

**Department of Epidemiology and Biostatistics**  
**Epidemiology 9582T – Meta-Analysis**

Winter 2022

**Tuesdays 1:30 to 3:30 pm**

(Mar 1 to Apr 7 - NCB 293)

**Thursdays 1:30 to 2:30 pm**

(Mar 1 to Apr 7 - NCB 293)

**Dates:** Mar 1 to Apr 7

**TA:** Jarred Wootten

[jwootte@uwo.ca](mailto:jwootte@uwo.ca)

**Office Hours:** TBD

**Instructor:** Dr. Monali Malvankar

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([monali.malvankar@schulich.uwo.ca](mailto:monali.malvankar@schulich.uwo.ca))

**Office Hours:** After class or by appointment

### Course Information

**Pre-Requisites: Epidemiology 3200A, Biostatistics 3100A, Systematic Reviews EPID 9580S**

Unless you have the requisites for this course or written permission from the undergraduate Chair to enroll, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

### Course Syllabus

Meta-analysis is used in every field including education, psychology, criminology, business, and ecology. Pharmaceutical companies use meta-analysis to synthesize evidence from a series of studies to assess the efficacy of a drug. This course will cover the details of the process of conducting a meta-analysis.

The weekly lectures will cover the details of the process of conducting a meta-analysis, discuss the strengths and limitations of the methods, and give step-by-step guidance on how to perform a meta-analysis, sub-group analysis, meta-regression, publication bias, and reporting results of a meta-analysis. The course instructor will solve meta-analysis examples for various data types using Microsoft excel as well as Stata 15.0 software and address any questions or issues that arise throughout the process. This will allow students to develop these meta-analysis skills in a secured and supported environment.

## **Learning Outcomes:**

By the end of this course, students will be able to:

- Apply techniques for conducting meta-analyses, including fixed-effect and random-effects models.
- Recognize different types of heterogeneity and design forest, and funnel plots.
- Identify when and how to perform a sub-group analysis and recognize various statistical issues related to subgroup analysis.
- Apply techniques for conducting cumulative meta-analysis and meta-regression.
- Acquire knowledge about STATA 15.0
- Write-up a systematic review and meta-analysis (optional) manuscript.

## **Weekly Topics**

<b>Week</b>	<b>Date</b>	<b>Topic</b>
1	March 1 to 3	<b>Introduction to Meta-Analysis</b>
2	March 8 to 10	<b>Fixed-effect and Random-effects Models</b>
3	March 15 to 17	<b>Sub-group analyses</b>
4	March 22 to 24	<b>Meta-regression</b>
5	March 29 to 31	<b>Publication Bias</b>
6	April 5 to 7	<b>Reporting Meta-Analysis Results</b>

## **Course Structure:**

The class sessions (Thursdays) will cover key information and class sessions (Tuesdays) will allow students to work on these skills in a supported environment. It should be noted that this course requires a significant amount of independent work, but it is intended to be highly practical and will prepare you to conduct a meta-analysis. During the course, you will plan, conduct, and report a rigorous systematic review and meta-analysis (optional). With sufficient planning and effort, your final group report may be appropriate for publication in a peer-reviewed journal.

## Course Materials

### **Required Texts:**

Borenstein M., Hedges L., Higgins J., Rothstein H., *Introduction to Meta-Analysis*, 5<sup>th</sup> edition. (Wiley-Blackwell, 2011).

Link: <http://ca.wiley.com/WileyCDA/WileyTitle/productCd-EHEP002313.html>

Chapters 1 – 7, Chapters 10 – 16, Chapters 19 – 21, and Chapters 30 and 41.

*Meta-analysis in Stata*, by Sterne J. (Stata Press, 2009)

Link: <http://www.stata.com/bookstore/meta-analysis-in-stata/>

Chapters 1 – 3.

### **Other Reference Texts:**

Egger M., Smith G., Altman D., *Systematic Reviews in Health Care: Meta-Analysis in Context*, Second Edition, BMJ books.

Link: <http://ca.wiley.com/WileyCDA/WileyTitle/productCd-072791488X.html>

Petitti DB., *Meta-Analysis, Decision Analysis, Cost-Effectiveness Analysis*, 2<sup>nd</sup> edition. Oxford University Press, 2000.

Link: <http://www.oxfordscholarship.com/view/10.1093/acprof:oso/9780195133646.001.0001/acprof-9780195133646>

Higgins JPT, Green S (editors). *Cochrane Handbook for Systematic Reviews of Interventions*. Version 5.1.0 (March 2011). The Cochrane Collaboration, 2011.

Download Available From: [https:// training.cochrane.org/handbook/current](https://training.cochrane.org/handbook/current)

Additional readings will be posted to OWL.

