

Teaching Elementary School Mathematics

Mathematics for Teachers II

Loyola University Chicago



Spring 2011 CIEP 105 Syllabus

CIEP 105-003 Tues 8:30am – 11:15am MC 308

Mr. J. Michael Rebeck
Home phone: 847-519-1966
E-mail: jrebeck@luc.edu
Office hours: by appointment

Required Instructional Material

- *Mathematics: A Human Endeavor*: A book for those Who Think they Don't Like the Subject, by H.R. Jacobs, 3rd edition.
- *The Man Who Counted*, by Malba Tahan
- Scientific calculator (TI graphing calculator recommended)

Conceptual Framework

The School of Education at Loyola University Chicago supports the Jesuit ideal of knowledge in the service of humanity and the advancement of social justice. In fact the conceptual framework of the School of Education is “Professionalism in Service of Social Justice.” CIEP 105 emphasizes the importance of ethical teacher behavior, equitable student access to a quality education, and strong support for the success of all. It is through a unique bond between instructor and learner that enables schools to leave no child behind and realize social justice.

Diversity

Loyola University Chicago strives to partner with schools and community agencies in the Chicago area. This provides students with the opportunity to embrace the challenges and benefits of diversity that enhance the environment for learning. In CIEP 105, students will study and discuss important social structures that may affect students' prior knowledge and attitudes.

Technology

This course will integrate technology into mathematics instruction facilitate inductive inquiry and provide multiple representations. Specific technology utilized includes: graphing calculator and computer productivity tools such as spreadsheets.

Students are expected to be expert in the use of the internet to access and use mathematical websites such as <http://mathforum.org/>, <http://www.history.mcs.st>, and <http://www.ac.uk/~history/> to research historical information about mathematical topics and <http://library.thinkquest.org/16661/> to make connections with mathematics and other topics.

Students will also be required to log on to Blackboard (blackboard.luc.edu) to monitor e-mail, announcements, and assignments posted to the class site and to submit assessments through LiveText.com.

Course Description

This course sequence provides the fundamental knowledge base for teaching elementary and middle school mathematics. This is the second of two courses. The emphasis is on algebra and problem solving. Candidates study the underlying principals of mathematics appropriate for grades K – 9. This course develops essential understanding of the historical development of mathematics, algebra, statistics, probability, and logic. The course focuses on the ability to apply mathematics and reasoning to solve problems. Students have an opportunity to discover patterns and use inductive and deductive reasoning. This experience encourages the application of algebra and logic to develop problem solving skills. Methods of instruction are presented to help prospective teachers develop teaching strategies that engage students in learning activities. The use of technology to aid in the learning process is addressed. The material presented is made relevant to and assessed using the local and state learning goals in mathematics, the NCTM standards, and the ACEI standards.

Chicago Academic Framework from the Chicago Public Schools

(<http://intranet.cps.k12.il.us/standards/CAS.html>)

Illinois State Learning Goals

(<http://www.isbe.state.il.us/ils/lmath.html>)

Principals and Standards for School Mathematics from the National Council of Teachers of Mathematics

(<http://www.nctm.org/standards>)

Association for Childhood Education International Elementary Education Standards

http://education.uncc.edu/eportfolio/documents/word_files/Standards/acei_standards.htm

This course contains a 4/5 week clinical component to allow students to work closely with an elementary/middle school teacher in a classroom setting.

Included in this course are two ACEI Core assessment requirements.

Core Assessment #2 Assessment of content knowledge in elementary education. This will be evaluated by the student's course grade.

Core Assessment #3 Assessment of the candidate's ability to plan instruction. The student will be required to submit a lesson plan using LiveText.

Also included in this course is an NCATE technology assessment.

Conceptual Framework Assessment #5 Assessment of the candidate's ability to demonstrate their knowledge and skill of technology to enhance education. The student will be required to submit a spreadsheet in LiveText.

Course Objectives

NCATE / NCTM Program Standards

Standard 1: Knowledge of Mathematical Problem Solving

Candidates know, understand and apply the process of mathematical Problem solving.

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 Representaion

Candidates can vary 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: Disposition

Candidates support a positive disposition toward mathematical processes and mathematical learning..

