaptive Visual Tracking in a Particle Filtering Framework”, IEEE International Conference on Advances in Computational Tools for Engineering Applications, Zouk Mosbeh, Lebanon.

- C.19 **M. Komeili**, N. Armanfard, M. Valizadeh, E. Kabir, (2009), “Feature Integration for Adaptive Visual Tracking in a Particle Filtering Framework”, IEEE 14th International CSI Computer Conference, Tehran, Iran.
- C.20 **M. Komeili**, M. Valizadeh, N. Armanfard, E. Kabir, (2009), “An Optimal Fuzzy System for Feature Reliability Measuring in Particle Filter-Based Object Tracking”, IEEE 14th International CSI Computer Conference, Tehran, Iran.
- C.21 N. Armanfard, **M. Komeili**, M. Valizadeh, E. Kabir, (2009), “Effective Hierarchical Background Modeling and Foreground Detection in Surveillance Systems”, IEEE 14th International CSI Computer Conference, Tehran, Iran.
- C.22 M. Valizadeh, **M. Komeili**, N. Armanfard, E. Kabir, (2009), “Degraded Document Image Binarization Based on Combination of Two Complementary Algorithms”, IEEE International Conference on Advances in Computational Tools for Engineering Applications, Zouk Mosbeh, Lebanon.
- C.23 M. Valizadeh, **M. Komeili**, N. Armanfard, E. Kabir, (2009), “A Contrast Independent Algorithm for Adaptive Binarization of Degraded Document Images”, IEEE 14th International CSI Computer Conference, Tehran, Iran.
- C.24 N. Armanfard, **M. Komeili**, M. Valizadeh, E. Kabir, S. Jalili, (2009), “A Non-Parametric Pixel-Based Background Modeling for Dynamic Scenes”, IEEE International Conference on Advances in Computational Tools for Engineering Applications, Zouk Mosbeh, Lebanon.
- C.25 N. Armanfard, M. Valizadeh, **M. Komeili**, E. Kabir, (2009), “Document Image Binarization by Using Texture-Edge Descriptor”, IEEE 14th International CSI Computer Conference, Tehran, Iran.
- C.26 M. Valizadeh, N. Armanfard, **M. Komeili**, E. Kabir, (2009), “A Novel Hybrid Algorithm for Binarization of Badly Illuminated Document Images”, IEEE 14th International CSI Computer Conference, Tehran, Iran.
- C.27 N. Armanfard, **M. Komeili**, E. Kabir, (2008), “TED: A Texture-Edge Descriptor Based on LBP for Pedestrian Detection”, IEEE International Symposium on Telecommunications (IST2008), Tehran, Iran, This Paper Was Awarded as the Best Paper of IST2008.
- C.28 **M. Komeili**, N. Armanfard, E. Kabir, (2008), “A Fuzzy Approach for Multi-Feature Pedestrian Tracking with Particle Filter”, IEEE International Symposium on Telecommunications (IST2008), Tehran, Iran.
- C.29 **M. Komeili**, N. Armanfard, E. Kabir, (2008), “Adaptive Visual Tracking by Decision Level Fusion of Features in A Particle Filter Framework”, 5th Iranian Conference on Machine Vision and Image Processing, Tabriz, Iran.
- C.30 N. Armanfard, **M. Komeili**, E. Kabir, (2008), “Efficient Nonparametric Background Modeling of Dynamic Scenes”, 5th Iranian Conference on Machine Vision and Image Processing, Tabriz, Iran.
- C.31 **M. Komeili**, E. Kabir, (2008), “Robust Color-Based Pedestrian Tracking in Varying Illumination Environments”, 16th Iranian Conference on Communication, Thran, Iran.

PATENTS

- P.1 **M. Komeili**, N. Armanfard, D. Hatzinakos, “An Expert System for Fingerprint Spoof Detection” International application number CA2019050141, Patent Cooperation Treaty (PCT), 2019-02-04.
- P.2 N. Armanfard, **M. Komeili**, J. P. Reilly, John F. Connolly, “Expert System for Automatic, Continuous Coma Patient Assessment and Outcome Prediction”, U.S. Provisional Patent, USPTO serial no. 62/509,986.

CURRICULUM VITAE

M

- a) **NAME: MILLS, Shirley E.**, Associate Professor, tenured
 Member of the Ottawa-Carleton Institute of Mathematics and Statistics
 Member of the Carleton University Institute for Data Science
 Member of the Laboratory for Research in Statistics and Probability
 Research Associate Member -Canadian Centre of Intelligence and Security Studies (CCISS)
 Member, Carleton Graduate Institute for Bioinformatics
 Member, Carleton Graduate Institute for Biomedical Engineering

b) EDUCATION:

Ph.D. Statistics and Applied Probability, University of Alberta, 1983
 Cert. Ed., Secondary Education, University of Manitoba, 1971
 M.Sc., Statistics, University of Manitoba, 1970
 B.Sc. Db. Hon., Mathematics and Statistics, University of Manitoba, 1969

c) EMPLOYMENT HISTORY:

<u>Dates</u>	<u>Rank/position</u>	<u>Department</u>	<u>Institution</u>
2005(sabbatical)	Director, Mathematics Research	CSEC	Govt. of Canada
1988- present	Assoc. Prof.	Math. & Stat.	Carleton U.
1987-93	Director	Stat. Cons.Ctr.	Carleton U.
1983-87	Asst. Prof.	Math. & Stat.	Carleton U.
1981-83	Sessional Lecturer and Grad.Asst.	Stat. & Applied Probability	U. of Alberta
1979-80	Asst. Prof.	Math. & Stat.	U. of Winnipeg
1978-79	Visiting Asst. Prof.	Mathematics	U. of Alberta
1975-78	Asst. Prof.	Math. & Stat.	U. of Winnipeg
1973-75	Lecturer	Math. & Stat.	U. of Winnipeg
1971-73	Sessional Lecturer	Math. & Stat.	U. of Winnipeg
1969	Actuarial Trainee		Great West Life
1967-70	Lab Assistant	Statistics	U. of Manitoba

d) ACADEMIC HONOURS:

2019 Faculty of Science, U. Manitoba Distinguished Aluma Award
 2018 Faculty of Science, Carleton U. Impact Award
 2015 Distinguished Service Award – Statistical Society of Canada
 1988 Carleton University Faculty of Science Teaching Award
 1977 Clifford J. Robson Award (for Excellence in Teaching) - U. of Winnipeg
 1971 Gold Medal for Teaching Proficiency, Fac. of Ed., U. of Manitoba
 Governor General Medal
 Isbister Scholarship
 I.O.D.E. Scholarship
 Rotary Scholarship
 M.U.N.A. Scholarship
 Board of Regents Scholarship, United College

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES

2023	Co-organizer (with Y.Zhao) of Statistical Society of Canada (SSC) 2023
2023	National Advisory Committee, World Statistics Congress, ISI 2023
2022	Co-organizer (with R. Lockhart) of Statistical Society of Canada (SSC) 2022 (virtual)
2022	Co-organizer of the 2 nd Big Data Cup 2022
2022	Co-organizer of 7 th International Ottawa Hockey Analytics Conference OTTHAC2022
2022	Elected President-elect of the Statistical Society of Canada
2021	Co-organizer (with A. Variyath) of Statistical Society of Canada (SSC) 2021 (virtual)
2021	Co-organizer (with M. Schuckers) (6 th) International Ottawa Hockey Analytics Conference 2021
2021	Co-organizer of the 1 st Big Data Cup 2021
2021	Co-organizer of 6 th International Ottawa Hockey Analytics Conference OTTHAC2021
2019-20	Chair- CANSSI Data Science (International) Committee
2019-20	Co-organizer (with Y. Zhao) of SSC 2020
2019	Co-organizer (with M. Schuckers) 5 th International Ottawa Hockey Analytics Conference
2019-22	Treasurer, Data Science and Analytics Section, Statistical Society of Canada
2019	Co-organizer (with J. R. Green) Fields-Carleton Seminar Series – Metrics, Techniques and Tools for Anomaly Detection
2019	Co-organizer (with J.R. Green) Fields-Carleton Short Course -Overview of Anomaly Detection: Existing Solutions and Latest Technological Trends
2019	Co-organizer (with J.R. Green) Fields-Carleton Workshop on Machine Learning with Class Imbalance
2019	Co-organizer (with J.R. Green) Fields-Carleton Public Lecture – Intro to Anomaly Detection: Statistical and Machine Learning Approaches
2019	Short Course for Statistics Canada – Introduction to Data Science
2018-	Co-lead (with James Green, SCE, Carleton) Fields-Carleton Centre for Quantitative Analysis and Modelling (CQAM) Lab for Anomalous Event Detection, Modelling and Prediction
2018	Co-organizer (with M. Schuckers) 4 th International Ottawa Hockey Analytics Conference
2018 -	Co-founder of “Women in Analytics”
2018 -19	Past President, Business and Industrial Statistics Section, Statistical Society of Canada
2017	Co-organizer (with M. Schuckers) 3 rd International Ottawa Hockey Analytics Conference
2017-18	Elected President, Business and Industrial Statistics Section, Statistical Society of Canada
2017-18	Chair, Committee of Presidents of Statistical Societies (COPSS) Committee for Elizabeth Scott Award
2016	Co-organizer (with M. Schuckers) 2 nd International Ottawa Hockey Analytics Conference
2016-17	Elected President-Elect, Business and Industrial Statistics Section, Statistical Society of Canada
2015	Co-organizer (with M. Schuckers) 1 st International Ottawa Hockey Analytics Conference
2013-14	Chair, Committee of Presidents of Statistical Societies (COPSS) Committee for Elizabeth Scott Award
2011-	SSC representative on COPSS Committee for Elizabeth Scott Award
Oct. 2010 -	Executive Director, Statistical Society of Canada
2010-	SSC representative to the Canadian Consortium on Research (CCR)
2009-	Data Mining Advisory Board, CSIS

2007- Data Mining Advisory Board, CBSA

2004 - Statistical Advisory Board, National Security Agency (NSA), U.S.A.

2004 - 2006 Elected Secretary, BISS, Statistical Society of Canada

2002 - Data Mining Advisory Board, Communications Security Establishment (CSE), Ottawa

2002 - 2015 Academic Staff Representative, Carleton Pension Plan Committee

1999 - 2002 Elected by Senate to Board of Governors, Carleton University; served as Vice-Chair Audit Committee, Chair of Library Committee, member of University Relations Committee, Vice-Chair of Nominating Committee

1997 - 2002 Elected by Science Faculty to Senate, Carleton University

1996 - 2002 Elected Treasurer, Canadian Association of University Teachers

1994 - 95 Chair, Committee on Regional and Society Cooperation, Statistical Society of Canada

1994 - 95 Past President, Carleton University Academic Staff Assoc.

1993 - 95 President of the Caucus for Women in Statistics (Canadian Section)

1993 - 94 President, Carleton University Academic Staff Assoc.

1993 - 94 Co-Chair, OCUFA Social Contract Working Team

1992 - 93 Expert witness re employment equity statistics in Supreme Court of Canada case

1992 - 93 Past President, Statistical Society of Ottawa

1992 - 93 Chair, Committee on Statistical Consulting, Statistical Society of Canada

1992 - 93 President-Elect, Carleton University Academic Staff Assoc.

1992 Advisory Committee re Macleans' Survey, Carleton University

1991 - 92 President, Statistical Society of Ottawa

1990 - 92 Chair, Committee on Statistical Consulting, SSC

1990 - 94 Secretary, Statistical Society of Canada

1990 - 99 Canadian Rep., International Women in Mathematics

1990 - 91 President-Elect, Statistical Society of Ottawa

1990 - 92 Salary and Benefits Chairperson, Carleton U. Academic Staff Assoc.

1990 Organizer - "Workshop on Software Reliability"

1989 - 91 President, Orchard Estates Community Association

1989 - 90 Secretary, Statistical Society of Ottawa

1987 - 89 Secretary, Orchard Estates Community Association

1987 - Refereeing papers for The Canadian Journal of Statistics and IEEE, among others

1983 - Member of the Laboratory for Research in Statistics and Probability, Carleton University - University of Ottawa

1976 - 78 Treasurer of the Statistical Association of Manitoba

I am currently on sabbatical. In 2023 I am serving on the Hiring Committee of the School of Mathematics and Statistics for an Instructor in Data Science and Statistics. I also represent the School on the Management Committee of the Data Science, Analytics and Artificial Intelligence Graduate Programs. I also represent the Faculty of Science on the Management Committee of the QED-AS-WA. In 2020-21 I served on the Hiring Committee of the School of Mathematics and Statistics for a hire of an Assistant Professor in Actuarial Science and on the Hiring Committee of the Department of Civil and Environmental Engineering for a hire of an Assistant/Associate Professor in Resilient Smart Infrastructure. In 2019-20 I served on the Hiring Committee in the Faculty of Science for a CRC Tier II hire in Data Science and Analytics and on the Hiring Committee for a hire of an Asst. Prof in Neuroscience. I also served on the Co-op Committee of the School and the University and on the Data Science and Analytics Graduate Program Committee and am Faculty of Science Grad Co-op Advisor, advise the Actuarial Students Group, and am on the 3 program committees of the School. I am also co-chair (with Y. Zhao) of the Local Organizing Committee for the Statistical Society of Canada 202 Meeting and co-chaired the 2022 Virtual Annual meeting with Richard Lockhart of SFU and with Asokan Variyath, Memorial U. for the 2021 Virtual Annual Meeting and co-chaired (with Y. Zhao) of the Local Organizing Committee for the Statistical Society of Canada 2020 Annual Meeting (which was cancelled at the last minute due to the COVID-19 pandemic.). I also supervised 3 graduate students on doing basketball analytics internships with the 2 Carleton Ravens basketball teams that won national titles this year.

f) CAREER GRADUATE AND POSTDOCTORAL SUPERVISION

Completed: 89M.Sc.(Math/Stat), 15 M. Sc. (I.S.S.), 2 Ph.D. (Co-supervision)

In progress: 1 PhD, 3 M.Sc. (Stat.; Biostat.), 1 M. Eng. (Bioinformatics/Biomedical Eng.)

PostDoc (Current)

Justin Lang (2022 -) (with P. Villeneuve)

Laura Rodriguez Villamizar (2022 -) (with P. Villeneuve)

Ph.D (Current/Incoming)

Mohammad-Amin Nabavi - Computer Vision applied to Sport Tracking

Josh Weissbock – Analytics in Sports

M.Sc./M.Eng.(Current/Incoming)

Ben Nikkel

Ph.D. (Completed)

Aly Sherif (2004)- Civil Eng.

M. Tayyaran (2000) - Civil Eng.

M.Sc . (Completed)

Michelle Caruso - Sentiment Analysis of COVID-19 Twitter Data

Ahmad Nazzal – (**Project** 2022) A Bayesian Approach to Sports Analytics

Benjamin Burr (**Thesis** 2021) - Intruder Alert: Dimension Reduction and Density-Based Clustering
for a Cybersecurity Application

Peter L'Oiseau (**Thesis** 2021)– Process-Oriented Player Evaluation Metrics for USports Basketball

Melissa van Bussel (2021)

Adam Shen (**Thesis** 2021) Tales of a Coronavirus Pandemic: Topi Modelling with Short-Text Data

Zhao Zhao (2021)

Agata Logvin (Thesis 2020)-joint with P. Villeneuve- Association between Urban Greenness and Sleep in Canadian Adults

Jiaming Han (**Thesis** 2020) - A Comparative study of selected supervised classification machine learning methods for credit card fraud detection

Sarah Salhab 2020)

Michael Armanious (**Thesis** 2019) - Men's U-Sports Basketball Analysis

Mohammad-Amin Nabavi (**Thesis** 2019) – Statistical Assessment of Soccer Players

Nargiz Babashli (2018)- joint with Y. Zhao

Alla Tudykhata (2017)

Christopher Shoniker (**Thesis** 2017) - Answering Three Questions About NHL Drafted Players: Will they play? When will they play? How long will they play?

Yilin He (2017)

Olga Titova (**Thesis** 2017) – San Francisco Crime Classification

Lu Zhu (**Thesis** 2017) - Statistical Evaluation of Malware Classification Algorithms

Ying Zhou (**Thesis** 2017) – Statistical Analysis of Classification Algorithms for Predicting Socioeconomics Status of Twitter Users

Yuan Gao (2017)

Daniel Hockey (**Thesis** 2016)- joint with Song Cai - Network Kriging: Predicting the Attributes of Nodes in a Network

Yanjiang Yu (**Thesis** 2016) - joint with Paul Villeneuve - Associations between long term exposure to air pollution and the incidence of dementia and cognitive impairment in a Canadian prospective cohort study

Yi Li (**Thesis** 2016) – joint with Paul Villeneuve - Outdoor air pollution and mortality: A case-crossover study in Canada

David Wilson (**Thesis** 2016) - Mining NHL Draft Data and A New Value Pick Chart

Patrick Cane (2016)

Yan Lei (2016)

Alexandr Diaz-Papkovich – (**Thesis** 2015) ”Mining the Play-by-Play in the NHL”

Chenxi Li - joint with Claire Austin (2015)

Kuan Chiao (Joe) Wang (2014)

Sherine Nahamias (**Thesis** 2014) : Empirical study of performance of some algorithms for clustering analysis of binary data with real-world applications”

Byron Cotnam (2013)

Yan Lei (2013)

Dong Liu (2013)

Susan Macpherson (2013)

John Than (2013)

Yingnan (Clare) Chen (2012)

Krista Morrow |(2012) – Project: Multiclass Anomaly on Large-Scale Network Traffic: An Empirical Study of the Use of Random Forest

Philippe Belanger (2012)

Kris Alladin (2011; joint with Dr. P. Farrell)* (3 years for completion due to illness)

Sofia Auer (2011)

Lingyun Zhu (2011)

Yan Lei (2011)

Olena Frolova (2010)

Huda Masoud (2010)

Rizwan Sultan (2010)

Lucy Turner (2010)

Tao Pang - in China with China Mobile

Olga Titova-

Shirin Roshanafshar (2010)

Farid Elktaibi (2010)

Ying Gai (2009) - Citizenship and Immigration

Ahalya Sivathayalan (**Thesis** 2009) –Thesis: Comparison of Clustering and Classification Methods combined with Dimension Reduction using Gene Expression Data

Kahina Sid Idris (2009)

James Diak (**Thesis** 2008) - Effect of enzyme additions, microaeration and grinding on septic tank performance and sludge accumulation rates M. Applied Science in Environmental Engineering

Dan Wu (**Thesis** 2008): Privacy -Preserving Classification

Jun Liu (2008) - with Y. Zhao

Morie Malowany (2008) - with P. Farrell - Health Canada Huadong

Li (2008)

Qinwen Zhong (2008) – CIHI

Jeiping Lei (2008) - Revenue Canada

Wei Li (2008) – Telus

Wei Huang (2008)

Patrick Boily (2008) - Transport Canada

Virendra Bharti (**Thesis** 2008) -(I.S.S.)- Mortality Associated with Arsenic in Drinking Water (Min. of Natural Resources)-Thesis: Analysis of Arsenic in Drinking Water from Wells

Ryan Duchesne (2008)-CBSA

Amy McNeely (2008)-CBSA/Transport Canada

Michael Rotondi (2006)- PhD candidate U.W.O. Orly

Brion (2006) - Health Canada

Elena Tipenko (2006) - Health Canada Rob

Wall (2006) – MBNA

Abdulrahman Abdulkader (**Thesis** 2006) - UAE Police -Thesis: Spatial Analysis of Criminal Incidents: Implementation of GIS and Spatial Statistics

Rob Wall (2006) – MBNA

Vladimir Sklokin- High Tech M. Sc.

Elena Tipenko (2006) - Health Canada

Jason Qin (2005) - High Tech M. Sc. – Nortel Yun

Luo (2005)

Lui Li (I. S. S.) (2005)

Daniela Dragomir (2005) –CIHI

Nan Chen (2005)

Xiaohong (Debra) Chen (2005) Cunye

Qiao (2005) – StatCan

Dabin Wang (2005)

Jianting Wang (2005)

Lubaba Kobaisy (2005) - Medical resident in U.S.A.

Xuemei Liang (2005)

Quan Gu (2004)
Yaping Luo (2004)
Yuhua Liu (2004)
Lesley Levesque (2004) - Industry Canada
Vahid Jamshidi (2004)
Dan Wu (2004) - Privacy-Preserving Classification
Vidya Thuppal (**Thesis** 2004) - (with P. Farrell); Health Canada -Thesis: Analysis of Algorithms for detecting disease outbreaks
David Meng (2003) (I.S.S.)
Danyu Xu (**Thesis** 2003) (I.S.S.) - Pattern Recognition of Mutual Funds using Self-Organizing Maps
Yong Li (2003)
Brian Hutton (2003)- Ottawa Research Institute
Manchun Fang (2003)- Chalmers Research Centre, CHEO;
Meredith Franklin (2003)- Harvard School of Public Health, Ph.D. candidate
Xiaoqi Lan (2003)- CIHI- Toronto/ Boston financial analyst
Ge (Rachel) Zhang (2003)- CIHI, Ottawa
Sawsun Kobaisy (2003) - Industry Canada
Jean He (2003)- CIHI, Ottawa
Sreelatha Gopalan (I.S.S.) -2003
Victor Mak (2003)- Transport Canada/CIHI
Sitara Samarayake (I.S.S.) (2003)Fall
Olga Davletova (I.S.S.) (2003) Fall 2000 - Industry Canada
Li Lu (2003)- (I.S.S.) Winter 2001
Mohammed Tanabian. I.S.S. (2002)-Winter 1999; Transport Canada
Wafaa Kadeer (2003)(I.S.S.)- Fall 2000
Doaa Swailum (2003)(I.S.S.)
Christina Koops (2002) - Transport Canada
Leah Ben Porat (M. Sc. Statistics) Fall 2000 ; Sloan Kettering, N.Y.
Catherine Fontaine (**Thesis** M.Sc.) September 1999 - July 2000 - Quebec Bureau of Statistics -Thesis: A Statistical Study of Canadian University Enrolments. Graduates and the Future Professoriate: Analysis of Available Data Sources
Abdul Rauf Khan (M.Sc. I.S.S.) Fall 1999 - Spring 2000
Nassr Al-Maflehi ((M.Sc. I.S.S.) Fall 1999- Industry Canada/ Saudi Arabia
Andrew Williams (M.Sc.) 1999
Peter Wright (M.Sc..) Fall 1997
Georgina Gonzalez (M.Sc.) Fall 1997
Agnesa Galan (M.Sc.) Fall 1997
Norma Chhab-Alperin (M.Sc.)-Medallist Fall 1995 (Statistics Canada)
Ioanna Fainaru (M. Sc. I.S.S.) Fall 1994
Chih-Chi Lee (M.Sc..) Statistician - Prov. of Quebec /CCAC (Ontario)
Kim Yue (M.Sc. 89)- PhD. started under J.N.K. Rao; working at York University
Jamie MacMillan (M.Sc.Winter 93) - Biostatistician, Glaxo
S. Heney Fall (M.Sc. 91) - Methodologist, Statistics Canada
P. Siregar Winter (M.Sc. 91) - Ph.D. studies @ Guelph

Ph.D. Committees-Member of examining committee

Akshay Talekar (2023) M.Sc. UOttawa M.Fraser – Towards general mental health biomarkers: machine learning analysis of multi-disorder EEG data

Abbas Rahal (2021) -PhD. UOttawa Bickel: Bayesian methods under unknown prior distributions with applications to the analysis of gene expression data

Graham Cree (2017) – Physics - Direct measurement of the Higgs boson mass, natural width, and cross section times branching ratio to four leptons using a per-event lineshape in the Higgs to ZZ to four lepton decay channel with the ATLAS detector

Dave McKenney (2017) – Computer Science – On Behaviour-based Network Inference and Distribution-based Network Control

Farnoosh Abbas Aghababazadeh (2015) (U Ottawa) - Estimating the Local False Discovery Rate via a Bootstrap Solution to the Reference Class Problem: Application to Genetic Association Data

Charles Saunders (2015) – Economics - Four Essays o Dynamic Panel Models

Mohammad Khalil (2013) - Civil Engineering – Bayesian Inference for Complex and Large-Scale Engineering Systems

Anu Thomas (2013) - Computer Science (medal nomination) – Anti-Bayesian Patten Classification Using Order Statistics

James Diak (2011) - Civil and Environmental Engineering “Freeze-Than Treatment of Wastewater Sludges Using Ferrate (VI) Oxidation and Lime Stabilisation as a Pre- and Post-Treatment (with Banu Ormeci)

Cesar Astudillo (2011) - Computer Science – Self Organizing Maps Constrained by Data Structures

Ebaa Fayyumi Ph.D. Computer Science (September 2008) - Novel Micro-Aggregaton Techniques for Secure Statistical Databases

Robert Catral Ph.D. Computer Science (June 2008) - Automatic Rule Discovery and Generalization in Supervised and Unsupervised Learning Tasks

Marco Carlone Ph.D Physics (2004) Determining the alpha/beta ratio for Prostate Cancer using Clinically Measured Dose Response Data

Luis Ruda (2003) - Computer Science Hyangmei

Kim (2003) - Statistics

Stefan Christiansen Ph.D. Computer Science October 1999

E. Ahmed (Statistics)

N. Prasad (Statistics)

D. Stukel (Statistics)

H. Zhao

Master of Science- Member of examining committee:

Abbas Rahal (2021) – M.Sc. (David Bickel) Bayesian methods under unknown prior distributions with applications to the analysis of gene expression data

Julie Hudson (2019) – M.Sc. Biostatistics (Kelly Burkett, Marie-Helene Roy-Gagnon) - Maternal Gene- Environment Effects: An evaluation of statistical approaches to detect effects and an investigation of the effect of violations of model assumptions

Bryan Paget (2019) – M.Sc. Stat (Maia Fraser, Vadim Kaimanovich) -Generative Adversarial Networks

Naga Haneesha Kanteti (2019) M. Applied Sc in Civil Eng. (Yasser Hassan) – Effect of Vehicle Connectivity on the Safety Performance of Freeway Acceleration Speed Change Lanes

Ekaba Besong (2018) Computer Science (John Oommen) - On Designing Adaptive Data Structures with Adaptive Data ‘Sub’-Structures

Tae Hyoun (Matthew) Park (2018) – Physics - Jet energy resolution measurement of the ATLAS detector using momentum balance

Tao Fu (I.S.S.) - 2004

Li Lu (I.S.S.) - 2003

P. Lavallée

E. Zanutto

B. Lefrançois

M. Keizer (Nursing (thesis)- U. of Ottawa) 1995 “Factors influencing the health-promoting behaviours of older women who provide care in the home for spouses with advanced cancer.

