

**SOUTHEAST COMMUNITY COLLEGE  
DIVISION OF ARTS AND SCIENCES**

**Mathematics**

**Revision Date: 2015-10-05**

**Term:** 2015 Fall  
**Course:** MATH-1600-ES31 (Calculus 1)  
**Class Time:** MTWTF 11:00–12:25 CT  
**Class Room:** ESQ 100C

**Instructor:** Toby Bartels, PhD  
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**Office Hours:** TT 14:00–16:30  
**Office:** ESQ 112

*Course policies follow this syllabus*

**I. CATALOG DESCRIPTION**

Course Number: MATH-1600  
Course Title: Analytic Geometry and Calculus I  
Prerequisite: A grade of C or higher in MATH-1200, MATH-1300, or the equivalent or an appropriate score on a math placement test.  
Catalog Description: This course is a study of analytic geometry and single-variable calculus. Topics include limits, continuity, derivatives, applications of derivatives, integrals, and applications of integrals.  
Credit Hours: 7.5  
Class Hours: 72¼  
Lab Hours: 0  
Total Contact Hours: 72¼

**II. COURSE OBJECTIVES**

- A. Perform computation of limits and continuity using appropriate analytical, graphical, and numerical methods.
- B. Calculate derivatives using the definition of derivative.
- C. Calculate derivatives using the rules of differentiation.
- D. Apply the concepts of differentiation to analyse increasing and decreasing functions and determine concavity.
- E. Apply the concepts of differentiation to calculate rates of change and perform optimization.
- F. Calculate integrals using the definition of integrals and approximation.
- G. Calculate integrals using the rules of integration.
- H. Apply the concepts of integration to calculate areas between curves and volumes of solids.

**III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES**

- A. Student Learning Outcomes:
  - 1. Understand concepts of calculus using algebraic, geometric, and numeric approaches.
  - 2. Apply calculus concepts to solve practical applications.
  - 3. Use calculus for modeling.
  - 4. Learn mathematics from investigation of practical problems.

- B.** General Education Learning Outcomes:
- 1.** GELO 3: Critical Thinking  
The student will demonstrate the ability to design, implement, evaluate, and reflect on a strategy to answer an open-ended question or achieve a specified outcome.
  - 2.** GELO 4: Problem Solving  
The student will demonstrate the ability to define a problem, develop a plan to solve the problem, collect and analyze information, solve the problem, evaluate results, and define any need for further work.
  - 3.** GELO 6: Quantitative Reasoning  
The student will demonstrate the ability to reason and solve quantitative problems using mathematical applications such as formulas, data sets, graphs, tables, etc.

**IV. CONTENT/TOPICAL OUTLINE**

- A.** Rates of Change & Tangents to Curves
- B.** Limit of a Function and Limit Laws
- C.** Formal Definition of a Limit
- D.** One-sided Limits and Limits at Infinity
- E.** Infinite Limits and Vertical Asymptotes
- F.** Continuity
- G.** Tangents and Derivatives at a Point
- H.** The Derivative as a Function
- I.** Differentiation Rules
- J.** The Derivative as a Rate of Change
- K.** Derivatives of Trigonometric Functions
- L.** The Chain Rule
- M.** Implicit Differentiation
- N.** Derivatives of Inverse Functions
- O.** Inverse Trigonometric Functions
- P.** Related Rates
- Q.** Extreme Values of Functions
- R.** The Mean-value Theorem
- S.** The First-derivative Test
- T.** Concavity and Curve Sketching
- U.** Indeterminate Forms and L'Hopital's Rule
- V.** Newton's Method
- W.** Applied Optimization
- X.** Antiderivatives
- Y.** Estimates with Finite Sums
- Z.** Sigma Notation and Limits of Finite Sums
- AA.** Definite Integrals
- BB.** The Fundamental Theorem of Calculus
- CC.** Indefinite Integrals and Substitution
- DD.** Substitution and the Area between Curves
- EE.** Volumes by Slicing
- FF.** Volumes by Cylindrical Shells
- GG.** Lengths of Plane Curves

**V. INSTRUCTIONAL MATERIALS**

- A.** Required Text: Hass, *University Calculus, Early Transcendentals*, 2nd Edition, Pearson (Prentice Hall), 2012: hardback, looseleaf, or through MyMathLab.
- B.** Optional resources:
  - 1.** A graphing calculator.
  - 2.** MyMathLab access code.

