

This course is an overview of the concepts necessary for performing systematic reviews and meta-analyses, covered in sufficient detail to enable students to conduct their own systematic reviews/meta-analyses upon completion of the course. Students will learn about individual steps involved in conducting systematic reviews and meta-analysis, including developing a focused research question, designing a study protocol, defining inclusion/exclusion criteria, identifying relevant literatures databases, developing literature search strategies, performing a literature search, creation of a data abstraction form, data abstraction and management, and statistical methods for meta-analysis. We will cover important topics such as when meta-analysis may be useful, choosing a meta-analytic method, study quality assessment, exploration of heterogeneity, evaluation of potential sources of bias, and presentation of results. Students will apply skills learned in this course to evaluate and update a published systematic review and meta-analysis.

**Course Information:**

1.0 credits, online

Pass/fail grading

7 required sessions over 4 weeks (9/29/08-10/24/08)

1 optional chat session with research librarians, and 1 optional in-class computer (STATA) lab

**Course Prerequisites:**

Basic biostatistics course, or permission of the instructors

**Required Textbook:**

Egger M, Davey Smith G, Altman A (eds). Systematic Reviews in Health Care: Meta-Analysis in Context. 2<sup>nd</sup> Edition. BMJ Books. London, England, 2001.

**Other Recommended Books:**

1. Sutton AJ, Abrams KR, Jones DR, Sheldon TA, Song F. Methods for Meta-Analysis in Medical Research. John Wiley and Sons. West Sussex, England, 2000.
2. Cooper H, Hedges LV (eds). The Handbook of Research Synthesis. Russell Sage Foundation. New York, 1994.
3. Hedges LV, Olkin I. Statistical Methods for Meta-Analysis. Academic Press. San Diego, California, 1985.
4. Petitti DB. Meta-Analysis, Decision Analysis, and Cost-Effectiveness Analysis. Oxford University Press, New York, 2000.

**Course Requirements:**

1. Homework assignments
2. Final Project/Write-up – Update a published systematic review/meta-analysis (provided by instructors)

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Session 1	Recommended Completion Date 9/30	Background about systematic reviews/meta-analysis Formulating a research question and research protocol	Instructor:
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#### Topics

1. Definition of systematic review and meta-analysis
2. Why do we need systematic reviews and meta-analyses?
3. Difference between systematic reviews and narrative reviews
4. Systematic reviews/meta-analysis of RCTs versus other study designs
5. Introduction to the Cochrane Collaboration
6. Outline of steps in performing a systematic review, including:
  - Defining a research question
  - Defining inclusion/exclusion criteria
  - Developing a study protocol

#### Required Reading (prior to session)

1. Egger Chapters 1, 2, 12, 25

#### *Homework Assignment 1:*

Using the Ross, et al. article that we have chosen for the course project, review the research question, protocol, and inclusion/exclusion criteria listed in the article. Briefly answer the following: Was the research question appropriately defined? Was it clear that a research protocol was developed prior to initiation of the study? Was this protocol explicitly stated? Were inclusion/exclusion criteria clearly stated? Is there anything that you might have done differently regarding defining the research question, planning or presenting the study protocol, or choice of inclusion/exclusion criteria? *Create and hand in* an inclusion/exclusion criteria form created *using the same criteria stated by the study authors.*

#### ***Homework Assignment 1 due Thursday October 2nd***

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Session 2	Recommended Completion Date	Goals of literature search How to develop search strategies for online databases	Instructors: HSL Librarians
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#### Topics

1. Goals of literature search
2. Databases (MEDLINE, EMBASE, etc.) & database-specific search strategies
3. Designing & implementing database search strategies (with demonstration of MEDLINE search)
4. Searching the grey literature, handsearching journals, contacting experts to find additional literature
5. Understanding the Cochrane Collaboration and navigation of the Cochrane website

#### Required Reading (prior to session)

1. Egger Chapter 4
2. Cooper Chapter 4

#### Suggested Reading

1. Petitti Chapter 4

#### *Homework Assignment 2:*

Review the search strategies indicated in the Ross, et al. meta-analysis. Briefly answer the following questions: Were the chosen databases appropriate to cover the relevant literature for the research question? Would you have searched any additional databases? Were the search strategies for individual databases sufficiently broad to identify most of the literature on the topic of interest within each of the databases? If there were limits placed on the search (e.g. language limits), were they appropriate? What steps (if any) were taken to find literature beyond the chosen databases? *Design and hand in your own MEDLINE search strategy to identify articles to update this review.*

#### *Chat Session (Monday 10/6, 12-1 PM):*

Attend the optional chat session with the HSL librarians for help in refining your MEDLINE search strategy.

