

CEP 805: Learning Mathematics with Technology

Spring 2011



Instructor

Dr. Ralph Putnam
511 Erickson Hall
East Lansing, MI 48824
517-353-9285
ralphp@msu.edu



Teaching Assistant

Ms. Eun Mi Kim
kimeun23@msu.edu

Course Overview

This course focuses on how the learning and teaching of mathematics can be supported through the use of technologies. We will explore important ideas about learning, about mathematics, about teaching, and about technology, with the goals of developing deeper perspectives on these issues and using powerful technologies to improve mathematics teaching. Important activities that will weave throughout the course are:

1. Explore particular technology-rich tools for supporting mathematics teaching and learning. We work with a number of web-based and software tools, such as spreadsheets, calculators, SimCalc, and Geometer's Sketchpad. This work will generate a personally-relevant on-line resource library of technologies for learning and teaching mathematics.
2. Consider the *Principles and Standards* of the National Council of Teachers of Mathematics, especially as they relate to current technologies. The *Principles and Standards* will help us structure our thinking about particular mathematical content across the grade levels.
3. Explore mathematical problems and ideas, deepening one's understanding of subject matter is a critical part of rethinking or improving one's teaching. Many of the new technologies available today change the ways that people can know and understand mathematics.
4. Rethink what mathematics is (and could be) learned in school and how it is learned.

Course Texts & Software

Each unit will involve reading from various sources related to mathematics and/or technology. Many of these readings will be available on the ANGEL site and course wikispace as PDFs (under the Readings/Resources tab). We do, however, require that you choose one of the

following options to gain access to our primary text—***Principles & Standards of School Mathematics*** (published by the National Council of Teachers of Mathematics; ISBN: 0873534808). We recommend the first because it comes with several extra benefits (e.g., access to online journals, e-seminars, discounts), but the other options are perfectly acceptable as well.

1. Become a member of the National Council of Teachers of Mathematics (student e-membership is \$39 for one year, you may use "Ralph Putnam, ralphp@msu.edu" as your referring professor) and receive free online access to *Principles & Standards*.
2. Sign up for 120-day free access to *Principles & Standards* at <http://standardstrial.nctm.org/triallogin.asp>. You will get full access, but it will end right about the time the semester ends.
3. Purchase a hard copy of *Principles & Standards* (either new or used, available for around \$40).

Visit www.nctm.org for more information.

In Unit 6 (beginning March 29), you will need ***Geometer's Sketchpad*** software, either your own copy or through your school. (We are looking into the availability of trial or reduced price versions, so don't rush out and buy it now.)

Course Structure

This is a three semester-hour graduate level course. As such, it demands a considerable amount of work on your part. The course was designed on the assumption that students would spend on average 8-10 hours per week engaged in on- and off-line course activities and reading. Because this is an online course, we will not have face-to-face meetings as is common in most courses. Instead we will "meet" electronically online through our course web site (in MSU's ANGEL system), our course wikispace, and by email. The course will consist of seven two-week units and a final one-week unit wrapping up the semester. The units are timed and organized to allow you to work on the weekends as well as during the week, especially during the collaborative and discussion activities when you need to coordinate with other course participants. Please note that this course is not like an independent study or correspondence course in which you complete various units of work at your own pace. The course is based on the assumption that important learning takes place through interacting with others; we will be working together as a community of learners for the semester. Units will typically run for two weeks, from Tuesday at 5:00 pm through midnight (EST) on the Monday two weeks later.

Each unit is structured around three types of activity:

- **Explore.** During the first part of the unit, you will explore and learn primarily on your own. Activities will include completing assigned readings and various activities concerning particular technologies and mathematical content. The technologies we will be using are available on the Web. Although most of these individual *Explore* activities and reading assignments will take place at the beginning of the unit, some may occur at other times during a two-week unit.
- **Collaborate.** During the second part of the unit, you will work in a small group to discuss what you have done and to complete group assignments. You will be assigned

to a study group for the duration of the course. The groups will be formed based on grade-level and various interests in mathematics learning and teaching. In your study group, you will *collaborate* and learn in what we hope will be a safe community in which all members work together to support one another's learning. During the first unit, your group will develop a set of norms–agreements about how to work together for the semester. Establishing such norms is important for creating an environment in which we can respect each other's points of view, seek out diverse ideas, and allow for open exploration and discussion. Study groups will have their own discussion forums and work space for meeting and working together virtually. It is important to participate in group activities in a timely manner. Many of the course activities are designed in a particular sequence involving input from others and collaboration. Being late for various activities and contributions will limit your own learning and that of your teammates.

- **Reflect.** The last few days of the unit will be set aside for you to *reflect* on the unit's content and activities and to complete individual work. You will have an opportunity in the reflection segment to communicate with us about what you are learning, how your group is working out for you, and how the course is going. We will use your feedback in all these areas to adjust the course as we go along.

Here is an illustration of the structure of a two-week unit. (Note that weeks here run from Tuesday to Monday!)