M. Gompala (Business) - co-supervisor 1995

C. Koch (Business) - co-supervisor

F. Smith (Business) - co-supervisor

2 in I.S.S. - Sue Bohme

Statistical Internships supervised:

Amin Nabavi (2022-23) - Basketball Analytics (Carleton U)

Evan Reynolds (2022-23) - Basketball Analytics (Carleton U)

Leila Gholizadeh Zivlaei (2022-23) - Basketball Analytics (Carleton U)

Ahmad Nazzal (2021-22) - Basketball Analytics (Carleton U)

Olivier Chabot (2021-22) – Basketball Analytics (Carleton U)

Zhao (2020-21) – Statistics Canada

Agata Logvin (2020) – Health Canada

Olivier Chabot (2020- 21) - Carleton Ravens Basketball

Peter l’Oiseau (2019-2021) – Carleton Ravens Basketball

Sarah Salhab (2019-20) – Health Canada

David Charles – (2018, 2019) – CRA

Ben Burr – (2018, 2019) – ESDC

Michael Armanious (2019) – Carleton Ravens

Lyndsay Caton (2018) – Health Canada

Mohammad Amin Nabavi (2017) CRA

Alla Tudykhata (2016) – CRA

Nargiz Babashli (2016) – CRA

Yi Li (2016) – CRA

Christopher Shoniker (2016) – Health Canada

Olga Titova *2015) – Health Canada

Yanjiang Yu (2015) Health Canada

David Wilson (2015) CRA

Daniel Hockey (2015) – RCMP

Sherine Nahmias (2015) – Public Health Agency of Canada

Kuan Wang(2014) - Health Canada

Chenxi Li (2012,2013) - Health Canada

John Than (2012,2013) - CBSA; Health Canada

Susan Macpherson (2013) - Statistics Canada

Dong Liu (2012; 2013) - CBSA

Byron Cotnam (2012, 2013) - CBSA
Geoff Halmo (2013) - CSEC
Sherine Nahmias (2012; 2013) - CSEC
Clare Chen (2012) - Statistics Canada
Krista Morrow (2011) - CSEC
Philippe Belanger (2011) – CBSA
Lingyun Zhu (2011) - Statistics Canada
Lucy Turner (2010) - Ottawa Hospital
Shirin Roshanafshar (2009) - Statistics Canada
Sarah Alam (2008) - Statistics Canada
Rizwan Sultan (2008 - Revenue Canada
Huda Masoud (2008) - Canadian Border Services Agency
Ying Gai (2008) - Citizenship and Immigration Canada
James Harrison (2007, 2008) - Canadian Border Services Agency
Kristina Rogers-Stewart (2007, 2008) - Alcatel/Lucent
Wei Li (2008) - Generation V
Morie Malowany (2007) -Health Canada
Jun Liu (2007) - Treasury Board
Dan Wu (2007) - Generation V
Ryan Duchesne (2006-7) - CBSA
Amy McNeely (2006-7) - CBSA
Benjamin Haddad (2004)- Ottawa Heart Institute
Vahid Jamshidi (2004)- Ottawa Heart Institute
Leslie Levesque (2003)- Human Resources Canada
Vidya Thuppal (2003)- Health Canada
Manchun Fang (2003)- Chalmers Research Centre, CHEO
Victor Mak (2002)- Transport Canada
Christina Koops (2002) - Transport Canada
Ge Zhang (2002)- Ottawa Heart Institute
Sawsun Kobaisy (2002)- Industry Canada
Brian Hutton (2002) - Corel, Loeb Research Centre
Jean He (2002) - CIHI
Stephen Lange - Revenue Canada GST statistics
Jun Liu - Bank of Canada time series analyses
Jamie MacMillan - Glaxo Pharmaceuticals
Stephen Heney - substance abuse statistics; work-family stress
Xingqiao Liu - Bank of Canada time series analyses
Natana Valivetti - substance abuse statistics
Kim Yue - substance abuse statistics
Chih-Chi Lee - with Revenue Canada on taxation statistics (database design and analysis)

GRADUATE THESES CO-SUPERVISED previously 2 in
Physics, 3 in Computer Science, 2 in Engineering

Honours Projects Supervised:

Ben Simms (2021) - Text Classification and Sentiment Analysis

Theresa Kennedy- 2021- Statistical Analysis of Shot Making in Hockey – Case Study of Auston Matthews

Stephanie Siu – 2020- Data Analytics on Similarities and Differences of Global Cuisines

Ching-Wen (Shelly) Wang –Network Alert graph and Community Detection

Justina Julius - 2019 – Evaluating the Relationship between Economic Performance and Gender Equality

Kamran Karim – 2018 – Corporate Risk and Performance: A Statistical Analysis

Randy Xing – 2017 – Home Price Index Methodology

Steven Wu – 2015 - AI Techniques & OLS Regression to Analyze CIS Basketball Play by Play

Daniel Hockey -2015 - Dynamic Network Analysis

Rene Bidart - 2015 - A Comparison of Machine Learning Algorithms for Mixed Martial Arts Fight Prediction

Nikolina Beg - 2014

Yuliang Zhang - 2013

Hazel Nicholls- May, 2008 - Health Behaviour in School Aged Children - Knowledge Discovery

Katelyn McLaren

Timothy Jun

Maria Akbar

Sonya Arora

Zana Omazic

Brian Hutton

Melanie Bryce

S. Heney

C.- C. Lee

F. Kuzniarz

C. Chen

K. Yue - second reader

E. Chen - second reader

T. S. Pearce

M. S. Rogers

g) COURSES TAUGHT:

2022-23 – course release and sabbatical
STAT5904 Statistical Internship
MATH5906 Research Internship
Directed Study – Analytics of Computer Vision

2021-22 STAT5703 Data Mining
STAT4601 Data Mining I
STAT5904 Statistical Internship

2020-21 - STAT5703 Data Mining
STAT5505 Design and Analysis of Experiments
STAT5904 Statistical Internship

2020 – STAT4601/5703 Data Mining I

2019 (while on sabbatical)

Directed Study- Advanced Methods in Data Mining STAT5904 Statistical Internship

2018-

STAT4601/5703 Data Mining

STAT5505 Design and Analysis of Experiments

STAT5904 Statistical Internship

2017-18

STAT4601/5703 Data Mining

STAT5602 Analysis of Categorical Data

STAT4504 Experimental Design STAT5904
Statistical Internship

2016-17

STAT5703 Data Mining

STAT5509 Multivariate Statistics

STAT5505 Design and Analysis of Experiments STAT5904 Statistical
Internship

2015-16

STAT 5602 Analysis of Categorical Data

STAT4504 Experimental Design STAT5904
Statistical Internship

On half year sabbatical 2016

2014-15

STAT5703 Data Mining

STAT5509 Multivariate Analysis

STAT5505 Design and Analysis of Experiments STAT5904 Statistical
Internship

Directed Studies - Advanced Data Mining

Directed Studies - Applied Longitudinal Data Analysis

2013-14

STAT5505 Design and Analysis of Experiments

STAT5703 Data Mining STAT5509 Multivariate
Analysis

STAT5602 Analysis of Categorical Data STAT5904 Statistical
Internship

2012-13

on half year sabbatical 2012;

STAT5505 Design and Analysis of Experiments STAT5703 Data Mining
MECH5806 Directed Studies

2011-12

STAT5602 Categorical Data Analysis STAT4601 Data
Mining

STAT4504 Experimental Design and Analysis 70.594/ STAT5904*
Statistical Internship MATH5901 Directed Studies

2010-11

STAT5701 Data Mining

STAT5505 Design and Analysis of Experiments
70.594/ STAT5904* Statistical Internship

MATH 5900 Analysis of Longitudinal Data

MATH 5900 Advanced Data Mining

2009-10 STAT5602 Analysis of Categorical Data
 STAT 5503 Linear Models
 70.594/ STAT5904* Statistical Internship
 MATH5900 Analysis of Longitudinal Data

2008-09 STAT5505/70.555 Design of Experiments
 70.594/ STAT5904* Statistical Internship
 MATH 5900 Analysis of Longitudinal Data

2007-08 STAT5703 Data Mining
 STAT5602 Analysis of Categorical Data
 MATH5901W Experimental Design and Response Surface Methods
 70.594/STAT5904* Statistical Internship

2006-07 STAT5703 Data Mining
 STAT5505/70.555 Design of Experiments
 70.594/ STAT5904* Statistical Internship

2005-06 STAT5703 Data Mining
 MATH5901W Experimental Design and Response Surface Methods 70.594/
 STAT5904* Statistical Internship
 MATH 5900 Analysis of Longitudinal Data

2004-05 STAT5505/70.555 Design of Experiments
 STAT5509 Multivariate Analysis 70.590W
 Data Mining
 STAT 5503 Linear Models
 70.594/ STAT5904* Statistical Internship
 MATH 5900 Analysis of Longitudinal Data

Historical Record of Graduate courses taught:

STAT5703 Data Mining 2005-6, 2006-7, 2007-8, 2010-11.2013W,2013F, 2015W, 2016F,2017W, 2018W, 2018F 2020W,
 2021W, 2022W

70.590W Data Mining 1999-2000,2000-2001,2001-2002, 2002-3, 2003-4, 2004-5

STAT5602 Analysis of Categorical Data 2007-8, 2009-10,2013,2015, 201

STAT5505/70.555 Design of Experiments 1993-1994, 1996-1997, 1998-1999, 2000-2001, 2003-2004, 2004-5, 2006-7, 2008-9,
 2010-11.2013W, 2014F,2016F, 2018F, 2020F

STAT5509 Multivariate Analysis 2002-3, 2004-5, 2014W, 2014F,2017W

70.559 Multivariate Analysis 1999-2000, 2000-2001 STAT
 5503 Linear Models 2003-2004, 2004-5, 2009-10
 70.553 Linear Models 1994-1995, 1997-98, 2002-3, 2003-4, 2004-5
 70.592 Seminar in Biostatistics 1998-1999, 1999-2000
 70.452 Sampling 2000-2001
 MATH5901W Experimental Design and Response Surface Methods 2003-4,2005-6, 2007-8,2014 70.594/
 STAT5904* Statistical Internship - every year
 Directed Studies: Analytics of Computer Vision 2022-23

 Directed Studies: Analysis of Longitudinal Data 2002-2003, 2003-2004, 2004Summer, 2006 Summer, 2008 summer, 2009-Summer, 2010 Winter, 2014Summer
 Directed Studies: Time Series Analysis 2002-2003 Directed
 Studies: Analysis of Microarray Data 2002-2003
 Directed Studies: Advanced Data Mining 2002-2003, 2015W, 2019F
 Directed Studies: Statistical Computing 2002-2003 MECH5906
 Directed Studies 2013W Experimental Design

Undergraduate courses taught

69.104*/MATH1004 Calculus
 69.109*/MATH1009 Calculus
 69.117*/MATH1107 Linear Algebra
 69.119*/MATH1109 Linear Algebra
 69.257*/STAT2507 Introduction to Statistics
 69.259*/Applied Statistics/STAT2509 Intro to Stat. Modelling II
 69.266*/STAT2606 Business Statistics I
 69.267*/STAT2607 Business Statistics II
 69.350/70.358*/STAT3508/STAT3558 Mathematical Statistics
 70.359*/STAT3559 Mathematical Statistics
 69.352*/STAT3502 Engineering Statistics
 69.353*/STAT3503/STAT3553 Regression
 69.354*/STAT3504 Analysis of Variance
 70.355 Regression and Experimental Design
 69.357*/STAT3507 Sampling Methodology
 70.453/STAT4503 Applied Multivariate Statistics
 STAT4504 Experimental Design
 STAT4601 Data Mining I

I have also given Directed Studies courses in the Dept. of Sociology and Anthropology, Carleton University and in the School of Nursing at U. of Ottawa.

h) PUBLICATIONS

Life-time summary (count)

Books authored	2(1)
Books edited.....	0
Chapters in books.....	4
Papers in <u>refereed</u> journals.....	14
Papers in refereed conference proceedings.....	32
Papers read	42
Technical reports.....	33
Others - (Invited talks or workshops presented).....	12

1.) Books authored:

Mills, S., E. and Norminton, E., J., An Introduction to Data Mining and Statistical Learning (in progress for J. Wiley and Sons, Ltd.)

Bharti, V. And Mills, S. (2009) Cancer Arsenic, Mortality and Their Relationship, Lap Lambert Academic Publishing
 Andrews, F., A., and Mills, S., E., Patterns of Use and Abuse of Beverage Alcohol, Tobacco and Cannabis in Canada: an Analysis of Available Data, Health and Welfare Canada, (1993), 323 pp.

Duxbury, L., Higgins, C., Lee, C., and Mills, S. E., 1992. Balancing Work and Family, NHRDP/Health and Welfare Canada, 1992, 542 pp.

2.) Chapters in edited books:

Andrews (Kellner), F., Mills, S., Hill, S., and Webster, I. 1996. Gender Differences in Alcohol-Related Victimization: An Analysis of the 1989 National Alcohol and Other Drugs Survey. In Women's Use of Alcohol, Tobacco and Other Drugs in Canada: Special Perspectives on Women for the National Alcohol and Other Drugs Survey, Ed.: Adrian, M., Lundy, C., and Eliany, M. Addiction Research Foundation, Toronto. Chapter 10, pp.157-174.

Faintuck, J., Mills, S., and Rogers, A. 1981. Acute myelocytic leukemia in a patient with Crohn's disease - did the radiation cause the cancer? In Diagnostic Radiation, pp. 23-31.

3.) Papers in refereed journals

Robinson, B., Edwards J.D., Kendzerska, T., Pettit, C.L., Poirel, D., Daly, J.M., Ammi, M., Khalil, M., Taillon, P.J., Sandhu, R., Mills, S., Mulpuru, S., Walker, T., Percival, V., Dolean, V., Sarkar, A. (2021) Study protocol: a comprehensive compartmental model and calibration algorithm for the study of clinical implications of the population-level spread of COVID-19 Robinson B, et al. *BMJ Open* 2022;0:e052681. doi:10.1136/bmjopen-2021-052681

Daniel Hockey, Song Cai, and Shirley Mills (2019) Predicting Node Attributes in a Social Network using Spatial Structure with a Calibrated Naïve Bayes Model, SSC 2019.

McDill, M. J. , and **Mills, S. E.**, Henderson, Y. Tracking the Gender Barrier II, ICWSE. May 2002.

McDill, M. J. and **Mills, S. E.** Tracking the Gender Barrier A 1990's Follow-up Study, New Frontiers, New Traditions – St. John's July 6-8, 2000, ICWSE. June 2000.

Chen, S. and **Mills, S. E.** Changing Operational Profiles: A Note on Software Reliability Estimation, IEEE Transactions on Software Engineering, Vol. 24, No. 3, March 1998, pp.234-240.

Chen, S. and **Mills, S. E.**, A Binary Markov Process Model for Random Testing, IEEE Transactions on Software Engineering, Vol. 22, No.3, March 1996, pp.218-222.

Surh, L., Wells, G., Mills, S. Cappelli, N., Doucet, H. Hunter, A. Feeny, D., 1993. Health Decisions in Molecular Genetic Services: A Systematic Approach Integrating Medical, Clinical and Social Issues. International Society of Health Technology Assessment. p.188-197.

Andrews, F. A. and Mills, S. E., 1993. Cannabis Use, Attitudes and the Use of Alcohol. J. Alc. Res.. pp.203-225.

Higgins, C., Duxbury, L., Lee, C., and Mills, S. E., 1992. Balancing Work and Family: An examination of work-time and work-location flexibility. Optimum, pp.29-37.

Duxbury, L., Lee, C., Higgins, C., and Mills, S. E., 1992. Balancing Work and Family: Time Spent in Paid Employment, Optimum, pp.38-45.

Duxbury, L., Higgins, C., Lee, C., and Mills, S.E., 1992. Balancing Work and Family: An Examination of Organizational and Individual Outcomes, Optimum, pp.46-59.

Duxbury, L.E., Higgins, C. A. and Mills, S. E., 1992. After-Hours Telecommuting and Work-Family Conflict: A Comparative Analysis, Information Systems Research, Vol.3, No.2, 173-189.

Herz-Fischler, R., Huse, V. and Mills, S. (1987). On the question of the Golden Number. Invited paper for the Canadian Journal of Psychology.

4.) Refereed Conference proceedings:

Agata Logvin, A., Villeneuve, P.J., Griffith, L.E., Raina, P., Rainham, D. G., Hystad, P., Peters, C. E., Dales, R., E., Ross, N.A., Crouse, D.L., Mills, S.E. (2021) **Association between urban greenness and sleep measures in Canadian adults: Findings from the Canadian Longitudinal Study of Aging** August 2021. ISEE Conference Abstracts 2021(1)DOI: [10.1289/isee.2021.P-204](https://doi.org/10.1289/isee.2021.P-204).

Burr, B, Wang, C-W(S), Salmon, G, Soliman, H., Mills, S (2020). On the Detection of Persistent Attacks using Alert Graphs and Event Feature Embedding, IEEE-NOMS, 4-4-2020.

Mills, S., (2019) Experiential Learning via Co-ops and Internships, SSC2019 Calgary.

Caton, L., Peters, C.E., Mills, S., Parent, M-É., Villeneuve, P.J. (2018) Occupational Physical Activity Levels and Risk of Lung Cancer: A Case-Control Study in Canadian Men, European congress of Epidemiology rises, Epidemiological Transitions and the Role of Epidemiologists July 2018 Lyon France.

Villeneuve, ISESP.J., Li Y., Mills, S., Van Ryswck, K., and Lavigne, E., (2016). Short-term effects of exposure to air pollution and mortality: are those previously diagnosed with cancer at greater risk? International Society Exposure Science ISES 2016 Conference. Utrecht, October 2016.

Villeneuve, P.J., Mills, S., Weichenthal, S.A., Lindsay, J., Crouse, D., (2016). Long-term exposure to air pollution and the incidence of dementia, Alzheimer's disease and cognitive impairment', 28th annual International Society for Environmental Epidemiology Conference, Rome, Italy, 1-4 September, 2016

Mills, S. E. (2015). *Privacy Preserving Classification for Partitioned Data*, Invited Paper, SSC 2015, Halifax, June 15.

Hockey, D., Mills, S., and Cai, S. (2015). [Predicting the Attributes of Nodes in a Dynamic Network](#), , SSC2015 Halifax, June 16.

Tehrani, A., Lau, D. T., and Mills, S. E. (2012). Pattern Recognition by Time Series Analysis of Monitoring Vibration Responses of Bridges, 5th European Conference on Structural Control, Genoa, Italy, June 18-20.

Mills, K.E., Mills, S.E., Nair, S. S., and Norminton, E. J. (2005). Visualizing Network Scans, SAMSI

Mills, K.E., Mills, S.E., Norminton, E.J. (2005). A Framework for Mining Email Communications, SAMSI

Chipman, H.E. and Mills, S.E. (2005). Pattern Discovery in Massive Social Networks, SAMSI

Mills, S.E. and Norminton, E.J. (2005). Pattern Recognition in Email Communications Interface'05.

McDill, J.M.J., and Mills, S.E., Tracking the Gender Barrier II, May 2002, Ottawa, Ont. ICWSE

McDill, J. M. J., and Mills, S.E. Tracking the Gender Barrier, June 2000, St. John's, Nfld. ICWSE.

Surh, L. C., Capelli, M., Hunter, A., Feeny, D., Kymlicka, W., Rodgers, S., Mills, S. E., Norminton, E. J., Picard, C., Wells, G., Wertz, D., Kasaboski, A., William, J. (1996). Deciding when Genetic Technology becomes Health Care Service. American Society of Human Genetics, October, 1996.

Adrian, M., Lundy, C., Eliany, M., Andrews, F., Blackwell, J., Blais, D., Carver, V., Chaikelson, J., Chevalier, S., Clarke, J., Dini, C., Farinon, L., Ferrence, R., Graham, D., Greaves, L., Harvey, K., Hill, S., Janacek, E., Leigh, G., Lightfoot, L., MacGregor, L., Mills, S., Morrissette, P., Nadeau, L., Paquin, A., Pederson, L., Ross, H., Scott, K., Tabisz, E., Thompson, J., Thurston, W., Webster, I., 1995. Women's Use of Alcohol, Tobacco and Other Drugs in Canada. 123rd Annual Meeting of the American Public Health Association, Oct, 29-Nov. 2, 1995, San Diego, California, U.S.A.

Surh, L. C., Capelli, M., Hunter, A., Feeny, D., Kymlicka, W., Rodgers, S., Mills, W., Norminton, T., Picard, C., Wells, G., Wertz, D., Kasaboski, A., William, J. (1996). Deciding when Genetic Technology becomes Health Care Service. American Society of Human Genetics, October, 1996.

Adrian, M., Lundy, C., Eliany, M., Andrews, F., Blackwell, J. Blais, D., Carver, V., Chaikelson, J., Chevalier, S., Clarke, J., Dini, C., Farinon, L., Ferrence, R., Graham, D., Greaves, L., Harvey, K., Hill, S., Janacek, E., Leigh, G., Lightfoot, L., MacGregor, L., Mills, S., Morrissette, P., Nadeau, L., Paquin, A., Pederson, L., Ross, H., Scott, K., Tabisz, E., Thompson, J., Thurston, W., Webster, I., 1995. Women's Use of Alcohol, Tobacco and Other Drugs in Canada. 123rd Annual Meeting of the American Public Health Association, Oct.29-Nov.2, 1995, San Diego, California, U.S.A.

Mills, S.E., Norminton, E.J., Surh, L., Walker, S. (1995). Policy Planning for new genetic services: the use of decision trees and regression analyses to assess cost effectiveness in molecular genetics. Presented at the American Society of Human Genetics Conference, October, 1995.

Adrian, M., Lundy, C., Eliany, M., Andrews, F., Blackwell, J. Blais, D., Carver, V., Chaikelson, J., Chevalier, S., Clarke, J., Dini, C., Farinon, L., Ferrence, R., Graham, D., Greaves, L., Harvey, K., Hill, S., Janacek, E., Leigh, G., Lightfoot, L., MacGregor, L., Mills, S., Morrissette, P., Nadeau, L., Paquin, A., Pederson, L., Ross, H., Scott, K., Tabisz, E., Thompson, J., Thurston, W., Webster, I., 1995. The Need for a Woman-Centred Approach to Deal with Women's Use of Alcohol, Tobacco and Other Drugs. Refereed paper presented at the VI International Conference on the Reduction of Drug Related Harm, Florence, Italy, 26-30 March, 1995.