Standard 9: Knowledge of Numbers and Operations

Candidates demonstrate computational proficiency, including a conceptual understanding of numbers, ways of representing numbers, relationships among numbers 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 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 skills

Schedule of Topics

Assignments will be listed in class and on Blackboard

Class date	Topics or Issues
Class #1 January 18	<ul style="list-style-type: none"> • Introductions • NCTM Standards • Numbers, numbers everywhere • Think, Think, Think • Patterns
Class #2 January 25	<ul style="list-style-type: none"> • More Patterns and Number Tricks • Logic: Inductive and Deductive Reasoning • Special Numbers and Their Factors
Class #3 February 1	<ul style="list-style-type: none"> • Fractions: Everyone's favorite "F" word • Ratios and Proportions • Spreadsheets • ISAT
Class #4 February 8	<ul style="list-style-type: none"> • Series and Sequences • Spreadsheets: Core Assessment Assigned (Due Feb 15)
Class #5 February 15	<ul style="list-style-type: none"> • Rules for Divisibility • The Number Line • Midterm: Lesson Plan Assigned (Due first class after Clinicals)
February 22	<ul style="list-style-type: none"> • Clinicals
March 1	<ul style="list-style-type: none"> • Clinicals
March 15	<ul style="list-style-type: none"> • Clinicals
March 22	<ul style="list-style-type: none"> • Clinicals
Class #6 March 29	<ul style="list-style-type: none"> • Functions and Linear Equations • Graphing Linear Equations • Writing Equations
Class #7 April 5	<ul style="list-style-type: none"> • Solving Equations • Polynomials
Class #8 April 12	<ul style="list-style-type: none"> • Factoring • Solving Quadratic Equations
Class #9 April 19	<ul style="list-style-type: none"> • Systems of Equations • Matrices • Using Matrices to Solve Systems
Class #10 April 26	<ul style="list-style-type: none"> • Using the TI Graphing Calculator • Logarithms and Exponentials
Final Exam Week	<ul style="list-style-type: none"> • Final Exam

**This calendar is subject to change at the professor's discretion.
Clinical dates and location will be determined at a later date.**

Class Assignments

Assignment #1

The Man Who Counted

Read chapters 1 – 4.

Complete reading guide worksheet for chapters 1 and 2.

Write a paragraph summary for chapters 3 and 4.

Assignment #2

Mathematics, A Human Endeavor

P. 548 Set 1, 1-26

P. 552 Set 2 12-15

P. 41 Set 1, 1-13

P. 44 Set 3, 1-4

The Man Who Counted

Read chapters 5 - 7 and write a paragraph summary for each chapter.

Assignment #3

Worksheets:

Ratios, Fractions, and Spreadsheets

Light Bulb Problem

ISAT Questions

Go to: http://isbe.net/assessment/pdfs/2007_Grade_6.pdf

The Man Who Counted

Read chapters 8 - 10 and write a paragraph summary for each chapter.

Assignment #4

Mathematics, A Human Endeavor

P. 62 12 -17

P. 64 1, 3, 5, 6

P. 69 7 - 21

P. 95 7 -14

P. 101 1- 3

P. 108 1 - 16

P. 111 6 -12

The Man Who Counted

Read chapters 11 - 13 and write a paragraph summary for each chapter.

ISAT Questions

Go to: http://isbe.net/assessment/pdfs/2006_Grade_6.pdf

Core Assessment - Spreadsheet Worksheet

Turn in a hard copy for next class.

Assignment #5

Core Assessment - Lesson Plan

Write a lesson plan for a math class that you will teach during your clinical.

Write the lesson plan in a Word Document following the Lesson Plan Template.
Submit your Word Document via LiveText .

Turn in a hard copy of your lesson plan during the first class after clinicals.

The Man Who Counted

Read chapters 14 - 16 and write a paragraph summary for each chapter.

Assignment #6

Mathematics, A Human Endeavor

p. 124 Set 1 1 - 14

p. 125 Set 2 1 - 14

p. 138 Set 1 1 - 23

p. 141 Set 2 1 - 10

Linear Function Worksheet

The Man Who Counted

Read chapters 17 - 19 and write a paragraph summary for each chapter.

