# Course Description

This course emphasizes mathematical competencies aligned with the National Council of Teachers of Mathematics’ (NCTM) Principles and Standards, the Common Core State Standards Initiative (CCSSI), and the Pennsylvania Department of Education (PDE) Standard Aligned System as critical to mathematics instruction for preschool and elementary teachers. It addresses the component of essential mathematics, which is characterized by a shift of focus from computation to problem solving and reasoning. One of the greatest assets in understanding children’s mathematics is that the instructors deepen their own mathematical thinking. Therefore, part of this course is about practicing mathematics, generating mathematical conversations, and reflecting on your own mathematical knowledge. Participants will solve a variety of mathematical problems during the course.

**University Learning Outcomes (ULO)**

* **ULO1:** Communication Skills
* **ULO2:** Professional Competency
* **ULO3:** Moral and Ethical Judgment
* **ULO4:** Problem Solving
* **ULO5:** Critical Thinking ­
* **ULO6:** Leadership in Society
* **ULO7:** Critical and Competent Use of Technology

# Program Learning Outcomes (PLO)

* **PLO1:** Apply theoretical and practical knowledge in support of your professional practice. (ULO 2, 4)
* **PLO2:** Utilize educational research and develop your own research interests and agenda. (ULO 2, 3)
* **PLO3:** Examine and critique the economic, political, cultural, historical, and social influences that impact education in the United States. (ULO 1, 3, 5)
* **PLO4:** Apply policies, statutes, and rules established by state and local agencies relating to judicious application of disciplinary methods and behavioral procedures. (ULO 3, 4)
* **PLO5:** Identify and use instructional methods and curricula that are appropriate and effective in meeting the needs of individual learners. (ULO 1, 2, 4, 5)

# Course Learning Outcomes (CLO)

* **CLO1:** Determine how to apply basic math skills to effectively instruct elementary grade students in mathematics.
* **CLO2:** Determine how to integrate best practices and standards in lesson planning and performance demonstration.
* **CLO3:** Determine how to use manipulatives, technology, problem-based learning, and higher-order thinking skills to creatively and effectively teach math for young and elementary-aged children.
* **CLO4**: Analyze techniques for assessing children’s skills, progress, and understanding of math concepts.
* **CLO5**: Evaluate diverse methods of instruction to facilitate meaningful and lasting learning of math skills, concepts, and reasoning.

**Student Expectations**

Students are expected to do the following:

* Ask probing and insightful questions related to course content.
* Make meaningful and relevant connections and application to their own learning process.
* Be productive and contributing members of class discussions.

# Required Course Materials

Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2016). *Elementary and middle school mathematics: Teaching developmentally, Enhanced Pearson eText with Loose-Leaf Version – Access Card Package* (9th ed.). Boston, MA: Pearson. ISBN: 9780134046952

# Suggested Point Values

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Assessment** | **Point Value** | **Due** |
| **Week 1** | |  |  |
|  | Discussion: Building a PLC | 30 |  |
|  | Discussion: NCTM Videos | 30 |  |
|  | Discussion: Number Sense | 30 |  |
| **Week 2** | |  |  |
|  | Discussion: Thinking Strategies | 30 |  |
|  | Discussion: Third Grade Math Routines | 30 |  |
|  | Discussion: Using Math Talk | 30 |  |
|  | The Broken Calculator | 50 |  |
| **Week 3** | |  |  |
|  | Discussion: Singapore Math | 30 |  |
|  | Discussion: Helping ELLs Makes Sense of Math | 30 |  |
|  | Evaluating Math Lessons | 50 |  |
| **Week 4** | |  |  |
|  | Discussion: Pascal’s Triangle | 30 |  |
|  | Discussion: Instigating Thinking | 30 |  |
|  | Discussion: Effective Questioning | 30 |  |
|  | Unit of Math Study | 50 |  |
| **Week 5** | |  |  |
|  | Discussion: Tessellations | 30 |  |
|  | Discussion: Math Groups | 30 |  |
|  | Integrated Math Lesson | 80 |  |
| **Week 6** | |  |  |
|  | Discussion: Collecting, Representing, and Interpreting Data | 30 |  |
|  | Discussion: Introduction to Coordinate Graphing | 30 |  |
|  | Presentation: Teaching Charts and Graphs | 80 |  |
| **Week 7** | |  |  |
|  | Discussion: Formative Assessment | 80 |  |
|  | Discussion: Grading Practices | 30 |  |
|  | Wiki: Standards of Mathematical Practices | 30 |  |
|  | Field Experience Logs | 100 |  |
| **Total Points** | | **1000** |  |

# Course Schedule

|  |  |  |
| --- | --- | --- |
| **Week** | **Start** | **End** |
| One | <insert start date> | <insert end date> |
| Two |  |  |
| Three |  |  |
| Four |  |  |
| Five |  |  |
| Six |  |  |
| Seven |  |  |