Andrews(Kellner), F. A., Mills, S. E., Hill, Suzanne, and Webster, I., 1993. Examining Gender Differences in Alcohol-Related Victimization: an Analysis of the 1989 National Alcohol and Other Drugs Survey. Refereed paper presented at the August

1993 American Sociological Association Meeting, Miami, Florida.

Andrews, F.A., Mills, S.E., Hill, Suzanne, and Webster, I., 1992. Gender Differences in Alcohol-Related Victimization: an Analysis of the 1989 National Alcohol and Drug Survey. Refereed paper presented at the 1992 Kettlebrun Meeting, Toronto, Canada.

Taylor, R. P., Mills, S., Chen, S. and El-Saadany, S., 1991. Reliability Assessment for Safety Critical Systems, 12th Canadian Nuclear Society Conference Proceedings, pp. 383-388.

Andrews, F. A., Mills, S. E., 1991. Cannabis Use and Abuse: a Causal Analysis, Refereed paper to American Sociological Assoc., Cincinnati.

Mills, S. E., 1991. Work-Family Conflict: An analysis of dual career males and females, A.S.A. Atlanta.

Andrews, F. A., Mills, S. E., 1991. Cannabis Use and Abuse: a Causal analysis, A.S.A. Cincinnati.

Mills, S. E., 1991. Development of a Statistical Consulting Centre, Proc. of Applied Statistics Conference, Montreal.

Mills, S. E., 1990. Software Reliability, A.S.A., Florida.

Duxbury, L. and Mills, S.E., 1989. The "Electronic Briefcase" and Work-Family Conflict: A Comparison of Dual Career and Traditional Males, Refereed paper to Int'l Quality of Life Conf., Raleigh, N. C.

Mills, S. E., 1989. Software Quality Assurance, A.S.A., San Francisco.

Duxbury, L. and Mills, S.E., 1989. The "Electronic Briefcase" and Work-Family Conflict: An Analysis by Gender, Stat. Soc. of Canada, Ottawa.

Mills, S. E., 1988. The Teaching of Applied Statistics: A Consulting Workshop, SSC, Victoria, B.C. ICOTS II. Mills, S. E., 1987. Outliers in Life-Testing Data. ASA, 1987.

5.) Major invited contributions and/or technical reports (CLASSIFIED PAPERS AND TECHNICAL REPORTS FOR THE STATISTICAL CONSULTING CENTRE ARE NOT INCLUDED IN THIS LISTING):

Mills, S. E. (2019) Data Analytics and its Application to the World of Sports, Jan. 31, 2019 U. Manitoba, Dept. of Statistics

Mills, S. E. (2018) Insights using Predictive Analytics, March 14, 2018, Carleton University Mills, S.E. (2018) Panel Discussion at 2018 International Methodology Symposium, Statistics Canada

Mills, S.E. and Schuckers, M. (2016) Co-organizer of Hockey Analytics 2018, Carleton University, September 10, 2018.

Mills, S. E. and Schuckers, M. (2017) Co-organizer of Hockey Analytics 2017, Carleton University, May 5, 2017.

Mills, S. E. (2017) Predictive Analytics, Data Day 4.0, Carleton University

Mills, S. E. and Schuckers, Michael (2016) Co-organizer of Hockey Analytics 2016, Carleton University, January 16, 2016.

Mills, S. E. and Schuckers, Michael (2015). Co-organizers of Hockey Analytics 2015, Carleton University, February 7, 2015.

Mills, S. E. (2015). *Privacy Preserving Classification for Partitioned Data*, Invited Paper, SSC2015 Halifax, June 15.

Mills, S. E. (2015). Data Mining: Analytics for the Big Data Age, Workshop on Data Mining: 2016 StatsCan Methodology Symposium

Mills, S. E. (2015). Invited Talk to BISS Section of SSC2015. Privacy-Preserving Supervised Learning, SSC2015 Halifax, June 15.

Mills, S. (2013) Big Data Talk, Statistical Society of Ottawa

Li, C., Austin, C., and Mills, S.E. (2013) NAPS database development for Environment Canada/Health Canada

Belanger, P. and Mills, S.E. (2010). Use of Visual Sampling Plan for Assessment of Hazard of Unexploded Ordinance site at Commonage Vernon, B.C., Call-up#5 Report for NOTRA/DND, Ottawa

Mills, S. E. (2008) Modelling Massive Networks using Tensors, NICDS, Ottawa

Sarkar, A., Mills, S. E. and Razaqpur, A. G., (2009). A Review on Risk Analysis: Probabilistic, Possibilistic and Evidence Theory, Evidence Theory, Prepared for Royal Canadian Mounted Police, Ottawa.

Mills, S. E. (2007) Mining of Massive, Sparse Graphical Networks, NPCDS, BIRS

Mills, S. E. (2006) Graph Mining, NPCDS, Toronto

Mills, K.E., Mills, S.E., Nair, S. S., and Norminton, E. J. (2005). Visualizing Network Scans, SAMSI

K.E., Mills, S.E., Norminton, E.J. (2005). A Framework for Mining Email Communications, SAMSI

Chipman, H.E. and Mills, S.E. (2005). Pattern Discovery in Massive Social Networks, SAMSI

- Mills, S.E. and Norminton, E.J. (2005). Pattern Recognition in Email Communications Interface'05.
- Mills, S.E. and Norminton, E.J. (2005). Pattern Recognition in Email Communications. SWUNEH05
- Mills, S.E. and Norminton, E.J. (2005) Data Mining of Social Networks, BRS/NPCDS
- Mills, S.E. (2004) Data Mining in Government, Canada Customs and Revenue Agency
- Mills, SE., and Norminton, E.J. (2004) Invited Workshop "Data Mining for Business and Finance", Business and Engineering Section, SSC Annual Meeting
- Mills, S.E. and Norminton, E.J. (2004) Visualizing Network Scanning Activity, SAWUNEH04 Mills, S.E. and Norminton, E.J. (2003) Mining Meta-Data, SAWUNEH03
- Mills, S., E. and Norminton, E., J. (2003) Data mining of meta-data. CSE.
- Mills, S.E. and Norminton, E.J. (2002) Data Mining, CSE
- Fontaine, C., and Mills, S., 2001. Results of a Statistical Study of Canadian University Enrolments and Graduates and Implications for the Full-time Professoriate in Canada. OCUFA Forum.
- Mills, S.E., Chen, S., El-Saadany, S., Liu, X., 1995. Reliability Assessment for Safety Critical Systems by Statistical Random Testing. Prepared for the Atomic Energy Control Board under its Regulatory Research and Support Program, Ottawa, Canada. AECB Project No.2.127.5 November 1995.
- Andrews, F. A. and Mills, S. E., 1993. Patterns of Use and Abuse of Beverage Alcohol, Tobacco and Cannabis in Canada: an Analysis of Available Data. Health and Welfare Canada.
- Duxbury, L., Higgins, C., Lee, C., and Mills, S. E., 1991. Balancing Work and Family: A Study of the Canadian Federal Public Sector. Health and Welfare Canada.
- Sont, W. and Mills, S. E., 1987. Radiation dosimetry: Use of the hybrid lognormal distribution. Dept. of National Health and Welfare.
- Mills, S.E. 1987. Fixed-width distribution-free confidence interval estimation of quantiles of localized historical acoustical data from a Fixed-Site Airport Noise Monitoring System, Dept. of Transport
- Mills, S. E. 1987. Monte Carlo computer simulation results for the Beta-Binomial Distribution. Dept. of National Health and Welfare
- Mills, S. E. 1987. Statistical Protocol for Risk Assessment of Aerobic Dance Injury. Sport Medicine Clinic, Carleton University.
- Mills, S.E. 1986. Modelling of annual occupational dose of radiation. Technical Report #93, Laboratory for Research in Probability and Statistics, Carleton University.
- Mills, S.E. 1986. A Critique of Methodology of the National Roadside Survey. Traffic Injury Research Foundation, Ottawa.
- Mills, S.E. 1985. Modelling annual occupational radiation dose and estimating risk. Radiation Protection Branch, Dept. of National Health and Welfare.
- Mills, S.E. 1985. Home Use Medical Device Experiments - Statistical Design II. Dept. of National Health and Welfare.
- Mills, S.E. 1985. Home Use Medical Device Experiments - Statistical Design I. Dept. of National Health and Welfare.
- Mills, S.E. 1983. Outliers in life-testing distributions, Ph.D. Thesis, U. of Alberta.

6.) Magazine Articles:

Adrian, M., Lundy, C., Eliany, M., Andrews, F., Blackwell, J. Blais, D., Carver, V., Chaikelson, J., Chevalier, S., Clarke, J., Dini, C, Farion, L., Ferrence, R., Graham, D., Greaves, L., Harvey, K., Hill, S., Janacek, E., Leigh, G., Lightfoot, L., MacGregor, L., Mills, S., Morissette, P., Nadeau, L., Paquin, A., Pederson, L., Ross, H., Scott, K., Tabisz, E., Thompson, J., Thurston, W., Webster, I., 1995. The Need for a Woman-Centred Approach to Deal with Women's Use of Alcohol, Tobacco and Other Drugs. International News Magazine Women and Drugs, 2nd Ed., (The Boumanhuis Foundation, The Netherlands), August 1995.

7.) Invited Talks

a) To other academic bodies

- Mills, S. E. (2019). Invited Talk "Predictive Analytics in Business and Industry", U. M. Dept. of Statistics
- Mills, S. E. (2017). Invited Talk on "Big Data and Predictive Analytics" to Data Day 4.0, Carleton University
- Mills, S. E. (2017). Invited Talk on "Visualization of Big Data" to Science Writers of Canada, Ottawa September 2017
- Mills, S. E. (2015). Invited Workshop on "Predictive Analytics" to Statistics Canada Symposium 2017
- Mills, S. E. (2015). Invited Talk to BISS Section of SSC2015. Privacy-Preserving Supervised Learning,

SSC2015 Halifax, June 15.

Mills, S. E. (2013) Big Data and Statistics, Statistical Society of Ottawa

Mills, S.E. (2009) The Math behind Numb3rs, the TV Show, 0 to Infinity Day, Carleton University

Mills, S. E. (2008) What do Facebook, pro sports, web surfing and terrorism have in common? 0 to Infinity Day, Carleton University

Mills, S. E. (2005) Data Mining, University of Waterloo Dept. of Statistics and Actuarial Science

Mills, S. E. (2004) Invited Workshop "Data Mining for Business and Finance", Business and Engineering Section, SSC Annual Meeting

Mills, S. E. and Norminton, E. J. (2003) Invited talk "Analysis of Meta-Data" to the Communications Security Establishment, Ottawa

Mills, S. E. and Norminton, E. J. (2003) Invited workshop "Data Mining" to the Communications Security Establishment. Ottawa

Fontaine, C., and Mills, S., Results of a Statistical Study of Canadian University Enrolments and Graduates and Implications for the Full-time Professoriate in Canada, OCUFA Hire Education Forum, Jan.26, 2001, Toronto

b.) non-academic talks

2008,2009,2010 - 0 to Infinity Day, School of Math and Stat., Carleton University

2003 Invited Workshop "Data Mining", CSE

1997 Invited Panellist at Round Table - Women, Gender and Science: New Historical, Philosophical and Policy Perspectives, Conference at Carleton University March 24, 1997

8.) Papers presented

a.) to learned societies

Burr, B, Wang, C-W(S), Salmon, G, Soliman, H., Mills, S (2020)..On the Detection of Persistent Attacks using Alert Graphs and Event Feature Embedding, IEEE-NOMS, 4-4-2020

Mills, S. E. (2017). Data Science and Statistics, Isobel Loutit Lecture, SSC 2017, Winnipeg.

Mills, S. E. (2015). Privacy-Preserving Supervised Learning, SSC2015, Halifax, June 15.

Mills, K.E., Mills, S.E., Nair, S. S., and Norminton, E. J. (2005). Visualizing Network Scans, SAMSI

Mills, K.E., Mills, S.E., Norminton, E.J. (2005). A Framework for Mining Email Communications, SAMSI

Chipman, H.E. and Mills, S.E. (2005). Pattern Discovery in Massive Social Networks, SAMSI

Mills, S.E. and Norminton, E.J. (2005). Pattern Recognition in Email Communications Interface'05.

Mills, S.E. and Norminton, E.J. (2005). Pattern Recognition in Email Communications. SAWUNEH05

Mills, S.E. and Norminton, E.J. (2005) Data Mining of Social Networks, BRS/NPCDS

Mills, S.E. (2004) Data Mining in Government, Canada Customs and Revenue Agency

Mills, S.E. and Norminton, E.J. (2004) Visualizing Network Scanning Activity, SAWUNEH04

Mills, S.E. and Norminton, E.J. (2003) Mining Meta-Data, SAWUNEH03

Mills, S., E. and Norminton, E., J. (2003) Data mining of meta-data. CSE.

Mills, S.E. and Norminton, E.J. (2002) Data Mining, CSE

Surh, L. C., Capelli, M., Hunter, A., Feeny, D., Kymlicka, W., Rodgers, S., Mills, W., Norminton, T., Picard, C., Wells, G., Wertz, D., Kasaboski, A., William, J.(1996). Deciding when Genetic Technology becomes Health Care Service, American Society of Human Genetics, October, 1996. .

Adrian, M., Lundy, C., Eliany, M., Andrews, F., Blackwell, J. Blais, D., Carver, V., Chaikelson, J., Chevalier, S., Clarke, J., Dini, C, Farinon, L., Ferrence, R., Graham, D., Greaves, L., Harvey, K., Hill, S., Janacek, E., Leigh, G., Lightfoot, L., MacGregor, L., Mills, S., Morissette, P., Nadeau, L., Paquin, A., Pederson, L., Ross, H., Scott, K., Tabisz, E., Thompson,

J., Thurston, W., Webster, I., 1995. Women's Use of Alcohol, Tobacco and Other Drugs in Canada. 123rd Annual Meeting of the American Public Health Association, Oct.29-Nov.2, 1995, San Diego, California, U.S.A.

Mills, S.E., Norminton, E.J., Surh, L., Walker, S. (1995). Policy Planning for new genetic services: the use of decision trees and regression analyses to assess cost effectiveness in molecular genetics. Presented at the American Society of Human Genetics Conference, October, 1995.

Adrian, M., Lundy, C., Eliany, M., Andrews, F., Blackwell, J. Blais, D., Carver, V., Chaikelson, J., Chevalier, S., Clarke, J., Dini, C., Farinon, L., Ferrence, R., Graham, D., Greaves, L., Harvey, K., Hill, S., Janacek, E., Leigh, G., Lightfoot, L., MacGregor, L., Mills, S., Morissette, P., Nadeau, L., Paquin, A., Pederson, L., Ross, H., Scott, K., Tabisz, E., Thompson, J., Thurston, W., Webster, I., 1995. Women's Use of Alcohol, Tobacco and Other Drugs in Canada. 123rd Annual Meeting of the American Public Health Association, Oct.29-Nov.2, 1995, San Diego, California, U.S.A.

Andrews, F. A., Mills, S. E., Hill, Suzanne, and Webster, I., 1993. Examining Gender Differences in Alcohol-Related Victimization: an Analysis of the 1989 National Alcohol and Drug Survey. Refereed paper presented at the August 1993 American Sociological Association Meeting, Miami, Florida.

Andrews, F.A., Mills, S.E., Hill, Suzanne, and Webster, I., 1992. Gender Differences in Alcohol-Related Victimization: an Analysis of the 1989 National Alcohol and Drug Survey. Refereed paper presented at the 1992 Kettlebrun Meeting, Toronto, Canada.

Taylor, R. P., Mills, S., Chen, S. and El-Saadany, S., 1991. Reliability Assessment for Safety Critical Systems, 12th Canadian Nuclear Society Conference Proceedings, pp. 383-388.

Andrews, F. A., Mills, S. E., 1991. Cannabis Use and Abuse: a Causal Analysis, Refereed paper to American Sociological Assoc., Cincinnati.

Duxbury, L. and Mills, S.E., 1989. The "Electronic Briefcase" and Work-Family Conflict: A Comparison of Dual Career and Traditional Males, Refereed paper to Int'l Quality of Life Conf., Raleigh, N. C.

Mills, S. E., 1991. Work-Family Conflict: An analysis of dual career males and females, A.S.A., Atlanta Andrews, F. A., Mills, S. E., 1991. Cannabis Use and Abuse: a Causal analysis, A.S.A. Cincinnati.

Mills, S. E., 1991. Development of a Statistical Consulting Centre, Applied Statistics Conference, Montreal. Mills, S. E., 1990. Software Reliability, A.S.A., Florida.

Mills, S. E., 1989. Software Quality Assurance, A.S.A., San Francisco.

Duxbury, L. and Mills, S.E., 1989. The "Electronic Briefcase" and Work-Family Conflict: An Analysis by Gender, Stat. Soc. of Canada, Ottawa.

Mills, S. E., 1988. The Teaching of Applied Statistics: A Consulting Workshop, SSC, Victoria, B.C. Mills, S. E., 1987. Outliers in Life-Testing Data. ASA, 1987.

Mills, S. E., 1986. The Use of Computers in Teaching Statistics, Second International Conference on the Teaching of Statistics, Aug. 1986.

Mills, S. E., 1984. Outlier-proneness of the family of Weibull distributions. Annual meeting of ASA, ENAR, WNAR.

b.) to other academic bodies

Mills, S. E. and Norminton, E. J. (2003) Invited talk "Analysis of Meta-Data" to the Communications Security Establishment, Ottawa

Mills, S. E. and Norminton, E. J. (2003) Invited workshop "Data Mining" to the Communications Security Establishment, Ottawa

Fontaine, C., and Mills, S., Results of a Statistical Study of Canadian University Enrolments and Graduates and Implications for the Full-time Professoriate in Canada, OCUFA Hire Education Forum, January 26, 2001, Toronto.

Mills, S., E., Chen, S., El-Saadany, S., Liu, X., "Reliability Assessment for Safety Critical Systems by Statistical Random Testing", AECB Project No.2.127.5, to AECB, November, 1995.

Mills, S. E., 1994. Invited talk "A Binary Markov Process Model for Random Testing" to the Centre for Mathematical Sciences, AECL Research (Math, Sci. and Tech. Seminar)

Mills, S. E., 1994. Invited talk "Environmental Research - Making a Difference" to Ontario Public School Teachers' Federation "Challenge of Change" conference

Mills, S.E., 1993. Two invited talks: "Work and Family Conflict" and "Software and Hardware Reliability" to OALT 20th Annual Conference

Mills, S. E., 1990. Statistical Random Testing of Safety-Critical Software, Workshop on Software Reliability 1990, Ottawa.

Mills, S. E., 1985. Detection of outliers in linear models. Business Surveys Methods Division, Statistics Canada (invited).

Mills, S. E., 1984. The concept of outlier-proneness. Arizona State University. (invited).

c.) non-academic talks:

2008 Invited Workshop “Data Mining for Business and Finance”, Business and Engineering Section, SSC Annual Meeting

2003 Invited Workshop “Data Mining”, CSE

1994 Invited talk "Women in Non-traditional Careers", Pathmakers' Forum

1994 Shad Valley, Ottawa: Invited talk "Substance Use and Abuse among Canadian Youth"

i. Research Funding

i) GRANTS

<u>Year</u>	<u>Funding Source</u>	<u>Type*</u>	<u>Amount per year</u>
2023-25	SSHRC/NFRF	G	\$500,000(A.Sarkar et al)
2023	CANSSI	G	\$5,000
2022	CANSSI Sports Analytics Grp	G	\$10,000
2022	CANSSI	G	\$5,000
2021	CANSSI	G	\$5,000
2020	Fields-Ont. Govt.	G	\$60,000
2021-24	Universities Canada & IDRC	G	\$3,500,000 QES-AS-WA
2019-	IDRC - Gendered Design in STEAM	G	\$1,100,00 (Sector Expert- (PIs-Hallgorson/Marshall)
2019	City of Ottawa-Open Data	G	3,000
2019	Fields/Ont.Govt.	G	2,500
2019	Fields/Ont.Govt.	G	3,000
2019	Fields/Ont.Govt.	G	3,000
2019	Fields/Ont.Govt.	G	10,000
2018-20	Fields/Ontario(CQAM Labs)	G	\$2M/yr for 2 years
2018-19	Fields	C	120,000 (with J. Green)
2016	Carleton – Internal	G	2,500
2015	Carleton - Internal	G	2,000
2014	Tri-Council -P.I. Majumdar	C	150,000
2013	Environment Canada	G	24,600
2010-	NOTRA	O	13,000
2008-9	Citizenship and Immigration	G	32,000/yr for 2 years
	CSEC	G	7,000
	NICDS	C	7,000
	NSERC-MITACS	C	15,000
	NSERC-MITACS	C	15,000
2005-	NPCDS	C	4,000
		G	25,000
	CSE	G	53,000
2004	CSE	G	25,000
	UAE	G	20,000
2003-4	CSE	G	16,300
	CAUT	O	2,500
2002-3	CSE	G	5,400
2001-2	Health Canada	G	12,500
2000	CAUT	O	4,000

1999	CPIC	G	29,500
1998-2001	MRC P.I.-M. Frize	C	197,264 (4 years)
1999-	Heenan Blaikie	I	24,000
1999-2001	Health Canada	G	36,000
1999	Psychological Corp	I	5,500
1998	Dept. of Justice	G	24,500
1995-2001	MELSI(MRC) -P.I.: L. Surh	C	278,464 (6 years)
1994-97	Ag. Canada	G	3,500
1994	Air Canada	G	4,000
1994-95	Can. Pharm	I	4,500
1994-96	Rev.Canada	G	16,380
1994	Fac. of Science	O	4,500
1993-94	DSS	G	80,000
1993-96	Tri-Council-P.I.:P.	C	\$ 2.25M (3
1993-96	City of Cornwall	C	\$1M(3 years)
1990-91	NSERC	C	7,200
1989-92	NHRDP	G	124,100
1989-92	NHRDP	G	92,400
1987	NSERC	C	3,986
1986	SEED'86	G	2,700
1984-86	NSERC	C	4,986

*Type: C-Granting councils; G-Government; F-Foundations; O-Other

ii) University

<u>Source</u>	<u>Purpose</u>	<u>Amount</u>	<u>Year</u>
MCRF	Cancer HotSpots-Geog. & Genomic	\$20K (joint)	2019-
Endowment	Basketball Analytics	Interest on \$1M	2018-
Fac. of Science	Chilly Climate Study	4,500	1994
Research Leadership Fund	Statistical Consulting Ctr	45,000	1987-88
GR-V	AIDS Research	3,000	1988
Travel	Research	1,200	1987
GR-V	Computer Assisted Instruction	2,200	1986-87
Undergrad Teaching Fund	Computer Lab. for Stat.	70,000	1985-87

iii) Contracts

<u>Source</u>	<u>Purpose</u>	<u>Amount</u>	<u>Year</u>
Ag. Canada	Optimization testing	3,500	1994
Air Canada	Employment Equity	4,000	1994
Can. Pharm.	CPhIS Study II	4,500	1994
Rev. Can.	GST Statistics	16,380	1994

j.) Service to the Profession

i) Offices in learned societies

- 2022-23 Co-organizer SSC2023
- 2021-22 Co-organizer VOC SSC2022
- 2020-21 Co-organizer VOC SSC2021
- 2020- Treasurer of Data Science and Analytics Section, SSC
- 2018-20 Appointed Co-local organizer, SSC2020 Annual Meeting @ Carleton U, Ottawa
- 2018-19 Past President – BISS, Statistical Society of Canada
- 2017-18 President – BISS, Statistical Society of Canada
- 2016 -17 President-Elect – BISS , Statistical Society of Canada
- 2011 - Executive Director, Statistical Society of Canada
- 2010 - Representative of the SSC to the Canadian Consortium for Research.
- 2004 -08 Secretary, BISS, Statistical Society of Canada
- 1994-99 Chair, Committee on Regional and Society Cooperation, Statistical Society of Canada
- 1993-95 President, Caucus for Women in Statistics (Canada)
- 1992-93 Past President, Statistical Society of Ottawa
- 1992-93 Chair, Committee on Statistical Consulting, Statistical Society of Canada
- 1991-92 President, Statistical Society of Ottawa
- 1990-92 Member, Committee on Statistical Consulting, SSC
- 1990-94 Secretary, Statistical Society of Canada
- 1990- Canadian Rep., International Women in Mathematics
- 1990-91 President-Elect, Statistical Society of Ottawa
- 1989-90 Secretary, Statistical Society of Ottawa
- 1976-78 Treasurer of the Statistical Association of Manitoba
- 1975-76 Secretary and Founding Member of the Statistical Assoc. of Manitoba

ii) Scholarly assessments

- 2007- Refereeing paper for IEEE- Transactions on Systems, Man and Cybernetics
- 2005- Refereeing papers for *Statistical Science*
- 1987- Refereeing papers for *The Canadian Journal of Statistics* and *IEEE*

iii) Other

1999-2001 Expert witness re statistical issues in Employment Equity

1994-97 Statistical Advisor on Market Value Assessment

1993 Member of Statistics Canada committee re Guaranteed Minimum Income Study

1992- Commentator on CBC Radio re:

* Polling

* Canada Elections Act

* Macleans' Survey of Universities

1992-93 Expert witness re employment equity statistics

k) Consulting work with Statistical Consulting Centre:

Ag. Canada Optimization testing 3,500 1994

Air Canada Employment Equity 4,000 1994

Can. Pharm. CPhIS Study II 4,500 1994

Rev. Can. GST Statistics 16,380 1994

DSS Lead Biokinetics 80,000 1993-94

Can. Pharm. CPhIS Study I 10,000 1993

Bank of Canada Time Series Modelling 7,000 1993

Lockwood Analysis of. Repeated Measures 2,500 1993

AECB Radon daughter analysis 4,500 1993

Can. Pharm. Clinical Pharm. Services Study 3,000 1992-93

Ag. Can. Risk Assessment 3,200 1993

Bell Canada Multiple comparisons(correl) 8,000 1993

Yukon YADS analysis 20,000 1993

Rev. Canada GST stat. database analysis 25,000 1993

IDRC-U. of O. Zaire - soil contamination 4,000 1992

M. Smith(Carleton) Fourier analysis of permafrost 2,500 1992

Further analysis re permafrost 2,000 1992-93

GRP-Wilson Market research 4,000 1992

Health and Welfare Optimal Designs 4,500 1992

NRC-Biomedical NMR analyses and stat.methods 3,000 1992-

Revenue Canada Sampling and Estimation 24,000 1992-93

Bank of Canada Economic Modeling 135,000 1991-92

Revenue Canada Sampling methodology 24,500 1991-92

NRC Biomedical Stat. Consulting 2,400 1991-92

AECB Software Reliability 50,000 1990-92

ADRI Response Surface Modeling 3,000 1990-91

Agric. Canada Risk Assessment 3,000 1990-91

Norlite Tech. Autodialing 4,800 1990

Health & Welfare Stat. Guidelines for NADS 2,600 1990-91

Health & Welfare Stat. Methodology 4,500 1990-91

Bell Canada Employment Equity Study 20,000 1990-91

Nat. Lib. Survey Microforms 4,500 1990-91

CHALLENGE'90 Substance Abuse Study 2,700 1990-91

Health & Welfare Research analysis 22,000 1987-88

AECB Modelling of Neutron overpower 17,500 1988-89

DEC Contact Physics 42,500 1988-91

Canada Post Tests of automated equipment 2,500 1988

Health and Welfare Computer programming 3,500 1987 re beta-binomial

Health & Welfare Radiation Dosimetry 5,000 1986-87

Transport Quantile estimation 4,500 1986-87

TIRF Blood Alcohol Level Analysis 1,200 1986

Health & Welfare Experimental Design for Medical Device Experiments II 3,000 1985

Health & Welfare Experimental Design for Medical Device Experiments I 3,000 1984

PROJECT LEADER ON: (partial listing)

1. Bank of Canada - Highly confidential work involving complex statistics and mathematics.

Statistical modelling using Splus. Calculation of turning point probability in economics. Calculation of the curvature in non-linear statistical modelling; correcting A/C, B/C criterion in multivariate time series in the software "MASTER FORECAST". Estimation of the state space model.

