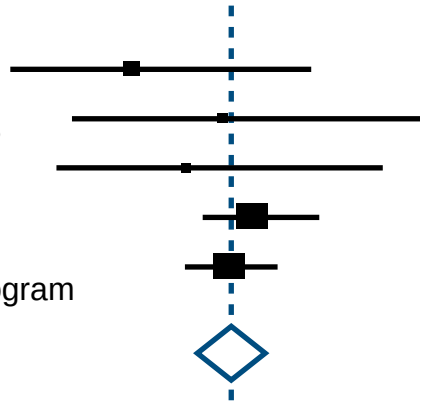
CGSC 4900A | 5901A: Introduction to Meta-Analysis
Course Outline Fall 2023



Class Information
Dates: Thursday September 7 2023 - Thursday December 7 2023

Time: 14:35-17:25
Location: Dunton Tower 2203 (Seminar room)
Course prerequisites: UG: fourth-year standing in CGSC Honours Program
Course website: TBD

Instructor Information
Instructor: John Anderson
Office: 2202A
E-mail: johnanderson3@cunet.carleton.ca. *Please use a Carleton email.*
Office Hours: Swing by my office on **Thursdays before class between 12:30 and 2:30**.

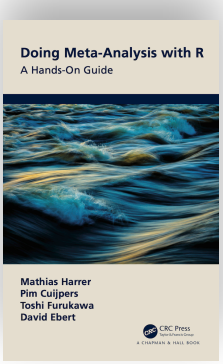
Course Description
Are you curious about the overall consensus within a field on a specific topic, such as the impact of stress on exam performance? Meta-analysis is a powerful tool for evaluating collective insights across various studies. In this course, we will explore meta-analytic papers in cognitive science and related disciplines, learn techniques for conducting systematic literature reviews (e.g., using COVIDENCE), extract pertinent summary effect sizes, and synthesize this information through meta-analysis. Students will engage in discussions on weekly topics and collaborate on a group project to meta-analyze a research question developed with the instructor. By the end of the course, students will possess a solid understanding of how to conduct and assess meta-analyses, as well as practical knowledge of their applications and limitations.

Classes will normally be structured so that the first hour will introduce a topic with a practical demonstration. The next hour will be devoted to discussing a relevant paper, while the final hour will be devoted to group-work on the major term project.

Learning Objectives/Outcomes
- Conduct literature searches and extract relevant effect sizes
- Read, interpret, and evaluate meta-analyses
- Use R (graduate students) or JASP (undergraduate students) to conduct meta-analyses
- Produce meta-analytic reports that provide insight into the robustness of a field or research question

Readings

Each week, students should expect to read one or two chapters in the textbook and the assigned article to discuss in class.
Course readings will be indicated on the lecture schedule. We will closely follow the Harrer text "Doing Meta-Analysis in R." The text is freely available here https://bookdown.org/MathiasHarrer/Doing_Meta_Analysis_in_R/.



Course Web Page (Brightspace)
Outline what students will find on the site and how it should and will be used.
For example:
The course website is located at https://carleton.ca/brightspace/

Here you can find the following:

1. Administrative documents (including this outline!)
2. Readings
3. A portal to upload assignments
4. A discussion board
5. Student presentation slides and code demonstrations

Evaluation
Note that graduate students are not required to complete weekly reflections, and their method/code demonstrations and research proposals are weighted more heavily.

Note also that while undergraduates are expected to do a "classic" meta-analysis for the final paper, graduate students should choose one of the advanced methods.

Undergraduate Students 4900A

Item	Weight of Grade	Due date
Research proposal (group project)	15%	Week 4 (September 28th)
Weekly reflections on readings (x10, 1% each)	10%	Weekly, **two hours before class.**
Method presentation/code demonstration	15%	Ongoing
Paper presentations	10%	Ongoing
In class participation and discussion *(includes presentation of proposal)*	25%	Ongoing
Final Paper (group project)	25%	Week 13 (December 7th)
Total	100%	

Note that each student will complete 2-3 independent presentations

Graduate students 5901A

Item	Weight of Grade	Due date
Research proposal (group project)	20%	Week 4 (September 28th)
Method presentation/code demonstration	20%	Ongoing
Paper presentations	10%	Ongoing
In class participation and discussion *(includes presentation of proposal)*	25%	Ongoing
Final Paper (group project)	25%	Week 13 (December 7th)
Total	100%	

