



BROWARD COMMUNITY COLLEGE COURSE OUTLINE

LAST REVIEW: 2006-2007
(i.e. 2003-2004)

NEXT REVIEW: 2010-2012
(i.e. 2008-2009)

STATUS: A
(A, I, D)

COURSE TITLE: Calculus and Analytical Geometry I

COMMON COURSE NUMBER: MAC 2311

CREDIT HOURS: 5

CONTACT HOUR BREAKDOWN
(per 16 week term)

CLOCK HOURS:
(Voc. Course ONLY)

Lecture: **80** Lab:

Clinic: Other:

PREREQUISITE(S): MAC1114 and MAC1140

COREQUISITE(S): None

PRE/COREQUISITE(S): None

COURSE DESCRIPTION *(750 characters, maximum):*

This is the first course of a three course sequence in calculus. Students may need access to a graphing calculator throughout the sequence of courses. Topics include: analytic geometry, functions, limits, continuity, derivatives and their applications, transcendental functions, anti-derivatives and definite integrals. Certain sections of this course may require the use of a graphing calculator. Meets Area 5A of the general education requirements for the A.A. degree. Meets Areas 4 or 5 of the general education requirements for the A.S. degree. Prerequisite: MAC1140 and MAC1114 with a grade in each of "C" or higher, or recommendation of the Mathematics Department is required.

General Education Requirements – Associate of Arts Degree (AA), meets Area(s): Area
General Education Requirements – Associate in Science Degree (AS), meets Area(s): Area
General Education Requirements – Associate in Applied Science Degree (AAS), meets Area(s): Area

UNIT TITLES

- 1. Functions, Limits, and Continuity**
- 2. The Derivative and Differentiation**
- 3. Extreme Function Values and Techniques of Graphing**
- 4. The Definite Integral and Integration**
- 5. Transcendental Functions**
- 6. Inverse Trigonometric Functions**



BROWARD COMMUNITY COLLEGE

COURSE OUTLINE

EVALUATION:

Please provide a brief description (250 characters maximum) that details how students will be assessed on the course outcomes.

Students will be assessed on the course outcomes of this course in a variety of ways. They will be assessed with chapter tests, quizzes on one or more sections, midterm exams and final exams.

**** Complete the following only if course is seeking general education status ****

GENERAL EDUCATION Competencies and Skills *:

Please highlight in green font all Competencies/Skills from the list below that apply to this course. In the box to the right of the Competency/Skill, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 5.12) that apply.

1. Read with critical comprehension	
2. Speak and listen effectively	
3. Write clearly and coherently	
4. Think creatively, logically, critically, and reflectively (analyze, synthesize, apply, and evaluate)	1.1 – 1.9, 2.1 – 2.12, 3.1 – 3.8, 4.1 – 4.8, 5.1 – 5.8, 6.1 – 6.5
5. Demonstrate and apply literacy in its various forms: (highlight in green ALL that apply) (1. technological, 2. informational, 3. mathematical, 4. scientific, 5. cultural, 6. historical, 7. aesthetic and/or 8. environmental)	1.1 – 1.9, 2.1 – 2.12, 3.1 – 3.8, 4.1 – 4.8, 5.1 – 5.7, 6.1 – 6.5
6. Apply problem solving techniques to real-world experiences	2.3, 2.11, 2.12, 3.1, 3.7, 3.8, 4.7, 6.4, 6.5
7. Apply methods of scientific inquiry	1.1 – 1.9, 2.1 – 2.12, 3.1 – 3.8, 4.1 – 4.8, 5.1 – 5.8, 6.1 – 6.5
8. Demonstrate an understanding of the physical and biological environment and how it is impacted by human beings	
9. Demonstrate an understanding of and appreciation for human diversities and commonalities	
10. Collaborate with others to achieve common goals.	
11. Research, synthesize and produce original work	
12. Practice ethical behavior	
13. Demonstrate self-direction and self motivation	
14. Assume responsibility for and understand the impact of personal behaviors on self and society	
15. Contribute to the welfare of the community	

** General Education Competencies and Skills endorsed by '05-'06 General Education Task Force*



BROWARD COMMUNITY COLLEGE

COURSE OUTLINE

Common Course Number: MAC 2311

Unit 1 **Functions, Limits, and Continuity**

General Outcome:

- 1.0 The student shall be able to evaluate limits and determine when a function is continuous.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 1.1 Graphically estimate limits.
- 1.2 Graphically recognize if a limit exists.
- 1.3 Demonstrate knowledge of ϵ - δ definition of limits.
- 1.4 Evaluate limits using the theorems on limits including the “squeeze” theorem.
- 1.5 Evaluate one-sided limits.
- 1.6 Determine if a function is continuous at a number “c” and on an interval for selected algebraic and transcendental functions.
- 1.7 Distinguish between removable and non-removable discontinuities using algebraic and graphical techniques.
- 1.8 Apply the Intermediate Value Theorem.
- 1.9 Graphically determine the domain and range of a function.