2. Digital Equipment - Contact physics with major impact on design of computer equipment. Highly confidential.

Analysis of data from first two phases of their experiments; design of subsequent experiments; interface with Battelle Labs to conduct sophisticated simulation and testing of computer equipment and manipulation of data files to perform statistical analyses and prepare reports based upon complex experimental designs.

3. The Psychological Corporation

Development of a complex sampling scheme to represent the Canadian population of school-age children for the purpose of validation of American norms on Canadian students for the WISC-III. Interface with Statistics Canada data and development of new sampling schemes with corresponding analysis methodology, meeting restriction of cost restraints and representativeness of marginal proportions. New theoretical results in statistics.

4. Agriculture Canada

Development of statistical assessment of risk for importation of animals and animal products. Development of a

computerized risk assessment model; international collaboration and support to develop a scheme which may be adopted by several countries.

5. ARA Consultants

Recovery of data which was the output of unknown programme and statistical analyses of this data set.

6. National Library

Data entry, creation of a SAS data set in UNIX, analysis of data using SAS and report preparation, with attendant graphics and summary statistics. Interpretation of a complex sampling scheme developed by Statistics Canada and communication of results to the client.

7. Dendron Resources

Survey of tree-growing related to climate. Interface with VAX computing environment and transport of data files via remote networking. Programming was done in SAS with analysis involving time series and cubic splines. Decoding of several large data sets which were lacking in documentation. Sophisticated statistical analyses which were required for appropriate interpretation.

8. Atomic Energy Control Board

Assessment and demonstration of the concept of statistical random testing of computer software to ascertain ultra-high reliability. Simulation of operational profiles using sophisticated computer programmes; deciphering of complex computer code; access to confidential programmes and documents. Preparation of statistical reports, conference presentations and seminars. Original research results on statistical random testing.

9. National Library

Transfer of data from a spreadsheet database to perform analyses using SAS on IBM/PC. Report generation with graphics interfaced with word processing.

10. Atomic Energy Control Board

Statistical analysis and critique of neutron overpower systems. This project required the acquisition of considerable knowledge in the field of physics and in particular in nuclear energy. Melding of engineering concepts with statistical ideas and presenting findings to a hostile environment.

11. Correctional Services

Development of complex sampling scheme under tight time and financial constraints, with statistical analysis plan provided.

12. Central Canada Exhibition - Market research.

Complete development of a survey to profile the attendance at the CCE. Development of survey instrument and sampling scheme, training and coordination of interviewers, with accompanying data entry, verification and statistical analyses. Comprehensive report to client.

13. Animal Disease Research Institute

Design of sophisticated vaccine trials using concepts of response surface methodology and experimental design. Analyses using SAS. Flaws in the standard methodology used by the international veterinary community for vaccine testing.

14. Bell Canada

Critique of statistical methodology related to employment equity analyses. Expert witness in litigation.

15. Silico Computer Systems

Review of confidential data files of the Dept. of National Defence and analyses related to these files. Quantitative reference for the economic ordering model based on a case history survey. Feasibility Study Report for Economic Ordering System for Ammunition Procurement.

16. Norlite Technology, Inc.

Analysis of a stationary system and proposal of a solution to handle the advance/predictive dialling problem for computerized telemarketing systems. New statistical research related to auto-dialling systems.

17. UMA Engineering - Ottawa-Carleton Cyclist Profile survey. Development of survey design, survey instrument, construction of database and analysis of survey results.

18. ACS Group - Telephone survey for follow-up re environmental survey

19. NRC Biomedical Section - Statistical training to a group of employees covering a wide range of statistical topics

20. GRP-OTT - Analysis of market research data to examine propensity to pledge and propensity to pay.

21. Burke Robertson - Expert witness affidavit re: patent litigation on Krazy Glue

22. M. Smith - Analysis of time series data on weather and incorporation in the analysis of permafrost conditions.

23. Health and Welfare - SAS training

24. Revenue Canada - development and testing of the Canadian GST database and related statistics

25. Canadian Pharmaceutical Association- development of database and statistical analysis and testing for clinical pharmacy study with regard to prescription drugs in Canada

26. U. of Ottawa Health Sciences - Large scale survey of caregivers of chronic care cancer patients

27. Health and Welfare Canada - Lead Biokinetics Study examining the transfer of lead from female monkeys to their fetuses. (funded by DSS through NIEHS)

28. Substance Use and Abuse Project - Combination of numerous large scale survey databases from Statistics Canada, Revenue Canada, Gallup, etc. Sophisticated statistical analyses of these databases to develop models predicting substance use and abuse in Canada.

29. Work-Family Stress Project - Design and analyses of large scale studies of the public and private sectors in Canada with regard to work stress, family stress and work-family stress. Psychological and demographic profiles developed and complex statistical models developed. Design and development of database developed as well.

30. CODE – Literacy assessment in Liberia

31. CFIA – Beef and Pork sampling in Canada

Jason D. Nielsen

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webpage: <http://www.math.carleton.ca/~jdn>

EDUCATION	Ph.D. in Statistics 2007 Simon Fraser University, Burnaby, British Columbia, Canada Advisor: Charmaine Dean Title: Spline Models for the Analysis of Recurrent Event Panel Data
	M.Sc. in Statistics 2001 Simon Fraser University, Burnaby, British Columbia, Canada Advisor: Charmaine Dean Title: An Exploration of the use of B-splines for the Semiparametric Analysis of Recurrent Event Data
	B.Sc. in Mathematics with Distinction in Actuarial Science 1999 University of Calgary, Calgary, Alberta, Canada
ACADEMIC EMPLOYMENT	Associate Professor 2013- School of Mathematics and Statistics Carleton University, Ottawa, Ontario, Canada
	Assistant Professor 2007-2013 School of Mathematics and Statistics Carleton University, Ottawa, Ontario, Canada
RESEARCH INTERESTS	Random effects and finite mixture models for the analysis of longitudinal count data, application of adaptive spline smoothing in complex models, and computational statistics with a focus on stochastic and deterministic methods of global optimization.
REFEREED PUBLICATIONS	In Preparation/Submitted or Under Revision Nielsen, J. D. (2024). Adaptive density estimation under both shape and moment constraints. In preparation. Dehghani, P. and Nielsen, J. D. (2024). The analysis of recurrent event panel data with a finite mixture frailty. Under revision.

Published or Accepted

- Nielsen, J. D., Rosenthal, J. S., Sun, Y., Day, D. M., Bevc, I., and Duchesne, T. (2014). Group-based criminal trajectory analysis using the cross-validation criteria. *Communications in Statistics: Theory and Methods* **43**, 4337-4356.
- Heckman, N., Lockhart, R. and Nielsen, J. D. (2013). Penalized regression, mixed effects models and appropriate modelling. *Electronic Journal of Statistics* **7**, 1517-1552.
- Day, D. M., Nielsen, J. D., Ward, A., Sun, Y., Rosenthal, J. S., Duchesne, T., Bevc, I. and Rossman, L. (2012). Long-term follow-up of criminal activity with adjudicated youth in Ontario: Identifying offence trajectories and predictors/correlates of trajectory group membership. *Canadian Journal of Criminology and Criminal Justice* **54**, 377-413.
- Asadi, M., Goldak, J., Nielsen, J. D., Zhou, J., Tchernov, S. and Downey, D. (2009). Analysis of predicted residual stress in a weld and comparison with experimental data using a regression model. *International Journal of Mechanics and Materials in Design* **5**, 353-364.
- Nielsen, J. D. and Dean, C. B. (2008). Clustered mixed nonhomogeneous Poisson process spline models for the analysis of recurrent event panel data. *Biometrics* **64**, 751-761.
- Nielsen, J. D. and Dean, C. B. (2008). Adaptive functional mixed NHPP models for the analysis of recurrent event panel data. *Computational Statistics & Data Analysis* **52**, 3670-3685.
- Dean, C. B. and Nielsen, J. D. (2007). Generalized linear mixed models: A review and some extensions. *Lifetime Data Analysis* **13**, 497-512.
- Dean, C. B., Nathoo, F. and Nielsen, J. D. (2007). Spatial and mixture models for recurrent event processes. *Environmetrics* **18**, 713-725.
- Prior, J. C., Nielsen, J. D., Hitchcock, C. L., Williams, L. A., Vigna, Y. M. and Dean, C. B. (2007). Medroxyprogesterone and conjugated estrogen are equivalent for hot flashes: a 1-year randomized double-blind trial following premenopausal ovariectomy. *Clinical Science* **112**, 517-525.
- Nielsen, J. D. and Dean, C. B. (2005). Regression splines in the quasi-likelihood analysis of recurrent event data. *Journal of Statistical Planning and Inference* **134**, 521-535.

PUBLISHED REPORTS

- Day, D. M., Nielsen, J. D., Ward, A., Rosenthal, J. S., Sun, Y., Duchesne, T. and Bevc, I. (2012). Criminal trajectories of two subsamples of adjudicated Ontario Youths. *Public Safety Canada Research Report: 2012-1*. Available at: <http://www.publicsafety.gc.ca/prg/cp/ncpc-pubs-eng.aspx>

PRESENTATIONS

- “Model-Based Penalty Smoothing for Panel Data Under a Markov Assumption”, Invited Talk, Statistical Society of Canada (SSC) Meeting, Halifax, Nova Scotia, June 2015.
- “Calling C and Fortran from R”, Ottawa-Gatineau R Users Group (OGRUG) Meeting, Ottawa, Ontario, November 2011.

- “A Functional Approach to the Analysis of Recurrent Event Data”, Invited Talk, STATISTICS 2011 CANADA / IMST 2011-FIM XX, Montréal, Québec, July 2011.
- “A Functional Approach to the Analysis of Recurrent Event Data”, Invited Talk, Statistical Society of Canada (SSC) Meeting, Wolfville, Nova Scotia, June 2011.
- “Statistical Computing: 2010 and Beyond”, Banff International Research Station for Mathematical Innovation and Discovery (BIRS), Invited Talk, Workshop – Functional Data Analysis: Future Directions, Banff, Alberta, May 2010.
- “Adaptive L-spline Smoothing with Applications”, Statistics and Probability Seminar, University of Ottawa, Ottawa, Ontario, March 2010.
- “Adaptive L-spline Smoothing with Applications”, Séminaire de Statistique, Université Laval, Québec City, Québec, February 2010.
- “Quantile Functions Distributed over Space and Time”, Invited Talk, Joint Statistical Meetings (JSM), Washington, DC, August 2009.
- “So you want to be Faculty?”, CRM/SSC Young Investigators Meeting, Université de Montréal, Montréal, Québec, April 2009.
- “Smooth Semiparametric Models for the Analysis of Recurrent Event Panel Data”, Statistics Seminar, University of Toronto, Toronto, Ontario, November 2008.
- “Adaptive Functional Models for the Analysis of Recurrent Event Panel Data”, Invited Talk, Western North American Region of the International Biometric Society (WNAR) Meeting, Davis, California, June 2008.
- “Functional Models for the Analysis of Recurrent Event Panel Data: With an Introduction to Smoothing”, Biology Department Seminar, Carleton University, Ottawa, Ontario, April 2008.
- “Adaptive Functional Models for the Analysis of Recurrent Event Panel Data”, Statistics Colloquium, Carleton University, Ottawa, Ontario, April 2008.
- “Adaptive Spline Models for the Analysis of Recurrent Event Panel Data”, Invited Talk, 1st Canada-Mexico Statistics Meeting, Guanajuato, Mexico, February 2008.
- “Adaptive Functional Models for the Analysis of Recurrent Event Panel Data”, Colloque de Statistique de Montréal CRM/ISM/GERAD, Montréal, Québec, February 2008.
- “Clustered Mixed Nonhomogeneous Poisson Process Model for the Analysis of Recurrent Event Panel Data”, Invited Talk, Joint Statistical Meetings (JSM), Salt Lake City, Utah, August 2007.
- “Adaptive Spline Models for the Analysis of Recurrent Event Panel Data”, Statistical Society of Canada (SSC) Meeting, St. John’s, Newfoundland, June 2007.
- “Mixed Nonhomogeneous Poisson Process Spline Models for the Analysis of Recurrent Event Panel Data”, Invited Talk, 17^o SINAPE - Simpósio Nacional de Probabilidade e Estatística, Caxambu, Brazil, July 2006.
- “A Functional Approach to the Analysis of Recurrent Event Panel Data”, Banff International Research Station for Mathematical Innovation and Discovery (BIRS), Invited Talk, Workshop on Forests, Fires and Stochastic Modeling, Banff, Alberta, May 2006.

“Mixed Nonhomogeneous Poisson Process Spline Models”, Invited Talk, Interdisciplinary Research in the Mathematical and Computational Sciences (IRMACS), Burnaby, British Columbia, November 2005.

“Mixed Nonhomogeneous Poisson Process Spline Models for the Analysis of Recurrent Event Panel Data”, Invited Talk, National Program on Complex Data Structures, Workshop on Current Issues in the Analysis of Incomplete Longitudinal Data, Fields Institute, Toronto, Ontario, October 2005.

”Mixed Nonhomogeneous Poisson Process Models for the Analysis of Recurrent Event Panel Data”, Western North American Region of the International Biometric Society (WNAR) Meeting, Fairbanks, Alaska, June 2005.

“A Light Introduction to Smoothing with an Emphasis on Splines”, Graduate Student Seminar Series, Department of Statistics and Actuarial Science, Simon Fraser University, November 2004.

“Spline Analysis of Recurrent Event Panel Data”, Latin American Congress on Probability and Mathematical Statistics IX (CLAPEM), Punta del Este, Uruguay, March 2004.

GRANTS

NSERC Discovery Grant 2008

Title: Dynamic Functional Models for Complex Recurrent Event Data Analysis

Amount: \$14,000 / year

Duration: 5 years

Dean of Science Start-up Grant 2007

Amount: \$30,000

STUDENT

Ria Verma Winter 2023

SUPERVISION

Title: Forecasting Recession in Canada and its Impact on the Housing Market
Undergraduate Honours Project

Rahda Verma Winter 2023

Title: Analysis on ChatGPT and Testing its Reliability
Undergraduate Honours Project

Jimi Owen Winter 2020

Title: Poisson Regression with Link Estimation and Penalized Splines
M.Sc. Project

Howard Silvey Winter 2020

Title: National Hockey League Data: Analysis and Prediction
Undergraduate Honours Project

Ventseslav Yordanov Fall 2019

Title: Fitting Spatially Correlated Data with a Poisson CAR Model
Undergraduate Honours Project

Parvin Dehghani Fall 2017
Title: The Analysis of Panel Data with a Flexible Frailty
M.Sc. Thesis

David Kenyi Fall 2017
Title: Investigating the Spread of Disease in Closed and Open Populations
Undergraduate Honours Project

Katrina Rogers-Stewart Summer 2015
Co-supervised with Professor Patrick Farrell
Title: Dose-response Modeling for Ordinal Outcome Data
Ph.D. Thesis

Nikolina Beg Winter 2015
Title: Model Based Penalized Smoothing for Panel Data Under a Markov Assumption
M.Sc. Thesis

Angelica Neisa Fall 2014
Title: Mixture Models for the Analysis of Heterogeneous Gene Expression in Growing
Yeast Cell Populations over Time
M.Sc. Project

Jonathan Boudreau Winter 2014
Title: Flexible Spline Based Models for the Analysis of Panel Data Under a Markov
Assumption
M.Sc. Thesis

Fares Said Fall 2012
Title: Modelling Resource Intensity Weights (RIWs) at the Canadian Institute For
Health Information (CIHI)
M.Sc. Thesis

Boyan Bejanov Fall 2011
Title: An Investigation into the Application of the Finite Element Method in Counting
Process Models
M.Sc. Thesis
Awarded a **Carleton University Senate Medal** for academic achievement

Daniel Bruce Winter 2009
Title: Modelling with Discrete Mixtures of P-splines
Undergraduate Honours Project

SERVICE

Conference/Workshop Organization

Fields Symposium: "Analysis of Survey Data and Small Area Estimation" May 2012
in honour of the 75th birthday of Professor J. N. K. Rao

Carleton University, Ottawa

jointly with P. Farrell, D. Haziza, M. Hidiroglou, S. Sinha and W. Yung

Statistical Society of Ottawa Student Research Day September 2010
 School of Mathematics and Statistics
 Carleton University, Ottawa

BIRS 5-day workshop: “Functional Data Analysis: Future Directions” May 2010
 Banff International Research Station, Banff
 jointly with J. Cao, J. O. Ramsay and F. Yao

Committee Work/School Service

Graduate Director	2011/12-2012/13, 2014/15, 2017, 2021/22-2023/24
Advisory to the Director	2008/09-2009/10
Computer Math Program	2007/08-2012/13, 2014/15-2019/20
Computer Resources	2007/08-2012/13, 2014/15-2019/20
Graduate Institute Advisory	2017/18-2019/20
Hiring (<i>Chair: 2010/11</i>)	2010/11, 2015/16
Honours Projects Coordinator	2018/19
Personnel	2009/10
Priority	2022/23
Retention	2008/09-2009/10
Social Events	2007/08, 2009/10
Statistics Program (<i>Chair: 2008/09-2009/10, 2016/17</i>)	2007/08-2012/13, 2014/15-2023/24
Undergraduate Studies	2008/09-2009/10, 2016/17, 2019/20, 2023/24

Thesis Defences

Sintaro Hagiwara (Ph. D.) – Carleton University	Summer 2020
Rimple Sandhu (Ph. D.) – Carleton University (Engineering)	Winter 2020
Reyhaneh Hosseini (Ph. D.) – University of Ottawa	Winter 2019
Nada Habli (M. Sc.) – University of Ottawa	Fall 2015
Ahalya Sivathayalan (Ph. D.) – Carleton University	Winter 2015
Jean-Karl Sirois (M. Sc.) – University of Ottawa	Winter 2015
Ewa Sucha (Ph. D.) – University of Ottawa	Fall 2014
Shintaro Hagiwara (M. Sc.) – Carleton University	Winter 2014
Brittany Milton (M. Sc.) – Carleton University	Winter 2014
Waad Subber (Ph. D.) – Carleton University (Engineering)	Winter 2012
Goldshid Chatrchi (M. Sc.) – Carleton University	Summer 2012
Ewa Makvandi-Nejad (M. Sc.) – University of Ottawa	Summer 2012
Luk Arbuckle (M. Sc.) – University of Ottawa	Fall 2011
Rashid Nikzad (M. Sc.) – University of Ottawa	Fall 2011
Lan Zhuo (M. Sc.) – Carleton University	Fall 2010
Robert Davies (M. Sc.) – University of Ottawa	Winter 2010
Ahmed Almaskut (M. Sc.) – Carleton University	Fall 2009
Christopher Gravel (M. Sc.) – Carleton University	Winter 2009
Oksana Chkrebti (M. Sc.) – Carleton University	Summer 2008
Virendra Bharti (M. Sc.) – Carleton University	Winter 2008
Jordan Bernick (M. Sc.) – Carleton University	Fall 2007

TEACHING

Winter Semester

2024

- Stat 2559: Basics of Statistical Modelling

Fall Semester	2023
- Stat 2655: Introduction to Probability with Applications	
Winter Semester	2023
- Stat 1500: Introduction to Statistical Computing	
Fall Semester	2022
- Stat 4604: Statistical Computing	
Winter Semester	2022
- Stat 1500: Introduction to Statistical Computing	
- Stat 2559: Basics of Statistical Modelling	
Winter Semester	2020
- Stat 2559: Basics of Statistical Modelling	
- Stat 5702: Modern Applied and Computational Statistics	
Fall Semester	2019
- Stat 2655: Introduction to Probability with Applications	
- Math 3806: Numerical Analysis	
Winter Semester	2019
- Stat 4604: Statistical Computing	
Fall Semester	2018
- Stat 2655: Introduction to Probability with Applications	
- Stat 4500/5600: Parametric Estimation/Mathematical Statistics I	
Winter Semester	2018
- Stat 2559: Basics of Statistical Modelling	
- Stat 5603: Reliability and Survival Analysis	
Fall Semester	2017
- Stat 5702: Modern Applied and Computational Statistics	
Winter Semester	2017
- Stat 2559: Basics of Statistical Modelling	
Winter Semester	2016
- Stat 2559: Basics of Statistical Modelling	
- Stat 5702: Modern Applied and Computational Statistics	
Fall Semester	2015
- Stat 2655: Introduction to Probability with Applications	
Winter Semester	2015
- Stat 4506: Nonparametric Statistics	
Fall Semester	2014
- Math 3806: Numerical Analysis	

Winter Semester	2013
- Stat 2559: Basics of Statistical Modelling	
Fall Semester	2012
- Stat 4604: Statistical Computing	
Winter Semester	2012
- Stat 2559: Basics of Statistical Modelling	
- Stat 3559: Mathematical Statistics	
Winter Semester	2011
- Stat 2559: Basics of Statistical Modelling	
- Stat 4506: Nonparametric Statistics	
Fall Semester	2010
- Math 3806: Numerical Analysis	
- Stat 4604: Statistical Computing	
Winter Semester	2010
- Stat 2559: Basics of Statistical Modelling	
- Stat 5902: Biostatistics Seminar	
Fall Semester	2009
- Math 3806: Numerical Analysis	
- Stat 5603: Reliability and Survival Analysis	
Winter Semester	2009
- Stat 2559: Basics of Statistical Modelling	
- Stat 5703: Data Mining	
Fall Semester	2008
- Math 3806: Numerical Analysis	
- Stat 4604: Statistical Computing	
Winter Semester	2008
- Stat 2607: Business Statistics II	
- Math 4907/Math 5900: Functional Regression Modelling and Data Analysis	

AWARDS	- Travel Award, Pacific Institute for the Mathematical Sciences	Spring 2006
	- Graduate Fellowship, Simon Fraser University	Fall 2004
	- Graduate Fellowship, Simon Fraser University	Spring 2004
	- NSERC Postgraduate Scholarship (PGS B)	2001 - 2003
	- Special Graduate Entrance Scholarship, Simon Fraser University	2001
	- Graduate Fellowship, Simon Fraser University	2001
	- Special Graduate Entrance Scholarship, Simon Fraser University	1999
	- Migotti - McComb Award, University of Calgary	1998
	- Alexander Rutherford Scholarship, Province of Alberta	1993

PROFESSIONAL
DEVELOPMENT

Short Course, "Bayesian Clinical Trials", Scott Berry, Western North American Region of the International Biometric Society (WNAR) Meeting, Fairbanks, Alaska, June 2005.

