Course Outline for Mathematics 37

TRIGONOMETRY WITH AN EMPHASIS ON ITS GEOMETRIC FOUNDATIONS

Catalog Description:

MTH 37 - Trigonometry with an Emphasis on its Geometric Foundations 5.00 units

Plane trigonometry, with topics from plane geometry. Contains the entire subject content of Mathematics 36. Includes circular and right triangle trigonometric functions; trigonometric equations, graphs and identities; triangle solutions. Polar coordinates. Also includes congruence, properties of polygons, parallel lines, similarity, areas, volumes, and coordinate geometry.

Prerequisite: MTH 55 (completed with a grade of "C" or higher) or , MTH 55L (completed with a grade of "C" or higher) or , MTH 55B (completed with a grade of "C" or higher) or an appropriate skill level demonstrated through the Early Assessment Program or an appropriate skill level demonstrated through the Mathematics Assessment process. May not receive credit if Mathematics 36 has been completed.

Grading Option: Letter Grade

Discipline:

<table>
<thead>
<tr>
<th>Units</th>
<th>Contact Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecture</td>
<td>5</td>
</tr>
<tr>
<td>Laboratory</td>
<td>0</td>
</tr>
<tr>
<td>Clinical</td>
<td>0.00</td>
</tr>
<tr>
<td>Total</td>
<td>5.00</td>
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Prerequisite Skills:

Before entry into this course, the student should be able to:

1. solve for a particular variable in a formula;
2. state the domain and range of a given function or given the graph of a function;
3. state domains and ranges of a function in set-builder and interval notation;
4. solve compound inequalities;
5. solve systems of linear equations in three unknowns using elimination and substitution;
6. solve applications involving a system of linear equations;
7. multiply polynomials;
8. factor polynomials by greatest common factor, by grouping and using special forms;
9. solve polynomial equations;
10. problem solve applications that contain polynomials;
11. solve quadratic equations by factoring, completing the square, square root principle and using the quadratic formula;
12. solve equations in quadratic form;
13. perform basic operations on complex numbers;
14. find complex roots of a quadratic equation;
15. sketch the graphs of linear, quadratic, rational, radical, exponential and logarithmic functions;
16. apply translations and reflections to obtain new graphs of quadratic, rational, radical, exponential and logarithmic functions;
17. identify the domains and ranges of linear, quadratic, rational, exponential and logarithmic functions;
18. sketch the graph of a circle and identify domain and range;
19. multiply, divide, add and subtract rational expressions;
20. simplify complex rational expressions;
21. solve rational equations;
22. solve applications that involve rational equations;
23. apply the properties of and perform operations with radicals;
24. apply the properties of and perform operations with rational and integer exponents;
25. solve radical equations;
26. find an inverse functions algebraically;
27. given a graph of function, sketch a graph of the inverse function;
28. perform function composition;
29. solve exponential and logarithmic equations;
30. find the distance between two points;
31. find the midpoint of a line segment.

Measurable Objectives:

Upon completion of this course, the student should be able to:

1. identify and use the trigonometric ratios in problem solving;
2. use radian measure;
3. define trigonometric functions in terms of the right triangle and the unit circle;
4. write down from memory the values of sine, cosine, and tangent functions of standard angles, both in degree and radian measure;
5. write down from memory the Pythagorean identities, reciprocal identities, double angle formulas for sine and cosine, and sum and difference formulas for the sine and cosine;
6. prove trigonometric identities;
7. use trigonometric formulas;
8. solve trigonometric equations with multiple angles over different intervals;
9. use the law of sines and the law of cosines to solve oblique triangles;
10. graph trigonometric functions;
11. graph the inverse sine, inverse cosine, and inverse tangent functions;
12. convert between polar coordinate system and rectangular coordinate system;
13. graph polar equations;
14. define and/or illustrate: segment, ray, angle, midpoint of a segment, bisector of an angle or segment, types of triangles and other polygons, congruence and similarity of triangles, perpendicular and parallel lines;
15. use definitions of the items in (14), along with postulates and theorems about them, together with undefined terms, to prove geometric theorems, both synthetically and analytically; and both directly and indirectly;
16. compute areas and volumes of geometric figures.

Course Content:
1. Trigonometric functions
2. Trigonometric equations
3. Trigonometric formulas and identities
4. The graphs of trigonometric functions and their inverses
5. Polar coordinates
6. Solution of triangles and related problems
7. Nature of an axiomatic system
8. Points, lines, planes, segments, rays, angles
9. Radian measure
10. Converse, inverse, contrapositive
11. Midpoint of a segment, bisector of a segment, bisector of an angle
12. Congruence (with related constructions) and similarity of triangles
13. Properties of triangles
14. Parallels and perpendiculars
15. Coordinate geometry
16. Properties of polygons
17. Areas of polygons, volumes and surface areas of polyhedra
18. Area and circumference of circle: volumes and surface areas of cylinders, cones, and spheres
19. Proofs of geometric theorems

Methods of Presentation:
1. Lecture/Discussion
2. Problem solving sessions

Assignments and Methods of Evaluating Student Progress
1. Typical Assignments
   A. Read section 3.1 in your text. Do exercises 1 – 13 odd, 15 – 20 all, and 27.
   B. Use the unit circles on a rectangular grid system to find values of \( \sin x \) for every angle that is a multiple of \( \pi/6 \) for the angles between 0 and 2\( \pi \). Using those values, draw the graph of \( y = \sin x \).
2. Methods of Evaluating Student Progress
   A. Quizzes
   B. Home Work
   C. Exams/Tests
   D. Final Examination
3. Student Learning Outcomes
   Upon the completion of this course, the student should be able to:
   A. Critically analyze mathematical problems using a logical methodology.
   B. Communicate mathematical ideas, understand definitions, and interpret concepts.
   C. Increase confidence in understanding mathematical concepts, communicating ideas and thinking analytically.

Textbooks (Typical):

Special Student Materials
1. Scientific calculator
2. Ruler
3. Compass

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