



BROWARD COMMUNITY COLLEGE COURSE OUTLINE

LAST REVIEW: 2002-2003
(i.e. 2003-2004)

NEXT REVIEW: 2007-2008
(i.e. 2008-2009)

STATUS: A
(A, I, D)

COURSE TITLE: Mathematics for Liberal Arts II

COMMON COURSE NUMBER: MGF 1107

CREDIT HOURS: 3

CONTACT HOUR BREAKDOWN
(per 16 week term)

CLOCK HOURS:
(Voc. Course ONLY)

| | |
|--------------------|-----------------|
| Lecture: 48 | Lab: |
| Clinic: | Other: 3 |

PREREQUISITE(S): MAT 1033

COREQUISITE(S): None

PRE/COREQUISITE(S):

COURSE DESCRIPTION *(750 characters, maximum):*

This is a general education course which includes college-level skills not included in the courses MAT0012 Pre-Algebra, MAT0024 Elementary Algebra, and MAT1033 Intermediate Algebra. The course will include selected topics from mathematics of finance; linear and exponential functions; number systems; history of mathematics; theory of numbers; graph theory; numerical methods and algorithms; game theory; and student project(s) (strongly recommended). This course will also emphasize applications to real world situations and the integration of other disciplines, including (but not limited to) business and the physical sciences. Prerequisite: MAT1033 with a grade of “C” or higher, or recommendation of Mathematics Department. *(Note: Mathematics for Liberal Arts I is not a prerequisite for this course)*. Recommendation of the Mathematics Department or at least a grade of “C” in the prerequisite course 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. **Mathematics of Finance**
2. **Linear and Exponential Functions**
3. **Number Systems**
4. **History of Mathematics**



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5. **Theory of Numbers**
6. **Graph Theory**
7. **Numerical Methods and Algorithms**
8. **Game Theory**
9. **Student Project(s) (strongly recommended)**



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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) | Unit 1, unit 2, unit 7, unit 8, 3.3, 3.4 |
| 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) | Unit 1 – unit 9 |
| 6. Apply problem solving techniques to real-world experiences | Unit 1, 2.6 |
| 7. Apply methods of scientific inquiry | |
| 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*



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UNITS

Unit 1 Mathematics of Finance

General Outcome:

- 1.0 The students should be able to apply mathematics to solve problems in the area of finance.

Specific Measurable Learning Outcomes:

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

- 1.1 Demonstrate an understanding of the utilization of mathematics in simple and compound interest applications.
- 1.2 Solve a variety of consumer loan application problems, including topics such as installment buying, credit loans & payments, & finance charges.
- 1.3 Solve a variety of money growth application problems including topics such as annuities, sinking funds, & IRA's.



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Unit 2 Linear and Exponential Functions

General Outcome:

- 2.0 The students should be able to select a suitable linear or exponential function as a mathematical model for a growth problem; and solve linear, logarithmic and exponential equations.

Specific Measurable Learning Outcomes:

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

- 2.1 Determine the slope of a line; and determine if paired data has a linear relation.
- 2.2 Write an equation of a line from given data; and use the equation to predict outcomes.
- 2.3 Graph linear functions, equations and inequalities; and determine slope, intercepts and feasible solutions from a graph.
- 2.4 Convert an exponential statement to logarithmic form and a logarithmic statement to exponential form.
- 2.5 Use the basic properties of logarithms to solve exponential or logarithmic equations.
- 2.6 With the aid of a calculator or computer software, use linear, exponential or logarithmic functions to solve applied problems in business, biology, or physical science.



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Unit 3 Number Systems

General Outcome:

- 3.0 The students should be able to demonstrate knowledge of various number systems and perform operations within the different systems.

Specific Measurable Learning Outcomes:

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

- 3.1 Demonstrate knowledge of the history of number systems.
- 3.2 Convert between different number base systems.
- 3.3 Add, subtract, and multiply in different number base systems.
- 3.4 Add, subtract, and multiply in modular systems including the 12-hour clock system.
- 3.5 Determine whether a system satisfies the closure, commutative, associative, identify, and inverse properties.
- 3.6 Determine if a system is a group.



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Unit 4 History of Mathematics

General Outcome:

- 4.0 The students should be able to demonstrate an understanding of the history of mathematics and be able to identify important events and contributions made by various mathematicians and cultures.