Workshop, "The Analysis of Event History Data", Richard Cook and Jerry Lawless, Statistical Society of Canada (SSC) Annual Meeting, Ottawa, Ontario, June 2000.

Instructional Skills Workshop, Learning and Instructional Development Centre, Simon Fraser University, Burnaby, British Columbia, September 1999.

PROFESSIONAL
EXAMS

Successfully completed exams 100 and 110 of the Society of Actuaries (SOA).

SKILLS

Programming languages: Fortran 77/90/95, R, C, C++, Python, Julia, Java, Lua, Javascript, ReasonML, Ocaml, Common Lisp, Scheme and Matlab/Octave

Markup Languages: L^AT_EX, Markdown, HTML, XML and JSON

Statistical Packages: S-Plus and SAS

Operating Systems: Linux (Arch/Manjaro, Debian/Ubuntu, Gentoo, Redhat/Fedora and Slackware), UNIX (FreeBSD and Solaris) and Windows NT/XP/Vista/7/8/10/11

Languages: English and French

AHMED EL-ROBY

Associate Professor - Carleton University
Herzberg Laboratories 5433 ◊ 1125 Colonel By Dr, Ottawa, Ontario, K1S 5B6
ahmed.elroby@carleton.ca

EDUCATION

University of Waterloo Ph.D. of Computer Science – Data Systems Research Group	<i>April 2018</i>
King Abdullah University of Science and Technology Master's of Science – InfoCloud Research Group	<i>July 2011</i>
Faculty of Engineering, Alexandria University Bachelor of Engineering – Computer and Systems Engineering Department	<i>June 2009</i>

PROFESSIONAL EXPERIENCE

Carleton University Associate Professor	<i>July 2023 - Present</i>
Carleton University Assistant Professor	<i>July 2018 - July 2023</i>
Carnegie Mellon University Intern	<i>June 2016 - September 2016</i>
Qatar Computing Research Institute Research Associate	<i>January 2014 - November 2014</i>
IBM Thomas J. Watson Research Center Software Engineer	<i>June 2010 - August 2010</i>
Nile University Research Assistant	<i>May 2008 - August 2008</i>

PUBLICATIONS

Journal Papers

- Abdelghny Orogat, Ahmed El-Roby. Maestro: Automatic Generation of Comprehensive Benchmarks for Question Answering Over Knowledge Graphs. In *Proceedings of the ACM on Management of Data*, 2(1), 2023.
- Shawn Graham, Donna Yates, Ahmed El-Roby. Investigating antiquities trafficking with gene rative pre-trained transformer (GPT)-3 enabled knowledge graphs: A case study. *Open Research Europe*, 3, 2023.
- Anthony N Tasca, Samantha Carlucci, James C Wiley, Matthew Holden, Ahmed El-Roby, Giorgio A Tasca. Detecting defense mechanisms from Adult Attachment Interview (AAI) transcripts using machine learning. *Psychotherapy Research*. 33(6), 2023.
- Shawn Graham, Donna Yates, Ahmed El-Roby. Relationship Prediction in a Knowledge Graph Embedding Model of the Illicit Antiquities Trade. *Advances in Archaeological Practice*, 3(2), 2023.
- Abdelghny Orogat, Ahmed El-Roby. Smartbench: Demonstrating automatic generation of comprehensive benchmarks for question answering over knowledge graphs. *Proceedings of the VLDB Endowment (PVLDB)*, 15(12):3662–3665, 2022.
- Abdelghny Orogat, Ahmed El-Roby. CBench: Demonstrating Comprehensive Evaluation of Question Answering Systems over Knowledge Graphs Through Deep Analysis of Benchmarks. *Proceedings of the VLDB Endowment (PVLDB)*, 14(12):2711–2714, 2021.
- Abdelghny Orogat, Isabelle Liu, Ahmed El-Roby. CBench: Towards Better Evaluation of Question Answering Over Knowledge Graphs. *Proceedings of the VLDB Endowment (PVLDB)*, 14(8):1325–1337, 2021.

- Ahmed El-Roby, Khaled Ammar, Ashraf Aboulnaga, Jimmy Lin. Sapphire: Querying RDF Data Made Simple. *Proceedings of the VLDB Endowment (PVLDB)*, 9(13):1481–1484, 2016.
- Essam Mansour, Ahmed El-Roby, Panos Kalnis, Aron Ahmadi, Ashraf Aboulnaga. RACE: A Scalable and Elastic Parallel System for Discovering Repeats in Very Long Sequences. In *Proceedings of the VLDB Endowment (PVLDB)*, 6(10):865–876, 2013.

Conference and Workshop Papers

- Ahmed El-Roby, Abdelrahman Hefny, Alireza Choubineh. StratAlign: Uncovering Tactical Patterns through Large-Scale Event Sequence Matching. In *Statsbomb Conference*, 2023.
- Yingjun Dai, Ahmed El-Roby. DaCon: Multi-Domain Text Classification Using Domain Adversarial Contrastive Learning. In *International Conference on Artificial Neural Networks*, 2023.
- Yuan Wu, Diana Inkpen, Ahmed El-Roby. Maximum Batch Frobenius Norm for Multi-Domain Text Classification. *Proceedings of the International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2022.
- Yuan Wu, Diana Inkpen, Ahmed El-Roby. Co-Regularized Adversarial Learning for Multi-Domain Text Classification. *Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2022.
- Yuan Wu, Diana Inkpen, Ahmed El-Roby. Towards Category and Domain Alignment: Category-Invariant Feature Enhancement for Adversarial Domain Adaptation. *Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV) Workshops*, 2021.
- Yuan Wu, Diana Inkpen, Ahmed El-Roby. Mixup Regularized Adversarial Networks for Multi-Domain Text Classification. *Proceedings of the International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2021.
- Yuan Wu, Diana Inkpen, Ahmed El-Roby. Conditional Adversarial Networks for Multi-Domain Text Classification. *Proceedings of the Second Workshop on Domain Adaptation for NLP*, 2021.
- Yuan Wu, Diana Inkpen, and Ahmed El-Roby. Dual Mixup Regularized Learning for Adversarial Domain Adaptation. *Proceedings of the European Conference on Computer Vision (ECCV)*, 2020.
- Ahmed El-Roby, Ashraf Aboulnaga. UFeed: Refining Web Data Integration Based on User Feedback. *Proceedings of The ACM International Conference on Information and Knowledge Management (CIKM)*, 2017.
- Ahmed El-Roby. Utilizing User Feedback to Improve Data Integration Systems. *IEEE 32nd International Conference on Data Engineering Workshops (ICDEW)*, 2016.
- Ahmed El-Roby, Ashraf Aboulnaga. ALEX: Automatic Link Exploration in Linked Data. *IEEE 32nd International Conference on Data Engineering (ICDE)*, 2016.
- Ahmed El-Roby, Ashraf Aboulnaga. ALEX: Automatic Link Exploration in Linked Data. In *Proceedings of the ACM SIGMOD International Conference on Management of Data*, 2015.
- Ahmed El-Roby, Mohamed Fahmy, May Moussa, Moustafa Youssef. Nuzzer-D: Demonstrating Device-free Passive Localization for Wireless Environments. In *Proceedings of the International Conference on Mobile Computing and Networking (MobiCom)*, 2008.

Technical Reports

- Ahmed El-Roby, Khaled Ammar, Ashraf Aboulnaga, and Jimmy Lin. “Sapphire: Querying RDF Data Made Simple” Technical Report arXiv:1805.11728, Computing Research Repository (CoRR), 2018.

FUNDING

-
- Mitacs Accelerate in Collaboration with Ericsson (PI), “Dynamic Network Re-dimensioning via Accurate Prediction of 5G Throughput and Reinforcement Learning”, 2021 - 2023, \$225,000.
 - NSERC Discovery Grant (PI), “Querying Heterogeneous Data for Non-Expert Users”, 2021 - 2026, \$120,000.
 - NSERC Launch Supplement (PI), “Querying Heterogeneous Data for Non-Expert Users”, 2021 - 2026, \$12,500.

- SSHRC Partnership Grant (Co-PI), "Archives 4.0: Artificial Intelligence for Trust in Records and Archives", 2021 - 2026, \$2,489,577.
- Google Cloud Platform Grant (PI), 2020 - 2021, \$5,000.
- Mitacs Accelerate Cluster in Collaboration with Irdeto (PI), "Automatic Understanding of the Semantics of Source Code For Identifying Sensitive Code Fragments", 2019 - 2022, \$133,333.
- Multidisciplinary Research Catalyst Fund (Co-PI), "Migration Policy Research Cluster", 2019 - 2020, \$50,000.
- The Office of The Dean of Science / The Office of the Vice-President (Research International) Grant (PI), 2019 - 2020, \$10,000.
- Carleton University Development Grant (PI), 2019 - 2020, \$5,000.
- Google Cloud Platform Grant (PI), 2018 - 2019, \$5,000.
- Startup Research Grant, \$85,000.

STUDENTS

Ph.D. Degree Students:

- Abdelrahman Hefny.
- Yingjun Dai.
- Abdelghny Orogat.

Master's Degree Students:

- Alex Gagnon.
- Kyle Kuehni.
- Anthony Tasca. Co-supervised with Prof. Matthew Holden.

Alumnus:

- Ph.D.
 - Yuan Wu. Co-supervised with Prof. Diana Inkpen. First employment: Assistant Professor at Jilin University, China. *Winter 2022*
- MCS
 - Ritika Bhatia. First employment: Ericsson. *Winter 2022*
 - Fathima Nizwana Yusuff. First employment: Trend Micro. *Winter 2022*
 - Xinyang Liu. First employment: IQVIA. *Winter 2022*
 - Srikanth Bandapally. Co-supervised with Hussein Mouftah. First employment: Ross Video. *Fall 2021*
 - Pooja Shah. Co-supervised with Hussein Mouftah. First employment: March Networks. *Fall 2021*
 - Tanya Tanya. Co-supervised with Hussein Mouftah. First employment: Klipfolio. *Fall 2021*
 - Tom Nguyen. Co-supervised with Hussein Mouftah. First employment: Amazon. *Fall 2020*
 - Jeffery Zhang. First employment: Statistics Canada. *Fall 2020*
- Undergraduate Honours Students
 - Hassan Eissa: Voting System: Database Vs. Blockchain. *Fall 2021*
 - Mahmud Ali: Visualization of Dependency Parse Trees of Natural Language Questions. *Summer 2021*
 - Jonathan Scala: Image Recognition Social Media Application. *Summer 2021*
 - Jiukai Zong: Skin Disease Identification System. *Summer 2021*
 - Conner Bradley (**Thesis**): Extending Heterogeneous Recommenders Beyond First-Party Datasets. *Winter 2021*

- Taher Mohammad: Student Grade Optimizer Web App. *Fall 2020*
- Mohammad Naddaf: Embeddings for Integration of Relational Tables and Knowledge Graphs. *Fall 2020*
- Rashmi Jasinghe: Embedding techniques to integrate Knowledge Graphs with Heterogeneous Relational Data. *Fall 2020*
- Mohamad Alkhani: Utilizing Traditional Blocking Approaches in Record Linkage. *Fall 2020*
- Bimal Bhagrath: Split: split payments with friends. *Summer 2020*
- Fatima Almalki: Clustering Natural Language Questions Based on Part-of-Speech Tags. *Winter 2020*
- Emmanuel Dairo: SQL Automatic Grader System. *Winter 2020*
- Jacob Larose: Automatic SQL Grader. *Winter 2020*
- James Fitzgerald: ESports Database for Carleton University. *Summer 2019*
- Maxim Desjardins-Macfarlane: Refining Web Tables for Better Searching. *Winter 2019*
- Sharath Kunnanath: Quantitative Analysis of Question Answering Evaluation Techniques. *Winter 2019*
- Gabe Sinhorin: Always-Correct Benchmark For Question Answering over RDF Data. *Winter 2019*

Membership on Thesis Committees:

Ph.D. Thesis Defence:

- Emmanuel Ayeleso. Supervisor: Timothy Lethbridge. University of Ottawa. *Fall 2023*
- Wejdan Alkaldi. Supervisor: Prof. Diana Inkpen. University of Ottawa. *Winter 2022*
- Ali Davoudian. Supervisor: Prof. Mengchi Liu. Carleton University. *Winter 2021*

Ph.D. Thesis Proposal Defence:

- Hongzhi Zhang. Supervisor: Prof. Omair Shafiq. Carleton University. *Fall 2023*
- Muhammed Kehinde Olorunnimbe. Supervisor: Prof. Herna Viktor. University of Ottawa. *Summer 2022*
- Wejdan Alkaldi. Supervisor: Prof. Diana Inkpen. University of Ottawa. *Winter 2022*
- Ali Davoudian. Supervisor: Prof. Mengchi Liu. Carleton University. *Winter 2020*

Ph.D. Comprehensive Exam:

- Elmira Adeeb. Supervisor: Prof. Jit Pose and Prof. Pat Morin. Carleton University. *Winter 2023*
- Amirali Madani. Supervisor: Prof. Anil Maheshwari. Carleton University. *Winter 2023*
- Hongzhi Zhang. Supervisor: Prof. Omair Shafiq. Carleton University. *Winter 2022*
- Hanping Zhang. Supervisor: Prof. Yuhong Guo. Carleton University. *Fall 2021*
- Patrick Killeen. Supervisor: Prof. Iluju Kiringa. University of Ottawa. *Fall 2021*
- Emmanuel Ayeleso. Supervisor: Prof. Timothy Lethbridge. University of Ottawa. *Winter 2020*
- Kalonji Kalala. Supervisor: Prof. Iluju Kiringa. University of Ottawa. *Winter 2020*

MCS Thesis Defence Committee Member:

- Sonam Rinchen. Supervisor: Prof. Hussein Mouftah. University of Ottawa. *Winter 2023*
- Macarious Abadeer. Supervisor: Prof. Wei Shi and Prof. Jean-Pierre Corriveau. Carleton University. *Summer 2022*
- Kenniy Olorunnimbe. Supervisor: Prof. Herna Viktor. University of Ottawa. *Summer 2022*
- Saranyanath Kadamgode Puthenveedu. Supervisor: Prof. Wei Shi and Prof. Jean-Pierre Corriveau. Carleton University. *Winter 2022*
- Johan Fernandes. Supervisor: Prof. Burak Kantarci. University of Ottawa. *Fall 2021*
- Alexis Adolfo Amezaga Hechavarria. Supervisor: Prof. Omair Shafiq. Carleton University. *Summer 2021*
- Davoud Saljoughi. Supervisor: Prof. Olga Baysal. Carleton University. *Winter 2021*
- Sania Hamid. Supervisor: Prof. Doron Nussbaum. Carleton University. *Winter 2020*
- Andrea Pagotto. Supervisor: Prof. John Oommen. Carleton University. *Winter 2020*
- Raisul Rashu. Supervisor: Prof. Olga Baysal. Carleton University. *Winter 2020*
- Tahira Ghani. Supervisor: Prof. John Oommen. Carleton University. *Fall 2019*
- Pourya Saljoughi Badlou. Supervisor: Prof. Leopoldo Bertossi. Carleton University. *Summer 2019*

MCS Thesis Defence Chair:

- Taoseef Ishtiak. Supervisor: Prof. Yuhong Guo. *Winter 2023*
- Keerthana Muthu Subash. Supervisor: Prof. Olga Baysal. *Summer 2021*
- Anousheh Shahmirza. Supervisor: Prof. Frank Dehne. *Summer 2021*
- Norbert Eke. Supervisor: Prof. Olga Baysal. *Winter 2020*
- Haitham Fallatah. Supervisor: Prof. Frank Dehne. *Fall 2019*
- Connor Hillen. Supervisor: David Mould. *Winter 2019*

TEACHING

- **Winter 2024:** COMP 3005 - Database Management Systems. *Carleton University*
- **Fall 2023:** COMP 5118. *Carleton University*
- **Winter 2023:** DATA 5000. *Carleton University*
- **Winter 2023:** COMP 5118. *Carleton University*
- **Fall 2022:** COMP 3005 - Database Management Systems. *Carleton University*
- **Winter 2022:** DATA 5000. *Carleton University*
- **Winter 2022:** COMP 5118 - Trends in Big Data Management. *Carleton University*
- **Fall 2021:** COMP 3005 - Database Management Systems. *Carleton University*
- **Fall 2020:** COMP 5118 - Trends in Big Data Management. *Carleton University*
- **Winter 2020:** COMP 5118 - Trends in Big Data Management. *Carleton University*
- **Winter 2020:** COMP 3005 - Database Management Systems. *Carleton University*
- **Fall 2019:** COMP 3005 - Database Management Systems. *Carleton University*
- **Winter 2019:** COMP 5900 - Recent Trends in Big Data Management. *Carleton University*
- **Winter 2018:** TA for CS 251 Computer Organization & Design. *University of Waterloo*
- **Fall 2017:** TA for CS 251 Computer Organization & Design. *University of Waterloo*
- **Fall 2016:** IA for CS 251 Computer Organization & Design. *University of Waterloo*
- **Spring 2015:** TA for CS 251 Computer Organization & Design. *University of Waterloo*
- **Winter 2015:** TA for CS 251 Computer Organization & Design. *University of Waterloo*
- **Fall 2012:** TA for CS 343 Concurrent and Parallel Programming. *University of Waterloo*
- **Spring 2012:** TA for CS 251 Computer Organization & Design. *University of Waterloo*
- **Winter 2012:** TA for CS 343 Concurrent and Parallel Programming. *University of Waterloo*
- **Fall 2011:** TA for CS 245/SE 212 Logic and Computation. *University of Waterloo*

SCIENTIFIC ACTIVITIES

Journal Reviewing:

- The Machine Learning Journal. *2022*
- The Distributed and Parallel Databases (DAPD) journal. *2022*
- IEEE Transactions on Knowledge and Data Engineering (TKDE). *2020*
- VLDB Journal. *2020*
- Information Systems Journal. *2019*

Program Committee:

- The ACM SIGMOD International Conference on Management of Data. *2025*
- Proceedings of the VLDB Endowment. *2024*

- The ACM SIGMOD International Conference on Management of Data. *2024*
- The ACM SIGMOD International Conference on Management of Data. *2023*
- The AAAI Conference on Artificial Intelligence. *2021*
- Schema-Agnostic Queries Semantic Web Challenge. *2015*

UNIVERSITY SERVICE AT CARLETON UNIVERSITY

- Co-op Reports Grading. *2022-2023*
- Committee Member: School of Computer Science Assistant Professor (AI) Hiring Committee *2021- 2022*
- Co-op Reports Grading. *2021-2022*
- Committee Member: CRC Tier II in Smart, Healthy, and Sustainable Communities and Environments Hiring Committee. *2021 - 2022*
- Co-op Reports Grading. *2020-2021*
- Committee Member: Tenure and Promotion Committee. *2019 - 2020*
- Co-op Report Grading. *2019-2020*
- Committee Member: Institute for Data Science Assistant Professor Hiring Committee. *2018 - 2019*
- Co-op Report Grading. *2018-2019*

Appointment

Matthew S. Holden (he/him/his)

Assistant Professor

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Education

- 2014 - 2018 Doctor of Philosophy in Computing
Queen's University, Kingston, Canada
Thesis: Computer-Assisted Assessment and Feedback for Image-Guided Interventions Training
Supervisor: Gabor Fichtinger
- 2012 - 2014 Master of Science in Computing
Queen's University, Kingston, Canada
Thesis: Linear Object Registration for Image-Guided Interventions
Supervisor: Gabor Fichtinger
- 2008 - 2012 Bachelor of Science Honors in Applied Mathematics and Physics
Western University, London, Canada
Thesis: Surgical Workflow Segmentation of Ultrasound-Guided Epidural Procedures
Supervisor: Terry Peters

Research Experience

- 2019 - Assistant Professor
Carleton University, Ottawa, Canada
Surgical Data Science
- 2018 - 2019 Postdoctoral Fellow
Johns Hopkins University, Baltimore, USA
Modelling and Analysis of Surgical Performance in Septoplasty
- 2012 - 2018 Graduate Research Assistant
Queen's University, Kingston, Canada
Performance Analysis and Monitoring in Image-Guided Interventions
- 2015 - 2016 Visiting Researcher
University of Rennes 1, Rennes, France
Computer-Assisted Training for Deep Brain Stimulation and Surgical Ontologies
- 2011 Undergraduate Research Assistant
Queen's University, Kingston, Canada
Performance Analysis and Monitoring in Image-Guided Interventions
- 2010 Undergraduate Research Assistant
Queen's University, Kingston, Canada
Simulation of Surface Acoustic Wave Propagation and Phononic Crystal Etching
- 2008 - 2012 Scholar's Electives Researcher
Western University, London, Canada
Projects related to applied mathematics, physics, and computer science

Teaching Experience

Course Instruction

- Winter 2024, COMP 4107: Neural Networks
Winter 2023, Carleton University, Ottawa, Canada
- Fall 2023, COMP 3106/4106: Artificial Intelligence
Fall 2022, Carleton University, Ottawa, Canada
Fall 2021,
Winter 2021,
- Winter 2024, COMP 5900: Surgical Data Science
Winter 2023, Carleton University, Ottawa, Canada
Summ 2022,
Fall 2020,
Winter 2020,
- Winter 2021 COMP 2804: Discrete Structures II
Carleton University, Ottawa, Canada
- Fall 2016 CISC 203: Discrete Mathematics for Computer Science II
Queen's University, Kingston, Canada

Invited Course Lectures

- Winter 2024, HLTH 4102: New Health Technologies
Fall 2022, Carleton University, Ottawa, Canada
Fall 2021, Topic: Machine Learning in Surgery
- Winter 2021, DATA 5000: Introduction to Data Science
Winter 2020, Carleton University, Ottawa, Canada
Topic: Surgical Data Science
- Winter 2018, CISC 472: Medical Informatics
Winter 2017, Queen's University, Kingston, Canada
Topic: Medical Education Informatics
- Fall 2014 COMP 329: Introduction to Computer-Integrated Surgery
Queen's University, Kingston, Canada
Computer-Assisted Interventions Training

Teaching Assistantship

- Winter 2018 CISC 352: Artificial Intelligence
Queen's University, Kingston, Canada
- Fall 2017 CISC 102: Discrete Mathematics for Computer Science I
Queen's University, Kingston, Canada

Winter 2015	CISC 271: Scientific Computing Queen's University, Kingston, Canada
Fall 2013	CISC 101: Elements of Computing Science Queen's University, Kingston, Canada
Fall 2012	CISC 121: Introduction to Computing Science Queen's University, Kingston, Canada

Supervision/Mentoring Experience

(student awards indicated inline)

Master's Students Supervised in Thesis/Project

2023 -	Elham Hekmatnia Program: Master of Computer Science - Data Science, Analytics, and Artificial Intelligence (Carleton University) Project: Orthodontic X-ray Analysis for Monitoring Malocclusion
2023 -	Booshra Nazifa Mahmud Program: Master of Computer Science (Carleton University) Project: Domain Knowledge and Data Augmentation for Improved Time Series Classification
2020 -	Anthony Tasca (co-supervised with Ahmed El-Roby) Program: Master of Computer Science (Carleton University) Project: Human Deepfake Detection
2019 -	Mehardeep Bhalla Singh Program: Master of Computer Science - Data Science Specialization (Carleton University) Project: Multi-Sensor Assessment of Skill in Point-of-care Ultrasound
2021 - 2023	Daniil Kulik Program: Master of Computer Science (Carleton University) Project: Synthetic Ultrasound Video Generation
2021 - 2022	Janine Hsu Program: Master of Applied Science - Biomedical Engineering (Carleton University) Project: Vasospasm Detection in Brain Images Award: 2022 Michael T. Richard Clinical Research Fellowship in Neurosurgery at the Ottawa Brain and Mind Research Institute
2020 - 2022	Ummey Hani Tanin Program: Master of Computer Science - Data Science Specialization (Carleton University) Project: Deep Video Analysis Methods for Surgical Skills Assessment in Cataract Surgery
2020 - 2021	Kun Yuan (co-supervised with WonSook Lee) Program: Master of Computer Science - Artificial Intelligence (University of Ottawa) Project: Surgical Workflow Anticipation Award: 2022 Joseph De Koninck Thesis Prize at University of Ottawa Award: 2021 MICCAI Young Scientist Award