Assignment #7

Equation and Polynomial Worksheet

ISAT Questions

Go to: http://isbe.net/assessment/pdfs/2006_Grade_7.pdf

The Man Who Counted

Read chapters 20 - 22 and write a paragraph summary for each chapter.

Assignment #8

Worksheets:

Complete worksheet from Assignment #7

Matrix Worksheet

Graphing Quadratic Functions Worksheet

ISAT questions

Go to: http://isbe.net/assessment/pdfs/2007_Grade_7.pdf

The Man Who Counted

Read chapters 23-25 and write a paragraph summary for each chapter

Assignment #9

Worksheets:

Systems of Equations I

Systems of Equations II

Systems of Equations III

The Man Who Counted

Read chapters 26-29 and write a paragraph summary for each chapter.

Assignment #10

Mathematics A Human Endeavor

p.186 1 - 10, 14 - 24

p.194 9 - 11

p.195 1 - 9

p. 202 1 - 14

The Man Who Counted

Read chapters 30 - 33 and write a paragraph summarizing your thoughts on the ending of the book.

Final Reflection (not for a grade and may be anonymous)

1. Your final impressions:
 - a. positives about the class
 - b. negatives about the class
 - c. suggestions
2. What would you use in your classroom?
3. Final thoughts, comments, critiques, or general statements for the good of the cause.

Course Policy

- 1. Academic Honesty:** Academic honesty is an expression of interpersonal justice, responsibility and care, applicable to Loyola University faculty, students,

and staff, which demands that the pursuit of knowledge in the university community be carried out with sincerity and integrity. The School of Education's Policy on Academic Integrity can be found at:

http://www.luc.edu/education/academics_policies_integrity.shtml. For additional academic policies and procedures refer to:

http://www.luc.edu/education/academics_policies_main.shtml

- 2. 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>

- 3. 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. The university qualifies these incidents as incidents of bias.

In order to uphold our mission of being Chicago's Jesuit Catholic University-- a diverse community seeking God in all things and working to expand knowledge in the service of humanity through learning, justice and faith, any incident(s) of bias must be reported and appropriately addressed. Therefore, the Bias Response (BR) Team was created to assist members of the Loyola University Chicago community in bringing incidents of bias to the attention of the university. If you believe you are subject to such bias, you should notify the Bias Response Team at this link: <http://webapps.luc.edu/biasreporting/>

Course Requirements

- 1. Attendance:** Important³! Time is short and there is much to be done. Absences should be for extreme circumstances only. Students should inform the

instructor of such circumstance.

2. Assignments: There will be homework, papers, a midterm exam and a final exam. All written work should be handed in (hard copy or electronic) on the due date. Late assignments are penalized 50%. An assignment is considered late if it is not submitted by the end of the class session on the due date. Exceptions to this policy are rare and are for extreme cases supported by documentation such as a doctor's note.

This course will contain a core assessment of **Conceptual Framework Standard 5:** Candidates demonstrate technological knowledge and skill which enhance education. Students will produce a spreadsheet to demonstrate the solution to a specific mathematical problem. This spreadsheet will be submitted in LiveText and will be evaluated using the following rubric:

Core Assessment Rubric

Conceptual Framework Standard	Target	Acceptable	Unacceptable
CF5: Candidates demonstrate technological knowledge and skill which enhance education NCTM 2003 6.1	Targeted Performance is evidenced by the selection of an appropriate technological tool, such as but not limited to, spreadsheets, dynamic graphing software, computer algebra systems, calculators, and presentation software, that promotes conceptual understanding of a mathematical concept or facilitates student construction of knowledge	Acceptable performance is evidenced by the use of appropriate technology, as a curriculum amplifier (use of technology to replicate an existing task. e.g. electronic flashcards). The activity provide motivation for students	Unacceptable performance is evidenced by the use of technology as a curriculum amplifier that is not motivational
Overall Score			

3. Clinicals: This course includes a required clinical component of 4/5 weeks. Students will be placed in a middle school at the start of the semester. Students will be expected to fully participate at their clinical site during that period. **Successful**

completion of clinicals is required to continue in the teacher preparation program.

