MATH 413: Mathematics for the Middle Grades

Class Information

Semester: Spring, 2013  
Meeting Times: T/TH: 11:00-12:15  
Room: GMCS-328 (or 422 lab)  
Schedule #: 21800  
Instructor: Dr. Janet Bowers  
Office: GMCS-570  
Email: JBowers@math.sdsu.edu  
Office Hours: MONDAY – 1:00-3:00  
TUESDAYS, 1:00-2:00PM (or by appointment, please feel free to email)  
Phone: 619-594-6361 (this is the least effective method for contacting me; email is much more efficient!)

Description of the course

From Catalog: Teacher-level look at mathematics taught in middle grades, to include proportional reasoning, rational and real numbers, probability, and algebra. Intended for those planning to teach mathematics in middle grades; cannot be used as part of major or minor in mathematical sciences with exception of major for single subject teaching credential. Students in the SSTC major must receive instructor permission. Prerequisite: Senior standing and Mathematics 311 or 312; Intended for Liberal Studies Majors only

Current Semester: Two themes will drive this year’s class: (a) the new Common Core Standards; and (b) the use of Technology, which is accelerating the pace of change in education. What does the new Common Core Standards Curriculum mean? How will it change teaching? How will it change assessment? How will it change learning?

Student Learning Outcome Statements

According to the new Common Core State Standards, students in middle school will have to learn fewer topics, but their learning will be deeper and more conceptually based. Therefore, the goals of this course are to prepare prospective middle (and high) school mathematics teachers to be ready for these expectations. Outcomes will include:

- Standard 1: Make sense of novel, involved problems and persevere in solving them
- Standard 2: Reason abstractly and quantitatively
- Standard 3: Construct viable arguments and critique the reasoning of others
- Standard 4: Model novel situations with mathematics and discuss how these problems would be solved by middle school students.
- Standard 5: Use appropriate tools strategically
- Standard 6: Attend to precision in both written and oral discussions with classmates, middle school students, and on exams.
- Standard 7: Look for and make use of structure
- Standard 8: Look for and express regularity in repeated reasoning

Required Textbook & Software

Fostering Algebraic Thinking by Mark Driscoll. ISBN 0-325-00154-5

Other assorted handouts that will be supplied by instructor.

Weekly assignments

Each week, students will be expected to engage in several types of activities:
Whole class discussions

Each week, I will introduce some of the concepts involved in the weekly unit. Students are encouraged to work together as a class to debate ideas for proving the various conjectures. Students are expected to participate in whole class and small group discussions.

Homework

Homework for part I of the course will involve explanations of somewhat involved problems assigned from the textbook. Some of these will be graded by instructor; others may be critiqued by classmates in the peer review process. Some of homework for part II will be computer-based. Homework for part III might be slightly more conventional (several problems to solve or questions to answer).

Projects

Students will work together to create an exemplary video illustrating several of the mathematical practices from the Common Core State Standards. Students may also work on a portfolio of modeling ideas.

Homework Policies

- Each student will turn in his or her own work, but collaboration is encouraged (unless otherwise noted, such as take-home exams).
- Students are encouraged to ask for help from the instructor (during office hours, or by appointment via email).
- Homework will be graded on a sliding scale, depending on number of problems assigned.
- Late homework will be downgraded by 10% of total score for every weekday late (unless dire circumstances intervene. Such cases will be discussed on a personal basis).

Assessment and grading

<table>
<thead>
<tr>
<th>Homework Assignments</th>
<th>35%</th>
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<tbody>
<tr>
<td>Test #1, tentatively scheduled for Tues, 2/26</td>
<td>20%</td>
</tr>
<tr>
<td>Test #2, tentatively scheduled for Tues, 3/26</td>
<td>20%</td>
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<tr>
<td>Final Exam, Tuesday, May 14 (10:30-12:30)</td>
<td>25%</td>
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Grading Scale

| 93% – 100% | A  | 74% – 76% | C  |
| 90% – 92%  | A- | 70% – 73% | C- |
| 87% – 89%  | B+ | 67% – 69% | D+ |
| 84% – 86%  | B  | 64% – 66% | D  |
| 80% – 83%  | B- | 60% – 63% | D- |
| 77% – 79%  | C+ | 59% or lower | F |
Course Outline (tentative)