Undergraduate Students Supervised in Honours Thesis/Project

- 2024 - Gurpiar Brar
Program: Bachelor of Computer Science (Carleton University)
Project: Predicting Learning Curves in Diagnostic Ultrasound
- 2023 - Uvernes Somarriba Castillo
Program: Bachelor of Computer Science (Carleton University)
Project: Reinforcement Learning in Simulated Surgery
- 2023 - Ujan Sen
Program: Bachelor of Computer Science (Carleton University)
Project: Using a Large Language Model (LLM) for Coaching on a Medical Intervention Task
- 2023 - Bining Long
Program: Bachelor of Computer Science (Carleton University)
Project: Integrating Domain Knowledge in Deep Learning for Pediatric Appendicitis Diagnosis
- 2023 Jake Taylor
Program: Bachelor of Computer Science (Carleton University)
Project: Ultrasound Image Processing via Generative Adversarial Networks
- 2022 - 2023 Sreepriya Pulyassary
Program: Bachelor of Computer Science (Carleton University)
Project: Vasospasm Detection Using Deep Learning and Domain Knowledge
- 2022 Chris Milan
Program: Bachelor of Computer Science (Carleton University)
Project: Deep Learning Algorithm to Automate Cerebral Vasospasm Detection
- 2022 Kheri Hughes
Program: Bachelor of Computer Science (Carleton University)
Project: Classifying scans in FAST ultrasound videos using convolutional neural networks
- 2021 - 2022 Ilan Gofman
Program: Bachelor of Computer Science (Carleton University)
Project: Classifying points of interest in FAST ultrasound videos using deep neural networks
- 2021 Mahad Elmi
Program: Bachelor of Computer Science (Carleton University)
Project: Using Self-Attention on Ultrasound-Guided Needle Insertion Skill Assessment Data
- 2021 Japinder Sandhu
Program: Bachelor of Computer Science (Carleton University)
Project: Time Series AI Video Editing
- 2021 Jeong Won Kim
Program: Bachelor of Computer Science (Carleton University)
Project: Colorization of Black and White Images Using Machine Learning

- 2020 Vineel Boddula
Program: Bachelor of Computer Science (Carleton University)
Project: Supervised Video Summarization for Ultrasound
- 2020 - 2021 Daniil Kulik
Program: Bachelor of Computer Science (Carleton University)
Project: Motion Analysis in Diagnostic Ultrasound
- 2020 Robert Tyrrell
Program: Bachelor of Computer Science (Carleton University)
Project: Skills and Context Recognition from Ultrasound Image Sequences
- 2019 Dehao Liu
Program: Bachelor of Computer Science (Carleton University)
Project: Point-of-care Ultrasound Skills Level Assessment by Machine Learning

Undergraduate Students Supervised in Research

- 2023 Connor Baillie
Program: Bachelor of Computer Science (Carleton University)
Project: Ultrasound-Guided Intervention Classification from Video
Award: Carleton University Dean's Summer Research Internship
- 2023 Ayoub Dahir
Program: Bachelor of Computer Science (Carleton University)
Project: Surgical Skills Classification from Extracted Features
Award: Carleton University Dean's Summer Research Internship
- 2023 Sreepriya Pulyassary
Program: Bachelor of Computer Science (Carleton University)
Project: Vasospasm Detection Using Deep Learning and Domain Knowledge
Award: Carleton University I-CUREUS Program
- 2021 Raymond Chan
Program: Bachelor of Computer Science (Carleton University)
Project: Simulating 2D Surgical Videos from 3D Pose Tracking Data for Skills Assessment
Award: NSERC Undergraduate Student Research Award
- 2021 Uvernes Somarriba Castillo
Program: Bachelor of Computer Science (Carleton University)
Project: Data Augmentation Strategies for Time Series in Interventional Healthcare
Award: Carleton University Dean's Summer Research Internship
- 2021 Damien Hood
Program: Bachelor of Computer Science (Carleton University)
Project: Characterizing Hand Motion for Data Augmentation in Interventional Healthcare
Award: Carleton University Dean's Summer Research Internship
- 2021 Daniil Kulik
Program: Bachelor of Computer Science (Carleton University)
Project: Motion Analysis in Diagnostic Ultrasound
Award: Carleton University I-CUREUS Program

2020 - 2021 Ujan Sen
 Program: Bachelor of Computer Science (Carleton University)
 Project: Monitoring Learning Curves in Simulated Colonoscopy
 Award: Carleton University Dean's Summer Research Internship

Students Mentored in Research

2022 - 2023 Lucas Gomez
 Program: Bachelor of Computer Science (Carleton University)
 Project: Deep Convolutional Spiking Neural Networks and the Human Visual System

2017 - 2018 Sachin Pasricha
 Program: Doctor of Medicine (Queen's University)
 Project: Monitoring Learning Curves in Ultrasound-Guided Needle Insertion Training

2016 - 2017 Sean Xia
 Program: Doctor of Medicine (Queen's University)
 Project: Computer-Assisted Training for Ultrasound-Guided Needle Insertions

2016 - 2017 Hillary Lia
 Program: Bachelor of Computer Science (Queen's University)
 Project: Skills Assessment in Ultrasound-Guided Needle Insertions

2015 - 2017 Vinyas Harish
 Program: Bachelor of Computer Science (Queen's University)
 Project: Image-Guided Interventions Training

2015 - 2016 Kyle MacNeil
 Program: Bachelor of Computer Science (Queen's University)
 Project: Objective Evaluation of Colonoscopy Procedural Skills Using Motion Analysis

Awards/Honours

2019 NSERC Postdoctoral Fellowship (ended early)
 Natural Sciences and Engineering Research Council of Canada

2017 - 2018 Modelling, Simulation, and Training Fellowship
 Link Foundation, Binghamton, USA

2017 PhD Research Achievement Award in Computing
 Queen's University, Kingston, Canada

2016 - 2017 Walter C. Sumner Memorial Fellowship Award
 Walter C. Sumner Foundation, Halifax, Canada

2016 Rennes Métropole Soutien à la Mobilité des Doctorants
 Rennes Métropole, Rennes, France

2015 - 2016 Mitacs Globalink Research Award - Campus France
 Mitacs Canada

- 2015 Distinguished Master's Thesis in Computing
Queen's University, Kingston, Canada
- 2015 ISCAS Student Travel Scholarship
International Society for Computer Aided Surgery
- 2014 - 2017 NSERC Canada Graduate Scholarship - Doctoral
Natural Sciences and Engineering Research Council of Canada
- 2013 - 2014 Ontario Graduate Scholarship
Ontario Ministry of Training, Colleges and Universities
- 2012 - 2013 NSERC Canada Graduate Scholarship - Master's
Natural Sciences and Engineering Research Council of Canada
- 2012 - 2013 Ontario Graduate Scholarship (declined)
Ontario Ministry of Training, Colleges and Universities
- 2012 Dillon Gold Medal in Applied Mathematics
Western University, London, Canada
- 2012 Gold Medal in Honors Double Major Physics
Western University, London, Canada
- 2012 Borwein Memorial Prize
Western University, London, Canada
- 2011 SPIE Student Travel Grant
Society for Photographic Instrumentation Engineers, Bellingham, USA
- 2011 NSERC CREATE Training Program in Bone and Joint Health Technologies
Natural Sciences and Engineering Research Council of Canada
- 2011 Albert O. Jeffery Scholarship in Applied Mathematics
Western University, London, Canada
- 2010 - 2011 Robert and Ruth Lumsden Scholarship in Science
Western University, London, Canada
- 2010 NSERC Undergraduate Student Research Award
Natural Sciences and Engineering Research Council of Canada
- 2010 Steinmetz-Woonton Scholarship
Western University, London, Canada
- 2010 University of Western Ontario Faculty Association Scholarship
Western University, London, Canada
- 2009 - 2012 Sarah and Andrew Hamilton Scholarship
Western University, London, Canada
- 2008 - 2012 Continuing Admission Scholarship
Western University, London, Canada

Professional Activities

Conference Organization

- 2024, 2023 Data Day 9.0
Carleton University, Ottawa, Canada
Planning Committee and Poster Judge
- 2023 International Conference on Information Processing in Computer-Assisted Interventions
Awards Panel
- 2011 - 2012 Scholar's Electives Program Conference
Western University, London, Canada
Fundraising and Advertising Committee

Journal Article Reviews (ad hoc)

- 2024 - Nature Communications Medicine
- 2023 - IEEE Journal of Biomedical and Health Informatics
- 2023 - SPIE Journal of Medical Imaging
- 2018 - International Journal of Computer Assisted Radiology and Surgery
- 2017 - Journal of Medical Robotics Research
- 2017 - IEEE Transactions on Medical Imaging
- 2017 - IEEE Transactions on Biomedical Engineering

Conference Paper/Abstract Reviews (recurring)

- 2020 - Information Processing in Computer-Assisted Interventions
- 2019 - Imaging Network Ontario
- 2017 - SPIE Medical Imaging
- 2015 - Medical Image Computing and Computer Assisted Interventions (including workshops)

Grant Proposal Peer Reviews (ad hoc)

- 2020 - Mitacs Accelerate

Selected Outreach Activities

- 2020 cuHacking Hackathon
Carleton University, Ottawa, Canada
General Judge
- 2014 - 2018;
2022 Perk Lab Slicer Bootcamp
Queen's University, Kingston, Canada
PLUS, SlicerIGT, and Perk Tutor platforms for image-guided interventions research
- 2015 SEAMO Innovation Showcase
Queen's University, Kingston, Canada
Perk Tutor platform for image-guided interventions training
- 2013 - 2014 Science Rendezvous Kingston
Queen's University, Kingston, Canada
SlicerIGT, Perk Tutor, and Mobile Image Overlay Software
- 2013 - 2014 Queen's University Discovery Day
Canadian Medical Hall of Fame
SlicerIGT, Perk Tutor, and Mobile Image Overlay Software

Invited Talks

- 2023 IEEE EMBS/OCIBME Seminar Series
Improving outcomes in surgery with machine learning
- 2021 Carleton University Data Day 7.1
Panel Discussion on Future of AI
- 2019 Ontario Health IT Conference
Panel Discussion on AI and Precision Medicine: Using AI, big data analytics and genomics to predict, prevent and cure diseases, and make individualized treatment decisions

Publications

Journal Articles

- [1] G. Salame, **M. S. Holden**, B. P. Lucas, and A. Portillo, "Change in economy of ultrasound probe motion among general medicine trainees," *The Ultrasound Journal*, vol. 16, no. 1, p. 5, 2024. DOI: 10.1186/s13089-023-00345-2.
- [2] D. Kulik, C. R. Bell, and **M. S. Holden**, "Fast skill assessment from kinematics data using convolutional neural networks," *International Journal of Computer Assisted Radiology and Surgery*, pp. 1-7, 2023. DOI: 10.1007/s11548-023-02908-z.
- [3] J. Ruzicki, **M. S. Holden**, S. Cheon, T. Ungi, R. Egan, and C. Law, "Use of machine learning to assess cataract surgery skill level with tool detection," *Ophthalmology Science*, vol. 3, no. 1, p. 100235, 2023. DOI: 10.1016/j.xops.2022.100235.
- [4] R. Prager, P. Pageau, T. Hodges, C. Yan, M. Woo, M.-J. Nemnom, S. Millington, **M. S. Holden**, R. St-Gelais, and W. J. Cheung, "Characterizing the biomechanical differences between novice and expert point-of-care ultrasound practitioners using a low-cost gyroscope and accelerometer integrated sensor: A pilot study," *AEM Education and Training*, vol. 6, no. 2, e10733, 2022. DOI: 10.1002/aet2.10733.

- [5] A. N. Tasca, S. Carlucci, J. C. Wiley, **M. S. Holden**, A. El-Roby, and G. A. Tasca, "Detecting defense mechanisms from adult attachment interview (aai) transcripts using machine learning," *Psychotherapy Research*, pp. 1–11, 2022. DOI: 10.1080/10503307.2022.2156306.
- [6] K. Yuan, **M. S. Holden**, S. Gao, and W. Lee, "Anticipation for surgical workflow through instrument interaction and recognized signals," *Medical Image Analysis*, vol. 82, p. 102611, 2022. DOI: 10.1016/j.media.2022.102611.
- [7] **M. S. Holden**, M. O'Brien, A. Malpani, H. Naz, Y.-W. Tseng, L. Ishii, S. S. Vedula, M. Ishii, and G. Hager, "Reconstructing the nasal septum from instrument motion during septoplasty surgery," *Journal of Medical Imaging*, vol. 8, no. 6, p. 065001, 2021. DOI: 10.1117/1.JMI.8.6.065001.
- [8] **M. S. Holden**, A. Portillo, and G. Salame, "Skills classification in cardiac ultrasound with temporal convolution and domain knowledge using a low-cost probe tracker," *Ultrasound in Medicine & Biology*, vol. 47, no. 10, pp. 3002–3013, 2021. DOI: 10.1016/j.ultrasmedbio.2021.06.011.
- [9] C. R. Bell and **M. S. Holden**, "Wanted: Automated objective proficiency assessment metrics for the fast exam (and other pocus studies)," *European Journal of Trauma and Emergency Surgery*, pp. 1–2, 2019, Letter to the Editor. DOI: 10.1007/s00068-019-01156-8.
- [10] **M. S. Holden**, S. Xia, H. Lia, Z. Keri, C. Bell, L. Patterson, T. Ungi, and G. Fichtinger, "Machine learning methods for automated technical skills assessment with instructional feedback in ultrasound-guided interventions," *International Journal of Computer Assisted Radiology and Surgery*, pp. 1–11, 2019. DOI: 10.1007/s11548-019-01977-3.
- [11] R. McGraw, Z. Keri, T. Chaplin, L. Rang, M. Jaeger, N. Rocca, **M. S. Holden**, Z. Keri, and G. Fichtinger, "Cognitive load theory as a framework for simulation-based, ultrasound-guided internal jugular catheterization training: Once is not enough," *Canadian Journal of Emergency Medicine*, vol. 21, no. 1, pp. 141–148, 2019. DOI: 10.1017/cem.2018.456.
- [12] C. Yeo, J. Ring, **M. S. Holden**, T. Ungi, A. Toprak, G. Fichtinger, and B. Zevin, "Surgery tutor for computational assessment of technical proficiency in soft-tissue tumor resection in a simulated setting," *Journal of surgical education*, vol. 76, no. 3, pp. 872–880, 2019. DOI: 10.1016/j.jsurg.2018.11.005.
- [13] **M. S. Holden**, C. N. Wang, K. MacNeil, B. Church, L. Hookey, G. Fichtinger, and T. Ungi, "Objective assessment of colonoscope manipulation skills in colonoscopy training," *International Journal of Computer Assisted Radiology and Surgery*, vol. 13, no. 1, pp. 105–114, 2018. DOI: 10.1007/s11548-017-1676-4.
- [14] **M. S. Holden**, Y. Zhao, C. Haegelen, C. Essert, S. Fernandez-Vidal, E. Bardinet, T. Ungi, G. Fichtinger, and P. Jannin, "Self-guided training for deep brain stimulation planning using objective assessment," *International Journal of Computer Assisted Radiology and Surgery*, vol. 13, no. 7, pp. 1129–1139, 2018. DOI: 10.1007/s11548-018-1753-3.
- [15] C. R. Bell, C. McKaigney, **M. S. Holden**, G. Fichtinger, and L. Rang, "Sonographic accuracy as a novel tool for point-of-care ultrasound competency assessment," *AEM Education and Training*, vol. 1, no. 4, pp. 316–324, 2017. DOI: 10.1002/aet2.10064.
- [16] R. McGraw, T. Chaplin, C. McKaigney, L. Rang, M. Jaeger, D. Redfearn, C. Davison, T. Ungi, **M. S. Holden**, C. Yeo, Z. Keri, and G. Fichtinger, "Development and evaluation of a simulation-based curriculum for ultrasound-guided central venous catheterization," *Canadian Journal of Emergency Medicine*, vol. 18, no. 6, pp. 405–413, 2016. DOI: 10.1017/cem.2016.329.
- [17] D. Clinkard, **M. S. Holden**, T. Ungi, C. Davison, D. Messenger, G. Fichtinger, and R. McGraw, "The development and validation of hand motion analysis to evaluate competency in central line catheterization," *Academic Emergency Medicine*, vol. 22, no. 2, pp. 212–218, 2015. DOI: 10.1111/acem.12590.
- [18] D. Clinkard, E. Moulton, **M. S. Holden**, C. Davison, T. Ungi, G. Fichtinger, and R. C. McGraw, "Assessment of lumbar puncture skill in experts and nonexperts using checklists and quantitative tracking of needle trajectories: Implications for competency-based medical education," *Teaching and learning in medicine*, vol. 27, no. 1, pp. 51–56, 2015. DOI: 10.1080/10401334.2014.979184.

- [19] Z. Keri, D. Sydor, T. Ungi, **M. S. Holden**, P. Mousavi, R. McGraw, D. Borschneck, G. Fichtinger, and M. Jaeger, “Computerized training system for ultrasound-guided lumbar puncture on abnormal spine models: A randomized controlled trial,” *Canadian Journal of Anesthesia/Journal canadien d’anesthésie*, vol. 62, no. 7, pp. 777–784, 2015. DOI: 10.1007/s12630-015-0367-2.
- [20] C. Yeo, C. Davison, T. Ungi, **M. S. Holden**, G. Fichtinger, and R. McGraw, “Examination of learning trajectories for simulated lumbar puncture training using hand motion analysis,” *Academic Emergency Medicine*, vol. 22, no. 10, pp. 1187–1195, 2015. DOI: 10.1111/acem.12753.
- [21] **M. S. Holden**, T. Ungi, D. Sargent, R. C. McGraw, E. C. S. Chen, S. Ganapathy, T. M. Peters, and G. Fichtinger, “Feasibility of real-time workflow segmentation for tracked needle interventions,” *IEEE Transactions on Biomedical Engineering*, vol. 61, no. 6, pp. 1720–1728, 2014. DOI: 10.1109/tbme.2014.2301635.
- [22] T. Ungi, D. Beiko, M. Fuoco, F. King, **M. S. Holden**, G. Fichtinger, and R. Siemens, “Tracked ultrasonography snapshots enhance needle guidance for percutaneous renal access: A pilot study,” *Journal of Endourology*, vol. 28, no. 9, pp. 1040–1045, 2014. DOI: 10.1089/end.2014.0011.
- [23] **M. S. Holden**, D. G. C. McKeon, and T. N. Sherry, “The double slit experiment with polarizers,” *Canadian Journal of Physics*, vol. 89, no. 11, pp. 1079–1081, 2011. DOI: 10.1139/p11-122.

Conference Proceedings

- [1] U. Tanin, A. Duimering, C. Law, J. Ruzicki, G. Luna, and **M. S. Holden**, “Performance evaluation in cataract surgery with an ensemble of 2d-3d convolutional neural networks,” in *Healthcare Technology Letters*, 2024. DOI: 10.1049/htl2.12078.
- [2] K. Barr, L. Hookey, T. Ungi, G. Fichtinger, and **M. S. Holden**, “Analyzing colonoscopy training learning curves using comparative hand tracking assessment,” in *Medical Imaging 2023: Image-Guided Procedures, Robotic Interventions, and Modeling*, SPIE, vol. 12466, 2023, pp. 466–472. DOI: 10.1117/12.2654309.
- [3] B. Long, Y. Guan, and **M. S. Holden**, “A two-stage neural network model for breast ultrasound image classification,” in *IEEE 23rd International Conference on Bioinformatics and Bioengineering (BIBE)*, IEEE Computer Society, 2023, pp. 129–133. DOI: 10.1109/BIBE60311.2023.00028.
- [4] R. W. Chan, R. Hisey, and **M. S. Holden**, “Feasibility of video-based skills assessment: A study on ultrasound-guided needle insertions using simulated projections,” in *Medical Imaging 2022: Image-Guided Procedures, Robotic Interventions, and Modeling*, SPIE, vol. 12034, 2022, pp. 663–669. DOI: 10.1117/12.2613199.
- [5] O. O’Driscoll, R. Hisey, **M. S. Holden**, D. Camire, J. Erb, D. Howes, T. Ungi, and G. Fichtinger, “Feasibility of object detection for skill assessment in central venous catheterization,” in *Medical Imaging 2022: Image-Guided Procedures, Robotic Interventions, and Modeling*, SPIE, vol. 12034, 2022, pp. 358–365. DOI: 10.1117/12.2607294.
- [6] K. Yuan, **M. S. Holden**, S. Gao, and W.-S. Lee, “Surgical workflow anticipation using instrument interaction,” in *International Conference on Medical Image Computing and Computer-Assisted Intervention*, Springer, 2021, pp. 615–625. DOI: 10.1007/978-3-030-87202-1_59.
- [7] R. Liu and **M. S. Holden**, “Kinematics data representations for skills assessment in ultrasound-guided needle insertion,” in *Medical Ultrasound, and Preterm, Perinatal and Paediatric Image Analysis*, Springer, 2020, pp. 189–198. DOI: 10.1007/978-3-030-60334-2_19.
- [8] R. E. Tyrrell and **M. S. Holden**, “Ultrasound video analysis for skill level assessment in fast ultrasound,” in *Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization*, vol. 0, Taylor & Francis, 2020, pp. 1–5. DOI: 10.1080/21681163.2020.1835549.
- [9] J. Laframboise, T. Ungi, L. Hookey, A. Lasso, M. Asselin, **M. S. Holden**, and G. Fichtinger, “Analyzing the curvature of the colon in different patient positions,” in *Medical Imaging 2019: Image-Guided Procedures, Robotic Interventions, and Modeling*, International Society for Optics and Photonics, vol. 10951, 2019, 109512F. DOI: 10.1117/12.2512455.

