CI/Math 389-3 Integrated Math Content and Methods for Teachers (4th-8th Grade)

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Wham 322M  
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By appointment

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CLASS MEETS: __________in the Math Lab.

CATALOG DESCRIPTION

(Same as Math 389) This course is designed for elementary school and middle school teachers, focusing on 4th-8th grade mathematics content and methods. Math content covers the developmental sequence of grade-appropriate mathematical concepts and skills in number systems, operations and algebraic thinking, ratios and proportional relationships, expressions and equations, functions and applications, measurement and data analysis, statistics and probability, and geometry. Methods of math teaching are integrated with the delivery of math content. The course showcases standards-based mathematical practices including problem solving, mathematical modeling, communication and justification, use of tools and technology, informative assessment, meeting the needs of diverse learners, building supportive math environments, lesson planning, and making interdisciplinary connections. [Prerequisite: CI/MATH 388 with a minimum grade of C. Co-requisites: EDUC 319 and EDUC 302.]

Objectives

The broad objectives of CI/Math 120-220-388-389 are to provide a sound basis in mathematics content and pedagogy for pre-service elementary school teachers. Upon completion of each course students will have mastered the mathematics content described in the specific course objectives and will be able to:

- evaluate and select the most effective resources, manipulatives, technologies, etc. to represent ideas and concepts in multiple ways;
- use varied approaches to mathematical concepts and procedures in order to meet the needs of students with diverse learning characteristics;
- adapt learning experiences and use alternate approaches suitable for individuals with disabilities.
- anticipate and build on students’ natural ways of thinking about mathematical ideas and concepts;
• anticipate misconceptions that may occur in students’ thinking about mathematical concepts and procedures, and design experiences to minimize these misconceptions;
• engage students in building their own mathematical knowledge through inquiry, investigation, group and individual work;
• use examples that are meaningful to their students (tied to students’ experiences);
• connect mathematics with students’ real-life experiences;
• integrate technology into classroom instruction (where that technology is available);
• design instructional experiences that promote communication of mathematical reasoning verbally and in writing.

Specific objectives of CI/Math 389 are as follows:

. translate between verbal, graphical and algebraic representations of a problem
. set up an algebraic model for a problem; explain what the model says
. solve an algebraic problem, explain the steps taken in the solution, recognize alternate correct solution procedures, interpret the solution, discard solutions which may be “mathematically” acceptable, but which have no meaning in the “real life” application
. recognize such figures as lines, circles, ellipses, parabolas, and hyperbolas, lines of symmetry, etc.
. understand, explain and implement both algebraic and graphical techniques for solving a system of 2 (or more) linear equations (or inequalities) in 2 unknowns
. understand and explain the concepts of relation and function using various models and representations
. apply the concepts of relation and function in various situations
. experience linear, quadratic and exponential functions through “real world” examples
. experience, at least informally, the trigonometric functions in the context of ratios in similar triangles
. experience the construction of complex numbers
. have an intuitive understanding of the concept of “line of best fit” and “curve of best fit”; be able to estimate such curves geometrically; be able to find such curves using appropriate technology

Prerequisite: CI/Math 120, 220, 388

Overarching expectation of students

To take responsibility for your 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 elementary/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

Overarching course themes

1. Openness in mathematics education:

Apply openness to problem solving – routine problems, that is, from the content of the traditional elementary/middle school mathematics curriculum, and non-routine problems; assessment [e.g., van den Heuvel and Becker (2003)]

Examples of problems and detailed lesson plans (some already available) or roughed out lesson plans (that can be made more detailed)

2. Mental computation:

Mental computation will be emphasized whenever possible in the course.

3. Children’s informal mathematics: [e.g., Becker and Selter; Carpenter et al., Cognitively Guided Instruction (CGI) materials]

4. Teaching aids … Representations

External representations can assist learners to develop their own internal representations. The general attitude towards teaching aids in the course will be to use them, but “less is more!”

There will be an emphasis on use of examples to illustrate how students (school and college) develop representations using their own natural thinking abilities to solve problems.

5. Importance of and appropriate ways to develop basic skills

The addition, subtraction, multiplication and division facts (while avoiding the “drill-to-kill” regime) and place value will be emphasized early in the course. There will be heavy emphasis on developing/maintaining computational skills.

Course outline [tentative – subject to some revision as we go along]:
Mathematical concepts and skills in number systems, operations. [1 week]

Ratios and proportional relationships. [1 week]

Data analysis, statistics, probability and geometry. [2 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 week]

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

**Learning/teaching resources**

- Selected articles for reading
- Videotapes (e.g., Polished Stones, Project Mathematics, Kamii, TIMSS)
- Computers and software
- Calculators – basic functions and fraction calculators
- E-mail – Important reading information will be posted to students via e-mail to enable them to remain up-to-date on current issues in mathematics teaching. Students will also receive information on “hot” issues in education.
- World Wide Web – (a) Reform debates: MathematicallySane and MathematicallyCorrect websites; (b) listserves – math-teach, math-learn, NCSM, ICTM, others; (c) teaching resources: Eisenhower National Clearinghouse (ENC).

