Math 220 – Mathematics Content and Methods for the Elementary School II
[Sections 2]

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Wham 322 M

OFFICE HOURS: Before and after class
By appointment

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CLASS MEETS: _____________ in the Math Lab [Wham 202 and 201]

CATALOG DESCRIPTION: [Note: CI 220 is the same as Math 220: the course is cross-listed in
the two Departments.]

Modern approaches to mathematics instruction for the elementary grades. Mathematics content
focuses on rational and irrational numbers, ordering of numbers, decimal representations,
percents, ratio and proportion, perimeter and area concepts, Pythagorean Theorem, concept of
square root and nth root, exponent notation, elementary geometry, triangles, quadrilaterals,
polygons, angles associated with a polygon, reflectional and rotational symmetry, congruence
and similarity, tessellations, transformations (translations, rotations, reflections), measurement of
perimeter, area, surface area, volume, mass, temperature, conversion of measurements.
Emphasis is placed throughout on reasoning, multiple representations of mathematical concepts,
making connections and communication. Two hours lecture, and two hours lab per week.
Prerequisite CI/Math120.

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 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 (1996); 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 throughout the course.

**Content in the Course**

**Numbers And Computational Algorithms**

- extend the number concepts and operations developed in Math 120 to integers, rational numbers and decimals
- understand and explain the operations on fractions; model them in various ways
- select and perform appropriate computational procedures to solve "real world" applications problems involving fractions
- understand and explain the ordering of the rational numbers; model this in different ways, e.g. on a number line, using pictures and other representations of fractions
- understand and explain ratio and proportion using various models
- use ratio and proportion to solve "real world" problems
- convert between decimal and fractional representations of (rational) numbers and explain the processes involved
- perform the four arithmetic operations on decimal numbers; explain why the algorithms work
- calculate percents of given numbers; estimate percents; convert from percents to decimals to fractions and back and explain the processes involved
- understand why increasing a number by (say) 10% and then decreasing the result by 10% doesn't get you back where you started
- determine mean, median and mode of a (small) data set

**Applications**

- understand and explain simple interest and other common applications of percents. Understand and explain the distinction between simple and compound interest. Be able to compute interest earned over (say) five years without resorting to formulas.
- understand and explain squares, square roots; other exponents; "rules" for exponents, etc.
- explain why a number such as the square root of 2 is not rational
- explain the difference between a rational and an irrational number; explain why a number with a terminating or repeating decimal is rational while a number with a non-repeating decimal expansion necessarily is irrational

**Elementary Geometry**

- understand and explain the Pythagorean theorem
- measure angles and explain how angles are measured
- explain (with justification) why a given figure will or will not tessellate the plane
• explain heuristically why the sum of the angles of a triangle is a straight angle
• recognize various types of triangles, quadrilaterals and other polygons; understand and explain properties of elementary geometric figures
• understand and explain perimeter and area of two dimensional (polygonal) figures and surface area and volume of three dimensional figures
• estimate areas by partitioning a figure various ways
• explain how the "familiar" area formulas evolve (e.g. for a triangle, parallelogram, trapezoid)
• explain how the "familiar" volume formulas evolve
• calculate perimeters, areas and volumes in standard (American) and metric measurement; explain the effect on perimeter, area and/or volume of changing one or more measures of a figure
• understand and explain reflectional symmetry; detect reflectional symmetry; create figures with specified lines of reflectional symmetry
• understand and explain rotational symmetry; detect rotational symmetry; create figures with specified rotational symmetries
• understand and explain congruence and similarity
• understand and explain the concepts of: altitude of a triangle, bisector of an angle, perpendicular bisector of a line segment. Demonstrate using paper folding and/or a Mira.
• understand and explain special properties of a rhombus, a rectangle, a kite, etc.
• explain what $\pi$ is

**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]

E-mail – Important reading information will be posted to students to enable them to remain up-to-date on current issues in mathematics teaching and education. Students will receive information on “hot” issues in education.

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/Math 220 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. __________  
2. __________  
3. __________  
4. __________  
5. __________  
6. __________  
7. __________  
8. __________  
9. __________  
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%
IMPORTANT DATES *
Semester Class Begin: .......................... 01/19/2016
Last day to add a class (without instructor permission): ....... 01/24/2016
Last day to withdraw completely and receive a 100% refund: ........ 01/31/2016
Last day to drop a course using SakshkNet: .................. 04/03/2016
Last day to file diploma application (for name to appear in Commencement program): .................. 02/12/2016
Final examinations: ........................................... 05/09-05/13/2016

Note: For outreaches, internships, and other course deadlines, visit Registrar’s Academic webpage http://registrar.siu.edu

SPRING SEMESTER HOLIDAYS
Martin Luther King, Jr’s Birthday Holiday 01/18/2016
Spring Break 03/12—03/20/2016

WITHDRAWAL POLICY – Undergraduate only
Students who officially register for a session may not withdraw merely by the stopping of attendance. An official withdrawal form needs to be initiated by the student and processed by the University. For the proper procedures to follow when dropping courses and when withdrawing from the University, please visit http://registrar.siu.edu/catalog/undergraduatecatalog.html

INCOMPLETE POLICY – Undergraduate only
An INC is assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments. An INC must be changed to a complete grade within one semester following the term in which the course was taken, or graduation, whichever occurs first. Should the student fail to complete the course within the time period designated, that is, by no later than the end of the semester following the term in which the course was taken, or graduation, whichever occurs first, the incomplete will be converted to a grade of F and the grade will be computed in the student's grade point average. For more information please visit: http://registrar.siu.edu/catalog/undergraduatecatalog.html

REPEAT POLICY
An undergraduate student may, for the purpose of raising a grade, enroll in a course for credit no more than two times (two total enrollments) unless otherwise noted in the course description. For students receiving a letter grade of A, B, C, D, or E, the course repetition must occur at Southern Illinois University Carbondale. Only the most recent (last) grade will be calculated in the overall GPA and count toward hours earned. See full policy at http://registrar.siu.edu/catalog/undergraduatecatalog.html

GRADUATE POLICIES
Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please visit http://gradschool.siu.edu/about-us/graduatecatalog/index.html

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 come to the DSS to open cases. The process involves interviews, reviews of student-supplied documentation, and completion of Disability Accommodation Agreements. http://disabilityservices.siu.edu

PLAGIARISM

MORRIS LIBRARY HOURS
http://www.lib.siu.edu/about

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 kind 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://salukicare.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.dps.siu.edu (disaster drill 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 as 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://wrtec.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/

Additional Resources Available:
SALUKINET: https://salukinet.siu.edu/cp/home/displaylogin
ADVISMENT: http://advisement.siu.edu/
PROVOST & VICE CHANCELLOR: http://pvcaas.siu.edu/
SIU ONLINE: http://online.siu.edu/

Spring 2016 R.O'Breake