### CLASS SCHEDULE

| Lectures: | Tuesdays and Thursdays (6:05 to 7:25 p.m.)  
(Tory Building 360) |
| Labs: | B1 - Wednesdays (8:05 to 8:55 p.m.)  
B2 – Wednesdays (9:05 to 9:55 p.m.)  
B3 – Thursdays (7:35 to 8:25 p.m.)  
B4 – Thursdays (8:35 to 9:25 p.m.)  
B5 – Tuesdays (4:35 to 5:25 p.m.)  
B6 – Tuesdays (3:35 to 4:25 p.m.)  
B7 – Thursdays (4:35 to 5:25 p.m.)  
B8 – Thursdays (3:35 to 4:25 p.m.)  
(Herzberg Labs for Physics 4385) |

### INSTRUCTOR

Tanvir Quadir  
E-mail: tanvir.quadir@carleton.ca  
cuLearn at [www.carleton.ca/cuLearn](http://www.carleton.ca/cuLearn)

### OFFICE HOURS

Wednesdays (6 to 7 p.m.)  
Herzberg Laboratories 4220  
(Availability: during office hours or via e-mail)

### TEACHING ASSISTANTS

Yanzhe Zhang (yanzhezhang@cmail.carleton.ca) (B1, B2, B4)  
Silas Xuereb (silasxuereb@cmail.carleton.ca) (B3, B5)  
Melissa Van Bussel (melissavanbussel@cmail.carleton.ca) (B6)  
Lama Elnaggar (lamaelnaggar@cmail.carleton.ca) (B7, B8)

### COURSE DESCRIPTION:

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.

**Precludes** credit for BIT 2000/2100/2300, ECON 2201, ENST 2006, GEOG 2006/3003 and STAT 2606/3502.

**Prerequisites:** An Ontario Grade 12 university-preparation Mathematics or equivalent, or permission of the School of Mathematics and Statistics

The course consists of lectures 3 hours a week, and labs 1 hour a week. The tutorial sessions will give students hands-on experience of solving problems based on the topics covered in the classes.
**DATA ANALYSIS AND MINITAB:** Students are required to use statistical software MINITAB for their assignments. Data used for assignment/examples are provided at cuLearn.

**EVALUATION DATES:**

<table>
<thead>
<tr>
<th>Examination</th>
<th>Date and Timing</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm Examination (One)</td>
<td>Saturday, November 2, 2019, 1 – 3 p.m.</td>
<td>25%</td>
</tr>
<tr>
<td>Assignments (Four)</td>
<td>Due on assigned due dates</td>
<td>22%</td>
</tr>
<tr>
<td>Final Examination</td>
<td>Between December 9 - 21, 2019 (TBA by the Registrar’s Office)</td>
<td>50%</td>
</tr>
<tr>
<td>Attendance</td>
<td>At least 90% of the classes should be attended to earn the full reward</td>
<td>3%</td>
</tr>
</tbody>
</table>

**TEXTBOOK:**

*Introduction to Probability and Statistics* by Mendenhall, Beaver, Beaver and Ahmed, 4th Canadian edition, Nelson. *Student Solutions Manual* for use with the textbook is also recommended.

**EVALUATION CRITERIA:**

Each student's grade in the course will be calculated as a weighted average of scores for one in-class mid-term examination (25%), four take-home assignments (22%), a final examination (50%), and attendance (3%). **If your final exam mark is less than 30%, you will receive an F, regardless of your term mark.** Important guidelines pertaining to the evaluation instruments are the following:

**MIDTERM EXAMINATION (25%):** Midterm examination will be held on Saturday, November 2, 2019 from 1 p.m. to 3 p.m. The midterm examination is closed-book. There is no deferred midterm. If you miss a midterm exam and provide a valid medical certificate or a verifiable compassionate reason within one week of the missed exam, the assigned weight (of 25%) will be added to your final exam; otherwise a mark of zero is assigned. Please note that doctor’s note or police report, the documentation provided by students for missed midterm may be subject to verification. Students will need to fill out the form “Consent to Release Information to a Third Party” (which is available at cuLearn) when they submit a medical note.

**ASSIGNMENT (22%) – DUE IN CLASS ON ASSIGNED DATES:** There will be four assignments, each counting equally toward the term mark. No late assignments will be accepted. Students may wish to work together on assignments, but each student must write up his/her assignment independently.

**FINAL EXAMINATION (50%):** The 3-hour final examination will take place during the official final examination period of December 9 to 21, 2019, and is scheduled by the Registrar’s Office. Please do not make travel plans prior to December 21, 2019. If you miss the final examination, please contact the Registrar’s Office as soon as possible after the missed exam in order to qualify to write a deferred exam next semester.
### TENTATIVE COURSE SCHEDULE (MAY BE ADJUSTED AS COURSE UNFOLDS):