#### ***Homework Assignment 2 due Tuesday, October 7th***

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Session 3	Recommended Completion Date 10/7	Applying a search strategy to identify literature Applying inclusion/exclusion criteria to select articles Abstracting data Data management	Instructors: HSL Librarians, Nayak
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#### Topics

1. Managing and sharing references
2. Applying inclusion/exclusion criteria to identify relevant articles
3. Approaches to quality assessment
4. Categories of data to abstract
5. Data abstraction
6. Data management/recordkeeping

#### Required Reading (prior to session)

1. Egger, Chapters 3, 5, 7

#### Suggested Reading

1. Petitti Chapter 5

#### *Homework Assignment 3:*

Construct and submit a data abstraction form to capture relevant information from articles found in your search to update the Ross, et al. meta-analysis. Test this data abstraction form on a few articles, and modify if necessary.

#### ***Homework Assignment 3 due Thursday October 9th***

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Session 4	Recommended Completion Date	Introduction to Statistical Methods for Meta-Analysis	Instructor: Nayak
	10/10		

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#### Topics

1. How to determine if studies found in systematic reviews are appropriate for meta-analysis
2. Statistical tests of homogeneity
3. Random effects versus fixed effects models
4. Overview of commonly used meta-analytic methods
5. How to choose a meta-analytic method

#### Required Reading (prior to session)

1. Egger Chapters 15, 16

#### *Homework assignment 4:*

Use the search strategy that you developed after Session 2 to update the literature search for the Ross, et al. meta-analysis. Use the inclusion/exclusion criteria form that you created to identify additional articles. Find 1 to 3 additional articles that meet your inclusion criteria. Keep a record of total number of articles found in your search, the number of articles excluded, and the number and titles of articles that met your inclusion criteria. *Using the data abstraction form provided to you by the class instructors, begin to abstract data from the studies that met your inclusion criteria.* Hand in the data abstraction forms for the articles you found. Also summarize your search process including information on how many articles you found, how many you excluded, a list of some of the most common reasons for exclusion, and the titles of the articles that you found that met inclusion criteria.

***Homework Assignment 4 (last HW assignment) due Wednesday October 15th***

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Session 5	Recommended	Exploring data	Instructor:
	Completion		Bost
	Date		
	10/14		

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#### Topics

1. Overview of approaches to exploring heterogeneity
2. Study quality
3. Publication bias and other potential sources of bias
4. Subgroup analysis
5. Meta-regression

#### Required Reading (prior to session)

1. Egger Chapters 8, 9, 11

#### *Course Final Project:*

On Friday October 17<sup>th</sup> you will be provided with the dataset (both in Excel and Stata) and all the Stata output needed for you to update the Ross, et al. meta-analysis. Begin work on the course project write-up. No more than a 5 page summary of your update of the published meta-analysis. Critique the published meta-analysis. What did the authors do well? What might you have done differently? Present results obtained from your update of the meta-analysis. What were your conclusions? Did they agree with the authors' conclusions?

#### *Course Final Project due Friday November 7*

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Session 6	Recommended Completion Date 10/17	Exploring combined data, Part 2 Statistical Methods for Meta-Analysis of Studies of Diagnostic Test Accuracy	Instructor: Nayak
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#### Topics

1. Continuation of topics covered in session 5
2. Sensitivity analysis
3. Statistical methods for meta-analysis of studies of diagnostic test accuracy

#### Required Reading (prior to session)

Egger Chapter 14

Continue working on the course project write-up. No more than a 5 page summary of your update of the published meta-analysis. Critique the published meta-analysis. What did the authors do well? What might you have done differently? Present results obtained from your update of the meta-analysis. What were your conclusions? Did they agree with the authors' conclusions?

***Course Final Project due Friday November 7***

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Session 7 (optional) Parkvale 222	Date 10/21; 10-12	Lab: Meta-Analysis using STATA	Instructor: Bost
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Topics

1. Overview of STATA commands for meta-analysis
2. Step by step tutorial using STATA to test for homogeneity, combine data, perform sensitivity analysis, explore for evidence of publication bias, present results

Required Reading (prior to session)

Egger Chapter 18

*In-class Exercise:*

Step by step tutorial of how to analyze your data in STATA.

Continue working on the course project write up. No more than a 5 page summary of your update of the published meta-analysis. Critique the published meta-analysis. What did the authors do well? What might you have done differently? Present results obtained from your update of the meta-analysis. What were your conclusions? Did they agree with the authors' conclusions?

***Course Final Project due Friday November 7***

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Session 8	Recommended Completion Date	Applications of systematic reviews/meta-analysis	Instructor: Nayak
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10/24

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Topics

1. Applying systematic reviews/meta-analysis to clinical care, cost-effectiveness analysis/decision analysis, health care policy, and guidelines

Required Reading (prior to session)

Egger Chapters 19,21,22,23

Continue working on the course project write up. No more than a 5 page summary of your update of the published meta-analysis. Critique the published meta-analysis. What did the authors do well? What might you have done differently? Present results obtained from your update of the meta-analysis. What were your conclusions? Did they agree with the authors' conclusions?

***Course Final Project due Friday November 7***