

Millersville University, Spring 2018
MATH 679: Technology in the Secondary Classroom, 3 credits

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Office Hours: Monday, Tuesday, Thursday 2:30 to 4 pm
Tuesday 5:15 to 5:45 pm
Other times available on request: *please just ASK* for other options as needed.

Course Description:

MATH 679 is intended to address the technological needs and interests of graduate students pertaining to the use of technology in the secondary classroom. The course will investigate various uses and misuses of technology as well as pertinent research regarding technology. The course will support the development of lessons that can be shared with and implemented by students in the class incorporating the use of graphics calculators, computer software, applets, the internet and other appropriate technology.

Catalog Description: Introduction to technologies currently available for teaching secondary mathematics. Emphasis on the use of modern graphics calculators, although computer software is also presented. Capabilities of the technologies examined in depth, but emphasis will be on the use of this technology in the classroom. Mathematical topics selected from elementary algebra, geometry, algebra II, precalculus and calculus. Prereq: Secondary teaching experience.

Course Objectives: Students should be able to

- demonstrate competence in using graphics calculators to solve a wide variety of problems in a algebra, trigonometry, calculus, and statistics,
- demonstrate competence in using Geometer's Sketchpad or Geogebra as both a tool for construction and for exploration,
- incorporate graphics calculator and computer technologies into their lessons,
- communicate beliefs about the use of technology in the secondary classroom based on research and educational philosophies,
- communicate appropriate uses and misuses of technology as it applies to their own classes and students,
- find appropriate resources on the internet to facilitate their own learning and teaching

Required Materials:

- a graphing calculator (preferably a TI-83+ or TI-84) for use in-class and out-of-class work,
- computer access (on campus may be necessary) for use outside of class to research internet issues and to practice the use of Desmos, Geogebra, etc.

Attendance: Regular class attendance is expected (see University Policy). All assignments, projects and presentations are announced and late work (except in rare circumstances) will **not** be accepted without penalty. Students are expected to participate in class discussion and are responsible for contacting the instructor **prior** to class by phone or email if an absence is unavoidable.

Assignments: Daily assignments will be given in order to supplement class work and extend your learning. Effective class discussion will rely on your fulfillment of these assignments. You will also have some reaction/reflection papers to write and turn in as announced.

Grading:

	A 100-93	A- 92-90
B+ 89-87	B 86-83	B- 82-80
C+ 79-77	C 76-73	C- 72-70
D+ 69-67	D 66-63	D- 62-60
	F 59-0	

Major Evaluation Components: details below

1. Position paper (due: January 31), 5%
 2. Revised position paper (due: May 2), 5%
 3. Instructional Unit (due: May 2), 15%
 4. Geogebra/SMP Task (due: March 21), 25%
 5. Research Paper (due: April 18): 20%
 6. Daily assignments, journal entries, attendance, and participation/discussion/debate (ongoing), 10%
 7. Presentation of Technology in Classroom (ongoing), 10%
 8. Presentation of Research on Technology (ongoing), 10%
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Assignment #1: Position Paper: due: Wednesday, January 31; APA-format, 2 pages.

Make a coherent argument for or against the use of technology in the secondary mathematics classroom. Discussion may include why the use of is reasonable or not, how much use is reasonable, how it can be effectively or ineffectively used, and why it may or may not be appropriate. You may wish to include a discussion of implementation issues (appropriate textbooks, adequate availability of labs or calculators). Additionally you may select one or more specific grade levels or mathematics courses on which to focus your argument. You may also use anecdotal information to support your argument. Be prepared to share your position in class.

Assignment #2: Revised Position Paper: due: Wednesday, May 9; APA-format, 3-5 pages.

Expand or even change your position from assignment #1 utilizing articles that you are able to find that support or contradict your initial beliefs. Suggestions for this include (but are not limited to): *Journal for Research in Mathematics Education*, *The Mathematics Teacher*, *Teaching Mathematics in the Middle School*, *School Science and Mathematics*, and *Teaching Children Mathematics*, *Research Synthesis (NCTM, 2008)*. Utilize at least 2 articles and be prepared to share your findings in class.

Assignment #3: Instructional Unit: due: Wednesday, May 2.