# Weekly Learning Modules

|  |  |  |  |
| --- | --- | --- | --- |
| Week One: Problem Solving | |  | |
| ***Learning Objectives*** | | ***Alignment*** | |
| * 1. Explain the problem-solving process used in children’s mathematical thinking. | | CLO1 | |
| * 1. Describe how writing and mathematics are connected and how they support one another. | | CLO2, CLO4 | |
| * 1. Determine various methods children use to develop number sense. | | CLO1, CLO5 | |
| ***Required Learning Resources and Activities****: Students must complete any resources and activities listed in this section as selected by the instructor.* | | ***Alignment*** | ***Pages/AIE/***  ***Generic*** |
| **Readings and Videos**  **Read** Ch. 1–3 of *Elementary and Middle School Mathematics*.  **Read** the following articles:   * ["More or Less? A Lesson with Kindergartners and First and Second Graders"](http://mathsolutions.com/wp-content/uploads/0-941355-74-8_L3.pdf) * "A Brief History of Mathematics Education and the NCTM Standards" on Blackboard * ["A Brief History of American K-12 Mathematics Education in the 20th Century"](http://www.csun.edu/~vcmth00m/AHistory.html)   **Watch** the following videos:   * [Building Conceptual Understanding for Mathematics](http://www.nctm.org/Standards-and-Positions/Common-Core-State-Standards/Teaching-and-Learning-Mathematics-with-the-Common-Core/#1) (5:48) * [Mathematics in the Early Grades](http://www.nctm.org/Standards-and-Positions/Common-Core-State-Standards/Teaching-and-Learning-Mathematics-with-the-Common-Core/#2) (12:08) | | 1.1, 1.2, 1.3 | Video = 1 hour |
| **Number Sense Self-Assessment**  **Appraise** your own math skills by completing a [Fourth Grade Math](https://www.ixl.com/math/grade-4) self-assessment.  **Complete** A.1 through A.9 under the Number Sense heading. | | 1.3 | N/A |
| **Field-Based Experience: Preparation and Overview**  During this course, you will complete 20 hours of field-based work as it pertains to math teaching and learning in the elementary school. You must keep a record of the time spent on these field-based projects using the Field Experience Log. The logs will be due during Week Seven of the course and will account for 10% of your grade.  **Select** field-based projects, lessons, observations, or other activities related to the topic of teaching math in a Pre-K–4 school setting.  **Confirm** your field-based experience location, and submit it to your instructor for approval. | | All Course Objectives | N/A |
| **Tutorials**  During this course you will be asked to use and participate in various technologies to complete activities and assignments.  **Review** the tutorials available on Blackboard, as needed.  **Click** the **Student Resources** button from the menu on the left. | | N/A | N/A |
| **Weekly Participation and Discussion**  The purpose of the weekly discussions is to provide you with a way to synthesize the concepts presented in this course. Each week, you will respond to the discussion questions with a substantive post of 200 to 250 words that addresses all the prompts for the question by 11:59 p.m. EST of the listed due date. By the conclusion of each week, Sunday at 11:59 p.m. EST, you will make at least one substantive comment of 100 to 150 words to three of your classmates’ posts for each assigned discussion question. Your comments must further the discussion by following the RISE model for meaningful feedback. It is recommended that you check in periodically throughout the week to ensure that you are meeting the participation requirement.  **Review** the RISE Model for Peer Feedback, located on Blackboard. | | N/A | N/A |
| **Total** |  |  | N/A |
| ***Supplemental Learning Resources and Activities****: These resources and activities provide further exploration of content, supplemental information, and skill building. Students may complete items in this section on their own or as selected by the instructor.* | | ***Alignment*** | ***Pages/AIE/***  ***Generic*** |
| **Adobe Connect Live Discussion**  **Review** [Adobe Connect Resources](https://sites.gmercyu.edu/student-resources/adobe-connect-resources/).  **Participate** in the scheduled live session with the course instructor. This session will provide an overview of the class and discuss the major assignments in the course.  **Prepare** to ask questions concerning the content of the week and the course as a whole.  *Note:* A recorded lecture will be made available to those who are unable to attend the live session. | |  | Live Discussion: lecture and discussion = **1 hour** |
| **Total** |  |  | **1 hour** |
| ***Assignments****: Students must complete the weekly assignment(s).* | | ***Alignment*** | ***Points/AIE/***  ***Generic*** |
| **Discussion: Building a PLC**  **View** the course introduction and brief biography posted by your instructor.    **Post** a short biography introducing yourself to the class in the Building a PLC discussion forum by Thursday.  **Include** the following information:   * Your name * Professional background   + Past and current employment   + Educational background   + Licenses or certifications   + Special training or areas of expertise   + Research interests * Your mathematics background * Your feelings about teaching math * Your personal experiences of how you were taught math in school   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | NA | Discussion: one post and replies to three other posts = **1 hour** |
| **Discussion: NCTM Videos**  **Review** the following videos:   * [Building Conceptual Understanding for Mathematics](http://www.nctm.org/Standards-and-Positions/Common-Core-State-Standards/Teaching-and-Learning-Mathematics-with-the-Common-Core/#1) (5:48) * [Mathematics in the Early Grades](http://www.nctm.org/Standards-and-Positions/Common-Core-State-Standards/Teaching-and-Learning-Mathematics-with-the-Common-Core/#2) (12:08)   **Respond** to the following questions in the NCTM Videos reflection discussion forum by Thursday:   * How does math conceptual understanding develop in the early childhood years? * How does a solid mathematical foundation influence more advanced math concepts?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 1.1 | Discussion: one post and replies to three other posts = **1 hour** |
| **Discussion: Number Sense**  **Explore** the interactive math game [How Many Under the Shell?](http://illuminations.nctm.org/Activity.aspx?id=3566)  **Consider** how this math game can serve as a foundation for number sense for early childhood students (Pre-K–2).  **Respond** to the following questions in the Number Sense discussion forum by Thursday:   * What role do counting sequences play in helping students understand number concepts? * What naturally occurring classroom activities could serve as a context for teaching counting sequences? * How do students’ number representations help them communicate their mathematical understandings? * How can students communicate in writing about their thoughts regarding mathematical thinking?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 1.2, 1.3 | Discussion: one post and replies to three other posts = **1 hour** |
| **Total** |  |  | **5 hours** |