**VI. METHODS OF PRESENTATION/INSTRUCTION**

- A. Methods of presentation typically include a combination of the following:
  - 1. Textbook readings.
  - 2. Supplemental lectures.
  - 3. Small-group discussion.
  - 4. MyMathLab (optional).

**VII. METHODS OF EVALUATION**

- A. Daily in-class group work.
- B. Extra-credit and make-up homework.
- C. Weekly quizzes.
- D. Comprehensive final exam
- E. SCC grading scale:

A+	95%+	C+	75%+	F	Below 60%
A	90%+	C	70%+		
B+	85%+	D+	65%+		
B	80%+	D	60%+		

**VIII. SPECIFIC COURSE REQUIREMENTS**

- A. None.

## Southeast Community College Syllabus Statements

### **Academic Integrity:**

Academic integrity is one of the basic principles of a college community. SCC encourages and expects the highest standards of academic honesty from all students. Please note that cheating, plagiarism, and other forms of academic dishonesty are monitored and subject to disciplinary action.

### **Americans with Disabilities Act — Reasonable Accommodations:**

If you have a disabling condition that may substantially limit your ability to participate in this class, please contact the Dean of Student Services for additional information and assistance. The campus telephone numbers are: Beatrice 402-228-8220, Lincoln 402-437-2619, Milford 402-761-8270.

### **Electronic Devices:**

Instructors may allow the use of cell phones and personal electronic devices in the classroom or lab for instructional purposes to help meet course objectives or participation in course activities. The use of cell phones or other electronic devices for **personal use** during class time may not be allowed. Each instructor can identify when the use of cell phones or personal electronic devices will be allowed. Failure to follow the instructor's directions may lead to formal disciplinary action.

### **Firearms/Weapons Strictly Prohibited:**

SCC policy prohibits the possession of firearms, weapons, or fireworks on College property or at any College-sponsored event. Effective January 1, 2007, Nebraska State Statute 69-2441 makes it unlawful to carry a concealed handgun into a meeting of the governing body of a political subdivision, or collegiate athletic event; school, school grounds, school-owned vehicle, or school-sponsored activity or athletic event. These prohibitions apply to EVERYONE (employees, students, invitees, and visitors) and are enforceable EVERYWHERE (all College property and all College-related events.) Violations of the prohibitions will result in disciplinary and/or law enforcement action.

### **Hazardous Chemicals — Right to Know Statement:**

Some courses offered at Southeast Community College use hazardous chemicals as part of their curriculum. If the course you are attending requires you to use or exposes you to hazardous chemicals, your instructor will provide you with information and instruction about those chemicals. That information will include: requirements regarding personal protective equipment, methods of safe handling, use, clean-up, first-aid measures, etc.

### **Statement of Equal Opportunity:**

The policy of Southeast Community College is to provide equal opportunity and nondiscrimination in all admission, attendance, and employment matters to all persons without regard to race, color, religion, sex, age, marital status, national origin, ancestry, veterans' status, sexual orientation, disability, or other factors prohibited by law or College policy. Inquiries concerning the application of Southeast Community College's policies on equal opportunity and nondiscrimination should be directed to the Vice President of Affirmative Action, Equity and Diversity, 301 S 68th Street Pl, Lincoln NE 68510-2449; Phone 402-323-3412; Fax 402-323-3420; Email [jsoto@southeast.edu](mailto:jsoto@southeast.edu).