An instructional unit will be a set of materials you put together to use with real or hypothetical students. A rule of thumb is to develop material to use for about 3 days of mathematics instruction. Although you are encouraged to utilize a variety of modes of technology and instruction, it is not required. You should try to incorporate something for a new area to you (that is feasible for you to implement): Smartboard, clickers, Desmos, Geogebra, applets, etc. You may include one “tried and true” lesson from your repertoire that has been strengthened or adapted for the purposes of this assignment. All materials should be complete and detailed. There is no set format required; however you should reference standards (PA Core) and/or district goals as appropriate; lesson objectives (student-centered), and provide a materials list in a brief overview of the activity. In the overview, you should also include prerequisite skills and knowledge that your students will need.

It is intended that these materials will be shared on D2L for the entire class.

Assignment #4: Geogebra/SMP Task: due: Wednesday, March 21.

This assignment will involve creating/modifying a Geogebra Task, teaching the task to students, and a paper. Details will be provided later.

Assignment #5: Research Paper: due: Wednesday, April 18, APA-format; 7 – 10 pages.

A student will read extensively in the literature generated by a particular area of interest in mathematics technologies. For example, a student might focus on the literature related to the use of a particular technology in learning mathematics (e.g., use of simulation tools in teaching probability and statistics, students' learning with dynamic geometry, effects of using CAS on students' mathematical learning in grades 6-14, teachers' beliefs about the use of technology in teaching and/or learning of mathematics). A paper may also focus on the developmental evolution of a particular tool (e.g., SimCalc MathWorlds, Graphing calculators, dynamic geometry tools) or be an autobiographical sketch of the work of a particular innovator in technologies for learning (e.g., James Kaput, Roy Pea, M. Kathleen Heid, Elliott Soloway, Seymour Papert). The review should include a summary of the most important work in the selected area and a critique of its strengths and weaknesses (critiques can be supported by articles written by others about the work). Such a review would enable a student to go more deeply into a particular area of interest than we will be able to as a class.

Assignment #7: Presentation of Technology in Classroom: Ongoing.

You will read and summarize an article focused on technology in the classroom (Mathematics Teacher or Mathematics Teaching in the Middle School are good resources). The summary should be no more than 1 page typed (single-spaced). You should include the full citation of the article, a brief summary of the technology, and how the technology is utilized in the classroom (tips or hints would be appreciated). For your presentations, you need to bring copies of the summary for each of your classmates. You will lead us in a discussion about your article. You should plan to engage us in the technology. Presentations will be capped at 30 minutes.

Assignment #8: Presentation of Research on Technology: Ongoing.

You will read and summarize an article focused on research on technology (Journal for Research in Mathematics Education is a good resource). The summary should be no more than 1 page typed (single-spaced). You should include the full citation of the article, a brief summary of the key points (not the abstract).

For your presentations, you need to bring copies of the summary for each of your classmates. You will lead us in a discussion about your article. You should plan to engage us with questions/comments based on the article. Presentations will be capped at 30 minutes.

Academic Integrity: Please refer to your Student Code of Conduct for details. Cheating or other dishonest behavior may result in course withdrawal as well as other disciplinary action.

Civitas: The academic program at Millersville University requires general civility, respect, and cooperation to flourish. Each member of this class is expected to display appropriate behavior at all times. Any person who exhibits disruptive, uncooperative, or threatening behavior or uses abusive, disrespectful, or obscene language will be dropped from the class.

Students with Learning Disabilities: Millersville University makes every effort to comply with legal requirements for students with learning disabilities. It is, however, the responsibility of the student with a learning disability, who desires accommodations, to make those expectations known to instructors. I recommend that you make an appointment with me to discuss this matter.

<http://www.millersville.edu/learningservices/>

Title IX: Millersville University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment, comply with Title IX of the Education Amendments of 1972, 20 U.S.C. §1681, et seq., and act in accordance with guidance from the Office for Civil Rights, the University requires faculty members to report to the University's Title IX Coordinator incidents of sexual violence shared by students. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report to the person designated in the University Protection of Minors policy incidents of sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred.

Information regarding the reporting of sexual violence, and the resources that are available to victims of sexual violence, is available at <http://www.millersville.edu/socialq/title-ix-sexual-misconduct/index.php>.

Subject to change without notice.