

I. EFFECTIVE DATE OF OUTLINE

Spring Semester, 2009. To be reviewed by the department annually.

II. CATALOG DESCRIPTION

- A. MATH 1400
- B. Survey of Calculus
- C. 4 Credits
- D. Offered Fall and Spring Semesters
- E. Prerequisite: MATH 1100 with a grade of C or higher; or eligible for MATH 1500.
- F. Concepts and techniques of differential and integral calculus for those who do not need the comprehensive calculus sequence (MATH 1510-1520). Principal applications from business, technology, social science, and statistics. Satisfies MnTC Goal 4.

III. RECOMMENDED ENTRY SKILLS/KNOWLEDGE

- A. Solve compound interest problems
- B. Apply the properties of exponents
- C. Find equations of lines
- D. Use algebraic techniques to solve linear and quadratic equations
- E. Graph linear and quadratic functions
- F. Apply functional notation and form difference quotients

IV. OUTLINE OF MAJOR CONTENT AREAS

- A. Limits of functions and difference quotients
- B. Continuity of functions
- C. Differentiation as a measure of rate of change
- D. Differentiation rules
- E. Differentials
- F. Definite integral as a measure of area
- G. Calculus applied to exponential and logarithmic functions
- H. Antiderivatives or indefinite integrals
- I. Evaluation techniques for integrals
- J. Partial derivatives for functions of several variables
- K. Extreme value problems
- L. Applications and modeling using differentiation and integration

V. LEARNING OUTCOMES

Upon successful completion of MATH 1400, students will be able to: (Letters in parentheses refer to student competencies of the Minnesota Transfer Curriculum, Goal 2–Critical Thinking, and Goal 4–Mathematical/Logical Reasoning.)

- A. Evaluate limits of functions and difference quotients. (2c,4a,4b,4d)
- B. Determine values for which a function is continuous and/or differentiable. (4a,4b,4c,4d)
- C. Find derivatives and integrals of basic functions including exponential and logarithmic functions. (4a,4b,4d)
- D. Set up and evaluate definite integrals representing area, consumer surplus, producer surplus, continuous money flow. (2a,2c,4a,4b,4d)
- E. Solve basic differential equations. (4a,4d)
- F. Find partial derivatives for functions of several variables. (4a,4b,4d)
- G. Solve extreme value problems including applying the method of Lagrange. (2a,2c,4a,4b,4d)

VI. METHODS USED FOR EVALUATION OF STUDENT LEARNING

The instructor will choose from among various evaluation techniques including – but not limited to – in-class testing, take-home testing, assignments, quizzes, attendance, group or individual projects, and research. The instructor will also choose a method for end-of-the-semester evaluation.

VII. SPECIAL INFORMATION

This course may be required for business and natural resources programs at some four-year colleges. Some instructors may require use of technology. This may include the use of one or more of a graphing calculator or computer algebra tools (such as the TI-89, MAPLE, Mathematica, or Wolfram Alpha).