CIEP 438
FALL 2014
LOYOLAUNIVERSITY
SYLLABUS

Mary Clare McCarthy   Instructor
Monday 4:15 PM – 6:45PM

Text: Principles and Standards for School Mathematics   NCTM. A free 120 day trial is available on line at www.nctm.org   Access to the new Common Core State Standards found at http://www.isbe.state.il.us/common_core/default.htm

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Conceptual Framework

This course is designed for students whose goal it is to gain a teaching position in a school. "Professionalism in Service of Social Justice" represents the foundation upon which this course has been developed. In support of this fundamental tenet of teacher development, we will begin to understand the diversity and complexity of roles and responsibilities when teaching mathematics. We will simulate and create opportunities to practice what is "right," with respect to teaching mathematics.

Course Description

This course sequence provides the fundamental knowledge base teaching elementary school mathematics. Candidates will study the underlying principles of mathematics appropriate for grades K – 8. To prepare teachers who can deliver high-quality mathematics education, the Loyola teacher preparation program must provide a strong knowledge base, positive attitude, and a wide range of instructional strategies.

This course includes two ACEI/NCATE Core Assessment requirements:
#2: Assessment of content knowledge in elementary education; this will be met by the course grade;
#3: Assessment of candidate ability to plan instruction which will be met in the Lesson Plan requirement which must be submitted in Live-Text.

Course Objectives

ACEI Standards

DEVELOPMENT, LEARNING AND MOTIVATION

1.0 Development, Learning, and Motivation--Candidates know, understand, and use the major concepts, principles, theories, and research related to development of children

and young adolescents to construct learning opportunities that support individual students' development, acquisition of knowledge, and motivation.

CURRICULUM

2.3 Mathematics—Candidates know, understand, and use the major concepts and procedures that define number and operations, algebra, geometry, measurement, and data analysis and probability. In doing so they consistently engage problem solving, reasoning and proof, communication, connections, and representation;

INSTRUCTION

3.1 Integrating and applying knowledge for instruction—Candidates plan and implement instruction based on knowledge of students, learning theory, connections across the curriculum, curricular goals, and community;

3.2 Adaptation to diverse students—Candidates understand how elementary students differ in their development and approaches to learning, and create instructional opportunities that are adapted   to diverse students;

3.3 Development of critical thinking and problem solving—Candidates understand and use a variety of teaching strategies that encourage elementary students' development of critical thinking and problem solving;

3.4 Active engagement in learning—Candidates use their knowledge and understanding of individual and group motivation and behavior among students at the K-6 level to foster active engagement in learning, self motivation, and positive social interaction and to create supportive learning environments;

3.5 Communication to foster collaboration—Candidates use their knowledge and understanding of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the elementary classroom.

ASSESSMENT

4.0 Assessment for instruction—Candidates know, understand, and use formal and informal assessment strategies to plan, evaluate and strengthen instruction that will promote continuous intellectual, social, emotional, and physical development of each elementary student.

PROFESSIONALISM

5.1 Professional growth, reflection, and evaluation—Candidates are aware of and reflect on their practice in light of research on teaching, professional ethics, and resources available for professional learning; they continually evaluate the effects of their

professional decisions and actions on students, families and other professionals in the learning community and actively seek out opportunities to grow professionally.

NCATE/ NCTM Standards

Standard 1: Knowledge of Mathematical Problem Solving
Candidates know, understand and apply the process of mathematical problem solving

Standard 2: Knowledge of Reasoning and Proof
Candidates reason, construct, and evaluate mathematical arguments and develop an appreciation for mathematical rigor and inquiry.

Standard 3: Knowledge of Mathematical Communication
Candidates communicate their mathematical thinking orally and in writing to peers, faculty, and others.

Standard 4: Knowledge of Mathematical Connections
Candidates recognize, use, and make connections between and among mathematical ideas and in contexts outside mathematical understandings.

Standard 5: Knowledge of Mathematical Representation
Candidates use varied representations of mathematical ideas to support and deepen students' mathematical understanding.

Standard 6: Knowledge of Technology
Candidates embrace technology as an essential tool for teaching and learning mathematics.

Standard 7: Dispositions
Candidates support a positive disposition toward mathematical processes and mathematical learning.

Standard 8: Knowledge of Mathematics Pedagogy
Candidates possess a deep understanding of how students learn mathematics and of the pedagogical knowledge specific to mathematics teaching and learning.

Standard 9: Knowledge of Numbers and Operations
Candidates demonstrate computational proficiency, including a conceptual understanding of numbers, ways of representing number, relationships among number and number systems, and the meaning of operations.

Standard 10: Knowledge of Different Perspectives on Algebra
Candidates emphasize relationships among quantities including functions, ways of representing mathematical relationships, and the analysis of change.

