**ILM Community College**

**Department of Early Childhood Education**

**ECE 123: Mathematics for the Young Child**

**Instructor:**  **Email:**

**Office:**  **Office Phone:**

**Course Website:**

**Office Hours:**

# I. Course Description

This course is an exploration of early mathematical content and concepts that are relevant to young children ages 0-6. Students will learn what mathematics looks like during the early years and learn strategies to recognize and promote mathematical understanding in young children. Particular emphasis will be on the following concepts: numbers, measurement, shapes, patterns, spatial relations, analysis of data.

# II. Course Objectives

|  |  |  |
| --- | --- | --- |
| Upon completion of this course, students will: | **ECE Gateways Competencies** | **ILECE Math Standards** |
| 1. Enhance children's natural interest in mathematics and their disposition to use it to make sense of their physical and social worlds and to create positive beliefs towards mathematics.
 | HGD5 | a1C, a2B, b1E |
| 1. Build on children's age, experience and knowledge, including their family, linguistic, cultural, and community backgrounds; their individual approaches to learning; and their informal knowledge.
 | FCR1, FCR2 | a2A, b2A |
| 1. Design and analyze meaningful and developmentally appropriate learning experiences, both informal and formal, for young children utilizing appropriate goals, concepts, and assessment.
 | IRE1, IRE5, CUR4, CUR7, CUR 8, CUR9 | a2A, a2B, b1A, b1B, b1D, b2C |
| 1. Demonstrate various methods of assessing young children’s mathematical knowledge, including observing, interpreting/analyzing student thinking processes, using a range of questioning strategies and considering developmental readiness.
 | O&A1, O&A2, O&A7 | b1D, b1F, b2B |
| 1. Demonstrate knowledge of the connections between mathematics, and other areas of the preschool and kindergarten curriculum.
 | CUR4, CUR7 | b1A |
| 1. Demonstrate and apply knowledge of the Illinois Early Learning and Development Standards and the New Illinois Learning Standards for Mathematics.
 | CUR2 | MP1-8 |
| 1. Explain the key mathematical concepts and skills that young children (prek-K) must develop and understand including the following concepts: numbers, counting and cardinality, operations and algebraic thinking, base ten, measurement, shapes, patterns, spatial relations, and analysis of data.
 | CUR5, CUR6 | a1A, a1B, a1C, b1C, b2D, c1A, c1B, c1C, c1D, c1E, c1F, c2A, c3A, c5A, c5B, c5C, c6A, c6B, c6C, c6D, c6E |

# IV. Materials Required

# *Textbook Suggestions*

Carlyle, A. & Mercado, B. (2012). *Teaching Preschool and Kindergarten Math.* Sausalito, CA: Math Solutions. ISBN: 978-1935099444

Clements, D.H. and Sarama, J. (2014). *Learning and Teaching Early Math: The Learning Trajectories Approach (2nd edition).* New York, NY: Routledge. ISBN: 000-0415828503

Copley, J.V. (2010). The Young Child and Mathematics (2nd edition). Reston, VA: National Council of Mathematics. ISBN: 978-1928896685

Geist, E. (2008). *Children are Born Mathematicians*. Pearson. ISBN 978-0131116771

Smith. S.S. (2013). Early Childhood Mathematics (5th edition). Pearson. ISBN: 978-0132613682

The Early Math Collaborative – Erikson Institute (2014). *Big Ideas of Early Mathematics: What Teachers of Young Children Need to Know.* Pearson. ISBN: 978-0132946971

# Additional Reading

NAEYC. 2010. “Early Childhood Mathematics: Promoting Good Beginnings.” A joint position statement of NAEYC and the National Council of Teachers of Mathematics (NCTM). [www.naeyc.org/files/naeyc/file/positions/psmath.pdf](http://www.naeyc.org/files/naeyc/file/positions/psmath.pdf).

# Standards

Common Core: <http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf> (pgs 1-12)

Illinois Early Learning Standards: <http://www.isbe.state.il.us/earlychi/pdf/early_learning_standards.pdf>

# V. Course Requirements

## **Mathematics Standards Paper (Objectives 3, 6)**

Students will be required to choose at least two standards in a specific domain of the Common Core Mathematics Standards or the Illinois Early Learning standards and a write a 2-3 page paper explaining and discussing the topics and standards selected. Students should also include a brief description of instructional activities that may be used with students to teach the selected standards.

1. ***Math Activity Plans* (Objectives 1,2,3,4,5,6,7)**

Students will be required to write instructional activity plans for children, 0-K based on the mathematical concepts discussed in class [approximately 2-4 plans, total]. The activity plans may be small group plans, and center/station plans. The plans must include the Illinois Early Learning Standards and/or Common Core Standards that are addressed in the paper. Be sure to also include any handouts, checklists, etc. that you would use in the activities.

1. ***Individual Student Assessment* (Objective 4)**

Students will be required to assess at least three toddler or pre-kindergarten children on a specific mathematic area or areas. Students will turn in a typed assessment plan for feedback *before* assessing the children. The plan should include an in-depth examination of children’s levels of understanding of the chosen area(s) and should include the following:

1. A brief description of the concept being assessed.
2. A detailed description of the activity being used to assess that concept including any specific questions that will be asked to the children
3. A list of any manipulatives being used.

