

COURSE: Summer 2010, FISH 7960/8960, Special Problems in Fisheries and Allied Aquacultures

TOPIC: Meta-analysis: Concepts, Limitations, and Possibilities

LECTURE: Thursdays, 3:30-5:00PM, Swingle 303, 2 credit hours

OFFICE HOURS: Available by appointment

REQUIRED PREREQUISITES: Graduate level students, instructor approval

INSTRUCTOR: Dr. Alan Wilson, Swingle 321, wilson@auburn.edu, 334-844-9321

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 power option for identifying patterns in disciplines where the availability of large, underanalyzed 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):

Articles from the peer-reviewed literature (see complete list at end of syllabus)

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>
Participation	25	A = 90-100%
Paper discussion	25	B = 80-89%
Project presentation	50	C = 70-79%
		D = 60-69%
		F = 0-59%
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Total points		100

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: Discussion is vital to an effective learning environment and participation grades will reflect student attendance and involvement during classroom activities. In order to participate, you need to be at class on-time and prepared (i.e., perused readings, practice with software).

(2) PAPER DISCUSSION: All students will be required to lead the discussion of a series of articles from the peer-reviewed literature during one class period.

(3) PROJECT PRESENTATION: All students will be required to present a 10-15 minute lecture describing a meta-analysis that they conduct during the course. Brief 1 page outlines of the project will be due by the third week of the course so that I can assist with project development. The students are expected to use the primary literature as references and data sources for this presentation. Students producing successful projects will be strongly encouraged 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 at the end of the semester so that course changes can be made to enhance the learning experience for this class and future classes. 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:

Title XII, Chapter 1200 of the SGA Code of Laws clearly defines the Auburn University student academic honesty code (available at <http://auburn.edu/tigercub/>) which states "*In accordance with those virtues of Honesty and Truthfulness set forth in the Auburn Creed, I, as a student and fellow member of the Auburn family, do hereby pledge that all work is my own, achieved through personal merit and without any unauthorized aid. In the promotion of integrity, and for the betterment of Auburn, I give honor to this, my oath and obligation.*"

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.

LECTURE SCHEDULE AND ASSOCIATED READINGS (CITATIONS FOLLOW):

<u>Date</u>	<u>Lecture topic</u>
June 3	Introduction to meta-analysis; historical overview Discussion leader – Alan Arnqvist and Wooster 1995, Cooper et al. 1990; Finney 1995; Glass 1976; Gurevitch et al. 2001; Osenberg and St. Mary 1998
June 10	Limitations of meta-analysis Discussion leaders – Nancy, Colleen, Mike U., Ginger Bailar 1997; Eysenck 1984; Eysenck 1994; Lecky et al. 1996; Møller and Jennions 2001
June 17	Where to find data? How to choose data?; *Student project proposal presentations* Discussion leaders – Marinda, Norbert, Sam Englund et al. 1999; Slavin 1995
June 24	Statistics and meta-analysis; (ir)relevance of null hypotheses & <i>P</i>-values Discussion leaders – Molly, Mallory, Victoria Fernandez-Duque 1997; Gurevitch and Hedges 1999; Johnson 1999
July 1	How to choose an effect size metric? Discussion leaders – Bob, Scott, Laurie Hedges et al. 1999; Osenberg et al. 1997; Osenberg et al. 1999
July 8	Introduction to Meta-Win 2.0 Discussion leader – Alan Rosenberg et al. 2000
July 15	Meta-analysis examples Discussion leaders – Michael C., Angela, Dilbur Benayas et al. 2009; Brett and Goldman 1996; Downing et al. 1999; Halaj and Wise 2001; Koricheva et al. 2004; Sarnelle 1992; Schmitz et al. 2000; Shurin et al. 2002; Worm et al. 2002
July 22	Group critique and review of peer presentations none
July 29	Final student presentations; *course evaluation* none

PARTICIPANT CONTACT INFORMATION:

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CITATIONS:

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- Bailar, J. C. 1997. The promise and problems of meta-analysis. *New England Journal of Medicine* **337**:559-561.
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- Downing, J. A., C. W. Osenberg, and O. Sarnelle. 1999. Meta-analysis of marine nutrient-enrichment experiments: variation in the magnitude of nutrient limitation. *Ecology* **80**:1159-1167.
- Englund, G., O. Sarnelle, and S. D. Cooper. 1999. The importance of data-selection criteria: Meta-analyses of stream predation experiments. *Ecology* **80**:1132-1141.
- Eysenck, H. J. 1984. Meta-Analysis - an Abuse of Research Integration. *Journal of Special Education* **18**:41-59.
- Eysenck, H. J. 1994. Systematic Reviews - Metaanalysis and Its Problems. *British Medical Journal* **309**:789-792.
- Fernandez-Duque, E. 1997. Comparing and combining data across studies: Alternatives to significance testing. *Oikos* **79**:616-618.
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- Glass, G. V. 1976. Primary, secondary, and meta-analysis of research. *Educational Researcher* 5:3-8.**
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- Møller, A. P., and M. D. Jennions. 2001. Testing and adjusting for publication bias. *Trends in Ecology & Evolution* **16**:580-586.

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- Osenberg, C. W., O. Sarnelle, S. D. Cooper, and R. D. Holt. 1999. Resolving ecological questions through meta-analysis: Goals, metrics, and models. *Ecology* **80**:1105-1117.
- Osenberg, C. W., and C. M. St. Mary. 1998. Meta-analysis: synthesis or statistical subjugation? *Integrative Biology: Issues, News, and Reviews* **1**:37-41.
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- Worm, B., H. K. Lotze, H. Hillebrand, and U. Sommer. 2002. Consumer versus resource control of species diversity and ecosystem functioning. *Nature* **417**:848-851.