Standard 11: Knowledge of Geometries
Candidates use spatial visualization and geometric modeling to explore and analyze geometric shapes, structures, and their properties.

Standard 12: Knowledge of Data Analysis, Statistics, and Probability
Candidates demonstrate an understanding of concepts and practices related to data analysis, statistics, and probability.

Standard 13: Knowledge of Measurement
Candidates apply and use measurement concepts and tools.

Course Requirements

Participation and attendance are necessary. A lesson plan will be developed and handed in for each assigned standard.   Using current mathematical textbooks and/or supplementary texts for research purposes, each student is to create a manipulative that will help teach the given standard. A bibliography for each assignment is required. No late work will be accepted. One activity will be presented to the class. Presentation dates will be announced at a later date. One of your lesson plans will be submitted to Live -Text for assessment.

Diversity

In concert with the mission statement and conceptual framework for the School of Education, faculty, academic activities, and learning environments will be sensitive to and driven by individual, cultural, social, and economic diversity awareness and respect. It is expected the student will develop a respect for, and a recognition of, the myriad forms of diversity that compose the construct of the world of a school as an educator. We will simulate and create opportunities to practice what is "right" with respect to the teachings of mathematics, regardless of the circumstances of the day.

Technology

Teachers of the twenty-first century must demonstrate competencies in a variety of forms of communications. To ensure that students of mathematics possess technological skills and competencies they will be expected to use a word processing program to prepare all printed materials, to use the University Virtual Library for research, and to use e-mail as an external communication vehicle among classmates and instructor.

Academic Honesty

Academic honesty is an expression of interpersonal justice, responsibility and care, applicable to LoyolaUniversity faculty, students, and staff, which demands that the pursuit of knowledge in the university community be carried out with sincerity and integrity. Academic dishonesty is one of several possible reasons why a student may be dismissed from the Graduate School of Education. For specific policies and procedures see:
http://www.luc.edu/education/academics_policies.shtml#honesty

Accessibility

Students who have disabilities which they believe entitle them to accommodations under the Americans with Disabilities Act should register with the Services for Students with Disabilities

(SSWD) office. To request accommodations, students must schedule an appointment with an SSWD coordinator. Students should contact SSWD at least four weeks before their first semester or term at Loyola. Returning students should schedule an appointment within the first two weeks of the semester or term. The University policy on accommodations and participation in courses is available at: http://www.luc.edu/sswd .

Harassment

It is unacceptable and a violation of university policy to harass, discriminate against or abuse any person because of his or her race, color, national origin, gender, sexual orientation, disability, religion, age or any other characteristic protected by applicable law. Such behavior threatens to destroy the environment of tolerance and mutual respect that must prevail for this university to fulfill its educational and health care mission. For this reason, every incident of harassment, discrimination or abuse undermines the aspirations and attacks the ideals of our community. For specific definitions of discrimination, abuse, and harassment refer p. 25-26 in the Loyola University Chicago Student Handbook, located at:
http://www.luc.edu/studentaffairs/pdfs/LoyolaStudentHandbook2006.pdf

If you believe you are subject to such harassment, you should notify your instructor. If you believe you are subject to harassment by your instructor, contact the Associate Dean of Academic Affairs at 312-915-6464.

Electronic Communication Policies and Guidelines

The School of Education faculty, students and staff respect each other's rights, privacy and access to electronic resources, services, and communications while in the pursuit of academic and professional growth, networking and research. All members of the university community are expected to demonstrate the highest standards of integrity, communication, and responsibility while accessing and utilizing technology, information resources, and computing facilities. A link to the Loyola University Chicago and School of Education official policies and guidelines can be found at: http://www.luc.edu/media/lucedu/education/pdfs/SOE_Cyberbullying_Policy.pdf

Course Outline

August 25	Introduction to CIEP 438, expectations, and syllabus. Opening activity. Read overview of standards, introduction to standards and Number and Operations.
September 8	Numbers and Operations activities. Read the Algebra section from "Standards".
September 15	Continue Number and Operations activities. Algebra activities. Read the Geometry section from "Standards".
September 22	Continue Algebra activities
September 29	Geometry activities.
October 13	Continue on Geometry activities. Read the section on Measurement from "Standards". Measurement activities. Read the section on Data Analysis and Probability from "Standards".
October 20	Data Analysis and Probability activities.
October 27	Continue Data Analysis and Probability activities. Read the section on Problem Solving from "Standards".
November 3	Problem Solving activities. Read the section on Reasoning and Proof and Communication from "Standards".
November 10	Reasoning and Proof activities. Read the section on Connections from "Standards".
November 17	Connections activities. Read the section on Representation from "Standards".
November 24	Representation activities
December 1	Review and finish presentations
December 8	Tentative date for final

Use this format for your lesson plans.   An engaging lesson with the use of manipulatives is expected. A Countdown video that will enhance your lesson is needed for each plan. A set of worksheets is not acceptable. A bibliography is to be attached.