 After completing the assessment, students will turn in a reflection in which they will describe the children’s understandings, providing appropriate evidence of their conclusions. Students should also *suggest appropriate instruction to target the children’s specific needs.*

1. ***Homework/Chapter related Activities***

Additional homework assignments should be given to students based on the various chapters that are being covered as well as general assignments that help meet course objectives. The following are just a general list and can certainly be expanded upon and included as a main assignment.

**Where is Math?** – Students should be provided time to observe in a prek classroom, and asked to take notes and write a brief summary of the math occurrences they saw during their observation. This allows students to realize that math really is everywhere and that young children truly do use math spontaneously throughout the day and that these are times that preschool teachers can integrate more informal math learning. Free time is a great time for observations. **(Objectives 2, 3)**

**Watching Children Count** - Students will observe young children count including both rote and rational counting. Students should take note of the various mistakes that the children may make, again both in rote and rational accounting and write a brief paper comparing their mistakes to the counting principals discussed in class. Students may also include this counting aspect in the assessment assignment. **(Objectives 4,7)**

**Family Math Newsletter** – Students will be asked to write a newsletter directed towards to families, which includes a brief description of a selected math topic being covered in a particular week or unit. The newsletter should provide parents information on the content being covered, home activities and additional resources such as books, websites, etc.

**Creating Math Games –** Students will create simple but fun games that provide practice to PreK-K grade children that address various concepts discussed in class. The games may include activities related to measurement, geometry, counting, etc. **(Objectives 3, 7)**

**Analyzing Children’s Picture Books** – Students will be asked to review various children’s picture books and write a brief paper explaining how they can be used to teach various mathematical concepts such as patterning, counting, shapes, etc. Picture books do not necessarily have to be focused directly on mathematics. This assignment can be combined with the math game assignment as well, where the math game includes children’s book content as well. **(Objectives 5, 7)**

**Future Teaching Practice –** Students will write a short, reflective paper about what they have learned in this course and how that learning may be reflected in their future teaching practice. **(Objectives 4, 5, 6, 7)**

1. ***Quizzes* (Objective 7)**

Quizzes will be given throughout the semester. Quizzes will be based on chapter and class material and will include multiple choice, short answer and problem solving.

# Evaluation and Grading Scale

**Assignments and Assessments’ Points**

|  |  |
| --- | --- |
| **Assessments** |  **Points** |
| Mathematics Standards Paper  |  |
| Math Activity Plans |  |
| Individual Student Assessment |  |
| Various Chapter Related Assignments |  |
| Quizzes  |  |

**Grading Scale**

|  |  |  |
| --- | --- | --- |
| **Scale** |  | **Grade** |
| 90 – 100% |  | A |
| 80 – 89.9% |  | B |
| 70 – 79.9% |  | C |
| 60 – 69.9%  |  | D |
| Below 60% |  | F |

**Class Policies**

**Participation**

 Regular attendance at all scheduled class sessions is expected. It is the student’s responsibility to notify his/her instructor if and why he/she is unable to attend any class session prior to that class session. Permission to make up work missed because of absence may be granted at the instructor’s discretion.

**Cell Phones/Laptops**

Cell phones should be off or in silent mode during class time. Texting during class time will be seen as a lack of participation and will result in participation point reductions. If laptops are used for note taking, it is expected that surfing the web, checking emails, etc. will not take place during class time. Out of respect for everyone in the class, disruptive behavior will not be tolerated.

**Late Assignments**

 No late assignments will be accepted except for documented emergencies and must be granted **PRIOR** to the day the assignment is due.

**Special Needs**

Any student needing to arrange a reasonable accommodation for a documented disability should contact Disability Concerns.

**Academic Integrity Policy/Plagiarism**

 Students are expected to be honest in all academic work. A student’s name on any academic exercise (theme, report, notebook, paper, examination) shall be regarded as assurance that the work is the result of the student’s own thought and study.

**Course Schedule/Topic Outline**

| **Week** | **Topic** | **Assignment/Text Reading** |
| --- | --- | --- |
| Week #1 | **Introduction/ Course Overview*** Course Syllabus & Schedule
* Course Assignments and Expectations
* Discuss Promoting Math Article
 | **Bring:** Course SyllabusCourse Schedule |
| **Reading:** Promoting Math Article |
| Week #2 | **IELDS - Numbers and Number Sense**Demonstrate beginning understanding of numbers, number names, and numerals. * Count with understanding and recognize “how many” in small sets up to 5.
* Use subitizing (the rapid and accurate judgment of how many items there are without counting) to identify the number of objects in sets of 4 or less.
* Understand and appropriately use informal or everyday terms that mean zero, such as “none” or “nothing”.
* Connect numbers to quantities they represent using physical models and informal representations.
* Differentiate numerals from letters and recognize some single‐digit written numerals.
* Verbally recite numbers from 1 to 10.
* Be able to say the number after another in the series up to 9 when given a “running start,” as in “What comes after one, two, three, four…?”.
 | **Reading:**  |
| Week #3 | **CCSS - Preschool and** **Kindergarten Counting and Cardinality (KCC1,2,3,4,4a,4b,4c,5,6,7)*** Know number names and the count sequence
* Count to tell the number of objects
* Compare numbers