In conjunction with the clinical experience, this course will require students to produce a lesson plan to be completed during the clinical experience to assess their ability to plan instruction. This lesson plan will be submitted in LiveText at the completion of the clinical component. The lesson plan will be evaluated using the following rubric:

CIEP 105: Mathematics Lesson Plan Rubric (*Understanding by Design* format)

	Target	Acceptable	Unacceptable
Content Standards ACEI 2.3 NCTM 8.4	Targeted performance is evidenced by linking highly appropriate standards to the lesson objectives	Acceptable Performance is evidenced by identifying appropriate standards	Unacceptable performance is evidenced by not identifying standards or identifying too broad, too difficult or inappropriate for the learner
Student Objectives NCTM 8.4	Targeted performance is evidenced by three or four objectives that are clearly related to the instruction and are written in correct format	Acceptable Performance is evidenced by three or four objectives that are related to the instruction and are written in correct format	Unacceptable performance is evidenced by objectives not written in the correct format or marginally related to instruction.
Learning Activity Description ACEI 2.3,3.3 NCTM 8.1, 8.3, 8.4, 8.7	Targeted performance is evidenced by a clear description of needed materials, introduction, lesson body, guided practice, feedback, independent practice and closure	Acceptable Performance is evidenced by description of most of the following components: needed materials, introduction, lesson body, guided practice, feedback, independent practice and closure	Unacceptable performance is evidenced by unclear or not detailed description of needed materials, introduction, lesson body, guided practice, feedback, independent practice or closure.
Learning Activity Sequencing ASCI 2.3, 3.3 NCTM 3.3, 4.3	Targeted performance is evidenced by use of multiple instructional strategies. Strategies are focused, sequential, build on one another and engaging	Acceptable Performance is evidenced by an attempt to use multiple strategies but fail to build on one another or has flawed focus or sequencing	Unacceptable performance is evidenced by a failure to use multiple strategies. The instruction is vague or difficult for a student to follow
Plan for student	Targeted performance is	Acceptable Performance	Unacceptable performance

motivation/ adaptation for diverse learners ACSI 3.2 NCTM 7.1,7.2, 8.1	evidenced by a deliberate plan to motivate students and provide appropriate entry points for diverse learners	is evidenced by an implicit plan to motivate students and provide appropriate entry points for diverse learners	is evidenced by no mention of a plan to motivate students or accommodate diverse learners.
Interdisciplinary Connections NCTM 4.1	Targeted performance is evidenced by a deliberate plan to make meaningful connections to other disciplines or the real world	Acceptable Performance is evidenced by an implicit plan to make some connections to other disciplines or the real world	Unacceptable performance is evidenced by no mention of a plan to make some connections to other disciplines or the real world
Check for comprehension/ assessment ASCI 4.0 NCTM 7.5, 8.3	Targeted performance is evidenced by the clear identification of criteria to determine level of student learning. The evaluation is linked to the objectives	Acceptable Performance is evidenced by some identification of criteria to determine level of student learning. The evaluation is linked to some of the objectives	Unacceptable performance is evidenced by the lack of criteria to determine level of student learning. little effort to link evaluation to the objectives
Overall Score			

4. Participation and Responsibility: Participation is more than talking in class. Participation means allowing one self to become engaged in the learning process. The following are examples of good class participation

- Contribute interesting insightful comments
- Presenting good examples of the comments on hand
- Raising good questions
- Listening and responding appropriately to others comments
- Being sensitive to your level of participation, making attempts to increase or decrease it if necessary
- Arriving on time for class

(Source: RE550 syllabus, Iowa State University)

5. Evaluation: A wide variety of evaluation strategies are used. A point system is used, so the percentages are approximate.

- Homework , Activities, and Projects 40 %
Candidates are expected to complete assigned homework each week and hand it in the next class. Late assignments are awarded 50% credit. Students will make reflective statements at the end of each class relative to the content covered in class. Due to the nature of these reflections, they can not be made up when absent.
- Clinical Experience 10%
Candidates will participate in Block 2 Clinicals. Instructor observation and assignments will serve as assessment tools
- Midterm 25 %
- Final Exam 25%

Grade Assignment ("+" and "-" grades are the two percentage points at the high and low ends of the stated grade ranges)

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%