Specific Measurable Learning Outcomes:

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

- 4.1 Demonstrate an understanding of the contributions made in Mathematics by the Egyptian culture and Babylonian culture during the period of 3000 B.C. - 600 B.C.
- 4.2 Demonstrate an understanding of the contributions made in Mathematics by the Greek culture during the period of 600 B.C. - A.D. 500.
- 4.3 Demonstrate an understanding of the contributions made in Mathematics by the Hindu culture and Arab culture (during the dark ages of Mathematics) during A.D. 500 - A.D. 1200.
- 4.4 Demonstrate an understanding of the contributions made in Mathematics during the Period of Transition, A.D. 1200 - A.D. 1550.
- 4.5 Demonstrate an understanding of the contributions made in Mathematics during the Modern Period, A.D. 1550 - present.



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Unit 5 Theory of Numbers

General Outcome:

- 5.0 The students should be able to demonstrate an understanding of number theory and apply the techniques to problem solve.

Specific Measurable Learning Outcomes:

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

- 5.1 Demonstrate an understanding of the concept of divisibility.
- 5.2 Calculate the greatest common factor (GCF) and the lowest common multiple (LCM) or a list of numbers.
- 5.3 Calculate the GCF using the division algorithm.
- 5.4 Use the division algorithm to write the GCF of (a,b) as a linear combination of a and b.
- 5.5 Apply the division algorithm to problem solving.
- 5.6 Demonstrate an understanding of the Unique Factorization Theorem; and write numbers as a product of prime factors.
- 5.7 Demonstrate an understanding of the properties of prime divisors (e.g., $p|(ab) \Rightarrow p|a$ or $p|b$).
- 5.8 Demonstrate an understanding of congruencies modulo m.
- 5.9 Solve linear congruencies.
- 5.10 Determine if a number is perfect, deficient or abundant.
- 5.11 Use concepts of this unit to encode and decode messages.



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Unit 6 Graph Theory

General Outcome:

- 6.0 The students should be able to recognize different kinds of graphs, circuits, and trees, and relationships between them.

Specific Measurable Learning Outcomes:

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

- 6.1 Demonstrate an understanding of graphs, subgraphs, paths and connections, cycles, and isomorphisms between graphs.
- 6.2 Determine if a graph is a tree.
- 6.3 Demonstrate an understanding of Hamilton cycles and Euler tours.
- 6.4 Apply the ideas of this unit to classic problems in graph theory.



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Unit 7 Numerical Methods and Algorithms

General Outcome:

7.0 The students should, with the aid of a programmable calculator or computer software, approximate parameters for numerical or measured data using simple algorithms.

Specific Measurable Learning Outcomes:

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

- 7.1 Recognize irrational and rational numbers; and distinguish the properties of their decimal representations.
- 7.2 Determine the appropriate number of significant digits in a measured number and in the result of a calculator.
- 7.3 Estimate the error in a calculation.
- 7.4 Estimate the rate of change in a measured quantity over an interval; and estimate the total change in the value of this quantity.
- 7.5 Apply simple numerical algorithms, including recursive and successive approximation techniques, to estimate the value of a parameter. Examples of methods to be used are Monte Carlo and binary-chopping.
- 7.6 Write a program for a calculator or a spreadsheet for a numerical algorithm.



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Unit 8 Game Theory

General Outcome:

8.0 The students should be able to demonstrate knowledge of the process for decision-making based on an understanding of game theory and its analytical techniques.

Specific Measurable Learning Outcomes:

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

- 8.1 Demonstrate the development of alternatives and decisions for a specific problem.
- 8.2 Create a model which addresses a description of consequences, a determination of attributes, and a development of the measures of performance.
- 8.3 Relate alternatives to consequences for any decision-making scenario.
- 8.4 Developing a tree diagram portraying all decisions and alternatives in sequential order.
- 8.5 Assign probabilities (simple, joint, and conditional) to all outcomes resulting from any decisions.
- 8.6 Determine the contribution for any terminal branch of the tree based on a sequence of decisions and alternatives.
- 8.7 Decide the optimal alternative(s) based on pay-off computations.
- 8.8 Conduct research to provide examples of "real world" instances in which game theory was used (is being used) to achieve a decision.
- 8.9 Participate in projects from other disciplines which involve the need to analytically arrive at decisions and recommendations



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Unit 9 Student Project(s)

General Outcome:

9.0 The students should be able to research a topic in mathematics, critically analyze the research and present the results in a well composed and well organized fashion. The instructor will assign the project(s) and specify the format for the report.

Specific Measurable Learning Outcomes:

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

Specific learning outcomes that are appropriate to the project assignment will be established by the instructor.