# Faculty Notes

**Adobe Connect:** Students should post any questions or comments they have to the Announcement forum. The instructor can then utilize those questions that come up in the first part of the week to tailor the live Adobe Connect class session that would be scheduled toward the later part of the week. That 1-hour synchronous session will allow students the opportunity to go over any questions they had with the homework and clarify any misconceptions they have about the course content. All Adobe Connect sessions should be recorded and a link to the recording be posted to the course page so any student who misses the session can review it later in the week.

*Note:* It is the instructor’s choice as to what day they will schedule the Adobe Connect Live Session, but it is recommended that they schedule this session for Wednesday of the week so students have plenty of time to review their homework prior to the deadline on Sunday.

**Field-Based Work:** Students are required to complete 20 hours of field-based work.

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| Week Two: Whole Numbers and Number Theory | |  |  |
| ***Learning Objectives*** | | ***Alignment*** | |
| * 1. Identify the properties of the four basic math operations. | | CLO1, CLO3 | |
| * 1. Describe the process of using problem-solving strategies in math. | | CLO3, CLO4 | |
| * 1. Explain the standard algorithms of the four basic math operations. | | CLO1, CLO3 | |
| * 1. Analyze prime and composite numbers. | | CLO1, CLO3 | |
| ***Required Learning Resources and Activities****: Students must complete any resources and activities listed in this section as selected by the instructor.* | | ***Alignment*** | ***Pages/AIE/***  ***Generic*** |
| **Readings and Video**  **Read** Ch. 4–6 of *Elementary and Middle School Mathematics*.  **Read** the following articles:   * ["What Could Be the Sum?"](http://www.mathsolutions.com/documents/0-941355-51-9_L.pdf) * ["How to Get Students Talking! Generating Math Talk That Supports Math Learning"](http://www.mathsolutions.com/documents/How_to_Get_Students_Talking.pdf) * ["Classroom Discussions: Using Math Talk in Elementary Classrooms"](http://mathsolutions.com/wp-content/uploads/978-1-935099-01-7_L.pdf)   **Watch** [Third Grade Math Routines](https://www.teachingchannel.org/videos/third-grade-math-routines) (5:42)  *Note: You may need to create a free account in order to view the library of videos. If it asks for a school or district, use one in your community if you are not already in a school setting.* | | 2.1, 2.2, 2.3, 2.4 | Video = 1 hour |
| **Total** |  |  | N/A |
| ***Assignments****: Students must complete the weekly assignment(s).* | | ***Alignment*** | ***Points/AIE/***  ***Generic*** |
| **Discussion: Thinking Strategies**  **Respond** to the following question in the Thinking Strategies discussion forum by Thursday:   * Do you believe that once children reach the abstract counting level, they are ready for activities that will help them move beyond counting to develop thinking strategies? Why or why not?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 2.2 | Discussion: one post and replies to three other posts = **1 hour** |
| **Discussion: Third Grade Math Routines**  **Review** [Third Grade Math Routines](https://www.teachingchannel.org/videos/third-grade-math-routines) (5:42)  **Respond** to the following questions in the Third Grade Math Routines discussion forum by Thursday:   * How do students practice multiplication in a variety of ways? * What engagement strategy does Ms. Saul use? * How do these activities build both skills fluency and conceptual understanding?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 2.2 | Discussion: one post and replies to three other posts = **1 hour** |
| **Discussion: Using Math Talk**  **Review** the following articles:   * ["How to Get Students Talking! Generating Math Talk That Supports Math Learning"](http://www.mathsolutions.com/documents/How_to_Get_Students_Talking.pdf) * ["Classroom Discussions: Using Math Talk in Elementary Classrooms"](http://mathsolutions.com/wp-content/uploads/978-1-935099-01-7_L.pdf)   **Respond** to the following question in the Using Math Talk discussion forum by Thursday, and cite evidence from both articles to support your answer:   * How can providing opportunities for students to talk about math help drive instruction, increase student engagement, and improve rigor in the classroom?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 2.2 | Discussion: one post and replies to three other posts = **1 hour** |
| **The Broken Calculator**  **Read** Broken Calculator <https://hcpss.instructure.com/courses/97/pages/broken-calculator>.  View Videos imbedded in the article: Routine – Broken Calculator – Multiplication  Routine - Broken Calculator - Division  **Write** a 350- to 500-word response to the following:How did the students in the videos meet the following objectives?   * Developing strategies to solve problems * Solving problems in more than one way * Working with relationships among numbers and operations of arithmetic * Recording, clarifying, and communicating mathematical ideas   **Submit** your answers by Sunday. | | 2.1, 2.3, 2.4 | N/A |
| **Total** |  |  | **4 hours** |

