

Youngstown State University  
**Department of Mathematics and Statistics**  
Course Syllabus for Mathematics 4869

- Title:** Functions, Calculus, and Applications for Middle School Teachers
- Description:** Polynomial and exponential functions, limits, derivatives, integrals, and applications. Interpretation of slope and area in graphs of functions from applied settings. Applications of limits to the derivations of geometric formulas. Relations between tables, graphs, and the symbolic representation of functions.
- Prerequisites:** M3767 and M3768 or consent of instructor
- Credit:** 3 s.h.
- Texts:** *Calculus*, Elliot C. Goodman, Barron's Educational Series 1997.
- Calculator:** One of the following graphics calculators is required for the course: TI-83, TI-83 plus, or TI-84 plus or TI-84 Silver Edition. Graphing calculators are permitted and recommended on the Praxis II examination in Middle School Mathematics.
- Goals:** This is the final course in the middle childhood mathematics concentration area topic sequence of Foundations, Statistics, Algebra, Geometry, and Calculus. As such, it serves both to expose future teachers to the conceptual foundations and some of the techniques of calculus and to simultaneously review important concepts from earlier courses.
- Topics:**
1. Limits as they occur in several settings including removable singularities of functions, right and left hand limits at non-removable singularities, limits at infinity, and applications of limits to the derivations of geometric measurement such as the area of a circle.
  2. Functions; explicit and implicit, combinations involving basic operations and composition, recursively defined functions and parametric functions, interplay of tabular, graphical, and formulaic representations of functions. Exponential and Logarithmic functions.
  3. Rates of change; average rate of change over an interval, instantaneous rate of change, graphical interpretation, basic theorems about differentiation, applications to the analysis of functions including optimization in applied contexts.

4. Accumulation; representation as area under a curve, calculation via a limit of sums with the help of technology, fundamental theorem of calculus, applications to measurement, economics, and probability.

**Assessment:** Will be left to the individual instructor. However, to be consistent with the goals of the course, especially those which implement NCTM and MAA recommendations for teachers, the course assessments should include a segment which specifically addresses the use of technological constructions and a segment which requires students to take more than one approach to a given topic. Multiple representations of the key ideas in this course should be a constant theme. Emphasis on the connection and interplay between various parts of mathematics previously studied by the students will support the primary goals of the course.

**Last day to Withdraw with a W:** Thursday, 2 November, 2006.

**Students with Disabilities:** In accordance with University procedure, if you have a documented disability and require accommodations to obtain equal access in this course, please contact the Office of Equal Opportunity and Disability Services at the beginning of the semester or when given an assignment for which an accommodation is required. Students with disabilities must verify their eligibility through the Office of Disability Services in Beeghly College of Education, room 3310, (330-941-1372) intake procedure.

**Semester:** Fall 2006

**Legal Holidays:** 4 September, 10 November, 23 November, and 24 November, 2006

**Term Ends:** Sunday, 17 December 2006