

Systematic Review and Meta-Analysis for Biomedical Research

VME 6070 Class #27328 (2 credits)

Class Periods: Wednesday, 6th and 7th period (12.50-2.45pm)

Location: CVM Deriso Hall Room 101

Academic Term: Spring 2022

Instructors:

Thomas Denagamage, BVSc, MS, PhD (course coordinator)

Clinical Assistant Professor of Veterinary Epidemiology

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Jorge Hernandez, DVM, MVPM, PhD (instructor)

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Hannah Norton MS, AHIP (instructor)

Chair, Health Science Center Library

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Course Description

This course is an introduction to systematic review and meta-analysis, an essential research synthesis tool for researchers to appraise currently available primary research objectively and to identify gaps in research. This course will provide a detailed description of the systematic review process, provide guidance on how to perform a systematic review and meta-analysis, and will help graduate students advance their dissertation.

Course Objectives

This course introduces graduate students to the methods of conducting systematic review and meta-analysis in randomized controlled trials and observational studies.

Course objectives are to;

- Formulate an answerable review question and specify the types of primary research studies needed to answer the review question
- Management of systematic review, screening primary research and critical appraisal of included studies
- Critique a systematic review and meta-analysis published recently in a scientific journal
- Prepare a systematic review and meta-analysis protocol

Student learning outcomes;

- The student will identify a biomedical research topic of interest that can be examined using up-to-date systematic review and meta-analysis methods and techniques.
- The student will lead a group discussion of a published systematic review and/or meta-analysis of randomized controlled trials or observational studies.
- The student will formulate and submit a systematic review and meta-analysis protocol for review and feedback by peer students and course instructors.
- The student will deliver an oral presentation of the systematic review protocol

Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) will be used as the guide for the course (<http://www.prisma-statement.org/Extensions/Protocols.aspx>).

Course Pre-Requisites / Co-Requisites

Must be a graduate student registered at the University of Florida.

Course Schedule: Wednesday, 6th and 7th period (12.50-2.45pm)

Date and Time	Topic	Instructor
Jan. 05 12.50-2.45pm	Introduction to the course & to systematic review and meta-analysis	Denagamage
Jan. 12 12.50-2.45pm	Defining a review question and eligibility criteria	Denagamage
Jan. 19 12.50-2.45pm	Comprehensive literature searching for systematic reviews	Norton
Jan. 26 12.50-2.45pm	Systematic review question of interest* and protocol development	Denagamage
Feb. 02 12.50-2.45pm	Strengths of evidence in experimental and observational studies	Hernandez
Feb. 09 12.50-2.45pm	Selection of relevant studies and data extraction	Denagamage
Feb. 16 12.50-2.45pm	Risk of bias / quality assessment in primary research	Denagamage
Feb. 23 12.50-2.45pm	Synthesizing the evidence & meta-analysis: Effect size and precision	Denagamage
Mar. 02 12.50-2.45pm	Meta-Analysis: fixed-effects model and random-effects model	Denagamage
Mar. 16 12.50-2.45pm	Meta-Analysis: Heterogeneity, subgroup analysis and meta-regression	Denagamage
Mar. 23 12.50-2.45pm	Publication bias and grading strength of evidence	Denagamage
Mar. 30 12.50-2.45pm	Oral presentation of protocol	Denagamage
April 6 12.50-2.45pm	Critical appraisal of systematic review and meta-analysis of randomized control trials and observational studies**	Denagamage
April 13 12.50-2.45pm	SR & MA reporting guidelines	Denagamage
April 20 12.50-2.45pm	Meta-Analysis: Special topics	Denagamage

*Students report describing the systematic review question of interest and hypotheses (if there are hypotheses) that will be used for the final assignment (protocol for systematic review and meta-analysis).

**Students identify a recently published systematic review of their interest for critical appraisal.

Required Textbooks and Software

All required readings will be made available through Canvas and will be posted in advance of the date on which they will be covered. The instructor will also post PowerPoint slides of each class in Canvas. Class resources, announcements, updates, and assignments will also be made available through Canvas.

Following software will be used during the course.