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| Week Three: Integers and Rational Numbers | |  |  |
| ***Learning Objectives*** | | ***Alignment*** | |
| * 1. Explain the importance of number sense in mathematics for all learners, including ELLS. | | CLO1, CLO4, CLO5 | |
| * 1. Explain how children learn about the concept of fractions. | | CLO4, CLO5 | |
| * 1. Evaluate math lessons that incorporate the National Council of Teachers of Math (NCTM) standards. | | CLO4, CLO5 | |
| ***Required Learning Resources and Activities****: Students must complete any resources and activities listed in this section as selected by the instructor.* | | ***Alignment*** | ***Pages/AIE/***  ***Generic*** |
| **Readings**  **Read** Ch. 7–10 of *Elementary and Middle School Mathematics*.  **Read** the following articles:   * ["Singapore Math: Simple or Complex?"](http://www.nychold.com/art-hoven-el-0711.pdf) * ["Helping English Language Learners Make Sense of Math Word Problems"](http://mathsolutions.com/documents/978-0-941355-84-1_L1.pdf) | | 3.1, 3.2, 3.3 | N/A |
| **National Council of Teachers of Math (NCTM)**  **Read** Correlations to Mathematics Common Core State Standards and NCTM’s Principles and Standards, located on Blackboard. | | 3.3 | N/A |
| **Fractions Self-Assessment**  **Appraise** your own math skills by completing a [Fourth Grade Math](https://www.ixl.com/math/grade-4) self-assessment.  **Complete** Q.1 through Q.16 under the Fraction Equivalence and Ordering heading. | | 3.1, 3.2, 3.3 | N/A |
| **Total** |  |  |  |
| ***Assignments****: Students must complete the weekly assignment(s).* | | ***Alignment*** | ***Points/AIE/***  ***Generic*** |
| **Discussion: Singapore Math**  **Review** [Singapore Math: Simple or Complex?](http://www.nychold.com/art-hoven-el-0711.pdf)  **Respond** to the following questions in the Singapore Math discussion forum by Thursday:   * What were some ways that word problems are solved using the Singapore math method? * What are your thoughts and ideas about using some of these strategies with students? * Would these methods have been useful to you as a student? Why or why not?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 3.1, 3.2 | Discussion: one post and replies to three other posts = **1 hour** |
| **Discussion: Helping English Language Learners Make Sense of Math**  **Review** “[Helping English Language Learners Make Sense of Math Word Problems](http://mathsolutions.com/documents/978-0-941355-84-1_L1.pdf).”  **Respond** to the following questions in the Helping English Language Learners Make Sense of Math discussion forum by Thursday:   * What are some ways that you should include English Language Learners in your math lessons? * What strategies should teachers utilize to make math more accessible to these learners?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 3.1 | Discussion: one post and replies to three other posts = **1 hour** |
| **Evaluating Math Lessons**  **Explore**the website [www.youcubed.org/week-of-inspirational-math/](https://na01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.youcubed.org%2Fweek-of-inspirational-math%2F&data=02%7C01%7Camiller%40synergiseducation.com%7Ce518e605770d4873987308d61d7bfa23%7C7a9bcbb102ab4062aafc53c0ba30b9ac%7C0%7C0%7C636728815658312993&sdata=XEJX3orpdWJfP4EaM8vMRgFdoZ%2FeSvGjaISwoFPiCRE%3D&reserved=0).    **Locate**one lesson plan at the Pre-K–2 grade level and one lesson plan at the 3–5 grade level from the website.    **Write**a 350- to 500-word evaluation for each lesson plan that addresses the following:          The PA Core Standards addressed in the mathematics content for each lesson        The essential mathematical ideas students will learn from the lessons        How you could use the lessons to improve mathematics instruction in your classroom        Any enhancements or extensions you would make to the lessons        The effectiveness of the lesson    **Submit**your evaluations by Sunday. | | 3.3 | N/A |
| **Total** |  |  | **2 hours** |

