



**BI 698: Introduction to Educational  
Research Methods**  
**1 graduate semester credit**  
**Fall 2018**

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**Course Location:**

- Online Zoom meetings (nine weeks)
- 1 day meeting during the HAPS Regional Conference (Columbus, Ohio, Oct. 18); this component can be replaced by additional readings and videos if necessary.

**Course Resources:**

1. National Research Council. (2001) How People Learn: Brain, Mind, Experience and School, Washington, D.C.: National Academy Press (you may download a free PDF of the entire book at: <http://www.nap.edu/openbook.php?isbn=0309070368> )
2. Online (open source) research articles, essays, and YouTube videos will also be used in the course for weekly assignments.
3. Valerie D. O'Loughlin's video series, "How to Develop a Scholarship of Teaching and Learning Project." (The videos are a component of a HAPS President's Initiative. You must be a member of HAPS to view some of this videos. The hyperlinks are available at the end of the syllabus)

**Computer Requirements:**

- For synchronous online discussions using Zoom, participants should have access to a computer with both a camera and a microphone (so the individual can project video and be heard in discussions).

- Participants should have a relatively fast internet connection for online discussions and to access any additional online videos the instructor assigns.
- Participants will need a gmail account in order to facilitate collaborative work using Google docs and Google sheets.

**Course Format:** This is an online course, with a one-day optional in-person component. Weekly online synchronous video discussions will be held on Zoom. Final assignments will be peer reviewed, and both the peer review process and the submission of the final assignments will be done online via Zoom and gmail.

**Course Description:** This course is for college level instructors who wish to gain familiarity with evidence based instructional practices (e.g., guided inquiry learning and collaborative testing), and investigate the effectiveness of these activities in their own classrooms. Course topics include learning theory, metacognition, and quantitative and qualitative educational research methods. Participants will learn the material through directed readings, in-person workshops, and online weekly synchronous discussion forums. In addition, participants will apply the information they have learned to the development of an educational research question they want to examine in their own classroom.

**Course Expectations:** This is a graduate-level course, and participants should expect to be able to devote a significant amount of time in course work, which will include:

- Directed readings in evidence based instructional practices and educational research methods (~15 hours)
- Participation in weekly online discussion forums (through Zoom) and optional in-person workshops to discuss teaching methods, educational research readings, and the final project (~15 hours)
- Searching online databases for background literature about a specific anatomy and physiology educational research question (~5 hours)
- Development and write-up of a 3-5 page proposal for an educational research project in your classroom (~5 hours)
- Peer evaluation of at least one other educational research project proposal of another HAPS-I participant (~2 hours)
- Incorporation of peer evaluation feedback into your final educational research project proposal (~2-3 hours)

**Course Outcomes:** Upon completion of this course, participants should be able to:

- Be able to explain and implement evidence based instructional methods, such as paired problem solving and guided inquiry.
- Define the concept of metacognition and explain how an individual develops metacognitive skill
- Compare and contrast novice versus expert learners
- Explain how learning may be contextualized and may be affected by misconceptions
- Explain the basics of classroom research and the assessment techniques used in such research.

- Describe and evaluate the Scholarship of Teaching and classroom research literature that is most related to the issues the participant wants to explore.
- Search online databases for anatomy and physiology educational research literature
- Compare and contrast quantitative and qualitative educational research methods, and evaluate which method(s) are most appropriate for a specific research question
- Frame an educational research question that is clear, defined, assessable and meaningful
- Evaluate educational research studies regarding their research design and assessment methods
- Synthesize their knowledge by developing a proposal of an educational research question in the participant's classroom

### **Course Assessments and Grading Policy:**

In order to pass this course, participants must earn 70% of the 200 total points assessed. Participants will be assessed in a variety of ways:

**1. Participation in the synchronous discussion forums on Zoom (50 points total):** During 9 of the weeks of online instruction, participants will be expected to participate in weekly online discussion forums through Zoom. Participants will be expected discuss the online readings, ask questions related to the readings and educational research, and assist in answering student questions. Should a participant not be able to attend an online discussion session, an individual may make up online discussion points by submitting a 1-page summary of the week's online readings and list questions and ideas raised by the readings.

**2. Chapter summary / leading online discussion (20 points).** Each member of the class will be required to generate a summary for one of the chapters, or articles, in the required reading. The summary will be archived on the course website. They will also be required to generate discussion questions and lead the Zoom session when that chapter or article is scheduled.