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
<th>Chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Sept. 16 – 20</td>
<td>Bivariate data. Events, sample space, combination of events, probability of an event. Addition rule, multiplicative rule. Conditional probability and independence.</td>
<td>Chapters 3 and 4</td>
</tr>
<tr>
<td>4</td>
<td>Sept. 23 – 27</td>
<td>Bayes’ rule. Probability distribution of a discrete random variable. Expectation and variance of a discrete random variable.</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>5</td>
<td>Sept. 30 – Oct. 4</td>
<td>Discrete probability distributions: Binomial, Poisson, and Hypergeometric</td>
<td>Chapter 5</td>
</tr>
<tr>
<td>6</td>
<td>Oct. 7 – 11</td>
<td>Continuous probability distributions: Normal distribution. Normal approximation to the binomial distribution.</td>
<td>Chapter 6</td>
</tr>
<tr>
<td>7</td>
<td>Oct. 21 – 25</td>
<td>Winter Break (No class)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Oct. 28 – Nov. 1</td>
<td>Estimation. Large sample. Population mean. Large-sample confidence intervals for the population mean. Large-sample confidence intervals for the binomial proportion.</td>
<td>Chapter 8</td>
</tr>
<tr>
<td>10</td>
<td>Nov. 4 – 8</td>
<td>Difference between means. Large-sample confidence intervals for difference between means. Large-sample confidence intervals for difference between two binomial proportions. Choosing sample size.</td>
<td>Chapter 8</td>
</tr>
<tr>
<td>11</td>
<td>Nov. 11 – 15</td>
<td>Test of hypothesis; Type-I and Type-II errors. Large-sample tests. $p$-values.</td>
<td>Chapter 9</td>
</tr>
<tr>
<td>12</td>
<td>Nov. 18 – 22</td>
<td>Large-sample tests for difference between two population means; difference between two population proportions.</td>
<td>Chapters 9 and 10</td>
</tr>
<tr>
<td>13</td>
<td>Nov. 25 – 29</td>
<td>The $t$-distribution and small-sample confidence intervals. Small-sample inference for difference between two population means.</td>
<td>Chapter 10</td>
</tr>
<tr>
<td>14</td>
<td>Dec. 2 – 6</td>
<td>More on hypothesis testing</td>
<td>Chapter 10</td>
</tr>
</tbody>
</table>
ADDITIONAL INFORMATION:

MATHEMATICS AND STATISTICS LEARNING ASSISTANCE PROGRAM (MS-LAP):
MS-LAP supports first year mathematics and statistics courses. This free-of-charge program helps
students in achieving their goals. It provides learning support and solutions to homework questions
through assistance videos. These services are available on cuLearn.

MS-LAP gives students tools to succeed while explaining step-by-step strategies and associated
theories for particular problem. The program is for anyone who wants to deepen their understanding
at the own pace, and in the comfort and privacy of their home.

COURSE STANDING: Standing in a course is determined by the course instructor subject to the
approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to
revision. No grades are final until they have been approved by the Dean.

ACADEMIC INTEGRITY: Students should familiarize themselves with the Carleton University
policy on Academic Integrity. This policy details those behaviours considered to be violations of
academic integrity (e.g. cheating, plagiarism) and provides guidelines as to the imposition of various
sanctions, including a reduction in grade, suspension, and expulsion. Also be aware of the academic
integrity policy on the registrar website page at https://carleton.ca/registrar/academic-integrity/

IMPORTANT DEADLINES: September 17, 2019 is the last day to register for the course;
September 30, 2019 is the last day to withdraw with a full fee adjustment; and December 6, 2019 is
the last day to withdraw without academic penalty.

STUDENTS REQUIRING SPECIAL ACCOMMODATION:

FOR STUDENTS WITH DISABILITIES: Students with disabilities requiring academic
accommodations are encouraged to contact a coordinator at the Paul Menton Centre for Students
with Disabilities (613-520-6608) or pmc@carleton.ca to complete the necessary letters of
accommodation. After registering with the Centre, please set up an appointment with the instructor to
discuss your needs at least two weeks prior to the in-class mid-term examination.

FOR RELIGIOUS OBSERVANCE: Students requesting academic accommodation on the basis of
religious observance should make a formal, written request to their instructor for alternate dates
and/or means of satisfying academic requirements. Such requests should be made during the first two
weeks of class, or as soon as possible after the need for accommodation is known to exist, but no
later than two weeks before the compulsory academic event.

Students who have questions or want to confirm accommodation eligibility of a religious event or
practice may refer to the Equity Services website for a list of holidays and Carleton’s Academic
Accommodation policies or may contact an Equity Services Advisor in the Equity Services
Department for assistance (ext. 5622).

FOR PREGNANCY: Pregnant students requiring academic accommodations are encouraged to
contact an Equity Advisor in Equity Services (ext. 5622) to complete a letter of accommodation. The
student must then make an appointment to discuss her needs with the instructor at least two weeks
prior to the first academic event in which it is anticipated the accommodation will be required.
<table>
<thead>
<tr>
<th><strong>FOR STUDENTS WITH DISABILITIES</strong></th>
<th>Contact Paul Menton Centre (ext. 6608) to obtain letters of accommodations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FOR RELIGIOUS OBLIGATIONS</strong></td>
<td>To be worked out on individual basis with instructor. Consult Equity Services Website or an Equity Advisor (ext. 5622) for Policy and list of holidays (<a href="http://www.carleton.ca/equity">www.carleton.ca/equity</a>)</td>
</tr>
<tr>
<td><strong>FOR PREGNANCY</strong></td>
<td>Contact Equity Services (ext. 5622) to obtain letters of accommodations</td>
</tr>
</tbody>
</table>

**ADDITIONAL STUDENT SUPPORT INFORMATION:**

Carleton University offers additional support at the Writing Tutorial Service (215PA), Student Life Services (501 Unicentre), and the Student Academic Success Centre (302 Tory).