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| --- | --- | --- | --- |
| Week Four: Fractions and an Introduction to Geometry | |  |  |
| ***Learning Objectives*** | | ***Alignment*** | |
| * 1. Explain why children require higher-level thinking to perform proportional reasoning. | | CLO3, CLO5 | |
| * 1. Analyze how basic reasoning skills are incorporated into ratios and proportions. | | CLO1, CLO5 | |
| * 1. Describe how children demonstrate their geometrical thinking. | | CLO3, CLO4, CLO5 | |
| * 1. Determine how the PA Math Core Standards relate to the Standards Aligned System. | | CLO2, CLO3 | |
| ***Required Learning Resources and Activities****: Students must complete any resources and activities listed in this section as selected by the instructor.* | | ***Alignment*** | ***Pages/AIE/***  ***Generic*** |
| **Readings and Videos**  **Read** Ch. 11–15 of *Elementary and Middle School Mathematics*.  **Read** the following articles:   * "Go Figure: Math and the Common Core” located on Blackboard. * ["Depth-of-Knowledge (DOK) Levels for Mathematics"](http://static.pdesas.org/content/documents/DOK_Math_levels.pdf) * ["Depth of Knowledge: An Effective Tool for Educating Students"](http://www.rpdp.net/DOK_pdfs/DOK_ShopTalk_Article.pdf) * ["Instigating Thinking in Math Class"](http://www.ascd.org/publications/educational-leadership/dec12/vol70/num04/Instigating-Thinking-in-Math-Class.aspx)   **Watch** the following presentations:   * ["Depth of Knowledge Training"](https://prezi.com/dtt-g7uut7f4/depth-of-knowledge-training/)  * ["Annotated Lesson Plan"](http://media.gmercyu.edu/edu508/annotated-lesson-plan/index.html) * ["Geometry Lecture"](https://vimeo.com/103376989) [0:42] | | 4.1, 4.2, 4.3 | Video = 1 hour |
| **Pennsylvania Department of Education Standards Aligned System (PDESAS)**  **Explore** [PDESAS.org](http://pdesas.org/).  **Go** tothe [Standards](http://pdesas.org/Standard) section, click **Download Standards**, and download the **PA Core – Mathematics, Grades PreK-12**. You will refer to these standards as you develop your Unit of Math Study this week. | | 4.4 | N/A |
| **Total** |  |  | **N/A** |
| ***Assignments****: Students must complete the weekly assignment(s).* | | ***Alignment*** | ***Points/AIE/***  ***Generic*** |
| **Discussion: Pascal’s Triangle**  **Explore** the meaning behind symbolic notation at [Pascal's Triangle](http://www.mathsisfun.com/pascals-triangle.html).  **Respond** to the following questions in the Pascal’s Triangle discussion forum by Thursday:   * Why does the addition rule work? * Why should children have extensive experience with proportional reasoning and basic reasoning skills?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 4.1 | Discussion: one post and replies to three other posts = **1 hour** |
| **Discussion: Instigating Thinking**  **Review** “[Instigating Thinking in Math Class](http://www.ascd.org/publications/educational-leadership/dec12/vol70/num04/Instigating-Thinking-in-Math-Class.aspx).”  **Respond** to the following questions in the Instigating Thinking discussion forum by Thursday:   * What did Hiltabidel mean when she said that students should be involved in productive struggle when working with the Common Core standards and competencies in math? * What are some ways to ask questions that will engage students in working with the Common Core standards and competencies in math? * What are some other thoughts and ideas you have to encourage higher-order thinking in math?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 4.4 | Discussion: one post and replies to three other posts = **1 hour** |
| **Discussion: Developing Common Assessments**  **Watch** [Behind the Scenes: Building a Common Formative Assessment -- Elementary Math](https://www.youtube.com/watch?v=SqNMmSrE6Ac) (6:09)  **Respond** to the following questions in the Developing Common Assessments discussion forum by Thursday:   * What factors did the team consider when making changes to their assessments? * Which were some of the concepts with fractions that they determined should be revised? * How did this team of teachers collaborate to revise assessments for their students?   **Provide** constructive feedback to three of your classmates’ posts by Sunday. | | 4.1, 4.2, 4.3 | Discussion: one post and replies to three other posts = **1 hour** |
| **Unit of Math Study**  **Review** the Lesson Plan example.  **Select** a clearly defined math topic, such as geometry, fractions, place value, or ratio that is appropriate for Pre-K– 4 students.  **Design** a Unit of Study using the Lesson Plan Template that includes the following:   * 3 days of lessons lasting around 50–60 minutes each day * DOK levels * The PA Core Math Standards present in each activity   **Submit** your Unit of Math Study by Sunday. | | 4.4 | N/A |
| **Total** |  |  | **4 hours** |

