



NEW JERSEY CENTER
FOR TEACHING & LEARNING

Progressive Science Initiative® (PSI®)

MATH6415: Learning & Teaching Elementary Mathematics I

Primary Student Contact: Kristin DeAngelis kristin@njctl.org

Faculty Team:

| | |
|-------------------|-------------------|
| Dr. Bob Goodman | bob@njctl.org |
| Kristin DeAngelis | kristin@njctl.org |
| Audra Crist | audra@njctl.org |
| Maria Surace | maria@njctl.org |
| Katy Goodman | katy@njctl.org |
| Brian Simone | brian@njctl.org |

Course Credit: 3.0 NJCTL credits

Dates & Times:

This is a 3-credit, self-paced course, covering 10 modules of content. The exact number of hours that you can expect to spend on each module will vary based upon the module coursework, as well as your study style and preferences. You should plan to spend approximately 15 hours per credit working online, and up to 30 hours per credit working offline.

Graduate Student Handbook: www.njctl.org/graduate-handbook/

COURSE DESCRIPTION:

This 3-credit course is the first in a two-course series designed for those who are currently teaching, or are preparing to teach, elementary mathematics. Learners will develop a strong understanding of mathematical concepts and instructional strategies necessary to effectively teach K-6 mathematics. The topics include counting & cardinality, operations & algebraic thinking, numbers & operations in base-ten, numbers & operations with fractions, and geometry.

STUDENT LEARNING OUTCOMES:

Upon completion of the course, the student will be able to:

1. Demonstrate a deep understanding of elementary mathematics concepts, including how to teach them, as detailed in the module learning outcomes below.
2. Integrate PMI materials (including presentations, labs, practice problems, etc.) to support student learning and deliver effective instruction.
3. Create a social constructivist learning environment through the use of formative assessment questions, interpreting the results of this assessment to effectively facilitate student-led discussions that support deeper understanding of the content.

4. Integrate multiple attempts to demonstrate student mastery of content knowledge, as encouraged/fostered by the PMI pedagogy.
5. Implement learning plans that are aligned to Common Core standards that allow for differentiation.

TEXTS, READINGS, INSTRUCTIONAL RESOURCES:

Required Texts:

- PMI Learning & Teaching Elementary Math I uses a free digital textbook accessible within the LMS.
- Participants will also need to access the Common Core State Standards at: <http://www.corestandards.org/Math/>

Recommended Texts:

There is no additional text.

COURSE REQUIREMENTS:

In order to receive a passing grade, the participant must complete the following course requirements:

Activities: A number of different learning activities will ensure participant engagement and learning in the course. These include:

- Engage in video module lessons which demonstrate minimized direct instruction followed by frequent formative assessment
- Completion of formative assessments aligned to learning objectives which include detailed analysis when answered incorrectly.
- Interaction with module discussion boards that allow conversation with peers and course instructors about the module's content, delivering that content to students. Discussion boards also serve as a place to ask and answer questions related to the module's content.

Short Answer Assignment: Each module requires one original response to a given prompt. These prompts are typically based upon course lessons and require teachers to analyze, reflect, and make connections between the module's content and their own classroom practice.

Mastery Exercises: For each module, these multiple-choice question quizzes assess the content knowledge gained in a module. Participants have the opportunity to retake; random questions are pulled from a larger question bank on each attempt ensuring varied questions.

Virtual Labs: In each module, a virtual lab write-up will be submitted. Virtual labs are interactive lab simulations that promote discovery-based student learning through real-world applications and analysis.

Module Exam: One is completed at the end of each module. It is a culminating exam consisting of multiple choice and free response questions aligned to the standards and objectives of the module.

Reflection Paper: At the end of the course, participants are required to reflect on the knowledge taught in the course, make connections, and compare/contrast their current pedagogy with new strategies gained in this assignment.

Final Exam: At the end of the course, a comprehensive exam consisting of Multiple Choice and Free Response questions assesses the content knowledge learned throughout the course.

GRADE DISTRIBUTION AND SCALE:

Grade Distribution:

| | |
|--------------------------|-----|
| Module Exams | 70% |
| Final Exam | 10% |
| Labs | 6% |
| Short Answer Assignments | 6% |
| Mastery Exercises | 6% |
| Reflection Paper | 2% |

Grade Scale:

| | |
|----|---------------|
| A | 93 – 100 |
| A- | 90 – 92 |
| B+ | 86 – 89 |
| B | 83 – 86 |
| B- | 80 – 82 |
| C+ | 77 – 79 |
| C | 73 – 76 |
| C- | 70 – 72 |
| D | 60.0 – 69.9 |
| F | 59.9 or below |

GRADING RUBRIC:

The following rubric is used to score:

- Short Answer Assignment – 6% of grade
- Reflection Paper – 2% of grade

The minimum possible score for this rubric is 4 points, and the score will be converted to the minimum grade available in this module (which is zero unless the scale is used). The maximum score 25 points will be converted to the maximum grade.