Tentative Schedule of Topics:

Part I: Fostering Algebraic Thinking
   Chapter 1: Developing Algebraic Habits of Mind (solving and extending problems)
   Chapter 2: Thinking about Algorithms (sums of consecutive integers, Euclidean Algorithm)
   Chapter 3: Number Theory (factors, patterns, modular arithmetic)
   Chapter 4: Generalizations (systems of equations, differences and sums, linear algebra and matrices)

Part II: Proportional Reasoning
   Chapter 1: Fractions and Ratios (algorithms for percent<->fractions<->dec, division of fractions)
   Chapter 2: Proportional reasoning (students’ difficulties, meaning of cross-multiplication, composite units versus unit fraction comparison methods)
   Chapter 3: Relation of proportional reasoning to other topics (geometry-Pyth Theorem, similarity, slope, constant of variation, slope)

Part III: Modeling in the Digital Age
   Modeling phenomena that employ applications of middle school mathematics.

Overview of venues, environments, and media to be employed

Class sessions will be held in one of two locations, GMCS-328 (main classroom) and GMCS-422 (computer classroom). The computer lab contains 20 laptop computers and a Promethean Board. Students are invited (and encouraged) to bring laptops, PDAs, etc. All course information and assignments will be posted on the Blackboard website associated with this class. Some assignments will be group-based; you will be assigned a group grade and an individual grade (based partially on peer evaluations).

Materials and resources to be obtained by students

As noted above, students must purchase a copy of “Fostering Algebraic Thinking” by Mark Driscoll. ISBN 0-325-00154-5. Optional: students may purchase the Geometer’s Sketchpad software available via www.keypress.com. Student version of this software costs approximately $10.

All readings will be posted on Blackboard. Students will be given free access to Dynabook.

Accommodations for students with disabilities

The instructor of this course enthusiastically supports the work of Disabled Student Services in providing authorized accommodations for eligible students. Therefore, students who receive DSS accommodations are encouraged to identify themselves to the instructor. It is critical that all students understand that the instructor will respect and accommodate a student’s particular needs and work to protect all students’ confidentiality regarding disability or other personal hardship issues.

Student privacy and intellectual property

Federal Law (FERPA) imposes important obligations on instructors to ensure the confidentiality of student grades and other evaluation of student work. The instructor of this course will not distribute or post grades in a way that allows anyone other than the individual student to access them. In addition, university policy grants to students intellectual property rights to work products they create as part of a course unless they are formally notified otherwise.

Given that this course will be part of an organized data collection, students will be notified at the time of an assignment if copies of students work will be retained beyond the end of the semester and/or used as examples for future students or the wider public.
Expected behavior, performance, and deportment

Students in this class are expected to contribute to class discussions and activities in positive ways such that all efforts indicate sincere attempts to create and maintain a supportive and successful learning climate.

Expectations for the instructor include, but are not limited to:

• Tests will be designed to fit in allotted time
• Tests will reflect the homework problems assigned
• Grading rubrics will be made public; substantiations for all grades will be given
• Assignments will be graded in a timely manner
• Grades will be calculated mathematically; no change of grades or extra credit will be given
• Course costs will be kept at a minimum; all readings will be posted for download on Blackboard

Expectations for students include, but are not limited to:

• Students will respect one another and the instructor. Angry, resentful, or disrespectful comments spoken in class diminish class morale and weaken the enjoyment of the class. Students wishing to express dissatisfaction with the teacher or class member are encouraged to talk with the instructor privately.
• No cheating of any kind will be tolerated. This includes plagiarism in written assignments, copying others’ work during exams (both in-class and take-home), and passing others’ work as one’s own. Sanctions that align with University policy will be assigned based on infraction.
• Mass emailing of any kind will NOT be permitted; if such a practice occurs, the sender will be subject to University sanctions.