MATHEMATICS IN

THE SECONDARY SCHOOL

Ma 607

Course Description: A presentation of objectives and techniques in major areas of junior and senior high mathematics is provided. Topics include: basic approach to arithmetic; teaching of algebra; formal and informal geometry; status of general mathematics; senior (12th grade) mathematics; and current literature on the teaching of mathematics.

I. General Aim

The general aim of this course is to have the students:

1. Develop a favorable attitude towards the mathematics of secondary school curriculum.

2. Understand how to apply principles of learning based on recommendation made in directions given by such groups as the College Entrance Examination Board, School Mathematics Study Group, National Council of Teachers of Mathematics, etc., to the subject matter of the secondary school.

3. Develop a background of information and the use of current research literature and professional materials.

4. Work in the selection and organization of subject matter for the attainment of meaningful learning with respect to common difficulties in achievement, in evaluation, and in research.

II. Specific Objectives:

To make provisions for:

1. Competence in the basic skills and understanding for dealing with numbers and form.

2. Habits of effective thinking - a broad term involving analytical, critical, and postulational thinking, as well as reasoning by analogies and the development of intellectual curiosity.

3. Communication of thought through symbolic expressions and graphs

4. Development of the ability to make relevant judgements through the discrimination of values.

5. Development of the ability to distinguish between relevant and irrelevant data.

6. Development of intellectual independence.

7. Development of aesthetic appreciation and expression.

8. Development of cultural advancement through a realization of the significance of mathematics in its own right and in its relation to the total physical and social structure.

III. Content and Scope of the Course.

1. The evolving program of secondary mathematics

2. Mathematics in general education

3. The impact of modern mathematics

4. Modern curriculum problems in mathematics

5. Stimulating and maintaining interest in mathematics

6. Means to effective instruction and guided learning

7. Planning for effective teaching and learning

8. Evaluation of instruction

9. Supervision of instruction

10. The professionally prepared teacher of mathematics

11. The teaching of arithmetic

12. The teaching of further topics in arithmetic.

13. The teaching of algebra in the junior high school.

14. The teaching of futher topics in elementary algebra.

15. The teaching of algebra in the senior high school and the junior college

16. The teaching of geometry in the junior high school

17. The teaching of geometry in the senior high school

18. More on the teaching of geometry

19. The teaching of trigonometry

20. The teaching of analytic geometry

21. The teaching of calculus

IV Basic Requirements of the successful completion of the course.

Final Examination
Periodic Quizzes
Classroom Participation
Homework Assignments and Projects.

V. Bibliography

Brumbaugh, Douglas K., and David Rock, *Teaching Secondary Mathematics, 2nd ed.* Mahwah, New Jersey. Lawrence ErlBaum Associates, 2001.

Burke, Maurice, and others (Eds.), *Navigating through Algebra in Grades 9-12*, National Council of Teachers of Mathematics, 2001.

Day, Roger, Paul Kelley, Libby Krussel, Johnny W. Lott, and James Hirstein, *Navigating through Geometry in Grades 9-12*, National Council of Teachers of Mathematics, 2001.

Eves, Howard, *An Introduction to the History of Mathematics*, Philadelphia, Saundus, 1990.

Geckmann, Charlene, *Exploring Calculus With a Graphing Calculator*. Reading, Mass. Addison-Wesley, 1992.

Harris, Kent, *Discovering Calculus with Maple*, New York, Wiley, 1992.

National Council of Teachers of Mathematics, *Assessment Standards for School Mathematics*, Reston, VA, 1995.

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Posamentier, Alfred, and Jay Stepelman, *Teaching Secondary Mathematics: Techniques and Enrichment Units, 5th ed.* Upper Saddle River, New Jersey. Prentice-Hall, 1999.

Simmons, George, *Calculus Gems: Brief Lives and Memorable Mathematics*, Highstown, NJ. Mc-Graw Hill, 1992.