## Methods of Evaluation

### A. Participation (16% of final grade)

- Students are expected to attend and actively participate in all class discussions and class presentations.
- Solve and upload weekly practice problems (6%) in their respective dropbox (**Due: every Sunday before midnight**)
- Each student will upload the fixed-effect meta-analysis example solved in class in their respective dropbox (2.5%).
  - **Due: Thursday, March 17 at the start of class**
- Each student will upload the random-effects meta-analysis example solved in class in their respective dropbox (2.5%).
  - **Due: Thursday, March 24 at the start of class**
- Each student will upload the sub-group analysis example solved in class in their respective dropbox (2.5%).
  - **Due: Thursday, March 31 at the start of class**
- Each student will upload the meta-regression example solved in class in their respective dropbox (2.5%).
  - **Due: Thursday, April 7 at the start of class**

### B. Assignments (20% of final grade)

- Meta-Analysis Assignment #1
  - **Due: Thursday, March 17 at the start of class**
- Meta-Analysis Assignment #2
  - **Due: Thursday, March 24 at the start of class**

### C. Presentations (14% of final grade)

- Each group will prepare a brief 8-10 mins presentation on their respective projects including data extracted, review findings, and meta-analysis (optional)
  - a. **Due: Tuesday, March 29 at the start of class**

### D. Final Essay (50% of final grade)

- Students will prepare a final group report for their systematic review and meta-analysis (optional) in the style of a journal manuscript
  - **Due: April 22 before midnight**

### **Late Assignment Policy**

Please negotiate an alternative deadline with the instructor in advance if you foresee difficulties meeting the assigned due dates.

### **Marking Reassessments**

Should you have concerns about a mark you have received on an assignment, you are welcome to request a reassessment from the instructor. In order to request a reassessment, please write one paragraph explaining why you believe you deserve a different mark from the one that you received. This will be read in conjunction with your original submission. The instructor will reassess your assignment based on this information. Requests for changes in marking made in any other manner will not be considered.

## **Western Academic Policies and Statements**

### **Absence from Course Commitments**

#### [Policy on Academic Consideration for Student Absences](#)

If you are unable to meet a course requirement due to illness or other serious circumstances, you must seek approval for the absence as soon as possible. Approval can be granted either through a self-reported absence or via the Academic Counselling unit. Students have two self-reports to use throughout the academic year; absence from course commitments including tests, quizzes, presentations, labs, and assignments that are worth 30% or less can be self-reported. Self-reported absences cover a student for 48 hours (yesterday + today or today + tomorrow). Your instructor will receive notification of your consideration; however, you should contact your instructor immediately regarding your absence. Students are expected to submit missed work within 24 hours of the end of the 48-hour period. Please review Western's [Academic Consideration for Student Absences](#) policy for more details.

If you have used both their self-reported absences or will miss more than 48 hours of course requirements, a Student Medical Certificate (SMC) should be signed by a licensed medical or mental health practitioner and you should contact academic counseling. Academic Counselling will be operating virtually this year and can be contacted at [scibmsac@uwo.ca](mailto:scibmsac@uwo.ca).

### **Special Examinations**

A Special Examination is any examination other than the regular examination, and it may be offered only with the permission of the Dean of the Faculty in which the student is registered, in consultation with the instructor and Department Chair. Permission to write a Special Examination may be given on the basis of compassionate or medical grounds with appropriate supporting documents. To provide an opportunity for students to recover from the circumstances resulting in a Special Examination, the University has implemented Special Examinations dates. These dates as well as other important information about examinations and academic standing can be found [here](#).

### **Statement on Academic Offences**

Scholastic offenses are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_grad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf)

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

### **Copyright and Audio/Video Recording Statement**

Course material produced by faculty is copyrighted and to reproduce this material for any purposes other than your own educational use contravenes Canadian Copyright Laws. You must always ask permission to record another individual and you should never share or distribute recordings.

### **Support Services**

As part of a successful student experience at Western, we encourage students to make their health and wellness a priority. Western provides several on campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your degree. For example, to support physical activity, all students, as part of their registration, receive membership in Western's

Campus Recreation Centre. Numerous cultural events are offered throughout the year. Please check out the Faculty of Music web page <http://www.music.uwo.ca/> and our own McIntosh Gallery <http://www.mcintoshgallery.ca/>.

Registrarial Services: <http://www.registrar.uwo.ca>

USC Student Support Services: <http://westernusc.ca/services/>

Academic Support and Engagement: <http://academicsupport.uwo.ca/>

Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their program director (Graduate or Undergraduate Chair), or other relevant administrators in their unit. Health and Wellness-related information and services are available at <https://www.uwo.ca/health/>

Students who are in emotional/mental distress should refer to Mental Health@Western <https://www.uwo.ca/health/> for a complete list of options about how to obtain help.

## Accessible Education Western (AEW)

Western is committed to achieving barrier-free accessibility for all its members. More information and access to services is available on the AEW website:

[http://academicsupport.uwo.ca/accessible\\_education/index.html](http://academicsupport.uwo.ca/accessible_education/index.html)

## Department & Faculty Offices

The Department of Epidemiology and Biostatistics is located on the third floor of the Western Centre for Public Health & Family Medicine (PHFM) on Western University's Main Campus.

## Technology Requirements

You are responsible for all required course materials and announcements posted to the course's OWL website. Please ensure that when you log in you are able to access the course site. A copy of the course outline will be available on both OWL and the departmental website.

Students will also use the following software or online platforms throughout the course (all available free of charge):

- Covidence: used for study screening (online)

<http://www.covidence.org>

- Mendeley: citation management software  
<http://www.mendeley.com>
- Review Manager (RevMan 5.3.5): used for data extraction and to create summary tables  
<http://tech.cochrane.org/revman/download>
- GRADEpro: used for GRADE evidence tables and summary of findings tables  
<https://gradepro.org>

STATA 15.0: statistical software

STATA: <https://www.stata.com/>

A revised course outline has been added to the "Syllabus" tab on OWL for your reference.