**3. Evidence-Based Instructional Practice Review (20 points).** Each participant will focus on one or two evidence based instructional practices (EBIP), such as guided inquiry, cooperative quizzes, or peer instruction (student response systems). Each participant will conduct a thorough research review for the chosen EBIP and prepare at least four one-half page reviews of research articles. (Note: this assignment will complement the final project.)

**4. Final project draft (Research Proposal) (50 points):** Each participant will design and prepare a 3-5 page proposal that: 1. Outlines a clearly defined and original educational research question; 2. Outlines appropriate methodology and assessment methods; and 3. Provides a review of relevant background literature. Submissions will be peer-reviewed by classmates.

**5. Peer review of a final project (20 points):** Participants are required to write up a 1-2 page peer review of a classmate's educational research proposal. The peer review should focus on constructive criticism, as described in the workshop session and related to the classroom readings. The peer reviewer should address questions such as: 1. Are the assessment methods appropriate? 2. Does the research question relate to the background literature? And 3. Is the research question well defined and assessable? Peer reviews will be posted online and emailed to the instructor.

**6. Revised final project (Research Proposal (40 points):** Participants will revise their project draft based on the peer review, and submit a final version via email. In addition, participants will submit a document summarizing their response to the peer review, outlining which comments were incorporated and explaining why others were not incorporated. The peer review response will be submitted along with the revised final project. Failure to turn in a timely peer review or failure to incorporate appropriate peer review comments will result in a partial or complete loss of these points.

1. Discussion Forum Participation	50 points
2. Book chapter summary (1 page) / leading an online discussion / discussion questions	20 points
3. Research review for final project (Four ½ page reviews of research articles) plus ½ page research question.	20 points
4. Final Project (3 to 5-page research proposal)	50 points
5. Peer review of final project (1 to 2-page critique)	20 points
6. Revised final project (3 to 5 page research proposal)	40 points
TOTAL	200 points

**Proposed Course Schedule:**

Date	Topics	Reading or Class Assignment
Week 1: Sept 2	Introduction to Course, Metacognition, Introduction to Pedagogical Research and Evidence Based Instructional Practices	How People Learn, Ch 1 Introduction to Evidence Based Instructional Practices (selected readings TBD) Introduction to IRB / Human Subjects Research
Week 2: Sept 9	Assessment in Teaching and Learning, Expert vs. Novice Learners, & Evidence Based Instructional Practices	How People Learn, Ch 2 SoTL Video 1: Part 1 Introduction to Educational Research and the Scholarship of Teaching Learning (SOTL) Reading: How to Develop a Scholarship of Teaching Project, <i>Adv. Physiol. Ed.</i> , 2006 <a href="http://advan.physiology.org/content/30/2/83">http://advan.physiology.org/content/30/2/83</a>
Week 3: Sept 16	Introduction to Quantitative and Qualitative Research Methods in Education.	How People Learn, Ch 3 SoTL Video 2 & 3: Developing a Clear Research Question and Reviewing the

		Educational Research Literature, and Determining Appropriate Methods of Assessment
Week 4: Sept 23	Quantitative vs. Qualitative Research Methods, How People Learn, Motivating Students	SoTL Video 4 & 5: Obtaining Human Subjects (IRB) approval; Collecting and Analyzing your Data, and Presenting and Publishing your Educational Research Review research articles / research questions <b>One paragraph description research question due</b>
Week 5: Sept 30	How to Develop a Scholarship of Teaching Project	Review research articles / research questions <b>Research Review due (20 points)</b>
Week 6: Oct 7	Research reviews and project preparation	Project preparation and review.
Week 7: Oct 21	Discussion of Final Educational Research Proposals	<b>Final Project (3 to 5-page research proposal)</b>
Week 8: Oct 28	Peer Review of Educational Research Proposals	Critiques / peer review of final projects
Week 9: Nov 4	Modify, edit and finalize educational research proposal	Final, revised, educational research proposal due at a time TBD.

### Valerie D. O'Loughlin's video series

#### [Scholarship of Teaching and Learning – Part 1](#)

Part 1 Introduction to Educational Research and the Scholarship of Teaching Learning (SOTL)

#### [Scholarship of Teaching and Learning – Part 2 \(Requires HAPS Membership\)](#)

Part 2 Developing a Clear Research Question and Reviewing the Educational Research Literature

#### [Scholarship of Teaching and Learning – Part 3 \(Requires HAPS Membership\)](#)

Part 3 Determining Appropriate Methods of Assessment

#### [Scholarship of Teaching and Learning – Part 4 \(Requires HAPS Membership\)](#)

Part 4 Obtaining Human Subjects (IRB) approval; Collecting and Analyzing your Data

