COURSE: Spring 2021, FISH 7350, Meta-analysis, 3 credit hours

LECTURE: Monday and Wednesday 2:00pm - 3:15pm, online

MODALITY: Online synchronous

OFFICE HOURS: Fridays, 8-10am; Also, available by appointment, as needed.

REQUIRED PREREQUISITES: Advanced graduate students, postdocs, faculty

RECOMMENDED PREREQUISITES: Prior coursework in R-based courses, such as WILD 7150 (Steury), BIOL/STAT 7250 (Abebe/Dobson), and AGRI 6010/6016 (Blythe)

INSTRUCTOR: Dr. Alan Wilson, Swingle 321, wilson@auburn.edu, 334-246-1120

ZOOM: We will use Zoom for remote course participants. You can access the specific Zoom room link for each class in Canvas (Link TBD).

COURSE WEBSITE: available at Canvas

STUDENT PUBLICATIONS FROM COURSE: http://wilsonlab.com/meta_class_pubs.html

FIELD OF STUDY: Meta-analysis is a quantitative approach for synthesizing results from diverse research studies that address a similar hypothesis. Effect sizes calculated from individual studies are combined to elucidate general patterns across studies. Like most approaches, meta-analysis has limitations (e.g., file drawer problem, dealing with varying publication quality). However, the technique can be a powerful option for identifying patterns in disciplines where the availability of large, under-analyzed datasets is common, such as ecology, psychology, medicine, and education.

COURSE OBJECTIVES & STUDENT LEARNING PHILOSOPHY: The course objectives represent a variety of tasks and skills that I expect students to have developed and mastered by the end of the course. Through participating in this course, you will (1) practice and develop your critical thinking skills (through in-class group discussions and presentations), (2) learn how to read and interpret the scientific literature, (3) broaden your understanding of meta-analysis, and (4) conduct your own meta-analysis.

REQUIRED MATERIALS (PROVIDED BY INSTRUCTOR AND STUDENTS VIA CANVAS):

1. Articles from the peer-reviewed literature (see complete list at end of syllabus)
2. R software (download it here https://www.r-project.org/)

GRADING:
Course grades are based on each student's cumulative performance for the following assignments:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Points</th>
<th>Grading scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>20</td>
<td>A = 90-100%</td>
</tr>
<tr>
<td>Librarian meeting</td>
<td>10</td>
<td>B = 80-89%</td>
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<tr>
<td>Initial project presentation</td>
<td>10</td>
<td>C = 70-79%</td>
</tr>
<tr>
<td>Outlines (brief &amp; manuscript)</td>
<td>10</td>
<td>D = 60-69%</td>
</tr>
<tr>
<td>Manuscript draft</td>
<td>10</td>
<td>F = 0-59%</td>
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<tr>
<td>Final project presentation</td>
<td>30</td>
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<tr>
<td>Paper</td>
<td>30</td>
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<tr>
<td>Total points</td>
<td>120</td>
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STUDENT EXPECTATIONS:
The course grade will be based on participation in lecture, discussion leading of important papers in meta-analysis, and a final project presentation as described below:

(1) **PARTICIPATION**: Participation is critical to success in this course. To participate, you need to be at class on-time and prepared (i.e., perused readings, practice with software). Discussion is vital to an effective learning environment and participation grades will reflect involvement during classroom activities. Student need to think about papers and lectures critically and provide thoughtful questions and comments during each lecture. Each student will also serve as a peer-reviewer for another student to improve the final class paper.

(2) **HOMEWORK**: To facilitate the learning process, homework associated with each component of conducting a meta-analysis will be assigned and due by the end of specific class days. Collaboration with other students, librarians, etc. is encouraged.

(3) **LIBRARIAN MEETING**: Meta-analysis is based on research synthesis. Auburn University’s library is full of experts trained to help researchers search for, identify, locate, and retrieve publications on diverse topics. All students will be required to have at least one formal meeting with an AU librarian and submit a short report about what information was gleaned from the meeting.

(4) **PROJECT PRESENTATIONS AND OUTLINES**: All students will be required to present two presentations. The first, a 2-minute lecture given early in the semester, will describe their planned meta-analysis. A brief 1-page outline of the project will be due at the time of the initial presentation so that I can assist with project development. The second, a 10-minute lecture given in the latter half of the semester, will describe the meta-analysis that was conducted and the associated results. A more developed manuscript outline will be due later in the semester. The students are expected to use the primary literature as references and data sources for these presentations.

(5) **FINAL PAPER**: All students will be required to submit a ~10-page paper associated with their meta-analysis project. A completed manuscript draft will be due after spring break. The paper should be prepared with submission to a journal in mind. Formatting should be specific to the target journal. Students are strongly encouraged to include their data and R code. Students producing successful projects will be strongly encouraged and supported to submit their papers to a peer-reviewed journal.

FEEDBACK & EVALUATION:
This course is for you to learn important fundamental concepts and ideas on which to build your understanding of meta-analysis. Course evaluations will be completed by students in the middle and at the end of the semester so that course changes can be made to enhance the learning experience for this class and future classes. Students are encouraged to use an anonymous online survey form as needed - [https://goo.gl/forms/ut92HZlH4lOHtfxm62](https://goo.gl/forms/ut92HZlH4lOHtfxm62) Finally, students are always welcome to schedule a meeting with me to talk more about topics discussed in class.
COURSE CHANGES:
Although I expect to cover all the topics described in the syllabus, course changes will likely occur - especially based on feedback from the students. Consequently, I reserve the right to modify the course to enhance the learning experience where I deem appropriate. Course changes will be described verbally during class and/or in writing via email and/or handouts.