**Teaching aids / related print materials**
. Attendance in class – class attendance is required.

. Taking responsibility for your own work
. Appropriate behavior as a student, in class and out of class
. Honesty in doing one’s work in the course – See student Conduct Code

Requirements

Come to every class session – a record of attendance will be kept

Do not be late for class – be in your seat and ready when the professor begins class – a record of tardiness will be kept

Be alert and pay attention in class

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

Completion of all course work – there will be no grade assigned until all coursework is handed in. If any work is not handed in, a grade of INComplete will be assigned.

Do you own work in class work

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

Read and study the required hand-out materials

Resources
Your fellow students -- Books -- Math Lab resources -- Education Library on 5th Floor of Morris Library

OTHER IMPORTANT INFORMATION

• Check to know the last day to drop with refund and last day to drop (W grade; no refund):
• If you need to drop this class, make sure you do so with your Advisor. Students who simply stop attending class will receive a grade of WF. This counts as an “F” in computing the GPA.
• Be aware of the University policy regarding the grade of INC.
CI/Math 389 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 lose 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
Lesson Plan 30 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%
IMPORTANT DATES *
Semester class begins: ............................................. 01/17/2017
Last day to add fall-term course (without Dean's signature): 01/22/2017
Last day to withdraw from the University with a full refund: 01/27/2017
Last day to drop a fall-term course for a credit refund: ........ 01/29/2017
Deadline to apply to graduate at the end of this term: ....... 04/21/2017
Final examinations: .................................................. 05/8–05/12/2017
Commencement: ....................................................... 05/13/2017
*For more detailed information on the above deadlines, please visit http:// registrar.siu.edu/calendars. For add/drop dates that apply to shorter-than-full-term courses, please check the Schedule of Classes search results at http:// registrar.siu.edu/schedule/index.php

SPRING SEMESTER HOLIDAYS
Martin Luther King Jr.'s Birthday Holiday: 01/16/2017
Spring Break: 03/11–03/17/2017

WITHDRAWAL POLICY – Undergraduate only
Students who officially register for a session must officially withdraw from that registration in a timely manner to avoid being charged as well as receiving a failing grade for those classes. An official withdrawal must be initiated by the student, or on behalf of the student through the academic unit, and be processed by the Registrar's office. For the proper procedures to follow when dropping courses and when withdrawing from SIU visit: http:// registrar.siu.edu/students-withdrawal.php

INCOMPLETE POLICY – Undergraduate only
An INC grade may be assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments for the course. An INC must be changed to a completed grade within one full semester (undergraduates), and one full year (graduate students), from the close of the term in which the course was taken or graduation, whichever occurs first. Should the student fail to complete the remaining course requirements within the time period designated, the incomplete will be converted to a grade of F and such grade will be computed in the student's grade point average. For more information visit: http:// registrar.siu.edu/grades/incomplete.php

REPEAT POLICY
An undergraduate student may, for the purpose of raising a grade, enroll in a course for credit more than once. For students receiving a letter grade of A, B, C, D, or F, the course repetition must occur at Southern Illinois University Carbondale. Effective for courses taken Summer 2013 or later, only the most recent (last) grade will be calculated in the overall GPA and count toward hours earned. This policy will be applied to all transferable credit in that only the last grade will be used to calculate grade point average. Only those courses taken at the same institution are considered repeats under this policy. See full policy at http:// registrar.siu.edu/students/repeatclasses.php

GRADUATE POLICIES
Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please refer to the graduate catalog at http://gradschool.siu.edu/about-us/grad-catalog/

DISABILITY POLICY
Disability Support Services provides the required academic and programmatic support services to students with permanent and temporary disabilities. DSS provides centralized coordination and referral services. To utilize DSS services, students must contact DSS to open cases. The process involves interviews, reviews of student-supplied documentation, and completion of Disability Accommodation Agreements. http://disabilityservices.siu.edu/

PLAGIARISM
Student Conduct Code http://sir.siu.edu/student-conduct-code/

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: call (618) 453-1492, email salukicare@siu.edu, or http://salukicares.siu.edu/

SIU'S EARLY WARNING INTERVENTION PROGRAM (EWIP)
Students enrolled in courses participating in SIU’s Early Warning Intervention Program might be contacted by University staff during a semester. More information can be found at the Core Curriculum's Overview webpage: http:// corecurriculum.siu.edu/program-overview/

EMERGENCY PROCEDURES
We ask that you become familiar with Emergency Preparedness at SIU. Emergency response information is available on posters in buildings on campus, on the Emergency Preparedness at SIU website, and through text and email alerts. To register for alerts visit: http://emergency.siu.edu/

STUDENT MULTICULTURAL RESOURCE CENTER
The Student Multicultural Resource Center serves as a catalyst for inclusion, diversity and innovation. As the Center continues its work, we are here to ensure that you think, grow and succeed. We encourage you to stop by the Center, located in Grinnell Commons, to see the resources available and discover ways you can get involved on the campus. Visit us at http:// 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://writ.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/

MILITARY COMMUNITY
There are complexities of being a member of the military community and also a student. Drill schedules, calls to active duty, complications with GI Bill disbursement, and other unforeseen military and veteran related developments can complicate academic life. If you are a member of the military community and in need of accommodations please visit Veterans Services at http://veterans.siu.edu/

Additional Resources:
ADVISEMENT: http://advisement.siu.edu/
SIU ONLINE: https://online.siu.edu/
SALUKI SOLUTION FINDER: http://solutionfinder.siu.edu/
MORRIS LIBRARY HOURS: http://libgrades.lib.siu.edu/hours

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