# Naugatuck Valley Community College
# STEM Division
# Science, Technology, Engineering and Mathematics

# Common Course Syllabus
# Geometry MAT*H148

**COURSE TITLE**:  Geometry, MAT*H148

**COURSE DESCRIPTION:** A foundation course in Euclidean geometry using an axiomatic as well as an inquiry approach. Topics include inductive and deductive reasoning, logic, polygons, parallelism, congruence, similarity, coordinate geometry, direct, indirect and coordinate proof, and three-dimensional space. A brief introduction to non-Euclidean geometry will be presented if time permits. As appropriate, computer software is used to encourage exploration and promote the formulation of hypotheses.

**NUMBER OF CREDITS:** 3 credit hours

**PREREQUISITE:** Grade of "C" or better in MAT*H137 (Intermediate Algebra) or an appropriate score on a college placement exam.

**COURSE OBJECTIVES:**
1. Further develop ability to reason logically by learning foundational geometry concepts.
2. Engage in activities that require identifying, analyzing, and solving problems.
3. Study the geometric topics of points, lines, planes, polygons, circles, and three-dimensional figures.
4. Analyze if-then statements and construct proofs.
5. Use coordinate geometry and transformations.

**LEARNING OUTCOMES:** At the end of this course the student will be able to do the following:

1. Inductive and Deductive Reasoning —
   a. Explain the difference between inductive and deductive reasoning.
   b. Explain the difference between validity and truth.
   c. Explain the difference between defined and undefined terms.
   d. Explain the difference between an axiom and a theorem.

2. Logic —
   a. Define a logical system.
   b. Form a negation.
   c. Form a conjunction and a disjunction.
   d. Establish the relationship between the validity of an argument and the truth values of the hypothesis and the conclusion.
   e. Use the paragraph method and indirect methods for proving selected theorems.

3. Points, Lines, Planes and Angles —
   a. Define a segment, ray, half line, half plane, and angle.
   b. Perform the basic constructions: bisection of a line segment, bisection of an angle, perpendicular to a line from a point P on the line and from a point P off the line, construction of an angle congruent to a given angle, construction of a line parallel to a given line through a point P off the line.

4. Separations —
   a. Define a convex set.
   b. Define a simple closed curve.
   c. Define polygon and identify polygons by their specific names.

5. Congruence —
   a. Prove selected properties of a triangle.
   b. Explain the differences between and similarities among parallelograms, trapezoids, rectangles, rhombuses and squares.
   c. Discover and prove many of the special properties of a parallelogram, trapezoid, rectangle, rhombus and square.
   d. Define an equivalence relation.
   e. Explain the difference between the measure of a geometric set of points and the congruence of two sets of points.
   f. Establish congruence of segments and angles.
   g. Establish congruence of triangles using SAS, ASA, SSS, AAS, or HL and by counterexample prove SSA is not a congruence theorem.

6. Measures —
   a. Compute the perimeter of selected polygons, the circumference of a circle, and the area, surface area, and volume of selected geometric figures.
   b. Define the interior and exterior of a circle, tangent to a circle, secant, chord, diameter, and use circle theorems to compute the measures of secant segments, tangent segments, and parts of chords.
   c. Find the measures of central angles, inscribed angles and other arc-angle measures.

7. Parallelism and Similarity —
   a. State the parallel axiom, explain its independence and the mathematical consequences of its independence.
   b. State some of the flaws in the ELEMENTS and explain how these flaws were corrected by mathematicians who followed Euclid.
   c. State and apply the Pythagorean Theorem and its converse.
   d. Establish the similarity of triangles using AA, SAS, ASA, SSS.
   e. Use 30-60 and 45-45 right triangle relationships to compute the measures of sides of triangles in applied problems.
   f. Define the sine, cosine, and tangent of an acute angle and use them in applied problems.
   g. Find the trigonometric ratios for 30, 60, and 45 degree angles.

8. Coordinate Geometry —
   a. Compute the slope of a line and, using slopes, recognize parallel and perpendicular lines.
   b. Use their knowledge of the relationships of slopes for parallel and perpendicular lines in applied problems and coordinate proofs.
   c. Determine the equation of a line.
   d. State and use the distance formula in proofs and applied problems.
   e. Find the coordinates of the midpoint of a line segment and use in applied settings.
   f. Apply analytic methods to selected geometric theorems.
   g. Determine, for selected theorems, whether coordinate or direct Euclidean or indirect proof techniques should be used.

**GRADING SYSTEM:** For the purpose of computing numerical credit point averages, grades are evaluated as follows for each semester hour of credit. Grades on exams, papers, and quizzes, will be based on this grading system.

| Numeric Grade | Acceptable Letter Grade Range to be used by the instructor | Description |
|---|---|---|
| 90 –100 | A– to A | Excellent |
| 80 – 89 | B–, B, B+ | Above Average |
| 70 – 79 | C–, C, C+ | Average |
| 60 – 69 | D–, D, D+ | Below Average |
| Below 60 | F | Failing |

**CLASS CANCELLATION PROCEDURE:** *If the instructor is late, the class is expected to wait 15 minutes before leaving or until informed of a cancellation by a college official. Information on weather related closings/late openings concerning Naugatuck Valley Community College can be obtained through local radio and television stations, or via the college website (http://www.nvcc.commnet.edu).* **NOTE:** *An alternative assignment may be given if classes are canceled due to weather.*

**ACADEMIC HONESTY STATEMENT:** *At NVCC we expect the highest standards of academic honesty. Academic dishonesty is prohibited in accordance with the Board of Trustee's Proscribed Conduct Policy in Section 5.2.1 of the BOT Policy Manual. This policy prohibits cheating on examinations, unauthorized collaboration on assignments, unauthorized access to examinations or course materials, plagiarism, and other proscribed activities. Plagiarism is defined as the use of another's idea(s) or phrase(s) and representing that/those idea(s) as your own, either intentionally or unintentionally. Anyone who is caught cheating on exams, plagiarizing another's work or published material will fail the course regardless of progress made in the course.*

**CHILDREN ON CAMPUS:** *With permission of the instructor only – Children must be attended at all times by a responsible adult. The student must notify the instructor or supervisor prior to the beginning of the class or activity that a child is present. Instructors and/or supervisors are authorized to ask the student or program participants to leave should the presence of a child be disruptive.*

**CELL PHONE/PAGER USE POLICY:** *Students are hereby notified that cellular phones and beepers are allowed in class only if they are turned off or turned to a silent mode. Under no circumstances are telephones to be answered in class. Students who ignore this policy may be asked to leave class. When there are extenuating circumstances that require that a student be available by phone or beeper, the student should speak to the instructor prior to class, so that together they can arrive at an agreement concerning the device.*

**STUDENTS WITH SPECIAL NEEDS:** *Students who may require accommodations on the basis of a learning disability are encouraged to contact the Coordinator of Learning Disabilities. Students who may require accommodations on the basis of all other disabilities should contact the Coordinator of Disability Services. After providing documentation and completing the disability disclosure process, students are then encouraged to meet with their instructor(s) to discuss the accommodations approved by the appropriate Coordinator and to complete the Accommodations Agreement form. Accommodations are not retroactive, students are therefore encouraged to meet with their instructor(s) at the beginning of each semester. Instructors, in conjunction with appropriate college personnel, will provide assistance and/or accommodations only to those students who have completed the disability disclosure and accommodations process.*