SURVEY OF MODERN MATHEMATICS

Ma 606

Course Description

This course offers a review of modern trends in mathematics with emphasis given to experimental programs. Topics in discrete mathematics are also included. Analyses are made of recommendations for new mathematics curricula.

Goals of the Course

1. To introduce students to important modern trends in mathematics.
2. To introduce mathematical ideas that are not covered in traditional textbooks and courses.
3. To increase the student's awareness of the importance of mathematical modeling and new areas in mathematics.
4. To enhance the depth of the student's understanding of the connections between various areas of mathematics.
5. To increase familiarity with technological tools which can enhance the teaching and learning of these topics.
6. To increase awareness of professional literature resources in new topics.

Instructional Procedures

Lecture and discussion. Student participation at the board. Homework and discussion of homework problems.

Course Content

1. The nature and extent of areas and applications of mathematics that may be new to most students.
2. The nature of mathematical models.
3. Concepts selected from the areas of discrete math, finite math, and/or operations research. Topics could include graph theory, algorithms, voting theory, predator/prey models, matrices, combinatorics, game theory, recursion, fractals, linear programming, scheduling problems, or apportionment problems.
4. Introduction to the history of the development of modern techniques.

Methods of Evaluation

1. Class participation in group work.
2. Homework and class discussion of homework.
3. Individual presentations of problems.
4. Preparation of written analyses, special assignments, and projects.
5. Written final examination or final project.

Bibliography

A. Required Text:

Goodaire, Edgar G., and Michael M. Parmenter, Discrete Mathematics with Graph Theory, Prentice Hall, Upper Saddle River, NJ, 1998.

For All Practical Purposes: Introduction to Contemporary Mathematics, 4th ed., W. H. Freeman and Company, New York, 1997.

Maurer, Stephen B., and Anthony Ralston, Discrete Algorithmic Mathematics, Addison-Wesley Publishing Co., Reading, Mass., 1991.

B. Additional Required Reading:

Kenney, Margaret J., and Christian R. Hirsch, eds., Discrete Mathematics across the Curriculum, K-12 (1991 Yearbook), National Council of Teachers of Mathematics, Reston, VA, 1991.

Kenney, Margaret J., and Christian R. Hirsch, eds., The Teaching and Learning of Algorithms in School Mathematics (1998 Yearbook), National Council of Teachers of Mathematics, Reston, VA, 1998.

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

National Council of Teachers of Mathematics, Discrete Mathematics and the Secondary Mathematics Curriculum, Reston, VA, 1990.

C. Supporting Bibliography:

Faculty Advancement in Mathematics Program, Modules in Discrete Mathematics, Modeling, Geometry I and Geometry II, Consortium for Mathematics and its Applications (COMAP), 1996.

Froelich, Gary, and Joseph Malkevitch, The Mathematical Theory of Elections, Module from Consortium for Mathematics and its Applications, 1996.

Malkevitch, Joseph, and Walter Meyer, Graphs, Models, and Finite Mathematics, Prentice-Hall, Englewood Cliffs, NJ, 1974.

D. Relevant Periodical Sources:

College Mathematics Journal, Mathematics Association of America.

Consortium, COMAP (Consortium for Mathematics and Its Application).

Math Horizons, Mathematical Association of America.

Mathematics Teacher, National Council of Teachers of Mathematics.

E. Other Resources:

Videos:

For All Practical Purposes Consortium for Mathematics and its Applications (COMAP).*

TV Math, Consortium for Mathematics and its Applications.
Management Science
Geometry
Computer Science and Social Choice