LOYOLA UNIVERSITY CHICAGO
Student Academic Services

LESSON PLAN FORMAT

Student teacher_____ Date_____

Lesson Topic_____ Grade Level_____

Estimated Time_____

- Anticipatory Set/Readiness:

- Objectives:

- Materials: (Hand-outs, hands-on, tests, etc.)

- Technology Integration:

- Procedures: (List questions/provide a script and use Bloom's Taxonomy to identify type)

- Closure:

- Evaluation (How well did the lesson go? What are the results of informal or formal testing of objectives? How did I do?):

Rubric for Lesson Plan Assessment

	2 Points	1 Point	0 Points
Common Core Standard	Specific to the lesson		
Anticipatory set/ Readiness	Engaging, enhances objective	Not engaging or relevant to lesson	Not Present
Objective	Student friendly language and appropriate to lesson	Not student friendly language and/or appropriate for the lesson	Not Present
Materials (hand-out, hand-on, etc.)	Included with lesson and sample attached	Not included with lesson and/ or sample not attached	Not Present
Technology Integration	Included with lesson and sample attached	Not included with lesson and/ or sample not attached	Not Present
Procedures: (List questions/provide a script and use Bloom's Taxonomy to identify type	Inclusive to adequately teach lesson with multiple examples to support lesson	Not inclusive to adequately teach lesson and/or without multiple examples to support lesson	Not Present
Closure	Student friendly language and appropriate to lesson	Not student friendly language and/or appropriate for the lesson	Not Present
Evaluation	Reflective and complete	Incomplete	Not Present
CountDown Title and Web Address	Web address and title included	Web address or title not present	Not Present
Bibliography	Present in proper format		Not Present

Rubric for Class Presentation

	3	2	1	0
Level of student engagement	Students actively engaged in lesson	Some level of engagement	Limited engagement	No engagement
Appropriateness of activity	On grade level and use of an integrated manipulative	On grade level, manipulative not appropriate for lesson	Activity without a manipulative	No activity
Lesson Plan	Available for both presenter and instructor	Available for student and not for instructor		Not available
Prepared for lesson	Handouts and materials ready	Some materials not on hand	Most materials not available	No handouts or manipulatives

Grading Scale

100 - 93 A
92 – 85   B
84 – 77   C
76 – 69   D

Points for Grades

Attendance	15 Points
Lesson plans	
5 points each	45 Points
Presentation	15 Points
Final Exam	25 Points

You may use these standards to record which standard and grade level you are assigned.

Number and Operations Standard for Grades K-8

Expectations

In grades k - 8 all students should—
Understand numbers, ways of representing numbers, relationships among numbers, and number systems
• work flexibly with fractions, decimals, and percents to solve problems;
• compare and order fractions, decimals, and percents efficiently and find their approximate locations on a number line;
• develop meaning for percents greater than 100 and less than 1;
• understand and use ratios and proportions to represent quantitative relationships;
• develop an understanding of large numbers and recognize and appropriately use exponential, scientific, and calculator notation;
• use factors, multiples, prime factorization, and relatively prime numbers to solve problems;
• develop meaning for integers and represent and compare quantities with them.

Understand meanings of operations and how they relate to one another
• understand the meaning and effects of arithmetic operations with fractions, decimals, and integers;
• use the associative and commutative properties of addition and multiplication and the distributive property of multiplication over addition to simplify computations with integers, fractions, and decimals;
• understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems.

Compute fluently and make reasonable estimates
• select appropriate methods and tools for computing with fractions and decimals from among mental computation, estimation, calculators or computers, and paper and pencil, depending on the situation, and apply the selected methods;
• develop and analyze algorithms for computing with fractions, decimals, and integers and develop fluency in their use;
• develop and use strategies to estimate the results of rational-number computations and judge the reasonableness of the results;
• develop, analyze, and explain methods for solving problems involving proportions, such as scaling and finding equivalent ratios.

Algebra Standard for Grades K-8

Expectations
In grades K-8 all students should—
Understand patterns, relations, and functions
• represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic rules;
• relate and compare different forms of representation for a relationship;

• identify functions as linear or nonlinear and contrast their properties from tables, graphs, or equations.

Represent and analyze mathematical situations and structures using algebraic symbols
• develop an initial conceptual understanding of different uses of variables;
• explore relationships between symbolic expressions and graphs of lines, paying particular attention to the meaning of intercept and slope;
• use symbolic algebra to represent situations and to solve problems, especially those that involve linear relationships;
• recognize and generate equivalent forms for simple algebraic expressions and solve linear equations

Use mathematical models to represent and understand quantitative relationships
• model and solve contextualized problems using various representations, such as graphs, tables, and equations.

