PROFESSIONALIZED SUBJECT MATTER IN PRECALCULUS MATHEMATICS

Ma 514

Course Description

This course present pre-calculus topics, particularly trigonometry and matrix operations. Attention will be given to historical considerations and to current trends in teaching this content. This course requires evidence that the student is making effective use of these concepts in the student's own classroom.

Prerequisite: Algebra

Goals of the Course

1. To provide a suitable approach to pre-calculus for teachers in both elementary and secondary schools.
2. To explore potential techniques for teaching selected concepts of pre-calculus.
3. To increase familiarity with technological tools which can enhance the teaching and learning of pre-calculus.
4. To extend the student's familiarity with various forms of assessment in pre-calculus.
5. To increase awareness of professional literature in pre-calculus education.

Instructional Procedures

This course is conducted in such a way that it provides a model for the teaching of pre-calculus with emphasis on the use of technology to enhance learning. Students should take an active part in the presentation of topics.

Course Content

1. The concept of function: numerical, graphical, and algebraic.
2. Linear, power, polynomial, exponential, logarithmic, rational, and trigonometric functions.
3. Families of functions and characteristics of families.
4. The role of the graphing calculator in teaching pre-calculus.
5. Modeling in the pre-calculus classroom.

Evaluation Methods

1. Participation in classroom discussion and activities.
2. Preparation of problem assignments and reaction papers on readings and films.
3. Oral presentation and/or written in-class exams.
4. Culminating experience of project, paper, or final exam.

Bibliography

A. Required Text

Connally, Eric, et al., Precalculus: Functions Modeling Change (Preliminary Edition), John Willey & Sons, Inc., New York, 1998.

Contemporary Precalculus through Applications: Functions, Data Analysis and Matrices, North Carolina School of Science and Mathematics, Janson Publications, Inc., 1996.

Gordan, Sheldon, et al., Functioning in the Real World: A Precalculus Experience Addison-Wesley, New York, 1997.

B. Additional Required Readings

Heid, M. Kathleen, et al., Algebraic in a Technological World: Addenda Series, Grades 9-12, National Council of Teachers of Mathematics, 1995.

C. Supporting Bibliography

Curriculum and Evaluation Standards for School Mathematics, National Council of Teachers of Mathematics, Reston, VA, 1989.

Heid, M. Kathleen, et al., Algebraic in a Technological World: Addenda Series, Grades 9-12, National Council of Teachers of Mathematics, 1995.

Technology in the Classroom, Volumes I and II, Consortium for Mathematics and its Applications

D. Relevant Periodical Sources

"Algebraic Thinking," focus issue of Mathematics Teacher February 1997.

College Mathematics Journal, Mathematics Association of America.

Consortium, newsletter of Consortium for Mathematics and its Application (COMAP).

Mathematics Teacher, National Council of Teachers of Mathematics.

E. Other Resources

Software:

Converge
Derive*

Videos:

Polynomials, California Institute of Technology.*
Sines & Cosines, Part 1 and 2, California Institute of Technology.*