- [10] D. Garcia-Mato, **M. S. Holden**, A. Lasso, A. Szulewski, J. Pascau, and G. Fichtinger, “3d gaze tracking for skill assessment in ultrasound-guided needle insertions,” in *32nd International Congress and Exhibition of Computer Assisted Radiology and Surgery*, vol. Supplement 1, 2018, S52–S53. DOI: 10.1007/s11548-018-1766-y.
- [11] R. Hisey, T. Ungi, **M. S. Holden**, Z. Baum, Z. Keri, C. McCallum, D. W. Howes, and G. Fichtinger, “Real-time workflow detection using webcam video for providing real-time feedback in central venous catheterization training,” in *Medical Imaging 2018: Image-Guided Procedures, Robotic Interventions, and Modeling*, Honorable mention poster award, International Society for Optics and Photonics, vol. 10576, 2018, p. 1057620. DOI: 10.1117/12.2293494.
- [12] R. Leung, A. Lasso, **M. S. Holden**, B. Zevin, and G. Fichtinger, “Exploration using holographic hands as a modality for skills training in medicine,” in *Medical Imaging 2018: Image-Guided Procedures, Robotic Interventions, and Modeling*, International Society for Optics and Photonics, vol. 10576, 2018, p. 1057611. DOI: 10.1117/12.2295495.
- [13] E. Rae, A. Lasso, **M. S. Holden**, E. Morin, R. Levy, and G. Fichtinger, “Neurosurgical burr hole placement using the microsoft hololens,” in *Medical Imaging 2018: Image-Guided Procedures, Robotic Interventions, and Modeling*, International Society for Optics and Photonics, vol. 10576, 2018, 105760T. DOI: 10.1117/12.2293680.
- [14] S. Xia, Z. Keri, **M. S. Holden**, R. Hisey, H. Lia, T. Ungi, C. H. Mitchell, and G. Fichtinger, “A learning curve analysis of ultrasound-guided in-plane and out-of-plane vascular access training with perk tutor,” in *Medical Imaging 2018: Image-Guided Procedures, Robotic Interventions, and Modeling*, International Society for Optics and Photonics, vol. 10576, 2018, p. 1057625. DOI: 10.1117/12.2293789.
- [15] V. Harish, E. Bibic, A. Lasso, **M. S. Holden**, T. Vaughan, Z. Baum, T. Ungi, and G. Fichtinger, “Monitoring electromagnetic tracking error using redundant sensors,” in *Medical Imaging 2017: Image-Guided Procedures, Robotic Interventions, and Modeling*, International Society for Optics and Photonics, vol. 10135, 2017, 101352R. DOI: 10.1117/12.2256004.
- [16] **M. S. Holden**, Z. Keri, T. Ungi, and G. Fichtinger, “Overall proficiency assessment in point-of-care ultrasound interventions: The stopwatch is not enough,” in *Imaging for Patient-Customized Simulations and Systems for Point-of-Care Ultrasound*, Springer, 2017, pp. 146–153. DOI: 10.1007/978-3-319-67552-7_18.
- [17] H. Lia, Z. Keri, **M. S. Holden**, V. Harish, C. H. Mitchell, T. Ungi, and G. Fichtinger, “Training with perk tutor improves ultrasound-guided in-plane needle insertion skill,” in *Medical Imaging 2017: Image-Guided Procedures, Robotic Interventions, and Modeling*, International Society for Optics and Photonics, vol. 10135, 2017, 101350T. DOI: 10.1117/12.2255840.
- [18] K. Carter, T. Vaughan, **M. S. Holden**, G. Gauvin, P. Pezeshki, A. Lasso, T. Ungi, E. Morin, J. Rudan, J. Engel, and G. Fichtinger, “Visual feedback mounted on surgical tool: Proof of concept,” in *Medical Imaging 2016: Image-Guided Procedures, Robotic Interventions, and Modeling*, International Society for Optics and Photonics, vol. 9786, 2016, p. 978614. DOI: 10.1117/12.2214982.
- [19] **M. S. Holden**, T. Ungi, C. McKaigney, C. Bell, L. Rang, and G. Fichtinger, “Objective evaluation of sonographic skill in focussed assessment with sonography for trauma examinations,” in *29th International Congress and Exhibition of Computer Assisted Radiology and Surgery*, vol. Supplement 1, 2015, S79–S80. DOI: 10.1007/s11548-015-1213-2.
- [20] M. Soehl, **M. S. Holden**, A. Lasso, and G. Fichtinger, “Scalable ultrasound calibration phantoms made from lego® bricks,” in *29th International Congress and Exhibition of Computer Assisted Radiology and Surgery*, vol. Supplement 1, 2015, S218–S219. DOI: 10.1007/s11548-015-1213-2.
- [21] **M. S. Holden** and G. Fichtinger, “Linear object registration of interventional tools,” in *Workshop on Augmented Environments for Computer-Assisted Interventions*, Springer, 2014, pp. 118–127. DOI: 10.1007/978-3-319-10437-9_13.
- [22] **M. S. Holden**, T. Ungi, D. Sargent, R. C. McGraw, and G. Fichtinger, “Surgical motion characterization in simulated needle insertion procedures,” in *Medical Imaging 2012: Image-Guided Procedures, Robotic Interventions, and Modeling*, International Society for Optics and Photonics, vol. 8316, 2012, 83160W. DOI: 10.1117/12.911003.

Book Chapters

- [1] T. Ungi, **M. S. Holden**, B. Zevin, and G. Fichtinger, “Chapter 37 - interventional procedures training,” in *Handbook of Medical Image Computing and Computer Assisted Intervention*, S. K. Zhou, D. Rueckert, and G. Fichtinger, Eds., Academic Press, 2020, pp. 909–929. DOI: 10.1016/B978-0-12-816176-0.00042-9.

Presentations/Abstracts

- [1] J. Bierbrier, R. Hisey, J. Yang, A. Duimering, C. Law, G. Fichtinger, and **M. S. Holden**, “Video-based phase recognition in cataract surgery,” Imaging Network Ontario, 2024.
- [2] B. Long, Y. Guan, and **M. S. Holden**, “Improving model adaptability: A domain knowledge-integrated deep learning approach for ultrasound image segmentation and classification,” Imaging Network Ontario, 2024.
- [3] J. Yang, R. Hisey, J. Bierbrier, C. Law, G. Fichtinger, and **M. S. Holden**, “Feasibility study of using yolov8 for cataract surgical tool detection in surgical microscope video,” Imaging Network Ontario, 2024.
- [4] I. Gofman and **M. S. Holden**, “Classifying points of interest in fast ultrasound videos using neural networks,” Imaging Network Ontario, 2023.
- [5] J. Hsu, I. Churchill, **M. S. Holden**, and H. Lesiuk, “Prediction of cerebral vasospasm using radiographical and clinical features: A machine learning model,” Canadian Neurological Sciences Federation Congress, 2023.
- [6] H. Lee, R. Hisey, **M. S. Holden**, J. Liu, T. Ungi, G. Fichtinger, and C. Law, “Evaluating faster r-cnn for cataract surgery tool detection using microscopy video,” Imaging Network Ontario, 2022.
- [7] O. O’Driscoll, R. Hisey, **M. S. Holden**, D. Camire, J. Erb, D. Howes, T. Ungi, and G. Fichtinger, “Feasibility of using object detection for performance assessment in central venous catheterization,” Imaging Network Ontario, 2022.
- [8] J. Ruzicki, **M. S. Holden**, S. Cheon, T. Ungi, R. Egan, and C. Law, “Assessing cataract surgery skills through machine learning: A pilot study,” American Society of Cataract and Refractive Surgery Conference, 2020.
- [9] J. Ruzicki, **M. S. Holden**, S. Cheon, T. Ungi, R. Egan, and C. Law, “Assessing cataract surgery skills through machine learning: A pilot study,” Canadian Ophthalmological Society, 2020.
- [10] J. Laframboise, T. Ungi, A. Lasso, M. Asselin, **M. S. Holden**, P. Tan, L. Hookey, and G. Fichtinger, “Quantifying the effect of patient position on the curvature of colons,” Imaging Network Ontario, 2019.
- [11] S. Pasricha, Z. Keri, **M. S. Holden**, and G. Fichtinger, “Developing a simulation curriculum to teach medical students to perform an ultrasound-guided needle insertion,” Canadian Conference on Medical Education, 2019.
- [12] P. Tan, J. Laframboise, C. Scott, R. Bechara, A. Lasso, M. Asselin, **M. S. Holden**, T. Ungi, and G. Fichtinger, “Quantitative assessment to determine change in colonic curvature with supine versus prone patient position using computed tomography colonography,” Canadian Digestive Diseases Week, 2019.
- [13] R. Hisey, T. Ungi, **M. S. Holden**, Z. Baum, Z. Keri, C. McCallum, D. W. Howes, and G. Fichtinger, “Assessment of the use of webcam based workflow detection for providing real-time feedback in central venous catheterization training,” Imaging Network Ontario, 2018.
- [14] **M. S. Holden**, H. Lia, S. Xia, Z. Keri, T. Ungi, and G. Fichtinger, “Configurable overall skill assessment in ultrasound-guided needle insertion,” Imaging Network Ontario, 2018.
- [15] R. Leung, A. Lasso, **M. S. Holden**, B. Zevin, and G. Fichtinger, “Using augmented-reality for self-directed surgical skills training in competency-based medical education,” Imaging Network Ontario, 2018.

- [16] S. Pasricha, Z. Keri, **M. S. Holden**, and G. Fichtinger, “Developing a simulation curriculum to teach medical students to perform an ultrasound-guided needle insertion,” William Ersil Resident Research Day, Best non-resident orthopaedic paper, 2018.
- [17] E. Rae, A. Lasso, **M. S. Holden**, E. Morin, R. Levy, and G. Fichtinger, “Accuracy of the microsoft hololens for neurosurgical burr hole placement,” Imaging Network Ontario, 2018.
- [18] J. Ring, C. T. Yeo, **M. S. Holden**, T. Ungi, G. Fichtinger, and B. Zevin, “Surgery tutor for assessment of technical proficiency in open soft-tissue tumour resection: A validation study,” International Conference on Residency Education, 2018.
- [19] S. Xia, Z. Keri, **M. S. Holden**, R. Hisey, H. Lia, T. Ungi, and G. Fichtinger, “Ultrasound-guided needle insertion simulator with tracking- and video-based skill assessment,” Imaging Network Ontario, 2018.
- [20] S. Xia, Z. Keri, **M. S. Holden**, R. Hisey, H. Lia, T. Ungi, L. Patterson, and G. Fichtinger, “Ultrasound-guided vascular access training with 3d visualization guidance in novice medical trainees,” Canadian Anesthesiologists’ Annual Meeting, Best Paper in Education and Simulation Finalist, 2018.
- [21] C. T. Yeo, J. Ring, **M. S. Holden**, T. Ungi, G. Fichtinger, and B. Zevin, “Surgery tutor – an open source platform for assessment of technical proficiency: A validation study in a simulated setting,” American College of Surgeons Surgical Simulation Summit, 2018.
- [22] C. T. Yeo, J. Ring, **M. S. Holden**, T. Ungi, G. Fichtinger, and B. Zevin, “Validation of surgery tutor for assessment of technical proficiency in soft-tissue tumour resection,” Canadian Surgery Forum, 2018.
- [23] V. Harish, E. Bibic, A. Lasso, **M. S. Holden**, T. Vaughan, Z. Baum, T. Ungi, and G. Fichtinger, “An application of redundant sensors for intraoperative electromagnetic tracking error monitoring,” Imaging Network Ontario, 2017.
- [24] **M. S. Holden**, C. N. Wang, K. MacNeil, B. Church, L. Hookey, G. Fichtinger, and T. Ungi, “Assessing technical competence in simulated colonoscopy using joint motion analysis,” Queen’s Graduate Computing Society Conference, Runner-up poster award, 2017.
- [25] **M. S. Holden**, C. N. Wang, K. MacNeil, B. Church, L. Hookey, G. Fichtinger, and T. Ungi, “Assessing technical competence in simulated colonoscopy using joint motion analysis,” Imaging Network Ontario, 2017.
- [26] Z. Keri, T. Ungi, **M. S. Holden**, G. Fichtinger, and R. McGraw, “Computer-assisted training and evaluation in procedural skill acquisition,” Annual Meeting for Health Sciences Research Trainees, 2017.
- [27] R. Leung, A. Lasso, **M. S. Holden**, G. Fichtinger, and B. Zevin, “Exploration using holographic hands as a modality for skills training in medicine,” Artificial Intelligence in Medicine, Best Abstract Award in Digital Medicine and Wearable Technology, 2017.
- [28] R. McGraw, Z. Keri, N. Rocca, T. Chaplin, L. Rang, M. Jaeger, **M. S. Holden**, and G. Fichtinger, “Using cognitive load theory to guide simulation-based ultrasound-guided internal jugular catheterization training: Once is not enough,” Royal College of Physicians and Surgeons of Canada Simulation Summit, 2017.
- [29] C. N. Wang, **M. S. Holden**, T. Ungi, G. Fichtinger, C. M. Walsh, and L. Hookey, “Developing a competency-based performance metric of colonoscopy skills acquisition using motion analysis - step 1: Low-fidelity benchtop model,” Journal of the Canadian Association of Gastroenterology, 2017.
- [30] **M. S. Holden**, M. Woodcroft, T. Chaplin, L. Rang, M. Jaeger, N. Rocca, R. C. McGraw, G. Fichtinger, and T. Ungi, “Central venous catheterization curriculum development via objective performance metrics,” Imaging Network Ontario, Cum Laude Award, 2016.
- [31] K. MacNeil, C. Wang, **M. S. Holden**, T. Ungi, G. Fichtinger, and L. Hookey, “System for objectively evaluating colonoscopy procedural skills using motion analysis,” Imaging Network Ontario, 2016.
- [32] R. McGraw, T. Chaplin, C. McKaigney, L. Rang, M. Jaeger, D. Redfearn, C. Davison, T. Ungi, **M. S. Holden**, C. Yeo, Z. Keri, G. Fichtinger, M. Woodcroft, and N. Rocca, “Using hand motion analysis to establish learning curves in ultrasound guided central venous access,” CAEP Feature Education Innovations, 2016.

- [33] M. Woodcroft, T. Chaplin, L. Rang, M. Jaeger, **M. S. Holden**, N. Rocca, T. Ungi, G. Fichtinger, and R. McGraw, “Development of a simulation-based curriculum for ultrasound-guided internal jugular central venous catheterization,” *Canadian Journal of Emergency Medicine*, 2016.
- [34] M. Woodcroft, T. Chaplin, L. Rang, M. Jaeger, **M. S. Holden**, N. Rocca, T. Ungi, G. Fichtinger, and R. McGraw, “Development of a simulation-based curriculum for ultrasound-guided internal jugular central venous catheterization,” *Annual Meeting for Health Sciences Research Trainees*, 2016.
- [35] C. Bell, C. McKaigney, **M. S. Holden**, J. Newbigging, T. Ungi, G. Fichtinger, and L. Rang, “Ultrasound probe motion tracking as a novel tool for pocus competency assessment,” *Canadian Association of Emergency Physicians*, 2015.
- [36] M. Woodcroft, T. Chaplin, L. Rang, M. Jaeger, **M. S. Holden**, N. Rocca, T. Ungi, G. Fichtinger, and R. McGraw, “Development of a simulation-based curriculum for ultrasound-guided internal jugular central venous catheterization,” *Queen’s University Medical Student Research Showcase*, 2015.
- [37] D. Clinkard, **M. S. Holden**, D. Messenger, T. Ungi, C. Davidson, G. Fichtinger, and R. McGraw, “Quantifying competency – the development and validation of a hand motion analysis program to discriminate experts and non-experts during central venous line cannulation,” *Canadian Anesthesiology Society*, 2014.
- [38] D. Clinkard, **M. S. Holden**, D. Messenger, T. Ungi, C. Davidson, G. Fichtinger, and R. McGraw, “Quantifying competency – the development and validation of a hand motion analysis program to discriminate experts and non-experts during central venous line cannulation,” *Canadian Association of Emergency Physicians*, 2014.
- [39] **M. S. Holden** and G. Fichtinger, “Linear object registration: A registration algorithm using points, lines, and planes,” *Queen’s University Graduate Computing Society Conference*, 2014.
- [40] **M. S. Holden** and G. Fichtinger, “Linear object registration: A registration algorithm using points, lines, and planes,” *Imaging Network Ontario*, 2014.
- [41] Z. Keri, D. Sydor, T. Ungi, **M. S. Holden**, R. McGraw, D. Borschneck, M. Jaeger, and G. Fichtinger, “A novel technology for teaching ultrasound-guided intrathecal needle insertion with perk tutor,” *Imaging Network Ontario*, 2014.
- [42] T. Ungi, D. Beiko, M. Fuoco, F. King, **M. S. Holden**, R. Siemens, and G. Fichtinger, “Tracked ultrasound snapshots improve the performance of novices in simulated nephrostomy,” *Imaging Network Ontario*, 3rd place poster award, 2014.
- [43] D. Clinkard, E. Moulton, **M. S. Holden**, G. Fichtinger, T. Ungi, and R. C. McGraw, “The validity of hand and tool motion analysis as an observer independent method of assessing competency – implications for assessment in competency-based education,” *Queen’s University Medical Student Research Showcase*, 2013.
- [44] **M. S. Holden**, T. Ungi, D. Sargent, R. C. McGraw, E. C. S. Chen, S. Ganapathy, T. M. Peters, and G. Fichtinger, “Real-time workflow segmentation for needle-based interventions,” *Imaging Network Ontario*, 3rd place poster award, 2013.
- [45] **M. S. Holden**, “Clearcut regions and the multi-valued nature of the complex logarithm,” *Canadian Undergraduate Mathematics Conference*, 2011.

Theses

- [1] **M. S. Holden**, “Computer-assisted assessment and feedback for image-guided interventions training,” Ph.D. dissertation, Queen’s University, 2019.
- [2] **M. S. Holden**, “Linear object registration for image-guided interventions,” M.S. thesis, Queen’s University, 2014.

Patents/Inventions

- [1] **M. S. Holden**, G. Fichtinger, C. Haegelen, P. Jannin, and Y. Zhao, “Proficiency assessment system and method for deep brain stimulation (dbs),” EP17306370, filed 2017.

Funding

- [1] **M. S. Holden**, *Data science for improved outcomes in interventional healthcare*, Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Launch Supplement, 2020.
- [2] **M. S. Holden**, *Data science for improved outcomes in interventional healthcare*, Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Grant, 2020.
- [3] **M. S. Holden**, *Start-up grant*, Carleton University, 2019.
- [4] B. Zevin, C. T. Yeo, J. Ring, **M. S. Holden**, T. Ungi, and G. Fichtinger, *Proficiency-based training in soft tissue resection using real-time computer navigation feedback from the surgery tutor*, Southeastern Ontario Academic Medical Organization (SEAMO) Endowed Scholarship and Education Fund, 2018.

ASST. PROF. ZINOVI RABINOVICH, PHD

HP 5410 (Data Science wing), Herzberg Laboratories, Carleton University, Ottawa, ON, Canada

• zinovi.rabinovich@carleton.ca

SHORT BIO

Zinovi Rabinovich is currently an Assistant Professor at the Carleton University, Ottawa, having joined it in 2023. However, his academic career started at the Nanyang Technological University (NTU), which he has joined in 2017 after holding an industrial position for 5 years as a Senior Algorithms Engineer at Mobileye Vision Technologies Ltd. His sustained publication record highlights two key directions of his current research agenda: social behaviour analysis; and choice manipulation. The latter, applied to Security Games via strategic information disclosure, was published in several seed papers in 2015. It has since gathered an independent following.

Dr. Rabinovich's record also includes post-doctoral appointments at the University of Southampton (2007-2010) and the Bar-Ilan University (2010-2011). His PhD is from the Hebrew University of Jerusalem (2008).

In 2018 Dr. Rabinovich became a proud father. Proud to a degree that compels noting it here.

EDUCATION

- **Ph.D.** in Computer Science, Hebrew University of Jerusalem, Israel, 2008.
Thesis: "*Dynamics Based Control and Continual Planning*", supervised by Prof. Jeffrey S. Rosenschein.
- **M.Sc.** in Computer Science, Hebrew University of Jerusalem, Israel, 2002.
Thesis: "*Inapproximability of Decentralized Control*", supervised by Prof. Jeffrey S. Rosenschein.
- **B.Sc.** in Computer Science and Mathematics, Hebrew University of Jerusalem, Israel, 1998.

RESEARCH INTERESTS: MANIPULATION OF DECISION BEHAVIOUR

- Modelling of manipulative interactions, inclusive of machine-human interactions
- Perceptual control and emergent behaviour

RESEARCH AND DEVELOPMENT EXPERIENCE

Information as a strategic resource and means of control

- Established information disclosure as a means to increased security
- Created models of open manipulation of adaptive and learning algorithms

Formal interaction modelling and solutions

- Described implicit manipulation of voting procedures
- Developed teaching methods by implicit modification of a learner's environment
- Engineered computational methods for equilibria computation

Human behaviour modelling and exploitation

- Formulated models of human response to open manipulation
- Developed methods for persuasive advice provision to humans

Advanced control algorithm designs

- A fault-tolerant controller scheme for continuous and discrete environments
- A multi-tasking controller with adjustable task coordination
- A family of teamwork oriented controllers
- A fully distributed emergent behaviour controller

Guidance and control based on visual cues

- Visual features detection, e.g. road surface markings, human body, etc
- (re)Construction of high level driver guidance

EMPLOYMENT HISTORY

- Assistant Professor**, Carleton University, Canada **May 2023-current**
Assistant Professor, Nanyang Technological University, Singapore **February 2017-November 2023**
Senior Algorithms Engineer, MobilEye Vision Technologies Ltd., Israel **August 2012-February 2017**
Algorithms Developer, MobilEye Vision Technologies Ltd., Israel **April 2012-July 2012**
- Guidance and control based on visual cues
 - Large scale visual (weekly structured) features detection
 - Development and deployment of Deep Neural Network (DNN) based solutions
 - Hybrid algorithmic solutions
 - Client support in matching algorithmic and regulation system requirements
- Postdoctoral Researcher**, Department of Computer Science, Bar-Ilan University, Israel **2010-2011**
- Formal open manipulation and persuasion method by information disclosure and/or direct advice of action
 - Modelling techniques of human response to a manipulative companion
 - Augmentation of formal persuasion methods and application to human subjects
 - Interfacing the technology with the industrial partner (GM Advanced Research Centre)
- Research Fellow**, “Market Based Control” project, ECS, University of Southampton, United Kingdom .. **2007-2010**
- Computational methods for complex equilibria with application to auction analysis
 - Development of a novel formal teacher-learner framework
 - Development of fault-tolerant control methods
- Manager of the Assistant Teaching Staff**, Hebrew University of Jerusalem, Israel **2006–2007**
Teacher, Hebrew University of Jerusalem, Israel **2005–2006**
Teaching Assistant, Hebrew University of Jerusalem, Israel **1999–2005**

RESEARCH GRANTS

- Carleton Start-Up-Grant, 75K CAD
- NTU Start-Up-Grant, 200K S\$, 15-Feb-2017 through 14-Feb-2021
- AcRF Tier-1 Grant, 97K S\$, 1-Nov-2018 through 31-Oct-2020

ACADEMIC SUPERVISION AND MENTORING

- PostDocs**, Nanyang Technological University, Singapore **2018-2023**
- Dr. Amr Ali Mokhtar Alhossary, Nov 2018 - July 2020
- PhD**, Nanyang Technological University, Singapore **2019-2024**
- Xu Hang, January 2019 – April 2023
 - Wang Rundong, August 2019 – November 2023
 - Bector Ridhima, August 2019 – February 2024 (awaiting formal conferral)
- MEng by Research**, Nanyang Technological University, Singapore **2018-2020**
- Zhou Jing Zhe (Fall 2018 - Spring 2020)
- Final Year Projects**, Nanyang Technological University, Singapore **2017-2023**
- “Vision transformer as image fusion model”, by Fengye Zhao, 2022-2023
 - “Early goal-detection for black-box environment poisoning attacks”, by Varun Srikant Iyengar, 2022-2023
 - “Acceptance of repeated automated advice”, by Li Ting Yeo, 2021-2022
 - “Reinforcement learning for swarm systems”, by Ramaswamy Arumugam, 2021-2022
 - “World model with PSR components”, by Wei Tng, 2021-2022

- “Lying in pursuit evasion task with multi-agent reinforcement learning”, by Damien Shiao Kiat Cheng, 2021-2022
- “Multi-Agent Deep Deterministic Policy Gradient Algorithm for Swarm Systems” by Bedi Jannat, 2020-2021
- “Wonders of World Models: Use of World Model in (simulated) robotic motion” by Shen Chen, 2020-2021
- “Applying Interpolation-Constrained Autoencoders to World Models Approach Reinforcement Learning” by Kevin Winata, 2020-2021
- “Model-based RL in ATARI games” by Akarapu Bharadwaj, 2020-2021
- “Exploring the strength of advice provision in reinforcement learning and the impact of an adversarial advisor” by Arun Rakshitha, 2020-2021
- “Non-repetitive gaming experience as a curriculum design problem” by Queck Yufei, 2019-2020
- “Capturing ATARI games as predictive state models” by Ang Teck Wee, 2019-2020
- “Genetic Algorithms for Swarm Parameter Tuning” by Chee Jun Yuan Glenn, 2018-2019
- “Socially aware flocking” by Ng Ken Jo, 2017-2018

MSc Student Co-Supervisor, Hebrew University of Jerusalem, Israel 2004–2008

- “Dynamics based control with PSRs” by Ariel Adam, Hebrew University, 2008
- “Behaviosites: Manipulation of global multiagent system behavior through parasitic infection” by Amit Shabtay, Hebrew University, 2006
- “The effects of parenting on genetic and learning agents” by Michael Berger, Hebrew University, 2004

Graduate Engineering Projects, Hebrew University of Jerusalem, Israel 2007-2008

- “HANS - HUJI’s Autonomous Navigation System” by D. Lax, K. Haas and Y. Movshovitz.

