

**COURSE:** Spring 2022, FISH 7350, Meta-analysis, 3 credit hours

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

**WHERE:** Swingle 301 or via zoom link in Canvas

**OPTIONAL HELP SESSION:** Thursdays, 8:00am-9:30am; 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) and BIOL/STAT 7250 (Abebe/Dobson)

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

**STUDENT PUBLICATIONS FROM COURSE:** [http://wilsonlab.com/meta\\_class\\_pubs.html](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 IN CANVAS:**

- (1) Articles from the peer-reviewed literature
- (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:

<u>Activity</u>	<u>Points</u>	<u>Grading scale</u>
Homework	20	A = 90-100%
Librarian meetings	10	B = 80-89%
Initial project presentation	10	C = 70-79%
Outlines (brief & manuscript)	10	D = 60-69%
Manuscript draft	20	F = 0-59%
Final project presentation	30	
Paper	30	
Total points	130	

## **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. Students 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 at the beginning of specific class days. Collaboration with other students, librarians, advisors, etc. is encouraged.

(3) *LIBRARIAN MEETINGS*: 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 two formal meetings with an AU librarian (one near the start of the class and the second by March 1) 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 that includes effect size data from at least 15 papers. 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/ut92HzIhHOUtfxm62> 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.

## **COVID-19 ADDITIONAL INFORMATION**

- Health and Participation in Class
  - Your health and safety, and the health and safety of your peers, are our top priorities. If you are experiencing any symptoms of COVID-19, or if you discover that you have been in close contact with others who have symptoms or who have tested positive, you must follow University guidelines. If you are feeling ill or if you have been exposed to someone with the virus, stay home to protect others.
  - Please do the following in the event of an illness or COVID-related absence:
    - Notify me in advance of your absence, if possible
    - Provide me with medical documentation, if possible
    - Keep up with coursework as much as possible
    - Participate in class activities and submit assignments remotely as much as possible
    - Notify me if you require a modification to the deadline of an assignment or exam
    - Finally, if remaining in a class and fulfilling the necessary requirements becomes impossible due to illness or other COVID-related issues, please let me know as soon as possible so we can discuss your options.
  - Students with questions about COVID-related illnesses should reach out to the COVID Resource Center at (334) 844-6000 or at [ahealthieru@auburn.edu](mailto:ahealthieru@auburn.edu).
- Health and Well-Being Resources
  - COVID Response Team (<https://ahealthieru.auburn.edu/>)
  - Student Counseling and Psychological Services (<http://wp.auburn.edu/scs/>)
  - AU Medical Clinic (<https://cws.auburn.edu/aumc/>)
  - If you or someone you know are experiencing food, housing or financial insecurity, please visit the Auburn Cares Office (<http://aucares.auburn.edu/>)
- A Healthier U Campus Community Expectations
  - We are all responsible for protecting ourselves and our community. Please read about student expectations for spring semester (<https://ahealthieru.auburn.edu/>).
- Course Expectations Related to COVID-19:
  - **Face Coverings:** As a member of the Auburn University academic community you are required to follow all university guidelines for personal safety with face coverings, physical distancing, and sanitation. Face coverings are required in this

class and in all campus buildings. Note that face coverings must meet safety specifications, be worn correctly, and be socially appropriate.

You are required to wear your face coverings at all times when indoors (<https://sites.auburn.edu/admin/universitypolicies/Policies/UsageOfFaceCoveringsPolicy.pdf>). If you remove your face covering or are non-compliant with the university's policies, you will be instructed to leave the classroom and will be held to the protocols outlined in the [Auburn University Policy on Classroom Behavior](https://sites.auburn.edu/admin/universitypolicies/Policies/PolicyonClassroomBehavior.pdf) (<https://sites.auburn.edu/admin/universitypolicies/Policies/PolicyonClassroomBehavior.pdf>). Any student who willfully refuses to wear a face covering and does not have a noted accommodation may be subject to disciplinary action.

- **Physical Distancing:** Students should observe appropriate physical distancing and follow all classroom signage/avoid congregating around doorways before or after class. If the instructional space has designated entrance and exit doors, you should use them. **Students should exit the instructional space immediately after the end of instruction to help ensure social distancing and allow for the persons attending the next scheduled class session to enter.**
- **Course Attendance:** If you are quarantined or otherwise need to miss class because you have been advised that you may have been exposed to COVID-19, you will be expected to develop a plan to keep up with your coursework during any such absences.
- **Course Meeting Schedule:** This course might not have a traditional meeting schedule in spring 2022. Be sure to pay attention to any updates to the course schedule as the information in this syllabus may have changed. Please discuss any questions you have with me.
- **Technology Requirements:** This course may require particular technologies to complete coursework. If you need access to additional technological support, please contact the AU Bookstore at [aubookstore@auburn.edu](mailto:aubookstore@auburn.edu).

*Disruptive or concerning classroom behavior involving the failure to wear a face covering, as directed by Auburn University, represents a potential Code of Student Conduct violation and may be reported as a non-academic violation. Please consult the [Classroom Behavior Policy](https://sites.auburn.edu/admin/universitypolicies/Policies/PolicyonClassroomBehavior.pdf) (<https://sites.auburn.edu/admin/universitypolicies/Policies/PolicyonClassroomBehavior.pdf>).*

- Course Delivery Changes Related to COVID-19
  - Please be aware that the situation regarding COVID-19 is frequently changing, and the delivery mode of this course may adjust accordingly. In the event that the delivery method is altered, please be assured that the learning goals and outcomes of the course will not change; however, some aspects of the course will change in terms of the mode of delivery, participation, and testing methods. Those details will be shared via Canvas as soon as possible. Please be prepared for this contingency by ensuring that you have access to a computer and reliable Internet.