Note that each student will complete 2-3 independent presentations

Lecture Schedule, topics highlighted in yellow are "classic" methods, while those in orange are "advanced"

DATE	DESCRIPTION		TEXTBOOK READINGS	PRESENTER & PAPER READINGS	COURSE ADMIN/ DEADLINES
9/7	Week 1: Introduction to Meta-Analysis	• Overview of meta-analysis, its uses, and importance. • Pre-registration using PROSPERO • Lit-review & data extraction using COVIDENCE • Brief introduction to the R programming language. • How to install R and RStudio. • Introduction to basic R commands. • *JASP as an alternative**	• Chapter 1 • *Chapter 2 is recommended if you have no background in R*	John Anderson	1. Review the course outline 2. Form groups for the group project 3. Select presenters for each week (each person does two presentations)
9/14	Week 2: Meta-Analysis Principles	• Effect sizes • Essential statistical concepts for meta-analysis. • Computing effect sizes in R.	• Chapters 3 & 17	TBD	• Undergraduate weekly reflection 1/10

DATE	DESCRIPTION		TEXTBOOK READINGS	PRESENTER & PAPER READINGS	COURSE ADMIN/ DEADLINES
9/21	Week 3: Conducting Meta-Analysis	• Random-effects and fixed-effects models. • Using R for meta-analysis calculations.	• Chapter 4	TBD	• Undergraduate weekly reflection 2/10
9/28	Week 4: Between study heterogeneity and forest plots	• Dealing with outlier studies • How to graphically present the results of your meta-analysis?	• Chapters 5 & 6	TBD	• Undergraduate weekly reflection 3/10 • Proposals due • Presentation of proposals during last hour (~15 minutes each)
10/5	Week 5: Meta-regression and subgroups analysis	• Understanding and conducting meta-regression and subgroup analysis. • Applying meta-regression and subgroup analysis in R.	• Chapters 7 & 8	TBD	• Undergraduate weekly reflection 4/10
10/12	Week 6: Publication Bias	• Detecting and dealing with publication bias. • Sensitivity analyses	• Chapters 9 & 15	TBD	• Undergraduate weekly reflection 5/10
10/19	Week 7: Writing up your findings - what to include? Pitfalls to avoid	• PRISMA Diagrams • Meta-analytic write up • Translating your findings from effect sizes into “practical effects” • Don’t use meta-analysis as a blunt instrument to make your point		TBD	• Undergraduate weekly reflection 6/10
10/26	*Reading Week No Class*				
11/2	Week 8: “Multilevel” Meta-analysis	• If your data are *nested …*	• Chapter 10	TBD	• Undergraduate weekly reflection 7/10

DATE	DESCRIPTION		TEXTBOOK READINGS	PRESENTER & PAPER READINGS	COURSE ADMIN/ DEADLINES
11/9	Week 9: Structural Equation Modeling Meta-Analysis	• What is structural equation modeling? Why use it for meta-analysis? • Multivariate meta-analysis (what if you have more than one outcome variable?)	• Chapter 11	TBD	• Undergraduate weekly reflection 8/10
11/16	Week 10: Network Meta-Analysis	• Why use network meta analysis? • Direct and indirect effects	• Chapter 12	TBD	• Undergraduate weekly reflection 9/10
11/23	Week 11: Bayesian meta-analysis	• Like multilevel but incorporating prior information • Can use the *brms* package in R or select Bayesian meta analysis in JASP	• Chapter 13	TBD	• Undergraduate weekly reflection 10/10
11/30	Week 12: Meta-Analysis of **MRI data** - ALE, SDM, and neurosynth	• Getting spatial coordinates for studies and converting between them • Multiple comparisons and cluster correction? • What if the studies don't report coordinates?		TBD	
12/7	Week 13: Final Class (Group Presentations!)	• What did you end up finding? Present your data! • How did the classic and advanced approaches differ?	NA	***Everyone***	• Final paper due • Presentation of final papers

This schedule is to be regarded as tentative, although the due dates of the proposal and final paper are fixed.