TEACHING RECORD

Instructor, SCS, Carleton University, Canada 2023-current

- COMP 5900G (Winter 2024) – Advanced Topics in Multi-Agent (Reinforcement) Learning
- COMP 3000B (Fall 2023) – Operating Systems

Instructor (Lec/Tut), SCSE, Nanyang Technological University, Singapore 2017-2023

- MSAI 6124 (2020/21) – Lec – Neuro Evolution and Fuzzy Intelligence
- CZ/CE 4016 (2017/18–2021/22) – Lec – Advanced Topics in Algorithms
- CZ/CE 2001 (2017/18,2019/20) – Tut – Algorithms
- CZ/CE 3005 (2016/17, 2018/19,2020/21-2021/22) – Lec,Tut – Artificial Intelligence
- CZ/CE 2005 (2018/19–2021/22) – Tut – Operating Systems
- CZ/CE 1007 (2017/18, 2019/20) – Tut – Data Structures
- CZ 1013 (2018/19, 2019/20) – Labs – Physics in Computing

Tutorial Developer and Presenter, AAMAS/IJCAI “Voting and Candidacy Games” 20015, 2017

Tutorial Developer and Presenter, AAMAS “Decision Making in Multiagent Settings” 2008-2014

Teacher (Acting Lecturer), Hebrew University of Jerusalem, Israel 2005–2006

- Re-design of an “Artificial Intelligence” course curriculum
- Design and delivery of lecture series
- Design of student achievement testing

Teaching Assistant, Hebrew University of Jerusalem, Israel 1999–2005

PUBLIC AND PROFESSIONAL SERVICE

- Judge for the 2018 and 2022 Singapore Science and Engineering Fair (SSEF)
- Advisory Committee Member, AAMAS Workshop on Multiagent Sequential Decision Making Under Uncertainty (MSDM), 2014-2015

- Co-Organiser of Conference Tutorials
 - “Decision Making in Multiagent Settings” Tutorial, AAMAS’08-’14
 - “Voting and Candidacy Games” Tutorial AAMAS’15, IJCAI’17
- Area Chair
 - International Joint Conference on Artificial Intelligence (IJCAI) 2023
- Senior Program Committee Member
 - Association for the Advancement of Artificial Intelligence Conference (AAAI) 2022-2024
 - Autonomous Agents and Multiagent Systems (AAMAS) Conference 2018, 2019
 - International Joint Conference on Artificial Intelligence (IJCAI) 2016, 2017, 2021
 - **Endorsed** by peers for performance at IJCAI-2016
 - International Conference on Principles and Practice of Multi-Agent Systems (PAAMS) 2017
- Program Committee Member
 - Conferences
 - Autonomous Agents and Multiagent Systems (AAMAS) Conference 2006-2008, 2012-2017, 2020-2024
 - Association for the Advancement of Artificial Intelligence Conference (AAAI) 2015-2018, 2020-2021
 - International Joint Conference on Artificial Intelligence (IJCAI) for years 2018-2020,2024
 - **Endorsed** by peers for performance at IJCAI-2018
 - International Conference on Automated Planning and Scheduling (ICAPS) 2021
 - International Conference on Machine Learning (ICML) 2021
 - Mexican International Conference on Artificial Intelligence 2011
 - IEEE International Conference on Systems, Man, and Cybernetics 2013
 - Int. Conf. on Practical Applications of Agents and Multi-Agent Systems (PAAMS) 2019
 - Workshops: GAIW (2019-2020); Agents and Incentives in AI (AI³, 2018); ADVERSE (2017); SecMAS (2016); MOO (2004); MSDM (2006-1015); OptMAS (2008); AMEC (2011, 2012, 2014)
- Reviewer
 - Conferences: IJCAI (2005-2015), AAAI (2005,2006, 2010, 2011, 2014), NeurIPS (2020,2021), ICML (2022), ICLR (2022)
 - Journals: Mathematical Programming, JAAMAS, AIJ, Trans Autonomous and Adaptive Systems, Computational Intelligence Journal, RAS, Annals of Operations Research

;

Publications

Journals (heavily refereed)

- [1] Marina Bannikova, Lihi Dery, Svetlana Obraztsova, Zinovi Rabinovich, and Jeffrey S. Rosenschein. Reaching consensus under a deadline. *Autonomous Agents and Multi-Agent Systems (JAAMAS)*, 35(1):1–42, 2021. (alt version: arXiv cs.CY/1905.07173), #.
- [2] Edith Elkind, Jiarui Gan, Svetlana Obraztsova, Zinovi Rabinovich, and Alexandros Voudouris. Protecting elections by recounting ballots. *Artificial Intelligence*, 290:103401, 2021. ##.
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- [8] Wanqi Xue, Wei Qiu, Bo An, Zinovi Rabinovich, Svetlana Obraztsova, and Chai Kiat Yeo. Mis-spoke or mis-lead: Achieving robustness in multi-agent communicative reinforcement learning. In *Proceedings of the 21st International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, pages 1418–1426, 2022. ##.
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- [10] Wei Qiu, Xinrun Wang, Runsheng Yu, Rundong Wang*, Xu He, Bo An, Svetlana Obraztsova, and Zinovi Rabinovich. RMIX: Learning risk-sensitive policies for cooperative reinforcement learning agents. In M. Ranzato, A. Beygelzimer, Y. Dauphin, P.S. Liang, and J. Wortman Vaughan, editors, *Proceedings of the 35th Conference on Neural Information Processing Systems (NeurIPS)*, volume 34, pages 23049–23062, 2021. preprint arXiv:2102.08159, ##.
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- [52] Ridhima Bector*, Hang Xu*, Abhay Aradhya, Chai Quek, and **Zinovi Rabinovich**. Should importance of an attack’s future be determined by its current success? In *Adaptive and Learning Agents (ALA) Workshop of AAMAS*, 2023.
- [53] Hang Xu*, Xinghua Qu, and **Zinovi Rabinovich**. Policy resilience to environment poisoning attack on reinforcement learning. In *Machine Learning Safety Workshop (MLSW) at NeurIPS*, 2022. alt version: <https://arxiv.org/abs/2304.12151>.
- [54] Hang Xu* and **Zinovi Rabinovich**. Truly black-box attack on reinforcement learning. In *Adaptive and Learning Agents (ALA) Workshop of AAMAS*, 2021.
- [55] Hang Xu*, Ridhima Bector*, and **Zinovi Rabinovich**. Teaching multiple learning agents by environment-dynamics tweaks. In *Adaptive and Learning Agents (ALA) and Optimization and Learning in Multiagent Systems (OptLearnMAS) Workshops of AAMAS*, 2020.
- [56] Jerome Lang, Evangelos Markakis, Nicolas Maudet, Svetlana Obraztsova, Maria Polukarov, and Zinovi Rabinovich. Strategic candidacy with keen candidates. In *Games, Agents and Incentives Workshop (GAIW), at the 18th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2019.
- [57] Amr Alhossary**, Judy Goldsmith, Svetlana Obraztsova, **Zinovi Rabinovich**, Alan Tsang, and Alex Wyllie**. These polar twins: Opinion dynamics of intervals. In *Games, Agents and Incentives Workshop (GAIW), at the 18th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2019.

- [58] Svetlana Obraztsova, Omer Lev, Maria Polukarov, Zinovi Rabinovich, and Jeffrey S. Rosenschein. Non-myopic voting dynamics: An optimistic approach. In *The 10th Workshop on Advances in Preference Handling (MPref), at the 25th International Joint Conference on Artificial Intelligence (IJCAI-2016)*, 2016. (Reworked and expanded from AGT@IJCAI-2015).
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- [63] **Zinovi Rabinovich**, Svetlana Obraztsova, Omer Lev, Evangelos Markakis, and Jeffrey S. Rosenschein. Analysis of equilibria in iterative voting schemes. In *5th International Workshop on Computational Social Choice (ComSoc-2014)*, 2014.
- [64] **Zinovi Rabinovich**. Strategic behaviour under constrained autonomy. In *AAMAS Workshop on Multiagent Sequential Decision Making Under Uncertainty (MSDM-2012)*, 2012.
- [65] Amos Azaria, Zinovi Rabinovich, Sarit Kraus, Claudia V. Goldman, and Omer Tsimhoni. Giving advice to people in path selection problems. In *Proceedings of the Interactive Decision Theory and Game Theory Workshop (IDTGT-2011)*, 2011.
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- [67] **Zinovi Rabinovich** and Jeffrey S. Rosenschein. Dynamics Based Control: Structure. In *Workshop on Multi-Agent Sequential Decision Making in Uncertain Domains (MSDM-2006)*, pages 148–161, 2006.
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- [69] Osnat Shapira, Zinovi Rabinovich, and Jeffrey S. Rosenschein. Simulation of cooperative behavioral trends by local interaction rules. In *The 3rd European Workshop on Multi-Agent Systems, EUMAS-2005*, pages 387–396, 2005.
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- [71] **Zinovi Rabinovich** and Jeffrey S. Rosenschein. Extended Markov Tracking with an application to control. In *The Workshop on Agent Tracking: Modeling Other Agents from Observations, at the 3rd International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS-2004)*, pages 95–100, 2004.

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- [72] Amit Shabtay, Zinovi Rabinovich, and Jeffrey S. Rosenschein. Behaviosites: A novel paradigm for affecting distributed behavior. In S. Brueckner, S. Hassas, M. Jelasity, and D. Yamins, editors, *The Fourth International Workshop on Engineering Self-Organizing Applications, Hakodate, Japan (ESOA 2006)*, number 4335 in Lecture Notes in Artificial Intelligence, pages 82–98. Springer, Berlin, 2006.

Tutorial Booklets

- [73] Svetlana Obraztsova, Maria Polukarov, and Zinovi Rabinovich. Voting and candidacy games. Tutorial of the International Joint Conference on Autonomous agents and Multiagent Systems (AAMAS), 2015.
- [74] Prashant Doshi and Zinovi Rabinovich. Decision making in extended multiagent interactions (DEMI). Tutorial of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2008.
- [75] Prashant Doshi, Zinovi Rabinovich, and Piotr J. Gmytrasiewicz. DEMI: Expanded version. Tutorial of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2009.

Working Papers

- [76] Rundong Wang*, Longtao Zheng, Wei Qiu, Bowei He, Bo An, **Zinovi Rabinovich**, Yujing Hu, Yingfeng Chen, Tangjie Lv, and Changjie Fan. Towards skilled population curriculum for multi-agent reinforcement learning. *arXiv preprint arXiv:2302.03429*, 2023.
- [77] Hang Xu*, Ridhima Bector*, and **Zinovi Rabinovich**. Social change: Interactive behavior cultivation.

Alan Tsang

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RESEARCH INTERESTS	Behavioural Game Theory, Bounded Rationality, Social Networks, Computational Social Choice, Multiagent Systems and its applications to substantive domains	
ACADEMIC TRAINING	Carleton University , Ottawa, Ontario, Canada Assistant Professor, 2020 - Present National University of Singapore , Singapore, Singapore Post-Doctoral Researcher, 2018 - 2020 University of Waterloo , Waterloo, Ontario, Canada Ph.D., Computer Science, 2017 Thesis: “Strategic Voting in Social Networks” (advised by Kate Larson) M.Math., Combinatorics & Optimization, 2011 B.Math., Computer Science (Bioinformatics Option), 2007	
SCHOLARSHIPS AND AWARDS	NSERC Discovery Grant (C\$24,000 × 5 years) with Early Career Researcher Supplement (C\$12,000)	2021-2026
CONFERENCE PUBLICATIONS	Oz Kilic, Alan Tsang , Catfished! Impacts of Strategic Misrepresentation in Online Dating, To Appear in <i>Proceedings of the 23th International Conference on Autonomous Agents and MultiAgent Systems</i> , 2024 Youcef Kardjadja, Alan Tsang , Mohamed Ibnkahla, Yacine Ghamri-Doudane, A Multi-Hop-Aware User To Edge-Server Association Game, In <i>9th IEEE Conference on Network Softwarization</i> , 2023 Omer Lev, Wei Lu, Alan Tsang , Yair Zick, Learning Cooperative Solution Concepts from Voting Behavior: A Case Study on the Israeli Knesset [Extended Abstract], In <i>Proceedings of the 20th International Conference on Autonomous Agents and MultiAgent Systems</i> , pp. 1572-1574, 2021 Edith Elkind, Neel Patel, Alan Tsang , Yair Zick, Keeping Your Friends Close: Land Allocation with Friends, In <i>Proceedings of the 2020 International Joint Conferences on Artificial Intelligence</i> , pp. 318-324, 2020 Rishav Agarwal, Robin Cohen, Lukasz Golab, Alan Tsang , Locating influential agents in social networks: Budget-constrained seed set selection, In <i>Canadian Conference on Artificial Intelligence</i> , pp. 15-28, 2020 Alan Tsang , Bryan Wilder, Eric Rice, Milind Tambe, Yair Zick (equal contribution), Group-Fairness in Influence Maximization, In <i>Proceedings of the 2019 International Joint Conferences on Artificial Intelligence (IJCAI)</i> pp. 5997-6005, 2019	

Alan Tsang, Amirali Salehi-Abari, Kate Larson, Boundedly Rational Voters in Large(r) Networks, In *Proceedings of the 2018 International Conference on Autonomous Agents and Multiagent Systems* (AAMAS) pp. 301-308, 2018

Alan Tsang, Kate Larson, The Echo Chamber: Strategic Voting and Homophily in Social Networks, In *Proceedings of the 2016 International Conference on Autonomous Agents and Multiagent Systems* (AAMAS) pp. 368–375, 2016

Alan Tsang, John Doucette, Hadi Hosseini, Voting with Social Influence: Using Arguments to Uncover Ground Truth [Extended Abstract], In *Proceedings of the 2015 International Conference on Autonomous Agents and Multiagent Systems* (AAMAS) pp. 1841–1842, 2015

JOURNAL
PUBLICATIONS

John A. Doucette, **Alan Tsang**, Hadi Hosseini, Kate Larson, Robin Cohen, Inferring True Voting Outcomes in Homophilic Social Networks, In *Autonomous Agents and Multi-Agent Systems*, Volume 33, Issue 3, 2019, p. 298–329

Robin Cohen, **Alan Tsang**, Krishna Vaidyanathan, Haotian Zhang, Analyzing Opinion Dynamics in Online Social Networks, In *Big Data and Information Analytics* (BigDIA), Volume 1, Number 4, 2016, p. 279–298

WORKSHOPS
PAPERS & OTHER
PEER-REVIEWED

Jojo Duan (Presenter), **Alan Tsang**, Simulation of Covid-19 Propagation on a Multi-layers Social Network Model, *ACM Canadian Celebration of Women in Computing* (Poster), 2022

Amr Alhossary, **Alan Tsang**, Zinovi Rabinovich, Svetlana Obraztsova, Judy Goldsmith, Alex Wyllie, These Polar Twins: Opinion Dynamics of Intervals, *Games, Agents and Incentives Workshop* (GAIW at AAMAS 2019), 2019

Alan Tsang, Kate Larson, If You Like It, then You Shoulda Put a Sticker on It — A Model for Strategic Timing in Voting, *The 4th Workshop on Exploring Beyond the Worst Case in Computational Social Choice* (EXPLORE at AAMAS 2017), 2017

Alan Tsang, Strategic Voting and Social Networks, Doctoral Consortium, In *Proceedings of the 2016 International Conference on Autonomous Agents & Multiagent Systems* (AAMAS 2016) pp. 1534-1535, 2016

John Doucette, Hadi Hosseini, **Alan Tsang**, Robin Cohen, Kate Larson, Voting with Social Networks: Truth Springs from Argument Amongst Friends *The 2nd Workshop on Exploring Beyond the Worst Case in Computational Social Choice* (EXPLORE at AAMAS 2015), 2015

TEACHING AND
SPEAKING
EXPERIENCE

Social Networking (COMP 4602) 2022, 2024

- Introduces concepts from graph theory and network analysis
- Taught 70 undergrad sections

Invited Speaker at University of Waterloo 2023

- For Trust Modeling, Explainability and Online Social Networks (CS 886)
- Topic: “Social Network Dynamics”

Multiagent Systems (COMP 5900 / 4900) 2021 - Present

- Examines interactions between rational agents whose objectives are not aligned
- Sections of 25 grads + undergrads, lecture + experiential learning components

Computing, Society and Ethics (COMP 4900) 2020 - Present

- Guided students in identifying ethical challenges in fictional and real world scenarios, evaluating the ethical merits of options, and critiquing / defending their choices
- Taught 60 undergrad sections, extensively discussion-based classes

3rd Annual Lecture on Computer Science and Society 2023

- Topic: “Building a Fairer Democracy: A Computational Perspective”

PROFESSIONAL
SERVICE

Games, Agents, and Incentives Workshop Lead Organizer 2024 - Present

ACM SIGAI Information Officer 2019 - Present

Games, Agents, and Incentives Workshop (GAIW) Organizer 2023 - Present

Reviewer for Journals

Transactions on Economics and Computation 2022
Artificial Intelligence 2018-2020,22
Autonomous Agents and Multi-Agent Systems 2017-2018
Journal of Artificial Intelligence Research 2018
Journal of Economic Theory 2020
Nature Human Behaviour 2020

Duties for Conferences and Workshops

PC Member for *Autonomous Agents and Multi-Agent Systems* 2019-2023
 PC Member for *AAAI Conference on Artificial Intelligence* 2018-2022
 PC Member for *Int’l Joint Conf. on Artificial Intelligence* 2019-2023
 PC Member for *Games, Agents and Incentives Workshop* 2020-2022
 PC Member for *Int’l Workshop on Computational Social Choice* 2018-2023

Other reviewer duties include *NSERC Discovery Grant External Reviewer* (2023), *Poland National Science Centre* (2020), *NeuraIPS* (2019), *ACM Conference on Economics and Computation* (2015, 2018, 2020),

UNIVERSITY
SERVICE

Host, CUIDS Distinguished Lecture Series 2022-Present

Committee Member, Dean’s Summer Research Internship 2021-Present

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RESEARCH INTERESTS

Machine Learning, Reinforcement Learning, Transfer Learning

WORK EXPERIENCE

Assistant Professor, School of Computer Science, Carleton University Jul 2022 - Now
Machine Learning Scientist, Layer 6 Mar 2021 - Jun 2022

EDUCATION

Ph.D. in Statistical Machine Learning 2013 - 2020
Department of Computing Science, University of Alberta
Supervisors: Prof. Dale Schuurmans, Prof. Russell Greiner

M.Sc. in Computing Science 2011 - 2013
Department of Computing Science, University of Alberta
Supervisor: Prof. Russell Greiner

B.Eng. in Computer Science & Technology 2007 - 2011
College of Computer Science and Technology,
Chu Kochen Honors College, Zhejiang University

PUBLICATIONS

Peer Reviewed

- S. Kalra*, J. Wen*, J. Cresswell*, M. Volkovs and H. Tizhoosh. **ProxyFL: Decentralized Federated Learning through Proxy Model Sharing**. *Nature Communications*, 2023.
- R. Gummadi, S. Kumar, J. Wen and D. Schuurmans. **A Parametric Class of Approximate Gradient Updates for Policy Optimization**. In *Proceedings of the 39th International Conference of Machine Learning (ICML)*, 2022. [Acceptance Rate 21.9% (1235/5630)]
- J. Wen, S. Kumar, R. Gummadi and D. Schuurmans. **Characterizing the Gap Between Actor-Critic and Policy Gradient**. In *Proceedings of the 38th International Conference of Machine Learning (ICML)*, 2021. [Acceptance Rate 21.5% (1184/5513)]
- J. Wen*, B. Dai*, L. Li and D. Schuurmans. **Batch Stationary Distribution Estimation**. In *Proceedings of the 37th International Conference of Machine Learning (ICML)*, 2020. [Acceptance Rate 21.8% (1088/4990)]
- J. Wen, R. Greiner and D. Schuurmans. **Domain Aggregation Networks for Multi-Source Domain Adaptation**. In *Proceedings of the 37th International Conference of Machine Learning (ICML)*, 2020. [Acceptance Rate 21.8% (1088/4990)]
- V. Ganapathiraman, X. Zhang, Y. Yu and J. Wen. **Convex Two-Layer Modeling with Latent Structure**. In *Proceedings of the 29th Neural Information Processing Systems (NeurIPS)*, 2016. [Acceptance Rate 23.6% (569/2403)]
- J. Wen, R. Greiner and D. Schuurmans. **Correcting Covariate Shift with the Frank-Wolfe Algorithm**. In *Proceedings of the 24th International Joint Conference on Artificial Intelligence (IJCAI)*, 2015. [Acceptance Rate 28.6% (572/1996)]
- M. White, J. Wen, M. Bowling and D. Schuurmans. **Optimal Estimation of Multivariate ARMA Models**. In *Proceedings of the 29th Annual Conference on Artificial Intelligence (AAAI)*, 2015. [Acceptance Rate 26.7% (531/1991)]
 - ▷ Invited to present in *the International Conference on Robotics and Automation (ICRA)*, 2015.
- J. Wen, C. Yu and R. Greiner. **Robust Learning under Uncertain Test Distributions: Relating Covariate Shift to Model Misspecification**. In *Proceedings of the 31st International Conference of Machine Learning (ICML)*, 2014. [25% (310/1238)]

Lightly Reviewed & Preprints

- A. Sui*, J. Wen*, Y. Lau, B. Ross and J. Cresswell. **Find Your Friends: Personalized Federated Learning with the Right Collaborators**. In *FL-NeurIPS Workshop*, 2022.
- J. Wen, Y. Cao and R. Huang. **Few-Shot Self Reminder to Overcome Catastrophic Forgetting**. *NeurIPS Workshop on Continual Learning*, 2018.
- C. Ma, J. Wen and Y. Bengio. **Universal Successor Representations for Transfer Reinforcement Learning**. *The 6th International Conference on Learning Representations (ICLR) Workshop*, 2018.
- J. Wen, N. Hassanpour and R. Greiner. **Weighted Gaussian Process for Estimating Treatment Effect**. *NeurIPS Workshop on Inference and Learning of Hypothetical and Counterfactual Interventions in Complex Systems*, 2016.

PROFESSIONAL SERVICES

Editorial Board	Machine Learning Journal	2020 - Now
Journal Reviewer	Journal of Machine Learning Research (JMLR)	2022
	Transactions on Pattern Analysis and Machine Intelligence (TPAMI)	2022
	Transactions on Machine Learning Research (TMLR)	2022
Senior PC	International Joint Conference on Artificial Intelligence (IJCAI)	2021
PC	Neural Information Processing Systems (NeurIPS) (Top 200 PC)	2018 - Now
	International Conference on Machine Learning (ICML)	2019 - Now
	International Conference on Learning Representations (ICLR)	2020 - Now
	Conference on Artificial Intelligence (AAAI)	2017 - Now
	International Joint Conference on Artificial Intelligence (IJCAI)	2021 - Now
	Asian Conference on Machine Learning (ACML)	2018 - Now
Thesis Examiner	Xuejun Han (PhD, Carleton)	2023
	Eric Maia (MSc, uOttawa)	2023
	Keerthana Subash (MSc, Carleton)	2022
Defense Chair	Robin Redhu (MSc, Carleton)	2023
	Zainab Albujaasim (PhD Proposal, Carleton)	2023

RESEARCH GRANT

CU REALISE Seed Grant (\$12,000)	2023
CU Research Development Grants (\$10,000)	2023
Carleton University Startup Funds (\$90,000)	2022

SUPERVISION

Current

Johnny Ma (PhD Student, w/ Prof. Wei Shi)

Hussein Elehwany (PhD Student, w/ Prof. Burak Gunay & Prof. Mohamed Ouf)

Paul Desaulniers (MSc Student, w/ Prof. Chao Shen)

Dawei Zhang (MSc Student)

Damien Hood (Undergrad, Honours Thesis)

Henry Vo (Undergrad, Honours Project)

Past

Andre Telfer (2023, MSc Student, w/ Prof. Alfonso Abizaid)

Andrii Stepura (2023, Undergrad, I-CUREUS program)

Harman Kang (2022, Undergrad, Honours Project)

TEACHING EXPERIENCE

COMP 5900	Reinforcement Learning, Carleton Univ.	2024W
COMP 4900	Introduction to Reinforcement Learning, Carleton Univ.	2023W, 2023F
COMP 3105	Introduction to Machine Learning, Carleton Univ.	2022F, 2023F
CMPUT 274	Introduction to Tangible Computing, Univ. of Alberta	2015F

HONORS AND AWARDS

Mitacs Accelerate Internship Program	2018
Alberta Innovates–Technology Futures Graduate Student Scholarship, AB, Canada	2016
Departmental Ph.D. Early Achievement Award Runner-up, Univ. of Alberta	2015
AAAI Student Scholarship	2015
Univ. of Alberta Doctoral Recruitment Scholarship	2013
Univ. of Alberta Master’s Scholarship (About Sixteen at Univ. of Alberta)	2011
First-Class Scholarship for Outstanding Students, Zhejiang Univ. (top 10%)	2010, 2009
First-Class Scholarship for Outstanding Merits, Zhejiang Univ. (top 10%)	2010, 2009
Baosteel Scholarship (Two at Chu Kochen Honors College, Zhejiang Univ.)	2010
Scholarship for Excellence in Research and Innovation, Zhejiang Univ.	2009
National Robot Soccer Champion of Chinese National Robot Contest, High School Group	2006