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| Week Five: Geometry and Measurement | |  |  |
| ***Learning Objectives*** | | ***Alignment*** | |
| * 1. Explain how movement and transformations are essential to understanding geometry. | | CLO3, CLO4, CLO5 | |
| * 1. Determine how to integrate children’s literature into math lessons to assist in the learning of math concepts. | | CLO5 | |
| * 1. Explain how various math groupings influence student learning and student achievement. | | CLO5 | |
| ***Required Learning Resources and Activities****: Students must complete any resources and activities listed in this section as selected by the instructor.* | | ***Alignment*** | ***Pages/AIE/***  ***Generic*** |
| **Readings**  **Read** Ch. 16–18 of *Elementary and Middle School Mathematics*.  **Read** the following articles:   * ["Estimating Length: Differentiating Within a Unit"](http://mathsolutions.com/wp-content/uploads/9780941355773_L.pdf) * ["Math Groups that Make Sense"](http://www.ascd.org/publications/educational-leadership/feb12/vol69/num05/Math-Groups-That-Make-Sense.aspx) | | 5.1, 5.2, 5.3, 5.4 | N/A |
| **Geometry Self-Assessment**  **Appraise** your own math skills by completing a [Fourth Grade Math](https://www.ixl.com/math/grade-4) self-assessment.  **Complete** P.1 through P.29 under the Geometry heading. | | 5.1, 5.2 | N/A |
| **Total** |  |  | **N/A** |
| ***Assignments****: Students must complete the weekly assignment(s).* | | ***Alignment*** | ***Points/AIE/***  ***Generic*** |
| **Discussion: Tessellations**  **Respond** to the following questions in the Tessellations discussion forum by Thursday:   * How are tessellations a combination of motions? * Why are tessellations important to the concept of geometry? * How are tessellations useful to student thinking and learning with abstract concepts in geometry?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 5.1 | Discussion: one post and replies to three other posts = **1 hour** |
| **Discussion: Math Groups**  **Review** “[Math Groups that Make Sense](http://www.ascd.org/publications/educational-leadership/feb12/vol69/num05/Math-Groups-That-Make-Sense.aspx).”  **Respond** to the following questions in the Math Groups discussion forum by Thursday:   * What are the main ideas conveyed about math grouping practices? * What are some ways that teachers can utilize differentiated instruction to determine math groups? * What are some of the challenges with heterogeneous groupings? * What were some of your experiences with math groupings as a student?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 5.3 | Discussion: one post and replies to three other posts = **1 hour** |
| **Integrated Math Lesson**  **Identify** a piece of children’s literature that can be developed into a problem-solving lesson or used to provide the context (theme) for a series of mathematics lessons. The piece of literature (a children's storybook) you may select may be either a story that deals directly with a mathematical concept or a story that can be used as a theme for generating problems.  *Note:* The problems should not be simply counting the number of objects in a picture, but involve higher-order concepts.  **Develop** an integrated math lesson using the Lesson Plan Template, which includes the following:   * Three days of lessons lasting around 50–60 minutes each day * Activities centered around the literature * Identify the PA Core Math Standards present in each activity.   **Submit** your Integrated Math Lesson by Sunday. | | 5.2 | N/A |
| **Total** |  |  | **2 hours** |