BROWARD COMMUNITY COLLEGE

COURSE OUTLINE

Common Course Number: MAC 2311

Unit 2 **The Derivative and Differentiation**

General Outcome:

- 2.0 The student shall be able to find derivatives using the definition of a derivative and special formulas, and apply derivatives to geometrical and physical problems.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 2.1 Define the derivative and use it to find the slope of a curve.
- 2.2 Calculate the derivative by its limit definition.
- 2.3 Use the derivative to calculate instantaneous rates of change.
- 2.4 Explain the relationship between the differentiability and continuity of a function.
- 2.5 Graphically interpret if a function is continuous and/or differentiable.
- 2.6 Apply the power rule, the scalar multiple rule, the sum rule, the product rule, and the quotient rule to find the derivative.
- 2.7 Use the chain and power rules for differentiating.
- 2.8 Calculate second-, third-, and higher-order derivatives.
- 2.9 Distinguish between explicit and implicit forms of an equation.
- 2.10 Demonstrate the technique of implicit differentiation and apply it to equations in implicit form.
- 2.11 Solve related rate problems.
- 2.12 Define the differentials dy and dx and demonstrate their use.



Common Course Number: MAC 2311

Unit 3 Extreme Function Values and Techniques of Graphing

General Outcome:

- 3.0 The student shall be able to find relative and absolute maxima and minima of a function, solve related geometrical and physical problems, and sketch graphs using the techniques of calculus.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 3.1 Apply Rolle's Theorem and the Mean Value Theorem.
- 3.2 Use the derivative to determine when a function is increasing or decreasing.
- 3.3 Use the derivative of a function to locate its relative extrema.
- 3.4 Graphically estimate the maximum or minimum of a function.
- 3.5 Use the first and second derivatives of a function to determine concavity and points of inflection.
- 3.6 Sketch the graph of an equation using calculus techniques.
- 3.7 Solve applied problems using the concepts of extrema.
- 3.8 Use derivatives to determine the velocity and acceleration of objects traveling along linear paths.



BROWARD COMMUNITY COLLEGE

COURSE OUTLINE

Common Course Number: MAC 2311

Unit 4 **The Definite Integral and Integration**

General Outcome:

- 4.0 The student shall be able to demonstrate knowledge of the theory of antiderivatives and skills in evaluating and applying antiderivatives.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 4.1 Use the summation notation with knowledge of its properties and rules.
- 4.2 Evaluate antiderivatives using basic theorems and substitution techniques.
- 4.3 Calculate the definite integral and the area under a curve as the limit of a Riemann sum.
- 4.4 Use the Fundamental Theorem of Calculus to calculate the value of a definite integral.
- 4.5 Apply the properties of the definite integral when evaluating an integral.
- 4.6 Demonstrate knowledge of the Mean Value Theorem for Integrals.
- 4.7 Solve differential equations involving the separation of variables.
- 4.8 Estimate the value of definite integrals and determine a bound for the error in the estimate.



BROWARD COMMUNITY COLLEGE

COURSE OUTLINE

Common Course Number: MAC 2311

Unit 5 **Transcendental Functions**

General Outcome:

- 5.0 The student shall be able to differentiate and integrate transcendental functions.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 5.1 Define the natural logarithmic function and use the definition to establish its properties.
- 5.2 Calculate the derivative of logarithmic functions.
- 5.3 Apply logarithmic differentiation to functions that are not themselves logarithmic.
- 5.4 Calculate the derivative of exponential functions.
- 5.5 Use integration formulas for exponential functions.
- 5.6 Derive and apply formulas for the derivatives of trigonometric functions.
- 5.7 Derive and apply the formulas for integrating trigonometric functions.



BROWARD COMMUNITY COLLEGE

COURSE OUTLINE

Common Course Number: MAC 2311

Unit 6 **Inverse Trigonometric Functions**

General Outcome:

- 6.0 The student shall be able to differentiate and integrate inverse trigonometric functions.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 6.1 Demonstrate an understanding of the relationship between the derivative of a function and the derivative of the function's inverse.
- 6.2 Derive and apply the formulas for the derivatives of the inverse trigonometric functions.
- 6.3 Identify and integrate functions whose antiderivatives are inverse trigonometric functions.
- 6.4 Evaluate definite and indefinite integrals yielding inverse trigonometric functions.
- 6.5 Apply the derivatives of inverse trigonometric functions, and apply integrals yielding inverse trigonometric functions, to geometrical and physical problems.