

Math 6990: Foundations and Frontiers of Undergraduate STEM Education
Fall 2017

Instructor: Dr. Michael Oehrtman
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MSCS 426

Office Hours: TBA
and by appointment

Class Times: MW 2:30 pm – 3:45 pm

Location: MSCS 519B

Website: <https://online.okstate.edu> (then log in and find our course)

Required Reading: The bulk of the work in this course will consist of reading, discussing, and critiquing journal articles and book chapters representing the foundations and frontiers of research in undergraduate Science, Technology, Engineering, and Mathematics (STEM) education. You will also be responsible for locating and reading additional articles relevant to your emerging research interests.

Course Description: This course will introduce you to research in STEM education. As such you will gain an appreciation of the problems tackled within these fields, the methodologies employed in this pursuit, and familiarity with a broad base of foundational literature. You will develop an understanding of the role of theory in STEM education research and how it is scientifically developed. Through this background, you will also begin to read and assess articles at the cutting-edge of research in STEM education.

Participation: In order to gain the most from this course and to contribute to the scholarly atmosphere of the class, you will need to carefully read all assignments well in advance of the class meetings for which they are assigned. Such careful reading is a very time-consuming process, often consisting of reviewing difficult passages multiple times, looking up cited references, comparing to other readings, scrutinizing provided data, evaluating the evidence presented to support claims and the logic behind overall arguments, etc. Compounding these difficulties is the fact that you will be reading about student understanding and learning of topics from a broad range of STEM disciplines that may be unfamiliar to you. During class, I expect you to offer insights you gained from the readings, ask questions about aspects that you did not understand, critique the analyses and arguments developed in the readings, and hold each other accountable for scientific discourse.

Project: You will complete a project involving an analysis of the research on a focused issue in STEM education research, culminating in a 15-20 page double-spaced paper and a 30 minute presentation. The topic should be in an area in which you do not currently have expertise and must be approved in advance by the professor. Your paper and presentation should include the following:

1. A brief overview of the content area for other non-experts.
2. A review of the literature.
 - Theoretical perspectives that have been applied to frame research questions and design the studies
 - Research questions posed and addressed
 - Research methods (data collection and analysis) used to address the research questions
 - Findings of the research
 - Outstanding questions that could be addressed by research
3. An analysis of your experience with the unfamiliar content area framed in terms of the constructs from existing research literature.

Grades: Course grades will be determined 50% from participation and 50% from the project.

Syllabus Attachment: Please read the OSU syllabus attachment, linked on the web at <http://academicaffairs.okstate.edu/content/resources-faculty-staff>. This has a lot of important information, including important dates and instructions about disability accommodations. Please contact me privately during the first week of the course if you need accommodations as a result of a disability.