THE COLLEGE OF NEW JERSEY
MATHEMATICS AND STATISTICS DEPARTMENT

MAT 096 Pre-calculus ***0 S.H.***

I Course Description

This course is only for students going on to calculus. Topics include: fundamentals of algebra, trigonometry, and analytic geometry. Stress is on computational and problem-solving techniques.

II Course Objectives

A. The student should be able to:

1. Demonstrate basic properties of real and complex numbers.
2. Perform fundamental operations on algebraic and transcendental functions and simplify the results.
3. Determine the domain and range of these functions, including composite functions.
4. Sketch graphs of these functions by an analysis of their properties rather than by merely plotting sets of points.
5. Find the zeros of functions and solve algebraic and trigonometric equations.
6. Perform operations with trigonometric functions.
7. Apply analytical geometry to distance, line, and conics.
8. Computer with approximate data, including use of an electronic calculator.
9. Solve "verbal" problems relating to applications.

III Course Outline

The number of lectures on each topic is designated at the end of each section.

A. Review of sets, intervals, cartesian coordinates, graphs. (2)
B. Functions: range, domain, inverse functions. (2)
C. Analytic Geometry: slopes of lines, distance formula, linear equations, translation of coordinates, equations of all conics with translations, symmetry, odd and even functions. (7)
D. Algebra: polynomials, roots of polynomials of low degree, graphs of polynomial functions, basic rational functions. (4)

E. Trigonometry: Angular measure, basic trigonometric functions and their graphs, basic trigonometric identities and equations, law of sins and cosines, *rotation of coordinates, *polar coordinates. (7)

F. Logarithmic and exponential equations, graphs, logarithmic techniques for solving equations. (4)

* time permitting

IV Teaching Methods

A. An attempt will be made to use realistic problem situations to provide motivation for consideration of the mathematical and theoretical aspects of the course.

B. Introduction and formal presentation of basic concepts by the instructor and/or capable students.

C. Each student will make adequate use of an electronic calculator through application to concrete problem situations.

D. Outside projects to meet the needs and/or interests of individuals or groups will be pursued and presented to the class if merited.

V Bibliography (see attached)

VI Course Requirements

A. Satisfactory understanding of basic mathematical skills and concepts.

B. Student's ability will be measured by:

1. Class participation
2. Assignments
3. Written examinations

VII Course Evaluation

A. By Students

1. Student evaluations

B. By Colleagues

1. Departmental discussions
2. Consultation with other departments the course serves.

V Bibliography

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Aufmann, Richard N., and Nation, Richard D., Jr., College Algebra and Trigonometry, Houghton Mifflin, 1995.

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Helton, Floyd F. and Margaret L. Lial, Precalculus Mathematics-A Functions Approach, Scott, Foresman and Co., l983.

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Holder, Leonard I., A Primer for Calculus, 3rd ed., Wadsworth Pub. Co., l984.

Hughes-Hallet, Deborah, The Math Workshop-Elementary Functions, W. W. Norton & Co., l980.

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Mansfield, R. and J. A. Cooley, Arithmetic and Elementary Algebra, Macmillan, 1976.

Moon, R. G., Understanding Elementary Algebra, Charles E. Merrill, 1978.

Munem, M. A. and J. P. Yizze, Precalculus-Functions and Graphs, 5th Ed., Worth Pub., l990.

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Sullivan, Michael, College Algebra, 2nd ed., Dellen, Macmillan, 1990.

Sullivan, Michael, College Algebra and Trigonometry, 2nd ed., Dellen, Macmillan, 1990.

Sullivan, Michael, Precalculus, Dellen, Macmillan, l990.

Swokowski, Earl W., Algebra and Trigonometry with Analytic Geometry, 6th ed., Prindle, Weber and Schmidt, Boston, l986.

Swokowski, Earl W., Algebra and Trigonometry with Analytic Geometry, 7th ed., Prindle, Weber and Schmidt, Boston, 1989.

Swokowski, Earl W., Fundamentals of Algebra and Trigonometry, 7th ed., Prindle, Weber and Schmidt, Boston, 1989.

Zill, Dennis G., J. M. Dewar and W. S. Wright, Basic Mathematics for Calculus, 3rd ed., Wadsworth Pub., l988.

The following books and articles by Shuster, C. N.:

1. Fieldwork in Mathematics, New York: American Book Co.
2. The Use of Measuring Instruments in the Teaching of Mathematics, III Yearbook of N.C.T.M.
3. Computation with Approximate Data, XX Yearbook of N.C.T.M.
4. The Sextant, How to Use It, Lafayette Instrument Co.
5. How to Use the Hyposmeter and Clinometer, Lafayette Instrument Co.
6. Modern Geometry, Schribner's.

7. Problems in Teaching the Slide Rule, New York: T. C. Bureau of Publications.

Visual materials will consist of the instruments to be used and related equipment plus actual direct use in the field of said materials.

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