EndNote/Mendeley/Zotero (<https://guides.uflib.ufl.edu/c.php?g=147417&p=968320>)

Covidence® (<https://www.covidence.org/organizations/aB9kQ/signup>)

Comprehensive Meta-Analysis (<https://www.meta-analysis.com/>)

Recommended Materials

- Cochrane Handbook for Systematic Reviews of Interventions, 2nd Ed. (2019) Edited by Julian P. T. Higgins et al. The Cochrane Collaboration. ISBN-13: 978-1119536628
- Introduction to Meta-Analysis, 2nd Ed. (2009) Micheal Borenstein et al. John Wiley & Sons Ltd.. ISBN-13: 978- 0470057247
- The Handbook of Research Synthesis and Meta-Analysis, 3rd Edition (2019) Harris Cooper, Larry V. Hedges, Jeffrey C. Valentine (eds.) New York: Russell Sage Foundation. ISBN-13: 978-0871540058

Attendance Policy, Class Expectations, and Make-Up Policy

Students are expected to attend all classes and to participate in discussions with the instructors and peers. Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. Additional information can be found here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Assignment Descriptions (Total points possible 600)

Production of systematic review in Covidence[®] (100 points)

Select a topic of interest for systematic review and/or meta-analysis, and produce each steps of their systematic review process using web-based software platform Covidence[®] (<https://app.covidence.org/organizations/aB9kQ/signup>).

Journal club discussion of published systematic review and meta-analysis (100 points)

Discussion / critique of published systematic review and meta-analysis using critical appraisal tools; ROBIS (<https://www.bristol.ac.uk/population-health-sciences/projects/robis/robis-tool/>) and/or (AMSTAR-2 <https://amstar.ca/index.php>)

Critique of systematic review and meta-analysis (100 points)

Prepare a critique of recently published systematic review and meta-analysis using critical appraisal tool ROBIS

Protocol for systematic review and meta-analysis (200 points)

Prepare a protocol for a systematic review and meta-analysis using PRISMA-P guidelines suitable for submission to “[BMC Systematic Reviews](#)” (Microsoft Word, Times New Roman, left aligned, double space, 10-12 pages plus references).

Oral presentation of protocol (100 points)

Presentation will be 20-25 minutes, including questions and answer, using PowerPoint.

Evaluation of Grades

Assignment	Due date	Total Points	Percentage of Final Grade
Production of systematic review in Covidence [®]	March 30	100	20%
Oral presentation of protocol	March 30	100	10%
Protocol for systematic review and or Meta-Analysis	April 01	200	40%
Journal club critique/discussion of published SR & MA	April 06	100	10%
Written critique of systematic review and meta-analysis	April 13	100	20%
		600	100%

Grading Policy

Percent	Grade	Grade Points
93.0 - 100.0	A	4.00
90.0 – 92.0	A-	3.67
87.0 - 89.0	B+	3.33
83.0 – 86.0	B	3.00
80.0 - 82.0	B-	2.67
77.0 - 79.0	C+	2.33
73.0 – 76.0	C	2.00
70.0 - 72.0	C-	1.67
67.0 - 69.0	D+	1.33
63.0 - 66.0	D	1.00
60.0 - 62.0	D-	0.67
0 – 60.0	E	0.00

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting

<https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary

action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:

<http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.

<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.

Evaluation of systematic review and Meta-Analysis protocol

Title: Identify the report as a protocol of a systematic review (5 points)

Rationale: Describe the rationale for the review in the context of what is already known (30 points)

Objectives: Provide an explicit statement of the question the review will address with reference to participants, interventions, comparators, and outcomes (PICO) (10 points)

Eligibility criteria: Specify the study characteristics (e.g. PICO, study design, setting, time frame) and report characteristics (e.g. years considered, language, publication status) to be used as criteria for eligibility for the review (20 points)

Information sources: Describe all intended information sources (e.g. electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage (10 points)

Search strategy: Present draft of search strategy to be used for at least one electronic database (e.g. PubMed) including planned limits, such that it could be repeated (20 points)

Data management: Describe the mechanism that will be used to manage records and data (5 points)

Selection process: State the process that will be used for selecting studies (e.g. two independent reviewers) through each phase of the review (i.e. screening, eligibility, and inclusion in meta-analysis) (10 points)

Data collection process: Describe planned method of extracting data from reports (e.g. piloting forms, done independently, in duplicate) and any processes for obtaining and confirming data from investigators (10 points)

Data items: List and define all variables for which data will be sought (e.g. PICO items, funding sources), any pre-planned data assumptions and simplifications (10 points)

Outcomes and prioritization: List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale (10 points)

Risk of bias in individual studies: Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis (20 points)

Data synthesis: (20 points)

(i) Describe criteria under which study data will be quantitatively synthesized

(ii) If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g. I^2)

(iii) Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)

(iv) If quantitative synthesis is not appropriate, describe the type of summary planned

Meta-bias(es): Specify any planned assessment of meta-bias(es) (e.g. publication bias across studies, selective reporting within studies) (10 points)

Confidence in cumulative evidence: Describe how the strength of the body of evidence will be assessed (e.g., GRADE) (10 points)

Total (200 points)