Analyze change in various contexts
• use graphs to analyze the nature of changes in quantities in linear relationships.

Geometry Standard for Grades K-8

Expectations

In grades K-8 all students should—
Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships
• precisely describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties;
• understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects;
• create and critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.

Specify locations and describe spatial relationships using coordinate geometry and other representational systems
• use coordinate geometry to represent and examine the properties of geometric shapes;
• use coordinate geometry to examine special geometric shapes, such as regular polygons or those with pairs of parallel or perpendicular sides.

Apply transformations and use symmetry to analyze mathematical situations
• describe sizes, positions, and orientations of shapes under informal transformations such as flips, turns, slides, and scaling;
• examine the congruence, similarity, and line or rotational symmetry of objects using transformations.

Use visualization, spatial reasoning, and geometric modeling to solve problems
• draw geometric objects with specified properties, such as side lengths or angle measures;
• use two-dimensional representations of three-dimensional objects to visualize and solve problems such as those involving surface area and volume;
• use visual tools such as networks to represent and solve problems;
• use geometric models to represent and explain numerical and algebraic relationships;

• recognize and apply geometric ideas and relationships in areas outside the mathematics classroom, such

Measurement Standard for Grades K–8

Expectations
In grades K–8 all students should—
Understand measurable attributes of objects and the units, systems, and processes of measurement
* understand both metric and customary systems of measurement;
• understand relationships among units and convert from one unit to another within the same system;
• understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume.

Apply appropriate techniques, tools, and formulas to determine measurements
• use common benchmarks to select appropriate methods for estimating measurements;
• select and apply techniques and tools to accurately find length, area, volume, and angle measures to appropriate levels of precision;
• develop and use formulas to determine the circumference of circles and the area of triangles, parallelograms, trapezoids, and circles and develop strategies to find the area of more-complex shapes;
• develop strategies to determine the surface area and volume of selected prisms, pyramids, and cylinders;
• solve problems involving scale factors, using ratio and proportion;
• solve simple problems involving rates and derived measurements for such attributes as velocity and density.

Data Analysis and Probability Standard for Grades K–8

Expectations
In grades K–8 all students should—
Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them
• formulate questions, design studies, and collect data about a characteristic shared by two populations or different characteristics within one population;
• select, create, and use appropriate graphical representations of data, including histograms, box plots, and scatterplots.

Select and use appropriate statistical methods to analyze data
• find, use, and interpret measures of center and spread, including mean and interquartile range;
• discuss and understand the correspondence between data sets and their graphical representations, especially histograms, stem-and-leaf plots, box plots, and scatterplots.

Develop and evaluate inferences and predictions that are based on data
• use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken;
• make conjectures about possible relationships between two characteristics of a sample on the basis of scatterplots of the data and approximate lines of fit;
• use conjectures to formulate new questions and plan new studies to answer them.

basic concepts of probability
• understand and use appropriate terminology to describe complementary and mutually exclusive events;
• use proportionality and a basic understanding of probability to make and test conjectures about the results of experiments and simulations;
• compute probabilities for simple compound events, using such methods as organized lists, tree diagrams, and area models.

Problem Solving Standard for Grades K–8

Instructional programs from prekindergarten through grade 12 should enable all students to—

- build new mathematical knowledge through problem solving;
- solve problems that arise in mathematics and in other contexts;
- apply and adapt a variety of appropriate strategies to solve problems;
- monitor and reflect on the process of mathematical problem solving.

Reasoning and Proof Standard for Grades K–8

Instructional programs from prekindergarten through grade 12 should enable all students to—

- recognize reasoning and proof as fundamental aspects of mathematics;
- make and investigate mathematical conjectures;
- develop and evaluate mathematical arguments and proofs;
- select and use various types of reasoning and methods of proof.

Communication Standard for Grades K–8

Instructional programs from prekindergarten through grade 12 should enable all students to—

- organize and consolidate their mathematical thinking through communication;
- communicate their mathematical thinking coherently and clearly to peers, teachers, and others;
- analyze and evaluate the mathematical thinking and strategies of others;
- use the language of mathematics to express mathematical ideas precisely.

Connections Standard for Grades K–8

Instructional programs from prekindergarten through grade 12 should enable all students to—

- recognize and use connections among mathematical ideas;
- understand how mathematical ideas interconnect and build on one another to produce a coherent whole;
- recognize and apply mathematics in contexts outside of mathematics.

Representation Standard for Grades K –8

Instructional programs from prekindergarten through grade 12 should enable all students to—

- create and use representations to organize, record, and communicate mathematical ideas;
- select, apply, and translate among mathematical representations to solve problems;
- use representations to model and interpret physical, social, and mathematical phenomena.