EDCI 657: Understanding and Engaging Students’ Conceptions of Mathematics
Spring 2011
Wednesday 4:15 – 7:00
Benjamin Building 2121

Instructor
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Office Hours
Wednesday 3:45 – 4:15, 7:00 – 7:30

COURSE DESCRIPTION
This course is designed to enhance the pedagogical knowledge of mathematics teachers. The course provides teachers with exposure to the research literature on students’ naive conceptions in mathematics, methods of evoking students’ initial understandings, the role of errors in learning, and what is known about the type of teaching that helps students address misconceptions (with specific attention to grades 4 – 9). Teachers are required to read and report on research concerning naive conceptions, not only for specific misconceptions but for the processes such as overgeneralization or overspecialization that lead to naive conceptions.

Prerequisites: Experience teaching mathematics at some grade K - 14 or permission of department.

COURSE OBJECTIVES
• To examine research studies and theories concerning understanding and the source, identification, and engagement of naive conceptions (misconceptions) in school mathematics
• To examine various representations and strategies that can be used in teaching various topics in mathematics
• To develop skill applying above knowledge in instructional interaction

MAJOR TOPICS
• Conceptions of mathematical proficiency
• Learning theories and views of student errors
• Research-based examples of (mis)conceptions from various mathematics topics
• Methods researchers use for probing student understandings; classroom adaptations thereof
• Strategies for amending (mis)conceptions, forming secondary intuitions, evolving new conceptions, cognitive change, conflict teaching, use of metaphor and models
• Strategies used in instruction; considerations in their use; resources

COURSE REQUIREMENTS
1. Misconception example and analysis briefs: Collect examples of student (mis)conceptions from your own teaching or work with students, analyze them, and address instructional responses. (3 brief papers)
2. Misconception research and review papers: Write research and review papers on particular misconceptions in given topics in mathematics. Specifically, in each paper, describe the misconception, review relevant articles, and analyze relevant parts of instructional materials. (2 papers)
3. Diagnostic interview and analysis assignment: (a) Prepare a diagnostic protocol for exploring a pupil’s knowledge in some self-selected area of mathematics that is deemed important in the NCTM Focal Points or compatible with collegiate reform efforts. The assignment also involves a rationale for the protocol. (b) Administer and analyze/interpret the results. Reflect on the process.
4. Reading synthesis: Prepare brief written syntheses of selected readings (2 article syntheses).
5. Class participation: Attend class, complete readings and related thinking/writing assignments, and participate in peer reviews of products and in class discussions.
It is expected that all written work be typed in Microsoft Word or Pages. Specific page length and formatting requirements for each assignment will be provided in the assignment description handouts. Punctuation, grammar, expression and proper citation of sources are the responsibility of the author and are part of the grade on an assignment. Citation formats should follow the APA 6th edition guidelines (see reference below). These mechanics are expected to reflect graduate level work, i.e., meet academic standards for professional papers.


It is not expected that you purchase this source (though it will also be useful for future courses). There are several websites that have compiled the citation formats from the APA 6th edition, including:

http://www.apastyle.org/learn/index.aspx
http://www.umuc.edu/library/guides/apa.shtml
http://owl.english.purdue.edu/owl/resource/560/01/

### REQUIRED TEXT/READINGS AND COURSE WEBSITE

**Required Text/Readings**


NOTE: You can purchase the book directly from The National Academies Press via their web site, [http://www.nap.edu/catalog.php?record_id=11101](http://www.nap.edu/catalog.php?record_id=11101). You can order just the book ($31.46) or just the PDF version ($27) you do not need to buy the $41 dollar bundle, although the website may give you that impression.

Other readings are available on the course Blackboard site.

**Course Blackboard Website**

We will be using our course Blackboard website to disseminate readings, announce information about assignments, and submit assignments (hosted on the UMD Enterprise Learning Management System—referred to as ELMS). To log onto the websites for your courses, go to [http://elms.umd.edu](http://elms.umd.edu). Type in your UMD Directory ID and password. Your Directory ID/Username and password are the same ID and password assigned to your ID@umd.edu email account. Your ELMS homepage should appear with a listing of the course Blackboard sites to which you have access. If you don't see EDCI 657 in your courselist, please let me know ASAP. Click on the link for the EDCI 657 course website to enter our course website.

If you need help using the Blackboard site, see the Student Resources tab on your ELMS homepage. If you have technical problems, please contact the OIT helpdesk (elms@umd.edu or 301-405-1400).

### COURSE EVALUATION

<table>
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<tr>
<th>Evaluation</th>
<th>Points</th>
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<tbody>
<tr>
<td>1. Misconception example and analysis briefs (2 brief papers; 20 points each)</td>
<td>40</td>
</tr>
<tr>
<td>2. Misconception research and review papers (2 papers; 30 points each)</td>
<td>60</td>
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<tr>
<td>3a. Diagnostic interview protocol with rationale</td>
<td>30</td>
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<td>3b. Analysis of the administered interview</td>
<td>40</td>
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<td>4. Reading syntheses (2 syntheses; 15 points each)</td>
<td>30</td>
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<tr>
<td>5. Class preparation and participation</td>
<td>50</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>250</strong></td>
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All final grades will be assigned based on the percentage of possible points earned. The scale used in grading will reflect the following guidelines and the bunching and distribution of total point scores (i.e., persons separated by one or two points will receive the same grade.) In no case will you receive a grade lower than the scale indicates.

225 - 250 points (90 - 100%) no less than an A
200 - 224 points (80 - 89%) no less than a B
175 - 199 points (70 - 79%) no less than a C
150 - 174 points (60 - 69%) no more than a D
less than 149 points (59% or below) fail

COURSE POLICIES

All assignments must be turned in by the dates and times given. If circumstances make completing the assignment on time impossible, you must notify me at least 24 hours in advance and we will decide an appropriate deadline. No credit will be given for late assignments if prior notice has not been provided.

Extra credit work will NOT be accepted. Only in very exceptional cases is it possible to change a grade by repeating or correcting an assignment.

If you have a documented disability and wish to discuss academic accommodations, please contact the instructor as soon as possible.

UNIVERSITY OF MARYLAND HONOR PLEDGE

The University has a nationally recognized Honor Code, administered by the Student Honor Council. The Student Honor Council proposed and the University Senate approved an Honor Pledge. The University of Maryland Honor Pledge reads:

I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination.

This Pledge statement should be included in each email or online submission of all papers, projects, or other academic assignments submitted for evaluation in this course. Details about how to do so will be provided in class.

Plagiarism is, unfortunately a common form of dishonesty. It is one I take very seriously. If you have any questions about the definition or seriousness of this, please read http://www.jpo.umd.edu/SHC/students.html.