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| Week Six: Statistics, Data Analysis, and Probability | |  |  |
| ***Learning Objectives*** | | ***Alignment*** | |
| * 1. Explain how children process statistics in mathematical problems. | | CLO3, CLO4 | |
| * 1. Analyze how to organize and represent data in graphs, charts, and tables. | | CLO4, CLO5 | |
| * 1. Identify how probability and ratio are used to determine chance. | | CLO3, CLO4, CLO5 | |
| ***Required Learning Resources and Activities:*** *Students must complete any resources and activities listed in this section as selected by the instructor.* | | ***Alignment*** | ***Pages/AIE/***  ***Generic*** |
| **Readings and Video**  **Read** Ch. 19–21 of *Elementary and Middle School Mathematics*.  **Read** the following articles:   * ["Collecting, Representing, and Interpreting Data"](http://mathsolutions.com/wp-content/uploads/0-941355-50-0_L.pdf) * ["Introduction to Coordinate Graphing"](http://mathsolutions.com/wp-content/uploads/0-941355-48-9_L2.pdf) * ["Looking at Data"](http://mathsolutions.com/wp-content/uploads/0-941355-75-6_L2.pdf)   **Watch** ["Probability"](https://vimeo.com/103376990) [0.28]. | | 6.1, 6.2, 6.3 | Video = 1 hour |
| **Probability and Statistics Self-Assessment**  **Appraise** your own math skills by completing a [Fourth Grade Math](https://www.ixl.com/math/grade-4) self-assessment.  **Complete** W.1 through W.5 under the Probability and Statistics heading. | | 6.2, 6.3 | N/A |
| **Total** |  |  | **N/A** |
| ***Assignments:*** *Students must complete the weekly assignment(s).* | | ***Alignment*** | ***Points/AIE/***  ***Generic*** |
| **Discussion: Collecting, Representing, and Interpreting Data**  **Review** “[Collecting, Representing, and Interpreting Data](http://mathsolutions.com/wp-content/uploads/0-941355-50-0_L.pdf).”  **Respond** to the following questions in the Collecting, Representing, and Interpreting Data discussion forum by Thursday:   * How can math teachers show graphs and charts in various ways to help students gain a better understanding of how to represent data? * How can students’ written responses support their mathematical thinking?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 6.1, 6.2 | Discussion: one post and replies to three other posts = **1 hour** |
| **Discussion: Introduction to Coordinate Graphing**  **Review** “[Introduction to Coordinate Graphing](http://mathsolutions.com/wp-content/uploads/0-941355-48-9_L2.pdf).”  **Respond** to the following questions in the Introduction to Coordinate Graphing discussion forum by Thursday:   * How does the mathematic academic vocabulary in this article support student responses? * How does coordinate graphing support the standards for charts and tables?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 6.1, 6.2 | Discussion: one post and replies to three other posts = **1 hour** |
| **Presentation: Teaching Charts and Graphs**  At parent math night, you have been assigned the task of explaining how parents can support their children at home on the major forms of presenting data: line graphs, bar charts, pie charts, and pictographs.Assume that your audience consists of parents who have limited English proficiency.  **Create** a multimedia presentation that includes the following:   * Explain each of the four types of charts and graphs. * Include sample data to represent each of the four types of charts and graphs. * Provide links to resources to assist parents at home with their children.   **Utilize** Microsoft*®* PowerPoint®, Prezi, or some other Web 2.0 tool to create your presentation. Include speaker’s notes to supplement the presentation content.  **Submit** your presentation or a link to your presentation to the Teaching Charts and Graphs discussion forum by Friday, to allow sufficient time for your classmates to review and respond.  **Review** at least one of your classmates’ presentations, and provide criticism, clarification, additional questions, or your own relevant thoughts by Sunday. | | 6.2 | Discussion: one post and replies to one other post = **1 hour** |
| **Total** |  |  | **4 hours** |

