

Mathematical Investigation and Problem Posing

E12.2104

Department of Teaching and Learning

Fall 2010

Syllabus

Class Meeting: Mondays 6:45-8:25 pm (last class on Wednesday 12/15)

Class Location: 515 Silver

Instructor: Orit Zaslavsky, Professor of Mathematics Education
210 East Bldg
239 Greene St
oz2@nyu.edu

Office Hours: By appointment

Course Description

This graduate mathematics course is targeted to students in mathematics education to develop mathematical knowledge for research and teaching in mathematics education. This knowledge includes developing skills in problem solving, problem posing, extending problems, and deeply exploring K-12 mathematics from a disciplinary perspective. The purpose of the course is for students to experience doing mathematics and to develop their own mathematical questions and explore them.

Course Objectives

Students should be able to:

- Explore and solve mathematical problems drawn from the K-12 mathematics curriculum with confidence
- Pose and explore their own mathematics problems with their origins in the K-12 mathematics curriculum, connected to advanced mathematical concepts
- Communicate the results of their explorations
- Participate in a mathematical community in appropriate ways, contributing ideas and helping to advance discussions
- Develop strategies that support lifelong learning of mathematics, particularly of mathematics related to their professional work

Required Texts

Brown, S. I., & Walter, M. I. (2005) *The Art of Problem Posing*. Mahwah, NJ: Lawrence Erlbaum Associates.

Polya, G. (1985). *How to Solve It*. Princeton, New Jersey: Princeton University Press.

Cuoco, A., Goldenberg, E. P., & Mark, J. (1996). Habits of mind: An organizing principle for mathematics curricula. *Journal of Mathematical Behavior*, 15(4), 375-402. (link on blackboard)

Assignments

You will primarily spend time exploring mathematics with your peers and alone, both during and outside of the class time. Additionally, you will read about mathematics and the process of doing mathematics in this course. You will be given opportunities to communicate about mathematics, in terms of your work in progress and more formal reports in which you present your crystallized current understanding about mathematics.

The class will be structured around mathematics inquiry as a class and individual mathematics exploration projects. We will spend time during most class period on both group and individual mathematics problem solving and investigations. You should begin thinking right away about a mathematical topic you would like to explore for your own mathematics inquiry project and your current questions about this mathematical topic. This topic should originate with questions about the mathematics in the K-12 curriculum.

Students are expected to follow the deadlines as given or negotiated in class. An assignment is considered late if it is not handed in within five minutes of the start of class or within five minutes of the time it is due electronically. Grades will be reduced for late work and for work that has not been proof read. All typed assignments must be double spaced and written in 12 point font.

Attendance and Participation

Because we want to create an environment of scholarship, the active participation of each participant is critical, both for the learning of each individual and for the group as a whole. However, we do not identify active participation with speaking in a whole group setting. We realize that participants come to the course with different past experiences with mathematics and mathematical exploration. If sharing ideas in class is difficult or scary, (particularly in the beginning of the course) participants can share ideas via e-mails to the group or during smaller group activities. But, this course cannot go forward without the active engagement of all participants in doing mathematics as members of our “community of scholars.” Thus, one unexcused absence is allowed. Additional unexcused absences will cause your attendance/participation grade to be reduced by 2 for each absence. If you are tardy more than 50 minutes or leave more than 50 minutes early, it will count as an absence. If an emergency occurs and you cannot attend class, please contact the instructor privately through email or phone. Students who anticipate being absent for religious observations should notify the instructor as soon as possible in advance of the absence.

Weekly Assignments

From time to time, participants will be given assignments that emerge from a particular class activity or serve as preparation for the next class activity. These include reading assignments. The weekly assignments are due within a week and should be submitted at the beginning of the following class, unless otherwise instructed.

Weekly Class Journal

At the end of class, on a regular basis, participants will take 15-30 minutes to write down what mathematical questions or insights class has generated. This is an informal record of what happens in class for each individual. Journals will be collected so that instructors can build upon student thinking in the design of class activity.

Online Discussions

Occasionally, the instructor will post a question for discussion on a topic that needs more time to think about than we have in class. The instructor will expect each person to make a minimum of 2 substantive comments per week on a Blackboard topic, for a given period.

Crystallizations

For our group mathematical inquiry, in addition to documenting your thinking in your course journal, you will write up at least two crystallizations – more formal reflections that crystallize your thinking about the group mathematical inquiry during the semester. This will be scheduled on a volunteer basis, but we strongly recommend volunteering early! These papers will be shared in class in small groups. Notify the instructor at least a week in advance of presentation.

Research Investigation Project

This is an extended investigation of a mathematical topic that interests the participant. Projects can be done individually or in pairs. Participants will be able to pursue their own mathematical interests. During the middle part of the semester (Weeks 5-8), participants will engage the class in a short mathematical exploration around their research topic. This might be an appropriate time to float a question, try out an argument, or work on a conjecture. The work on the project will result in a paper that will be presented to an “editorial panel” for peer review (see below). The resulting texts may be suitable for publication in one of NCTM’s journals. See the instructor for possibilities.

A guide for the timing for the research project is:

Weeks 1-4:	Choose and refine a research question.
Weeks 5-8:	Active period of research and writing, 15 minute presentations to the class on the research question.
Week 9:	Turn first draft of project paper in
Weeks 12-14:	Revise paper based on feedback and make presentations
December 15:	Submit final project

Weekly Project Journal

A short weekly email report from every student is required each week. This short report will focus on any progress (including new questions!) on the research project. This can be a very informal report, and need not be longer than a couple of paragraphs as some weeks you may have more to report than others. In order to share among class members, each student will circulate his or her project journal to a group of three to four other students. The groups may rotate over the course of the semester.

“Editorial Board”

Peer review is a critical part of a community of scholars. Early in the semester, participants will organize into editing boards of 3-4 members each (See Brown & Walter, Chapter 7). During the ninth week of the semester, participants will submit drafts of their papers to an editorial panel for review. Review boards will read submissions and will provide feedback on papers to the authors by the end of week 11.

Assessment and Grading

Class participation, online discussions, and weekly assignments – 20%

Class journal – 10%

Crystallizations (2) – 10%

Inquiry project journal – 10%

Inquiry project first draft – 10%

Editorial board reviews – 10%

Inquiry project presentation – 10%

Inquiry project final paper/report – 20%

Any student attending NYU who needs an accommodation due to a chronic, psychological, visual, mobility, and/or learning disability, or is Deaf or Hard of Hearing should register with the Moses Center for Students with Disabilities at 212 998-5980, 240 Greene Street, www.nyu.edu/csd.