Intermediate scores will be converted respectively and rounded to the nearest available grade. If a scale is used instead of a grade, the score will be converted to the scale elements as if they were consecutive integers.

| | Meets Expectation | Approaches Expectation | Below Expectation | Limited Evidence |
|--|--------------------------|-------------------------------|--------------------------|-------------------------|
| | <i>7 points</i> | <i>5 points</i> | <i>3 points</i> | <i>1 point</i> |

| | | | | |
|------------------------------|--|---|--|---|
| Content | <ul style="list-style-type: none"> • Demonstrates excellent knowledge of concepts, skills, and theories relevant to topic. | <ul style="list-style-type: none"> • Demonstrates fair knowledge of concepts, skills, and theories. | <ul style="list-style-type: none"> • Demonstrates incomplete or insubstantial knowledge of concepts, skills, and theories. | <ul style="list-style-type: none"> • Demonstrates little or no knowledge of concepts, skills, and theories. |
| Depth of Reflection | <ul style="list-style-type: none"> • Content is well supported and addresses all required components of the assignment. | <ul style="list-style-type: none"> • Content is partially supported; addresses most of the required components of the assignment. | <ul style="list-style-type: none"> • Content contains major deficiencies; addresses some of the required components of the assignment. | <ul style="list-style-type: none"> • Content is not supported and/or includes few of the required components of the assignment. |
| Evidence and Practice | <ul style="list-style-type: none"> • Response shows strong evidence of synthesis of ideas presented and insights gained throughout the entire course. The implications of these insights for the respondent's overall teaching practice are thoroughly detailed, as applicable. | <ul style="list-style-type: none"> • Writing is mostly clear, concise, and well organized with good sentence/paragraph construction. Thoughts are expressed in a coherent and logical manner. There are no more than five spelling, grammar, or syntax errors per page of writing. | <ul style="list-style-type: none"> • Response is missing some components and/or does not fully meet the requirements indicated in the instructions. Some questions or parts of the assignment are not addressed. Some attachments and additional documents, if required, are missing or unsuitable for the purpose of the assignment. | <ul style="list-style-type: none"> • Response excludes essential components and/or does not address the requirements indicated in the instructions. Many parts of the assignment are addressed minimally, inadequately, and/or not at all. |
| | <i>4 points</i> | <i>3 points</i> | <i>2 points</i> | <i>1 point</i> |
| Writing Quality | <ul style="list-style-type: none"> • Writing is well-organized, clear, concise, and focused; no errors. | <ul style="list-style-type: none"> • Some minor errors or omissions in writing organization, focus, and clarity. | <ul style="list-style-type: none"> • Some significant errors or omissions in writing organization, focus, and clarity. | <ul style="list-style-type: none"> • Numerous errors in writing organization, focus, and/or clarity. |

The following rubric is used to score:

- Labs – 6% of grade

The minimum possible score for this rubric is 2 points, and the score will be converted to the minimum grade available in this module (which is zero unless the scale is used). The maximum score of 14 points will be converted to the maximum grade.

Intermediate scores will be converted respectively and rounded to the nearest available grade. If a scale is used instead of a grade, the score will be converted to the scale elements as if they were consecutive integers.

| | Meets Expectation | Approaches Expectation | Below Expectation | Limited Evidence |
|---------------------|--|--|---|---|
| | <i>7 points</i> | <i>5 points</i> | <i>3 points</i> | <i>1 point</i> |
| Completeness | <ul style="list-style-type: none"> Lab write-up is complete with no missing fields. | <ul style="list-style-type: none"> Lab write-up has 1-2 missing fields. | <ul style="list-style-type: none"> Lab write up has 3-5 missing fields. | <ul style="list-style-type: none"> There are more than 5 missing fields on the lab write-up. |
| Calculations | <ul style="list-style-type: none"> All answers are calculated correctly. | <ul style="list-style-type: none"> Most answers are calculated correctly, but there are 1-2 minor calculation errors. | <ul style="list-style-type: none"> Most answers are calculated correctly, but there are multiple minor calculation errors, or 1-2 gross miscalculations. | <ul style="list-style-type: none"> There are calculation errors throughout the lab. |

The remaining types of assignments are not scored using a rubric. These assignments are scored using percentage correct to assign a letter grade. The assignments in this manner are as follows:

- Mastery Exercises – 6% of grade
- Module Exams – 70% of grade
- Final Exam – 10% of grade

Mastery Exercises can be retaken as many times as desired to ensure a high score. Due to the nature of these assignments, each time they are taken, they will be composed of unique questions pulled randomly from a larger question bank.

Module Exams can be retaken one time. Final Exams cannot be retaken.

ACADEMIC STANDING:

NJCTL has established standards for academic good standing within a student’s academic program. Students enrolled in any NJCTL online course must receive an 80 or higher to successfully complete a course and receive credit for that course. An 80 is equivalent to a GPA of 2.7 or B-. Additionally, students in an endorsement program must receive a cumulative GPA of 3.0 for all courses combined in order to successfully complete the program.

ACADEMIC INTEGRITY:

Students must assume responsibility for maintaining honesty in all work submitted for credit and in any other work designated by the instructor of the course. Academic dishonesty includes cheating, fabrication, facilitating academic dishonesty, plagiarism, reusing /repurposing your own work, unauthorized possession of academic materials, and unauthorized collaboration.