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| Week Seven: Algebraic Thinking and Assessment | |  |  |
| ***Learning Objectives*** | | ***Alignment*** | |
| * 1. Determine the underlying concepts of algebraic thinking. | | CLO4, CLO5 | |
| * 1. Explain the Standards of Mathematical Practices as a part of the Common Core State Standards. | | CLO2 | |
| * 1. Analyze how data from local, state, and national assessments can be used to drive instruction. | | CLO2, CLO5 | |
| ***Required Learning Resources and Activities****: Students must complete any resources and activities listed in this section as selected by the instructor.* | | ***Alignment*** | ***Pages/AIE/***  ***Generic*** |
| **Readings**  **Read** Ch. 22 & 23 of *Elementary and Middle School Mathematics*.  **Read** the following articles:   * ["Developing Algebraic Thinking Using Manipulatives"](http://mathsolutions.com/wp-content/uploads/Developing_Algebraic_Thinking_i35.pdf) * ["Every Day in Every Classroom"](http://www.ascd.org/publications/educational-leadership/nov09/vol67/num03/Every-Day-in-Every-Classroom.aspx) * ["The Best Value in Formative Assessment"](http://www.ascd.org/publications/educational-leadership/dec07/vol65/num04/The-Best-Value-in-Formative-Assessment.aspx) * ["Standards for Mathematical Practice"](http://www.corestandards.org/Math/Practice/) * ["The Case Against the Zero"](http://www.ccresa.org/Files/Uploads/252/The_Case_Against_Zero.pdf) | | 7.1, 7.2, 7.3 | N/A |
| **Algebra Self-Assessment**  **Appraise** your own math skills by completing a [Fourth Grade Math](https://www.ixl.com/math/grade-4) self-assessment.  **Complete** G.1 through G.6 under the Algebra heading. | | 7.1 | N/A |
| **Total** |  |  | **N/A** |
| ***Supplemental Learning Resources and Activities****: These resources and activities provide further exploration of content, supplemental information, and skill building. Students may complete items in this section on their own or as selected by the instructor.* | | ***Alignment*** | ***Pages/AIE/***  ***Generic*** |
| **Adobe Connect Live Discussion**  **Participate** in the scheduled live session with the course instructor. This session will provide a summary of the course.  **Prepare** to ask questions concerning the content of the course and provide constructive feedback.  *Note:* A recorded lecture will be made available to those who are unable to attend the live session. | | All Course Objectives | Live Discussion: lecture and discussion = **1 hour** |
| **Total** |  |  | **1 hour** |
| ***Assignments****: Students must complete the weekly assignment(s).* | | ***Alignment*** | ***Points/AIE/***  ***Generic*** |
| **Discussion: Formative Assessment**  **Review** the following articles:   * ["Every Day in Every Classroom"](http://www.ascd.org/publications/educational-leadership/nov09/vol67/num03/Every-Day-in-Every-Classroom.aspx) * ["The Best Value in Formative Assessment"](http://www.ascd.org/publications/educational-leadership/dec07/vol65/num04/The-Best-Value-in-Formative-Assessment.aspx)   **Respond** to the following questions in the Formative Assessment discussion forum by Thursday:   * How can assessment be used for learning rather than as an assessment of learning? * What type of assessment do you think most teachers use when teaching math?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 7.3 | Discussion: one post and replies to three other posts = **1 hour** |
| **Discussion: Grading Practices**  **Review** “[The Case Against the Zero](http://www.ccresa.org/Files/Uploads/252/The_Case_Against_Zero.pdf).”  **Respond** to the following questions in the Grading Practices discussion forum by Thursday:   * What is the best way for students to be graded? * What are your thoughts in second-chance learning?   **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to three of your classmates' posts by Sunday. | | 7.3 | Discussion: one post and replies to three other posts = **1 hour** |
| **Wiki: Standards of Mathematical Practices (SMP)**  **Read** the [Standards for Mathematical Practice](http://www.corestandards.org/Math/Practice/) from the Common Core State Standards Initiative.  **Select** two of the SMPs that you feel are most important for you as a future elementary classroom teacher, and explain how you would apply them in your teaching practices by Thursday.  **Post** constructive criticism, clarification, additional questions, or your own relevant thoughts to at least three of your classmates' posts by Sunday.  Example:   |  |  |  | | --- | --- | --- | | **Common Core State Standards for Mathematical Practice** | **Add your thoughts to 2 of these standards, and include your name at the beginning of your response.** | **Provide feedback to 1 of your classmates’ posts, and include your name at the beginning of your response.** | | 1. Make sense of problems, and persevere in solving them. | (Amy M.) As a Pre-K instructor, I would… | (Mike D.) Amy, this is an interesting point, but I wonder… | | | 7.2 | Wiki = **1 hour** |
| **Field Experience Logs**  **Submit** your Field Experience Logs by Sunday. | | All Course Objectives | Field-Based Experience = **20 hours** |
| **Total** |  |  | **24 hours** |

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# Faculty Notes

**Field Experience Logs:** Please submit students’ Field-Based Experience Logs upon course completion:

Access the **Full Grade Center**.

Right-click on the column name and select**Assignment File Download**.

Click the box next to **Name**to select all users.

Click the **Submit** button.

Click **Download assignments now**.

Save the file to your Desktop or Z Drive.

Email the zip file to the program director.

**Wiki: Standards of Mathematical Practices:** Copy the wiki template below into Blackboard.

|  |  |  |
| --- | --- | --- |
| **Common Core State Standards for Mathematical Practice** | **Add your thoughts to 2 of these standards, and include your name at the beginning of your response.** | **Provide feedback to 1 of your classmates’ posts, and include your name at the beginning of your response.** |
| 1. Make sense of problems, and persevere in solving them. |  |  |
| 2. Reason abstractly and quantitatively. |  |  |
| 3. Construct viable arguments, and critique the reasoning of others. |  |  |
| 4. Model with mathematics. |  |  |
| 5. Use appropriate tools strategically. |  |  |
| 6. Attend to precision. |  |  |
| 7. Look for and make use of structure. |  |  |
| 8. Look for and express regularity in repeated reasoning. |  |  |

# Breakdown of Academic Instructional Equivalencies

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| **Week 1** |  |  |
| Required |  | 4 |
| Supplemental |  | 1 |
|  |  |  |
| **Week 2** |  |  |
| Required |  | 4 |
| Supplemental |  |  |
|  |  |  |
| **Week 3** |  |  |
| Required |  | 2 |
| Supplemental |  |  |
|  |  |  |
| **Week 4** |  |  |
| Required |  | 4 |
| Supplemental |  |  |
|  |  |  |
| **Week 5** |  |  |
| Required |  | 2 |
| Supplemental |  |  |
|  |  |  |
| **Week 6** |  |  |
| Required |  | 4 |
| Supplemental |  |  |
|  |  |  |
| **Week 7** |  |  |
| Required |  | 23 |
| Supplemental |  | 1 |
|  |  |  |
|  |  |  |
| **Total Required Hours** |  | 43 |
| **Total Supplemental Hours** |  | 2 |
| **Total Hours** |  | 45 |