

MATH 614 Syllabus: The Learning and Teaching of Geometry

Tues 6-8:40 pm WH 306

Dr. Dawkins

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Office hours by appointment (please take me up on this!)

Texts:

Stylianou, D. A., Blanton, M. L., & Knuth, E. J. (Eds.). (2009). *Teaching and learning proof across the grades: A K-12 perspective*. NY: Routledge. [ISBN: 978-0-415-98984-8]

Other selected readings will be provided by the professor.

Course Content:

This course seeks to provide a survey of current scholarship, trends, policies, and innovations regarding the learning and teaching of geometry at the secondary level. As a *mathematics education* course, instruction will be geared toward developing understanding of mathematics in light of pedagogical goals and concerns as well as understanding of pedagogy specifically oriented toward geometric content. Mathematical topics will reflect the scope of geometric concepts reflected in the NCTM standards and CCSS for secondary geometry. Themes of argumentation and proof and the role of geometric technology will receive particular attention as vehicles for the course.

Course Goals:

Students in this course should develop:

- Familiarity with current theoretical frameworks for the learning and teaching of geometry as they relate both to classroom practice and classroom research.
- Awareness of the general forms of reasoning that underlie geometric thinking and how they can be fostered within the classroom.
- Deeper insight into high school geometry content as it pertains to student learning and content standards for secondary geometry.
- Insight into the role argumentation within a technology-mediated community of practice plays in concept development and the emergence of proof in a geometric setting.

Assessment:

- *Course attendance and participation* is required. Any absences beyond the first will result in grade reduction. Students are also expected to come to class prepared to discuss and contribute to class activities and engage in group activities to earn full participation credit. (50 points)
- *Reflective writings* will constitute a regular part of course activities. Both as a vehicle for reflective learning and formative assessment, prompts for reflections will regularly be provided and students will be required to turn in written responses. Responses should be long enough to cover the subject, but at least one page will be a good rule-of-thumb regarding length. (50 points)
- *Leading discussion over readings* will be required of every class member once during the semester. Students will be assigned a reading in advance and should come to class with a set of open-ended questions for group discussion. It is expected that all class members will be capable of analyzing and critiquing the papers beyond a basic summary. If you have questions about this please see me for some guidance. (50 points)

- *Research paper* on a particular topic regarding the learning and teaching of geometry. Topics may range from the teaching and learning of a particular geometric topic to theoretical considerations in geometric education. In-service teachers may even want to gear their paper toward culminating in a research-informed unit for instruction in their classroom. Topics should be chosen and submitted for professor approval by October 6 (though I will accept them earlier). The papers will be due on the final class meeting, December 1. It is encouraged however that students turn in rough drafts earlier than this for feedback. Each student will present a short account of his or her research findings during the final class session. The research report should include at least six references, at least three of which should be scholarly sources such as edited book chapters or research journal articles. Further instructions regarding this assignment will be provided nearer to the date of topic approval. (100 points)
- *A student interview* will be conducted by each student. The interview seeks to observe and classify one student's geometric reasoning abilities. Keep in mind that the goal of an interview is to document how the student reasons rather than to teach. Every student is responsible for selecting a research subject. Please see me if you have difficulty gaining access to a high-school or beginning college student to interview. The first portion of the assignment is to select a particular topic or group of topics in geometry and create an interview protocol designed to elicit the students' reasoning in light of the class readings. These interview protocols are due to me on Sept 29 (though you may turn them in earlier if you would like to do your interview earlier). Once your protocol is modified in light of my feedback, you will conduct your interview. You should audio- or video-record the interview and maintain any written record of the students' work. You will then write a report explaining with evidence your assessment of the student's geometric reasoning abilities. Your analysis should go beyond a simple description of whether the students got "right" or "wrong" answers or what they did and did not know, but should explain the kinds of reasoning of which they were capable and not capable. Finally you should suggest an exploratory learning exercise that would help the student begin to extend their current forms of geometric reasoning. The final report will be due on November 17. (Protocol: 20 points, Report: 80 points)
- *Final Examination*. The final exam will be administered Tues December 8 at 6 pm. (50 points)