Term Work

Weekly reaction papers (undergraduate only) x10, (1% each)
Due two hours before the class on Brightspace, e.g., 12:35

These are marked for completion and effort - note that if you "phone it in" or if it appears that you just skimmed the readings and didn't engage with the topic, you may lose points. Each of the

Research Proposal (15% UG, 20% GS)
Due September 28th at the beginning of class (14:35) on Brightspace

Students will work with the professor and their groups to select a suitable research question for meta-analysis. Students will work in their groups using Google Drive to collaborate and co-write a proposal. In all written work, it should be **clearly defined** which student wrote which section, and 75% of the grade for the evaluation will be based on individual writing, and 25% will be based on the cohesiveness of the final product.

The proposal should include a PROSPERO-style *pseudo preregistration* (note it's not necessary to actually pre-register the analysis on the PROSPERO site, just to follow their format). This includes the search strategy, background, expected theoretical contribution, etc. In addition, a fulsome description of the need for a meta-analysis in an APA style introduction should be included, and, if possible (highly encouraged), a power analysis. For proposed analyses students should read the first paragraph of each text chapter to understand why each might be helpful, and which research questions they might address. Any variables the students think might be useful to interrogate for moderator analysis or for examining subgroups should also be included. PROSPERO guidelines can be found here.

So, the format could be as follows:

1	APA-style cover page
2	APA-style abstract
3	APA-style introduction (2-4 pages) • Emphasis should be on the need for a meta-analysis, the potential theoretical contribution, and what the existing literature shows.
4	PROSPERO-style pre-registration
5	(If included) Power analysis
6	APA-style works cited

Feedback will be provided to students via Brightspace on PDF documents.
Final Paper (25%)
Due December 7th at the beginning of class (14:35) on Brightspace

A final APA-style meta-analysis. The paper should follow APA-style guidelines and present the results of a “classic” and “advanced” meta-analysis. For example, a classic meta-analysis might be presented to show the overall impact of an effect on an outcome and a network meta-analysis might be presented to assess the impacts of multiple related specific and indirect effects on the outcome. Reports should include appropriate graphics, bias assessments, and, importantly, go beyond merely documenting an effect size. As with the proposal, 75% of the grade will be based on individual writing, and 25% will be based on the cohesiveness of the final grade. Please use comments to indicate who was primarily responsible for each section.

Other forms of evaluation

- This is a seminar, so you are expected to do the readings, attend and actively participate. Don’t worry about "saying the wrong thing,” I think it’s more important that we all learn.
- At the beginning of class I will take attendance, and at the end of class I will place another check next to a person’s name if they participated - this will count towards 25% of your grade.
- Presentations of papers should be ~15 minutes and follow IMRAD format (introduction, methods, results, and Discussion). Please also consider including some questions you had about the reading at the end to kick-start the discussion.
- Presentations of methods should be primarily in the software you’re using - though feel free to jump between slides and the software if needed. The idea is to run as much of the demonstration “live” so that everyone gets a chance to review this technique.

Policy on Late Assignments

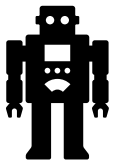


Late assignments will be penalized at 10% of the assignment value per day or part day. In the interest of being fair to all students, there will be no grace period. Therefore, a document submitted 1 minute after the deadline will be considered late.

Therefore, it is strongly recommended that you upload and submit the document before the last few minutes before the deadline. A doctor’s note or other medical documentation must be provided within two working days after the due date to avoid late penalties. To be considered official, all extensions must be obtained in writing from the instructor. If you are running into trouble, it is vital to approach me as soon as possible.

Informal accommodation due to short-term incapacitation: [provide information on your requirements for short-term informal accommodations. If you require supporting documentation, you may only request the Self-Declaration for Academic Considerations form (https://carleton.ca/registrar/wp-content/uploads/self-declaration.pdf) which replaces medical notes.]

Policy on the use of artificial intelligence *to be discussed in class*



You MAY use AI to edit work you have already written or to help generate ideas, but you should never be in a situation where you are directly copying and pasting de-novo content from the AI directly into your assignment.

If you choose to use AI, you must append a statement to the assignment stating how AI was used and highlight which ideas are yours and which the AI heavily influenced. You must also append the entire transcript of the chat session you used.

If you are working on a group project, the use of AI affects you and your peers, so you will need to get 100% agreement between all group members before using AI in the manner described above is sanctioned. Again, if using AI for group projects, transcripts and clear demarkations of which ideas are novel vs. those that are generated should be included.