#### [Scholarship of Teaching and Learning – Part 5 \(Requires HAPS Membership\)](#)

Part 5 Presenting and Publishing your Educational Research

**Recommended Resources: Note: Participants do not need to read all of these resources, and additional resources will be posted as needed.**

**Peer Reviewed Papers**

1. Ballen, C. J., Wieman, C., Salehi, S., Searle, J. B., & Zamudio, K. R. (2017). Enhancing Diversity in Undergraduate Science: Self-Efficacy Drives Performance Gains with Active Learning. *CBE—Life Sciences Education*, 16(4), ar56. <https://doi.org/10.1187/cbe.16-12-0344>
2. Cooper, K. M., Downing, V. R., & Brownell, S. E. (2018). The influence of active learning practices on student anxiety in large-enrollment college science classrooms. *International Journal of STEM Education*, 5(1). <https://doi.org/10.1186/s40594-018-0123-6>
3. Doherty, J. H., & Wenderoth, M. P. (2017). Implementing an Expressive Writing Intervention for Test Anxiety in a Large College Course. *J Microbiol Biol Educ*, 18(2). <https://doi.org/10.1128/jmbe.v18i2.1307>
4. Dolan, E. L. (2007). Grappling with the Literature of Education Research and Practice. *CBE—Life Sciences Education*, 6(4), 289–296. <https://doi.org/10.1187/cbe.07-09-0087>
5. Eddy, S. L., Brownell, S. E., Thummaphan, P., Lan, M.-C., & Wenderoth, M. P. (2015). Caution, Student Experience May Vary: Social Identities Impact a Student’s Experience in Peer Discussions. *CBE Life Sci Educ*, 14(4), ar45. <https://doi.org/10.1187/cbe.15-05-0108>
6. Eddy, S. L., Converse, M., & Wenderoth, M. P. (2015). PORTAAL: A Classroom Observation Tool Assessing Evidence-Based Teaching Practices for Active Learning in Large Science, Technology, Engineering, and Mathematics Classes. *CBE—Life Sciences Education*, 14(2), ar23. <https://doi.org/10.1187/cbe.14-06-0095>
7. Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, 111(23), 8410. <https://doi.org/10.1073/pnas.1319030111>
8. Freeman, S., Theobald, R., Crowe, A. J., & Wenderoth, M. P. (2017). Likes attract: Students self-sort in a classroom by gender, demography, and academic characteristics. *Active Learning in Higher Education*, 18(2), 115–126. <https://doi.org/10.1177/1469787417707614>
9. Honicke, T., & Broadbent, J. (2016). The influence of academic self-efficacy on academic performance: A systematic review. *Educational Research Review*, 17, 63–84. <https://doi.org/10.1016/j.edurev.2015.11.002>
10. Jackson, M. A., Tran, A., Wenderoth, M. P., & Doherty, J. H. (2018). Peer vs. Self-Grading of Practice Exams: Which Is Better? *CBE—Life Sciences Education*, 17(3), es44. <https://doi.org/10.1187/cbe.18-04-0052>
11. O’Loughlin, V. D. (2006). A “how to” guide for developing a publishable Scholarship of Teaching project. *Advances in Physiology Education*, 30(2), 83–88.
12. Pape-Lindstrom, P., Eddy, S., & Freeman, S. (2018). Reading Quizzes Improve Exam Scores for Community College Students. *CBE—Life Sciences Education*, 17(2), ar21. <https://doi.org/10.1187/cbe.17-08-0160>

13. Schinske, J. N., Perkins, H., Snyder, A., & Wyer, M. (2016). Scientist Spotlight Homework Assignments Shift Students' Stereotypes of Scientists and Enhance Science Identity in a Diverse Introductory Science Class. *CBE—Life Sciences Education*, 15(3), ar47. <https://doi.org/10.1187/cbe.16-01-0002>
14. Tanner, K. D. (2013). Structure Matters: Twenty-One Teaching Strategies to Promote Student Engagement and Cultivate Classroom Equity. *CBE—Life Sciences Education*, 12(3), 322–331. <https://doi.org/10.1187/cbe.13-06-0115>

## **Books**

Scientific Teaching, by Jo Handelsman, Sarah Miller, and Christine Pfund.

The Core Concepts of Physiology, by Joel Michael, William Cliff, Jenny McFarland, Harold Modell and Ann Wright.

*Discipline-based education research: Understanding and improving learning in undergraduate science and engineering*, by Singer, S. R., Nielsen, N. R., & Schweingruber, H. A. (Eds.). (2012). Washington, DC: National Academies Press.

## **Videos**

Biology Education Scholarship – by Erin Dolan