**SEFS 590: Synthesis and Meta-analysis in Ecology**

**Fall 2019 (3 credits)**

**Instructor**: Laura Prugh

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**Office Hours**: Thursdays 1-2 PM (or by appt.)

**Time & Location:** T Th 10-10:50 AM, WFS 107

**Prerequisites:** This is a graduate-level course. All students should be enrolled as graduate students and have taken at least one 400-level stats course or above.

**Textbook (required):** Koricheva, Gurevitch, & Mengersen (editors). 2013. Handbook of Meta-analysis in Ecology and Evolution. Princeton University Press, Princeton NJ.

**Course description:**

Quantitative syntheses and meta-analyses are essential tools in the sciences. Results from single studies are often not repeatable, and thus meta-analyses serve a crucial role by synthesizing results from numerous studies to provide a more robust understanding of scientific phenomena. This course will provide graduate students with the foundational knowledge needed to conduct quantitative syntheses and meta-analyses. The course will begin with a series of lectures introducing students to the quantitative techniques used and issues that need to be considered. Students will then form groups based on similar interests and spend the majority of the quarter gaining hands-on experience conducting a meta-analysis. Note that although the course only meets for two hours per week, this is a 3-credit class. Students are expected to spend a substantial amount of time outside of class working on their group projects.

**Course Objectives:**

The purpose of this course is to provide foundational knowledge and hands-on experience conducting quantitative syntheses and meta-analyses. Upon completion of the course, students should have acquired key knowledge and skills needed to conduct syntheses independently. Specific learning objectives include the following:

1. Understand the differences between reviews, syntheses, and meta-analyses, and pros and cons of each approach
2. Gain familiarity with common statistical approaches used and quantitative issues involved
3. Gain hands-on experience conducting a meta-analysis from start to (near) finish—from generating a research question, to compiling data, to analysis and writing.

Ultimately, it is hoped that students will conduct meta-analyses that will lead to high quality peer-reviewed papers. However, generation of submission-quality papers by the end of the quarter is an unrealistic goal. By the end of the course, each group should have a solid foundation should they choose to continue working to finalize their papers for submission. Authorship on papers will be proposed early on in project development, but students must continue to be involved in completing papers to be included as a co-author on a submitted paper. If a student’s contributions cease at the end of the course, they will be acknowledged but not included as a co-author.

**COURSE SCHEDULE**

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| **Date** | **Week** | **Topic/activity** | **Reading** |
| Sept 26 | Week 1 | Course Introduction & project group formation |  |
| Oct 1 | Week 2 | Types of syntheses | Chpt 1&2 |
| 3 |  | Literature search & selection | Chpt 3-5 |
| Oct 8 | Week 3 | Effect size calculations | Chpt 6-7 |
| 10 |  | Project work |  |
| 15 | Week 4 | Overview of statistical approaches | Chpt 8 |
| 17 |  | LS vs ML vs Bayesian approaches | Chpt 9-11 |
| 22 | Week 5 | Using metawin in R (hands on) |  |
| 24 |  | Statistical issues: missing data & publication bias | Chpt 13&14 |
| 29 | Week 6 | Paper discussion | Shurin et al. |
| 31 |  | Project work |  |
| Nov 5 | Week 7 | Best practices summary | Chpt 20 |
| 7 |  | Paper discussion | Gaynor et al. |
| 12 | Week 8 | Project work |  |
| 14 |  | **Open book exam** |  |
| 19 | Week 9 | Project work |  |
| 21 |  | Project work |  |
| 26 | Week 10 | Project work |  |
| 28 |  | No class, Thanksgiving break |  |
| Dec 3 | Week 11 | Project work |  |
| 5 |  | Project work |  |
| 6 |  | **Final paper due** |  |

**GRADING POLICY AND OTHER COURSE INFORMATION**

Your grade in this course will be based on 4 components: (1) a metawin worksheet, (2) a practical exam, (3) participation, and (4) your final group paper.

**Metawin worksheet:** During our in-class exercise learning to use the R package *metawin*, you will complete a worksheet that will be graded.

**Practical exam:** This test will be a mix of questions relating to the lecture material and hands-on analyses in which you will work with an example dataset. The exam will be open book.

**Participation:** You are expected to attend all class periods. Because most of the course will be spent conducting an actual meta-analysis, you will be expected to work independently outside of class periods on your term project for a substantial amount of time. If you will be in the field or attending a conference during the term, discuss these absences with me as far in advance as possible. Students should come to each session fully prepared (e.g., having done readings or agreed-upon project work), and participate fully in paper discussions.

**Group projects:** There will be 4 main components to the group projects: (1) literature review, (2) data collection/extraction, (3) data analysis, (4) and writing. Each component will be worth roughly ¼ of the grade for the group project, though tasks may be divided such that different students focus more or less on different components. Given that it will be necessary to continue working beyond the end of the term to complete the papers, students will be graded on their contributions to the group efforts up until the end of the term. A draft will be due on the last day of class.

**Course Grading**

Metawin worksheet 20 pts

Practical Exam 80 pts

Participation 100 pts

Final paper 200 pts

**Total: 400 points**

Final grades will be assigned according to the following scale:

A = 3.5-4.0, 90-100%, 360-400 points

B = 2.5-3.4, 80-89%, 359-320 points

C = 1.5-2.4, 70-79%, 319-280 points

D = 0.7-1.4, 60-69%, 279-240 points

F = 0, < 60%, 0-239 points

**Note:** 60% -> 0.7 = the lowest passing grade

59% or lower = academic failure (no credit earned)

For more information on UW Grading system, you can visit: <http://www.washington.edu/students/gencat/front/Grading_Sys.html>

## Late Policy

Assignments turned in late will receive a 10% reduction in points PER DAY late, starting immediately after the assignment is due (i.e., if it is due at 5PM and turned in at 5:01PM, 10% would be deducted, and an additional 10% deducted for each 24-hour period thereafter).

## Academic Integrity

Plagiarism, cheating, and other misconduct are serious violations of your contract as a student. We expect that you will know and follow the University's policies on cheating and plagiarism. Any suspected cases of academic misconduct will be handled according to University regulations. More information, including definitions and examples, can be found at: <http://depts.washington.edu/grading/pdf/AcademicResponsibility.pdf>

## Disability Accommodations

To request academic accommodations due to a disability, please contact Disability Resources for Students, 011 Mary Gates, (206)543-8924 (V/TTY), http://depts.washington.edu/uwdrs/. If you require academic accommodations, please coordinate with DRS and/or present your letter from DRS to the instructor so we can discuss the accommodations needed for this class.