## LECTURE SCHEDULE AND ASSOCIATED READINGS (AVAILABLE IN CANVAS):

<u>Day</u>	<u>Lecture topic</u>
Jan 12	Introduction to meta-analysis; historical overview Discussion leader – Alan
Jan 17	<b>MLK HOLIDAY – NO CLASS</b>
Jan 19	Steps for conducting a meta-analysis and discussion of Wilson et al. (2006) example Discussion leader – Alan <b>Gurevitch et al. 2018, Polanin et al. 2017</b>
Jan 24	Limitations of meta-analysis and advice from past students in this class Discussion leader – Alan; Frank Moen, Emily Driessen (guest lecture) <b>Glass 1976; Vrieze 2018</b>
Jan 26	Where to find data? Get to know your university librarian to help locate papers! Discussion leader – Adelia Grabowsky (guest lecture) <b>*Summary of 1<sup>st</sup> meeting with librarian due*</b> <b>Brazzeal 2018; PRISMA 2009 checklist</b>
Jan 31	<b>Class exercise: locate papers for a targeted search</b> Discussion leader – Alan <b>Homework: submit results from targeted search; due February 02</b>
Feb 02	<b>Data management: tools and techniques for success</b> Discussion leader – Ali Krzton (guest lecture) <b>R for Data Science, by Wickham and Golemund</b> <a href="https://r4ds.had.co.nz">https://r4ds.had.co.nz</a>
Feb 07	How to choose data? How to extract data? Discussion leader – Alan <b>Install ImageJ and metaDigitise (R package)</b> <b>Englund et al. 1999; Bown and Sutton 2010</b>
Feb 09	<b>Class exercise: extract and organize data</b> Discussion leader – Alan <b>Nakagawa et al. 2017</b> <b>Homework: submit results from data extraction; due February 14</b>
Feb 14	<b>Brief project descriptions (2 minutes with 1 PowerPoint slide)</b> Presenters – all students <b>*Student project outlines due and brief (2 minutes) introduction presentation*</b>
Feb 16	How to choose an effect size metric? Discussion leader – Alan <b>Gurevitch and Hedges 1999; Osenberg et al. 1997</b>
Feb 21	<b>Class exercise: how to calculate an effect size?</b> Discussion leader – Alan <b>Install MS Excel and R (or RStudio) on your laptop</b> <b>Readings TBD</b> <b>Homework: submit effect size data; due February 23</b>
Feb 23	<b>Standard statistics and meta-analysis; (ir)relevance of null hypotheses &amp; P-values</b> Discussion leader – Alan ( <i>metafor</i> intro) <b>Install this program on laptop – R (or RStudio) (with metafor)</b> <b>Borenstein et al. 2009 (chapters 10-16)</b> <b>*Summary of 2<sup>nd</sup> meeting with librarian due*</b>
Feb 28	<b>Introduction to R for Meta-Analysis and advanced meta-analysis statistics</b> Discussion leader – Jordan Eckert (guest lecture) <b>Install missForest R package before class</b> <b>*midterm course evaluation*</b>

- Mar 02** Introduction to Bayesian statistics for Meta-Analysis  
Discussion leader – Elif Dede Yildirim (guest lecture)  
**TBD**
- Mar 07** **SPRING BREAK – HAVE FUN AND BE CAREFUL**
- Mar 09** **SPRING BREAK – HAVE FUN AND BE CAREFUL**
- Mar 14** Tips for preparing a manuscript for a journal  
Discussion leader – Alan  
**Borja 2014; Gewin 2018; Hsieh 2018**
- Mar 16** Class exercise: conduct thorough meta-analysis  
Discussion leader – Alan  
Homework: submit results from meta-analysis; **due March 21**  
**\*Manuscript outlines due\*** (choose an appropriate journal, consider author guidelines, and develop a manuscript outline)
- Mar 21** Discuss current meta-analyses *and informal student chatting time*  
Discussion leaders – Alan  
**TBD**
- Mar 23** Student presentations (10 minutes - PowerPoint; recorded)  
**TBD**
- Mar 28** Discuss current meta-analyses *and informal student chatting time*  
Discussion leaders – Alan et al.  
**TBD**
- Mar 30** Student presentations (10 minutes - PowerPoint; recorded)  
**TBD**
- Apr 04** Discuss current meta-analyses *and informal student chatting time*  
Discussion leaders – Alan et al.  
**TBD**
- Apr 06** Student presentations (10 minutes - PowerPoint; recorded)  
**TBD**
- Apr 11** Discuss current meta-analyses *and informal student chatting time*  
Discussion leaders – Alan et al.  
**TBD**  
**\*Complete manuscript drafts due\***
- Apr 13** Peer-review of manuscripts
- Apr 18** Discuss current meta-analyses *and informal student chatting time*  
Discussion leaders – Alan et al.  
**TBD**
- Apr 20** Peer-review of manuscripts
- Apr 25** Discuss current meta-analyses *and informal student chatting time*  
Discussion leaders – Alan et al.  
**TBD**
- Apr 27** Peer-review of manuscripts  
**\*Final paper due\***; **\*final course evaluation\***