ACADEMIC HONESTY:
The Auburn University Student Academic Honesty Code (available at https://sites.auburn.edu/admin/universitypolicies/Policies/AcademicHonestyCode.pdf) clearly defines the university’s honesty code. I expect all students to conduct themselves in my class with this Code in mind

ACCOMMODATIONS FOR DISABILITIES:
If you have a disability and/or a special need that requires accommodations, please inform me immediately so that I can develop a plan to work with you and arrange an appointment with a campus disabilities counselor.

PARTICIPANT LIST
Alan Wilson wilson@auburn.edu
<table>
<thead>
<tr>
<th>Day</th>
<th>Lecture topic</th>
<th>Discussion leader</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 11</td>
<td>Introduction to meta-analysis; historical overview</td>
<td>Alan</td>
<td>Glass 1976; Gurevitch et al. 2001; Normand 1999; Nakagawa et al. 2017; Arnqvist and Wooster 1990; Finney 1995; Osenberg and St. Mary 1998</td>
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<tr>
<td>Jan 13</td>
<td>Steps for conducting a meta-analysis and discussion of Wilson et al. 2006 example</td>
<td>Alan</td>
<td>Gurevitch et al. 2018, Polanin et al. 2017</td>
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<td>Jan 18</td>
<td>MLK HOLIDAY – NO CLASS</td>
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<tr>
<td>Jan 20</td>
<td>Limitations of meta-analysis</td>
<td>Alan</td>
<td>Glass 1976; Vrieze 2018</td>
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<tr>
<td>Jan 25</td>
<td>Where to find data? Get to know your university librarian to help locate papers!</td>
<td>Adelia Grabowsky</td>
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<tr>
<td>Jan 27</td>
<td>Class exercise: locate papers for a targeted search</td>
<td>Alan</td>
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<tr>
<td>Feb 01</td>
<td>Data management: tools and techniques for success</td>
<td>Ali Krzton</td>
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<tr>
<td>Feb 03</td>
<td>How to choose data? How to extract data?</td>
<td>Alan</td>
<td>Englund et al. 1999; Bown and Sutton 2010</td>
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<tr>
<td>Feb 08</td>
<td>Class exercise: extract and organize data</td>
<td>Alan</td>
<td>Nakagawa et al. 2017</td>
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<tr>
<td>Feb 10</td>
<td>Brief project descriptions (2 minutes with 1 PowerPoint slide)</td>
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<tr>
<td>Feb 15</td>
<td>How to choose an effect size metric?</td>
<td>Alan</td>
<td>Gurevitch and Hedges 1999; Osenberg et al. 1997</td>
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<tr>
<td>Feb 17</td>
<td>Class exercise: how to calculate an effect size?</td>
<td>Alan</td>
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*Student project outlines due and brief (2 minutes) introduction presentation*

Homework: submit effect size data; due next class period
Feb 22  Introduction to R for Meta-Analysis and advanced meta-analysis statistics
Discussion leader – Ash Abebe (tentative)
Normand 1999; van Houwelingen et al. 2002, Dobson et al. 2018
BRING LAPTOP TO CLASS; Install this program on laptop – R (with metafor)

Feb 24  Standard statistics and meta-analysis; (ir)relevance of null hypotheses & P-values
Discussion leader – Alan (metafor intro)
BRING LAPTOP TO CLASS
Borenstein et al. 2009 (chapter 16)
*midterm course evaluation*

Mar 01  Class exercise: conduct thorough meta-analysis
Discussion leader – Alan
BRING LAPTOP TO CLASS
*Homework: submit results from meta-analysis; due next class period*

Mar 03  Tips for preparing a manuscript for a journal
Discussion leader – Alan
Borja 2014; Gewin 2018; Hsieh 2018
*Manuscript outlines due* (choose an appropriate journal, consider author guidelines, and develop manuscript outline)

Mar 08  Discuss current meta-analyses
Discussion leaders – Alan et al.
Readings TBD

Mar 10  WELLNESS DAY – NO CLASS

Mar 15  Discuss current meta-analyses
Discussion leaders – Alan et al.
Readings TBD

Mar 17  Student presentations (10 minutes - PowerPoint; recorded)
Presenters – TBD

Mar 22  Discuss current meta-analyses
Discussion leaders – Alan et al.
Readings TBD

Mar 24  Student presentations (10 minutes - PowerPoint; recorded)
Presenters – TBD

Mar 29  Peer-review of manuscripts
BRING LAPTOP TO CLASS
*Complete manuscript drafts due*

Mar 31  Student presentations (10 minutes - PowerPoint; recorded)
Presenters – TBD

Apr 05  Peer-review of manuscripts
BRING LAPTOP TO CLASS

Apr 07  Discuss current meta-analyses
Discussion leaders – Alan et al.
Readings TBD
Apr 12  Peer-review of manuscripts  
BRING LAPTOP TO CLASS

Apr 14  Discuss current meta-analyses  
Discussion leaders – Alan et al.  
Readings TBD

Apr 19  Peer-review of manuscripts  
BRING LAPTOP TO CLASS

Apr 21  Discuss current meta-analyses  
Discussion leaders – Alan et al.  
Readings TBD

Final paper due; *final course evaluation*