CI 415 Modern Approaches to Teaching Middle School Mathematics (Grades 4-8)

Cheng-Yao Lin
Wham 322 M
OFFICE HOURS: Before and after class
By appointment

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Always feel free to contact me for an appointment at other times.

CLASS MEETS: _____________ in the Math Lab [Wham 201]

CATALOG DESCRIPTION:

Examines current mathematics materials and teaching approaches. Hands-on experience with a multitude of teaching aids including microcomputers and problem solving materials. Student exchange of ideas and discussion of activities for classroom use. Prerequisite: CI 322 and an overall GPA of at least 2.75

Overarching expectation of students

To take responsibility for their own learning

Overarching assumption

That pre-service teachers will take an active role in their own learning

Main spirit in the course

The content of the course will be directly related to the middle school mathematics curriculum

Overarching objectives in the course

. to improve students’ attitudes towards mathematics,
. to change students’ beliefs about what mathematics is,
. to reduce anxiety in doing mathematics, and about mathematics,
. to re-learn, with understanding, much of the mathematical content of elementary/middle school mathematics,
to learn new mathematical content and pedagogy directly related to the elementary/middle school mathematics curriculum,

to learn to think in a correct way about teaching mathematics at the elementary/middle school levels

Content in the Course

Geometric explorations. [1 week]

Straight edge and compass constructions. Why the constructions work. Developing the process of justification in the mathematical sense. [1 week]

Axioms of Euclidean Geometry. Elementary results of Euclidean Geometry. [1 week]

Symmetries of three-dimensional figures. Patterns relating number of edges, vertices and faces. The 5 Platonic solids. [1 week]

Coordinate geometry. Symmetry and rotations in coordinate notation. Translations, reflections and rotations in coordinate notation. Composition of motions. [1 week]

Linear relationships expressed via tables, graphs, formulas. Linear equations understood graphically and algebraically. Slope and intercepts. Developing a linear equation (or inequality) model from “real-world” data. Applications such as the relationship between Fahrenheit and Celsius temperatures. [1 week]

Applications of algebra to real life problems. Translation into mathematical notation and back. Multiple representations of a problem. Basic solution techniques and rationale. [1 week]

Basic properties of lines, circles, ellipses, parabolas and hyperbolas. Communication and reasoning will be highly visible. [1 week]

Real world situations which give rise to systems of linear equations (or inequalities) in 2 unknowns. Solution techniques and rationale. [1 week]

Relations and functions. Various ways to represent them (graphs, tables, equations, input-output machines). Connection to transformations already explored in geometry topics. [1 week]

Exploration of linear and quadratic functions. Exploration of the effect of changing an input x to x plus constant, changing an output y to y plus constant, etc. [1 week]

Real world examples in which linear and quadratic functions are the “tools of choice.” [1 week]

The basic trigonometric functions of an angle. Connection to similar triangles. The emphasis is on introducing the trigonometric functions as an important family of examples rather than on
covering a lot of trigonometric formulas. Topics are related to mandated state and national standards. [1-2 weeks]

Introduction to complex numbers (e.g., from the point of view of needing some way of solving the equation \( x^2 + 1 = 0 \)). Exploration of the representation of complex numbers in the xy-plane. Geometric and algebraic representations of complex numbers. [1-2 weeks]

**Learning/teaching resources**

Selected articles will be handed out for reading

Videotapes (e.g., Polished Stones, Project Mathematics)

Computers (with learning software)

Calculators – basic functions and fraction calculators

Outside speakers [special education and elementary/middle school]

World Wide Web – (a) Reform debates: MathematicallySane and MathematicallyCorrect websites; (b) listserves – ICTM, others;

**Teaching aids / related print materials**

Text: A book/teaching materials for the course will be developed as the course unfolds around the main foci. A Graduate Assistant will assist in the course.

