Mathematics 67-319
Infinite Processes for Elementary and Middle School Programs

Pre-requisites: Mathematics 110 (Number Systems); 211 (Geometry and Measurement) and Mathematics 217 (Data Exploration), each with a grade of C or better.

Course Objectives: This course is designed to provide you 1) conceptual knowledge of functions, limiting processes, rates of change, and optimization; 2) techniques for approximating and calculating areas; 3) a deep appreciation for the historical development of the calculus and its power and beauty; 4) an understanding of how infinite processes are part of the elementary and middle school curricula; and 5) experience using technology to solve problems numerically and graphically.

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Office Hours: M and W: 11:30 – 1:00, T and R: 3:00 – 3:30, and other times by appointment. Don't hesitate to ask!

Text and Materials:
Big Ideas in Mathematics for Future Middle Grades Teachers: Big Ideas in Infinite Processes by J. Szydlik and C. Seaman.

Math Through the Ages: A Gentle History for Teachers and Others by Berlinghoff and Gouvea. Farmington, Maine: Oxford House Publishers. This text is required for all the elective courses in the mathematics minor for elementary education majors. Keep it for 317, 413 or 415.

I suggest you borrow or purchase a graphics programmable calculator like the TI 84 (TI 83 or TI 86 are fine too).

Topical Outline:
Weeks 1 - 4: Limiting Processes: ideas of infinity and "getting close," classic paradoxes in infinity; cardinality; Cantor's Diagonal Argument.

Weeks 5 – 8: Functions and Modeling: function forms; some trigonometry; end behavior; polynomials and the Fundamental Theorem of Algebra

Week 9 - 14: Big Ideas of Calculus: rates of change through geometric relationships and activities that involve motions of objects; slope of a tangent line; intuitive meaning and definition of the derivative; derivative shortcuts; graphical,

numerical and algebraic methods for finding minima and maxima through investigations; antiderivatives; the definite integral; and The Fundamental Theorem of Calculus.

Instructional Methodology:
The concepts of this course will be introduced through hands-on activities and problems. Class time will be spent working on problems and discussing strategies and solutions. You are expected to participate fully in the class activities and to share your ideas with the class. Students will be responsible for completing historical readings and working problems outside of class. After the first three weeks, approximately one day each week will be devoted to student presentations on and discussions of historical topics.

Assessment:
We will have three exams each worth 20 percent of your course grade. The dates of those exams will be Friday, October 6th; Friday, November 10th; and Friday, December15th.

Written work will compose 20 percent of your grade. This work could include exercises, problem write-ups, quizzes, and short papers.

You (and your partners) will do a project on an historical aspect of the course material and present your project to the class. That work will compose 15 percent of your grade.

Your contribution to the class discussions is very important and therefore your attendance and participation comprises 5 percent of your grade in this course. You may miss two classes without penalty, and after that you will lose a percentage point of your course grade for each day missed (up to 5%).

Summary:

Exam I	20%
Exam II	20%
Exam III	20%
Written Work:	20%
Project:	15%
Attendance:	5%
Total	100%

The grading scale will be approximately as follows:

A	90 - 100% of the course points
B	80 - 89%
C	70 - 79%
D	60 - 69%
F	0 - 59%