CITING SOURCES WITH APA STYLE:

All students are expected to follow proper writing and APA requirements when citing in APA (based on the APA Style Manual, 6th edition) for all assignments.

DISABILITY SERVICES STATEMENT:

We are committed to providing reasonable accommodations for all persons with disabilities. Any

student with a documented disability requesting academic accommodations should contact the Dean of Students, Melissa Axelsson, for additional information to coordinate reasonable accommodations for students with documented disabilities (melissa@njctl.org).

NETIQUETTE:

Respect the diversity of opinions among the instructor and classmates and engage with them in a courteous, respectful, and professional manner. All posts and classroom communication must be conducted in accordance with the student code of conduct. Think before you push the Send button. Did you say just what you meant? How will the person on the other end read the words?

Maintain an environment free of harassment, stalking, threats, abuse, insults or humiliation toward the instructor and classmates. This includes, but is not limited to, demeaning written or oral comments of an ethnic, religious, age, disability, sexist (or sexual orientation), or racist nature; and the unwanted sexual advances or intimidations by email, or on discussion boards and other postings within or connected to the online classroom.

If you have concerns about something that has been said, please let your instructor know.

CLASS SCHEDULE:

| Module | Module Learning Outcomes | Assignments |
|---|--|---|
| 1 – Whole Numbers, Natural Numbers & Place Value | <ul style="list-style-type: none"> Students will be able to understand the concepts of natural numbers and whole numbers. Students will be able to compare and order integers and rational numbers. Students will be able to apply their prior knowledge of the number system to problems involving integers. Students will understand place value and how to write numbers in standard, numeric and expanded forms. | <ul style="list-style-type: none"> Short Answer Lab Mastery Exercises Module Exam |
| 2 – Operations with Whole & Natural Numbers | <ul style="list-style-type: none"> Students will carry out the operations of addition, subtraction, multiplication and division. Students will understand relationships between the operations of addition, subtraction, multiplication and division. | <ul style="list-style-type: none"> Short Answer Lab Mastery Exercises Module Exam |
| 3- Integers & Rational Numbers | <ul style="list-style-type: none"> Students will be able to understand the concepts of opposite numbers, negative numbers, and absolute value. Students will be able to compare and order integers and rational numbers. Students will be able to apply their prior knowledge of the number system to problems involving integers. Students will be able to add, subtract, multiply and divide integers. | <ul style="list-style-type: none"> Short Answer Lab Mastery Exercises Module Exam |
| 4 – Factors & Multiples | <ul style="list-style-type: none"> Students will explore even and odd numbers. Students will review divisibility rules. Students will use factors and multiples to find both GCFs and LCMs. | <ul style="list-style-type: none"> Short Answer Lab Mastery Exercises Module Exam |

| | | |
|---|--|---|
| 5 – Fraction Concepts & Early Computation | <ul style="list-style-type: none"> • Students will be able to understand that a fraction is another representation of a division problem. • Students will be able to calculate the sum and difference of fractions with unlike denominators, including mixed numbers. • Students will be able to model and solve multiple step word problems using operations with fractions. | <ul style="list-style-type: none"> • Short Answer • Lab • Mastery Exercises • Module Exam |
| 6 – Multiplication & Division of Fractions | <ul style="list-style-type: none"> • Students will develop an understanding for multiplication of whole numbers by fractions as well as fractions by fractions. • Students will develop an understanding of division of a fraction by a unit fraction and a fraction by a unit fraction by using a concrete model. • Students will be able to calculate the product and quotient of two fractions. • Students will be able to model and solve multiple step word problems using operations with fractions. | <ul style="list-style-type: none"> • Short Answer • Lab • Mastery Exercises • Module Exam |
| 7 – Decimal Operations | <ul style="list-style-type: none"> • Students will review long division. • Students will practice and learn the standard algorithms for decimal computation. • Students will be able to solve real world application problems that involve the addition, subtraction, multiplication and division of decimals. • Students will be able to add, subtract, multiply and divide rational numbers. • Students will be able to transform rational numbers into decimals. | <ul style="list-style-type: none"> • Short Answer • Lab • Mastery Exercises • Module Exam |
| 8 - Geometry | <ul style="list-style-type: none"> • Students will be able to identify basic 2 and 3 dimensional shapes, including their names and characteristics. • Students will be able to determine the perimeter, area and volume of basic shapes. • Students will be able to find lines of symmetry. • Students will identify and create types of lines. | <ul style="list-style-type: none"> • Short Answer • Lab • Mastery Exercises • Module Exam |
| 9 – Strategies for Teaching Elementary Mathematics | <ul style="list-style-type: none"> • Students will be able to use strategies that help students internalize math learning. | <ul style="list-style-type: none"> • Short Answer • Lab • Mastery Exercises • Module Exam |
| 10 – Final Reflection | <ul style="list-style-type: none"> • Review topics as desired • Zoom conference with instructor to review for final exam | <ul style="list-style-type: none"> • Reflection Paper • Final Exam |