- To clarify, asking a chatbot to write an introduction section for your paper and copying the resulting paragraphs is prohibited.
- Asking a chatbot to suggest alternative wording for your paragraph is permitted, provided you show me both versions.

If I suspect any student of abusing this policy, we will pivot away from take-home assignments to in-class tests.

Additional Information

In accordance with the Carleton University Undergraduate Calendar (p 34), the letter grades assigned in this course will have the following percentage equivalents:

A+ = 90-100	B+ = 77-79	C+ = 67-69	D+ = 57-59
A = 85-89	B = 73-76	C = 63-66	D = 53-56
A - = 80-84	B - = 70-72	C - = 60-62	D - = 50-52
F = Below 50			

Grades entered by Registrar:
WDN = Withdrawn from the course
DEF = Deferred

PLAGIARISM

The University Academic Integrity Policy defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source. Examples of sources from which the ideas, expressions of ideas or works of others may be drawn from include but are not limited to: books, articles, papers, literary compositions and phrases, performance compositions, chemical compounds, artworks, laboratory reports, research results, calculations and the results of calculations, diagrams, constructions, computer reports, computer code/software, material on the internet and/or conversations.
Examples of plagiarism include, but are not limited to:

- any submission prepared in whole or in part, by someone else, including the unauthorized use of generative AI tools (e.g., ChatGPT);
- using ideas or direct, verbatim quotations, paraphrased material, algorithms, formulae, scientific or mathematical concepts, or ideas without appropriate acknowledgment in any academic assignment;
- using another's data or research findings without appropriate acknowledgement;
- submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own; and
- failing to acknowledge sources through the use of proper citations when using another's work and/or failing to use quotations marks.

Plagiarism is a serious offence that cannot be resolved directly by the course's instructor. The Associate Dean of the Faculty conducts a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They can include a final grade of "F" for the course.

Statement on Student Mental Health

As a University student you may experience a range of mental health challenges that significantly impact your academic success and overall well-being. If you need help, please speak to someone. There are numerous resources available both on- and off-campus to support you. Here is a list that may be helpful:

Emergency Resources (on and off campus): https://carleton.ca/health/emergencies-and-crisis/emergency-numbers/

Carleton Resources:
- Mental Health and Wellbeing: https://carleton.ca/wellness/
- Health & Counselling Services: https://carleton.ca/health/
- Paul Menton Centre: https://carleton.ca/pmc/
- Academic Advising Centre (AAC): https://carleton.ca/academicadvising/
- Centre for Student Academic Support (CSAS): https://carleton.ca/csas/
- Equity & Inclusivity Communities: https://carleton.ca/equity/

Off Campus Resources:
- Distress Centre of Ottawa and Region: (613) 238-3311 or TEXT: 343-306-5550, https://www.dcottawa.on.ca/
- Mental Health Crisis Service: (613) 722-6914, 1-866-996-0991, http://www.crisisline.ca/
- Empower Me: 1-844-741-6389, https://students.carleton.ca/services/empower-me-counselling-services/
- Good2Talk: 1-866-925-5454, https://good2talk.ca/
- The Walk-In Counselling Clinic: https://walkincounselling.com

Requests for Academic Accommodations
ACADEMIC ACCOMMODATION
You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:
Pregnancy obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For accommodation regarding a formally-scheduled final exam, you must complete the Pregnancy Accommodation Form (click here).
Religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details click here.
Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, please request your accommodations for this course through the Ventus Student Portal at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (*if applicable*). Requests made within

two weeks will be reviewed on a case-by-case basis. For final exams, the deadlines to request accommodations are published in the University Academic Calendars. After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable).

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: https://carleton.ca/equity/sexual-assault-support-services

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation will be provided to students who compete or perform at the national or international level. Write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf

Important Information

- Students must always retain a hard copy of all work that is submitted.

-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

- For us to respond to your emails, we need to see your full name, CU ID, and the email must be written from your valid CARLETON address. Therefore, in order to respond to your inquiries, please send all email from your Carleton CMail account. If you do not have or have yet to activate this account, you may wish to do so by visiting http://carleton.ca/ccs/students/

-November 15, 2023: Last day for academic withdrawal from full fall and late fall classes

-March 15, 2024: Last day for academic withdrawal from full winter, late winter and fall/winter courses.

For a list of dates and deadlines, including holidays and exam dates, please visit:
https://calendar.carleton.ca/academicyear/