RUTGERS
Graduate School of Education

Learning and Teaching
Graduate School of Education
Rutgers, The State University of New Jersey
10 Seminary Place
New Brunswick, NJ 08901-1183

www.gse.rutgers.edu/lt
LT@gse.rutgers.edu

848-932-0789
Fax: 732-932-7552

Technology in Mathematics Teaching
15:254:548 (1)
3 Credits

Instructor: Muteb M. Alqahtani	Muteb.alqahtani@gse.rutgers.edu
Phone Number 908 494 0805	10 Seminary Pl Rm 231
Office Hours: by appointment	Prerequisites or other limitations: Undergraduate mathematics major or equivalent.
Mode of Instruction: ___ Lecture _X_ Seminar ___ Hybrid ___ Online ___ Other	Permission required: _x_ No __Yes Directions about where to get permission numbers: from the instructor

Learning goals

The central goal of this course is to help you use technology as an effective pedagogical tool in the mathematics courses that you teach. More specifically, after this course, you should:

1. Be comfortable using various types of technology found in school mathematics classrooms.
2. Have a knowledge of some classroom activities that incorporate technology.
3. Be aware of the psychological and educational principles that make technology an effective teaching tool.
4. Be able to design lessons that incorporate technology and be able to critically evaluate these lessons and others that are presented to you.

Course catalogue description

Focus on development of familiarity and facility with major technologies used in K-12 teaching. Highlighted hardware and software include graphing calculators; algebraic system, function plotting, and geometry construction software; and modeling, simulation, and tutorial software. Potential impact of technologies on traditional school mathematics curricula.

Class materials:

The class will deal with different technologies and it will take place in the computer lab at the GSE. The technologies includes Excel Spreadsheets, GeoGebra, and Graphing Calculators. I encourage you to bring your graphing calculator and install GeoGebra <http://www.geogebra.org/cms/en/download/> in your personal computer. If you do not have a graphing calculator, I will provide one for you.

Reading List:

These articles are available in the course page on Sakai.

Battista, M. T. (2002). Learning geometry in a dynamic computer environment. *Teaching Children Mathematics, 8*(6), 333-339.

Goldenberg, E. P. (1988). Mathematics, metaphors, and human factors: Mathematical, technical, and pedagogical challenges in the educational use of graphical representation of functions. *The Journal of Mathematical Behavior*.

McGraw, R., & Grant, M. (2005). Investigating mathematics with technology: Lesson structures that encourage a range of methods and solutions. In W. J. Masalski & P. C. Elliott (Eds.), *Technology-supported mathematics learning environments* (Vol. Sixty-Seventh Yearbook, pp. 303-317). Reston, VA: National Council of Teachers of Mathematics.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A new framework for teacher knowledge. *Teachers College Record, 108*(6), 1017-1054. [only read pages 1020-1031]

Piez, C. M., & Voxman, M. H. (1997). Multiple representations—Using different perspectives to form a clearer picture. *The Mathematics Teacher*, 164-166.

Grading and Activities:

Critical examination paper (20%)- In the middle of the course, I will present a technology activity and you will be asked to evaluate the strengths and weaknesses of this activity. After you will hand in the first draft of your paper, you will compare your responses with your classmates and receive feedback from me. You can then hand in a revised version of your paper. Both papers will be considered when determining your grade.

Technology adaptation paper (20%)- You will choose a technology-based activity that you obtained from the internet or another outside source and describe how you can adapt it in your classroom. This lesson plan will be consistent with the Rutgers lesson plan format.

Technology activity paper (20%)- As a group assignment, you will design a lesson plan that incorporates technology in a meaningful way, and you will present this lesson plan to your peers. This lesson plan will be consistent with the Rutgers lesson plan format.

Final examination (20%)- Late in the semester, you will be given a final exam in which you will be asked to solve mathematical problems with the use of technology in the ways that we discussed in class. This test will be similar to "mastery" tests given in some introductory mathematics and science courses. Being competent with technology requires knowing how to use technology to accomplish a variety of specific and well-defined tasks. You will have to demonstrate this competence on the final examination.

Classroom discussion (20%)- classroom discussion grade is a subjective grade that takes many factors into account. Obviously, the comments you make in class and your participation in our in-class activities will play a central role in determining your classroom discussion grade. These two factors will also be taken into account. Also, once a week you are asked to write a *reaction paper*. By Sunday, I would like you to e-mail me a brief statement describing your general impressions of the course. These papers do not need to be long, nor proofread carefully. I only want to have a sense of how the course is progressing for you.

RUTGERS

Course outline:

	Activity	Reading/Assignment due
5/27	Excel (graphing)	
5/28	Excel (calculus-1)	Mishra & Koehler
5/29	Excel (calculus-2)	
6/2	Excel (tutoring)	Piez & Voxman
6/3	GC (function commands)	Goldenberg
6/4	GC (statistics)	Draft, critical paper
6/5	GC (CBR)	
6/9	GeoGebra (graphics)	Critical paper due
6/10	GeoGebra (algebra)	
6/11	GeoGebra (variables)	McGraw & Grant
6/12	GeoGebra (sequences)	
6/16	GeoGebra (spreadsheets)	Adapted Lesson Plan Due
6/17	GeoGebra (activities)	Battista
6/18	Online applications	
6/19	Smartboard (commands)	
6/23	Smartboard (commands)	
6/24	Final Exam	
6/25	Presentations	Final Lesson Plan Due
6/26	Presentations	

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: https://ods.rutgers.edu/students/documentation-guidelines. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: https://ods.rutgers.edu/students/registration-form.