**IELDS – Numbers and Number Sense**Add and subtract to create new numbers and begin to construct sets. * Recognize that numbers (or sets of objects) can be combined or separated to make another number.
* Show understanding of how to count out and construct sets of objects of a given number up to 5.
* Identify the new number created when small sets (up to 5) are combined or separated.
* Informally solve simple mathematical problems presented in a meaningful context.
* Fairly share a set of up to 10 items between two children.
 | **DUE:**  |
| **Reading:**  |
| Week #4 | **IELDS – Numbers and Number Sense**Begin to make reasonable estimates of numbers. * Estimate number of objects in a small set.

Compare quantities using appropriate vocabulary terms. * Compare two collections to see if they are equal or determine which is more, using a procedure of the child’s choice.
* Describe comparisons with appropriate vocabulary, such as “more”, “less”, “greater than”, “fewer”, “equal to”, or “same as”.
 | **Quiz #1**  |
| **DUE:**  |
| **Reading:**  |
|  Week #5 | **CCSS - Operations and Algebraic Thinking** **Kindergarten (KOA 1-5)*** Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.
 | **DUE :**  |
| **Reading:**  |
| Week #6 | **CCSS - Number and Operations in base 10****Kindergarten (KNBT 1)*** Work with numbers 11-19 to gain foundations for place value
 | **Quiz # 2** |
| **DUE:**  |
| **Reading:**  |
|  Week #7 | **IELDS – Identify and describe common attributes, patterns, and relationships in objects**Explore Objects and Patterns* Sort, order, compare, and describe objects according to characteristics or attribute(s)
* Recognize, duplicate, extend, and create simple patterns in various formats.

Describe and document patterns using symbols. * With adult assistance, represent a simple repeating pattern by verbally describing it or by modeling it with objects or actions.
 | **DUE:**  |
| **Reading:**  |
|  Week #8 | **IELDS- Explore concepts of geometry and spatial relations**Recognize, name, and match common shapes. * Recognize and name common two- and three-dimensional shapes and describe some of their attributes (e.g., number of sides, straight or curved lines).
* Sort collections of two‐ and three‐dimensional shapes by type (e.g., triangles, rectangles, circles, cubes, spheres, pyramids).
* Identify and name some of the faces (flat sides) of common three‐dimensional shapes using two-dimensional shape names.
* Combine two-dimensional shapes to create new shapes.
* Think about/imagine how altering the spatial orientation of a shape will change how it looks (e.g., turning it upside down).
 | **Quiz # 3****DUE:**  |
| **Reading:**  |
| Week #9 | **IELDS- Explore concepts of geometry and spatial relations**Demonstrate an understanding of location and ordinal position, using appropriate vocabulary. * Show understanding of location and ordinal position.

Use appropriate vocabulary for identifying location and ordinal position. | **DUE:**  |
| **Reading:**  |
|  Week #10 | **CCSS- Geometry (KG1-6)****Kindergarten** * Identify and describe shapes.
* Analyze, compare, create, and compose shapes.
 | **Quiz #4** |
| **DUE:**  |
| **Reading:**  |
| Week #11 | **IELDS - Begin to make predictions and collect data information**Generate questions and processes for answering them. * With teacher assistance, come up with meaningful questions that can be answered through gathering information.
* Gather data about themselves and their surroundings to answer meaningful questions.

Organize and describe data and information. * Organize, represent, and analyze information using concrete objects, pictures, and graphs, with teacher support.
* Make predictions about the outcome prior to collecting information, with teacher support and multiple experiences over time.

Determine, describe, and apply the probabilities of events. * Describe likelihood of events with appropriate vocabulary, such as “possible”, “impossible”, “always”, and “never”
 | **DUE:**  |
| **Reading:**  |
| Week #12 | **IELDS – Measurement of Objects and Quantities**Measure objects and quantities using direct comparison methods and nonstandard units. * Compare, order, and describe objects according to a single attribute.
* Use nonstandard units to measure attributes such as length and capacity.
* Use vocabulary that describes and compares length, height, weight, capacity, and size.
* Begin to construct a sense of time through participation in daily activities.
 | **DUE:**  |
| **Reading:**  |
| Week #13 | **IELDS – Measurement of Objects and Quantities**Begin to make estimates of measurements. * Practice estimating in everyday play and everyday measurement problems.

Explore tools used for measurement. * With teacher assistance, explore use of measuring tools that use standard units to measure objects and quantities that are meaningful to the child.

Know that different attributes, such as length, weight, and time, are measured using different kinds of units, such as feet, pounds, and seconds. | **DUE:**  |
| **Reading:**   |
| Week #14 | **CCSS - Measurement and Data** **Kindergarten (KMD 1-3)*** Describe and compare measurable attributes.
 | **Quiz #5** **DUE:**  |
| **Reading:**  |
| Week #15 |  |  |
| **Finals Week** |  |