**Assessment of students**

Students will develop a *complete* and *comprehensive* Notebook through the semester -- a 3-inch, 3-ring binder of materials with the following sections: (1) Administrative Materials: Course organization (objectives of course, course outline, assessment/evaluation information, course resources, etc.), (2) Class notes, (3) Reviews/Summaries of articles, (4) Assignments, quizzes, etc. (5) E-mail notes from the instructor (6) Other handouts. The Notebook will serve as an important basis for assessing/evaluating students and assigning the course grade.

. Mid-semester exam [in-class]

. Final exam – with ample time to demonstrate what students know

. Writing assignments – several during the course, to improve writing skills

. Instructor subjective evaluation of students

. Regular out-of-class assignments – problem sets
Extra credit work

Other

Requirements

Come to every class session.

Maintain binder/portfolio of all course materials [3-inch, 3-ring binder]

Completion of all course work – there will be no grade until all coursework is handed in

Active participation in class activities – take responsibility for your own learning

Read and study the hand-out materials

Active participation in class activities – take responsibility for your own learning

Read the Student Conduct Code that is handed out.
CI 415 NOTEBOOK GRADES

I. Organization of Notebook:

You are required to have a 3-inch, 3-ring binder with the following information on the spine: name, mailing address, email address, course number, and phone number.

Section 1- Classnotes

Section 2- Summaries of assigned readings

Section 3- Assignments

Section 4- Tests

Section 5- Handouts

II. Reflections:

1. __________  6. __________
2. __________  7. __________
3. __________  8. __________
4. __________  9. __________
5. __________  10. __________

III. Totals:

Organization of Notebook ____/50____
Reflections ____/50____

Total ________________/ 100____________________
ATTENDANCE

I expect you to be here for each class and on time. You will receive 30 points for perfect attendance. One excused absence will result in 30 points. For each class you miss after the first excused absence you will loose 10 points; regardless of the reason. A total of five missed will result in an F in the course.

GRADING CRITERIA

Attendance 30 points
Homework 150 points
Computational Test 50 points
Midterm Test 100 points
Final folder 100 points
Final Test 200 points

GRADING SCALE

A  90%-100%
B  80%-89%
C  70%-79%
D  60%-69%
F  0%- 59%
SAFETY AWARENESS FACTS AND EDUCATION

Title IX makes it clear that violence and harassment based on sex and gender is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you know has been harassed or assaulted, you can find the appropriate resources here: http://safe.siu.edu

SALUKI CARES

The purpose of Saluki Cares is to develop, facilitate and coordinate a university-wide program of care and support for students in any type of distress—physical, emotional, financial, or personal. By working closely with faculty, staff, students and their families, SIU will continue to display a culture of care and demonstrate to our students and their families that they are an important part of the community. For information on Saluki Cares: (618) 453-5714, or smcares@siu.edu,

http://salukicares.siu.edu/index.html

EMERGENCY PROCEDURES

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. We ask that you become familiar with the SIU Emergency Response Plan and Building Emergency Response Team (BERT) programs. Emergency response information is available on posters in buildings on campus, available on BERT’s website at www.bert.siu.edu, Department of Safety’s website at www.dds.siu.edu (disaster drop down) and the Emergency Response Guideline pamphlet. Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency.

INCLUSIVE EXCELLENCE

SIU contains people from all walks of life, from many different cultures and sub-cultures, and representing all strata of society, nationalities, ethnicities, lifestyles, and affiliations. Learning from and working with people who differ is an important part of education as well an essential preparation for any career. For more information please visit: http://www.inclusiveexcellence.siu.edu

LEARNING AND SUPPORT SERVICES

Help is within reach. Learning support services offers free tutoring on campus and math labs. To find more information please visit the Center for Learning and Support Services website.

Tutoring: http://tutoring.siu.edu
Math Labs http://math.siu.edu/courses/course-help.php

WRITING CENTER

The Writing Center offers free tutoring services to all SIU students and faculty. To find a Center or Schedule an appointment please visit http://write.siu.edu

AFFIRMATIVE ACTION & EQUAL OPPORTUNITY

Our Office's main focus is to ensure that the university complies with federal and state equity policies and handles reporting and investigating of discrimination cases. For more information visit: http://diversity.siu.edu/