NEW JERSEY CENTER
FOR TEACHING & LEARNING

Progressive Mathematics Initiative® (PMI®)
MATH6433: Learning and Teaching Geometry

Instructors/Email: Dr. Robert Goodman   bob@njctl.org

Audra Crist   audra@njctl.org

Maria Surace   maria@njctl.org

Course Credit: 4.0 NJCTL credits

Dates & Times:
This is a 4-credit, self-paced course, covering 13 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 12-20 hours per module, completing the module slides, readings, short answer assignments, labs, mastery exercises, practice problems, and module exams.

LMS Link: https://moodle.njctl.org/course/view.php?id=99

COURSE DESCRIPTION:
This course is for teachers who intend to become middle school and/or high school mathematics teachers. This is a proof-based course that requires teachers to develop skills in writing deductive geometric proofs. It provides teachers with the background knowledge, at an introductory college level, of Euclidean Geometry and applies that knowledge when writing proofs and problem solving. While the focus will be on two-column proofs, there will be some exposure to other types of proof.

This course includes topics taken from the middle school and high school Common Core State Standards for Mathematics (CCSS) and the New Jersey State Standards for Mathematics. The focus is the conceptual development of points, lines, planes, angles & proofs and their application to the understanding of triangles, similar triangles & trigonometry, congruent triangles, circles, analytic geometry, transformations, quadrilaterals, area, volume, and probability.

STUDENT LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:
1. Integrate PSI-PMI materials to support student learning and deliver effective instruction.
2. Implement hands-on and virtual labs to promote discovery-based student learning.
0. Create a social constructivist learning environment through the use of formative assessment questions.
0. Interpret the results of formative assessment to effectively facilitate student-led discussions that build mental models that support the understanding of the content.

0. Integrate multiple attempts to demonstrate student mastery of content knowledge, as encouraged/fostered by the PSI-PMI pedagogy.
0. Implement learning plans that are aligned to Common Core standards, incorporate literacy strategies and allow for differentiation.

TEXTS, READINGS, INSTRUCTIONAL RESOURCES:
Required Texts:
- This course uses a free digital textbook accessible at: https://njctl.org/courses/math/geometry/
- Participants will download SMART Notebook presentations, homework files, labs, and teacher resources from the PMI Geometry course

Recommended Readings:
- Related articles within discussion prompts

COURSE REQUIREMENTS:
In order to receive a Passing grade, the participant must complete the following course requirements:
1. 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.
2. Short Answer Assignment: Each module requires one (1) 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.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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

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 /re-purposing 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, Dr. Rosemary Knab, additional information to coordinate reasonable accommodations for students with documented disabilities (rosemary@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	Required Readings	• Assignments
1 – Points, Lines, & Planes	• PDFs of presentations within the module.	• Short Answer • Lab • Mastery Exercise • Module Exam
2 – Angles & Introduction to Proof	• PDFs of presentations within the module.	• Short Answer • Lab • Mastery Exercise • Module Exam
	• **4 - Geometry**	
3 – Parallel Lines	• PDFs of presentations within the module.	• Short Answer • Lab • Mastery Exercise • Module Exam
4 – Triangles	• PDFs of presentations within the module.	• Short Answer • Lab • Mastery Exercise • Module Exam
5 – Similar Triangles & Trigonometry	• PDFs of presentations within the module.	• Short Answer • Lab • Mastery Exercise • Module Exam
6 – Congruent Triangles	• PDFs of presentations within the module. • Article embedded in discussion	• Short Answer • Lab • Mastery Exercise • Module Exam
7 – Circles	• PDFs of presentations within the module.	• Short Answer • Lab • Mastery Exercise • Module Exam
8 – Analytic Geometry	• PDFs of presentations within the module.	• Short Answer Assignment • Lab • Mastery Exercise • Module Exam

9 – Transformations	● PDFs of presentations within the module.	● Short Answer Assignment ● Lab ● Mastery Exercise ● Module Exam
10 – Quadrilaterals	● PDFs of presentations within the module.	● Short Answer Assignment ● Lab ● Mastery Exercise ● Module Exam
11 – Area of Figures	● PDFs of presentations within the module.	● Short Answer Assignment ● Lab ● Mastery Exercise ● Module Exam
12 – 3D Geometry	● PDFs of presentations within the module.	● Short Answer Assignment ● Lab ● Mastery Exercise ● Module Exam
13 – Probability	● PDFs of presentations within the module.	● Short Answer Assignment ● Lab ● Mastery Exercise ● Module Exam
14 – Reflection & Final Exam	● Review topics from course ● Zoom meeting with course instructor, as needed	● Reflection Paper ● Final Exam