	Tue	Wed	Thur	Fri	Sat	Sun	Mon
Week 1	EXPLORE	EXPLORE	EXPLORE	EXPLORE	EXPLORE	COLLABORATE	COLLABORATE
Week 2	COLLABORATE	COLLABORATE	COLLABORATE	COLLABORATE	REFLECT	REFLECT	REFLECT

You can see the actual days for particular units and their components at any time by clicking on the *Calendar* tab in the ANGEL site or the course wikispace. In each unit you will have assignments that entail having discussions with your team or the whole class in discussion forums. Your group will have a coordinator for each unit, assigned on a rotating basis. The group coordinator will get your discussions going and report back to the whole class as required. When you need to turn in assignments, there will be *Dropbox* links for you to use in the ANGEL site.

Units

Unit 1: Getting Started	Jan 10 - Jan 24
Unit 2: Learning, Mathematics, & Technology	Jan 25 - Feb 7
Unit 3: Number & Operations	Feb 8 - Feb 21

Unit 4: Algebra	Feb 22 - Mar 6
SPRING BREAK	Mar 7 - Mar 11
Unit 5: Mathematical Processes	Mar 14 - Mar 28
Unit 6: Geometry & Measurement	Mar 29 - Apr 11
Unit 7: Data Analysis & Probability	Apr 12 - Apr 25
Unit 8: Wrapping Up	Apr 26 - May 5

Prerequisites

Although this is a course about technology for teaching and learning mathematics, it is not a course about basic technology skills. To succeed in this course, you will need some technology skills and abilities that the course itself will not teach. Course documents will direct you to tutorials that can help you acquire the skills you need, but that work is not part of the class. In particular, the following skills are essential:

- You need to be able to use **Microsoft Word** for word processing at a reasonable level of proficiency. For example, you should be able to use headings, make tables, and insert diagrams and images. You will also need to be (or become) comfortable with the *track changes* and *comment* features of Word, for we may use these tools to collaborate and to interact with each other's work.
- You will need to know how to download various documents and applications from the Internet and install them on your own computer. We will try to always provide instructions and will be available for some trouble shooting.
- Most important of all, you will need to approach each of the technologies we use in this class with a belief that you can learn to use them on your own, with the help we will provide in written documents and the help you will get from discussions other members of the class and with us in the online discussion board we will use throughout the semester. Some people find it easiest to learn a new technology by watching someone else use it or getting immediate help from an expert, but since this is an online course, those options are not open to us. Other people find it easiest to learn new technologies by experimenting and exploring on their own. You will be able to do that kind of exploring, but each new technology that we use will be introduced through structured assignments that are intended to guide you through your initial use.

Assignments

Reading assignments: We will have reading assignments in almost every unit. Reading assignments will usually include one or more questions that will be used in online discussions. Readings will be assigned from online sources linked through the class site. This course will be paced to provide opportunities for collaboration and discussion—thus, it is not a course you can do ahead of time. However, there are some assignments (primarily reading) that you can go

ahead with whenever you have time.

Discussions: In each unit, you will be responsible for engaging in discussion with other class members. It is important that participate in these discussions in a timely manner.

Writing assignments: Each unit will have individual writing assignments, including weekly reflections on how the class is going for you, what you have learned, and how your team is working.

Online Resource Library: Over the course of the semester, you will compile a set of resources about learning, mathematics, and technology that can support your work as an educator. The list will take the form of annotated links to web-based resources. We will explore different tools and formats for developing your list. [Here is a description of the project.](#)

Grading

You will be graded based on participation, on timely completion of your assignments, and on the quality of your written, multimedia, and technology assignments. I expect everyone to participate fully in the class, so I will make it a point to contact you privately via email if your participation is not up to par. Because much of the work will be done in your study-group discussions, it is imperative that everyone join in. Assignment due dates are clearly specified in each unit. Grades for late assignments will be reduced by 20%. Assignments will not be accepted more than one week beyond the end of each unit except in prearranged or unusual circumstances.

Participation*	25%
Unit Assignments & Reflections	50%
Online Resource Library	25%

*Participation consists primarily of activity in discussion forums (i.e., substance and frequency of posts) but may also include involvement in collaborative assignments.

Overview of the Course Webpace Structure

We have two online spaces for our course because they each offer different advantages. ANGEL is MSU's official course management system and is designed to effectively manage the course roster as well as discussion forums and official assignments. We also have a wikispace which is more user-friendly for delivering and interacting around course content and also has many capabilities that will be useful as we collaborate. Below is an overview of what you can expect to find on each space. Note that various readings and resources will be available in both places.

MSU ANGEL site (angel.msu.edu)

- Discussion forums

- Course roster and email
- Submission of assignments (i.e., dropboxes)
- Grade management
- Various resources (e.g., calendar, syllabus, readings)

Course Wikispace (cep805.wiki.educ.msu.edu)

When you go to the wikispace the first time, you will need to request an account. **Use your MSU NetID (same as you use to log on to Angel), but use a different password.**

- Course news and reminders
- Unit content and guidelines
- Team collaboration space
- Various resources (e.g., calendar, syllabus, readings, links)

Academic Honesty

This course adheres to Michigan State University's policies on academic honesty, which can be found on the website of the Office of the Ombudsman (<https://www.msu.edu/unit/ombud/>).

This syllabus may be modified, at which point notification will be sent via email.