BROWARD COLLEGE
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Course Outline

Course Title: Survey Of Mathematics
Common Course Title: MGF1107
Effective Term: Fall 2020 (Aug 22, 2020)
Credit Hours: 3 Units

Next Review : Aug 6, 2025
Contact Hour Breakdown: *(Per 16 week Term)*

Total: 48	
Lecture:	Lab:
Clinic:	Other:

Requirements

This course does not have any required pre-requisites or co-requisites.

Course Description:

This general education course will include 4 units. Mathematics of finance is required, and at least 3 other units are to be selected from among: linear and exponential functions; number systems; history of mathematics; elementary number theory; graph theory; and voting and apportionment theory. This course will also emphasize applications to real-world situations and may include projects and the integration of topics from other academic disciplines, including, but not limited to, business and the physical and social sciences. Meets Area 5a of the General Education Requirements for the A.A. degree and for the A.S. degree.

Course Outline

UNITS

Unit 1 : Mathematics of Finance (This unit is required.)

General Outcome
1.0 Apply mathematics to solve problems in the area of finance. This unit is a requirement for this course.

Specific Learning Outcomes
1.1 Demonstrate an understanding of the utilization of mathematics in simple and compound interest applications.
1.2 With the appropriate use of technology, solve a variety of money application problems, including (but not restricted to):
1.2.1 Simple interest
1.2.2 Future and present values
1.2.3 Unearned interest and payoff amounts
1.3 Demonstrate knowledge of consumer loan application problems, including (but not restricted to):
1.3.1 Credit loans and payments
1.3.2 Credit cards and finance charges
1.4 Demonstrate an understanding of fixed rate mortgages, including (but not restricted to):
1.4.1 Calculating regular monthly payment with the use of appropriate technology
1.4.2 Escrow accounts
1.4.3 Closing costs and other expenses associated with buying a house
1.4.4 Calculating amortization schedules
1.4.5 Mortgage interest and tax implications
1.5 Demonstrate a basic understanding of investing and personal finance, including (but not restricted to):
1.5.1 Basic types of investments and their associated risks
1.5.2 Basic investing terminology and calculations
1.5.3 Concepts of traditional IRAs and Roth IRAs

Unit 2 : Linear and Exponential Functions

General Outcome
2.0 Evaluate and interpret linear, quadratic, and exponential functions as mathematical models.

Specific Learning Outcomes
2.1 Review solving linear equations and proportions that include combining like terms and the distributive property.
2.2 Calculate the slope and intercepts of linear equations.
2.3 Graph linear equations.
2.4 Demonstrate basic knowledge of functions, including recognizing linear functions, using appropriate function notation, and evaluating functions.
2.5 Write, evaluate, and interpret linear functions.
2.6 With the appropriate use of technology, evaluate and interpret quadratic functions restricted to substituting for the independent variable x.
2.7 With the appropriate use of technology, evaluate and interpret exponential functions restricted to substituting for the independent variable x.
2.8 With the appropriate use of technology, evaluate and interpret logarithmic functions restricted to substituting for the independent variable x.
2.9 Read, evaluate, and interpret functions used to solve applied problems, including (but not restricted to):
2.9.1 Average rate of change
2.9.2 Cost, revenue, and profit functions
2.9.3 Maxima and minima
2.9.4 Population growth models
2.9.5 Growth and decay models

Unit 3 : Number Systems

General Outcome
3.0 Demonstrate knowledge of various number systems and perform operations within the different systems.

Specific Learning Outcomes
3.1 Demonstrate knowledge of positional number systems, grouping number systems, place value, and face value.
3.2 Perform conversions between Hindu-Arabic numbers and: Ancient Egyptian, Ancient Roman, Classical Chinese, Babylonian, Mayan, and Greek numbers.
3.3 Demonstrate knowledge of the Hindu-Arabic number system, including expanded form and historical calculation devices (such as the abacus and the lattice method).
3.4 Perform conversions between different number base systems.
3.5 Perform addition, subtraction, and multiplication operations in different number base systems.
3.6 Perform addition, subtraction, and multiplication in modular systems, including the 12-hour clock system.
3.7 Read and solve applied problems using modular arithmetic.

Unit 4 : History of Mathematics

General Outcome
4.0 Demonstrate an understanding of the history of mathematics, and be able to identify important events and contributions made by various mathematicians and cultures.

Specific Learning Outcomes
4.1 Demonstrate an understanding of the contributions to mathematics made 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 to mathematics made by the Greek culture during the period of 600 B.C. - A.D. 500.
4.3 Demonstrate an understanding of the contributions to mathematics made 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 to mathematics during the Period of Transition, A.D. 1200 - A.D. 1550.
4.5 Demonstrate an understanding of the contributions to mathematics during the Modern Period, A.D. 1550 - present.

Unit 5 : Elementary Number Theory

General Outcome
5.0 Demonstrate an understanding of number theory concepts and techniques, and apply them to solve problems.

Specific Learning Outcomes
5.1 Demonstrate an understanding of the concept of divisibility.
5.2 Calculate the greatest common factor (GCF) and the least common multiple (LCM) of a list of numbers.
5.3 Demonstrate an understanding of prime numbers, including how to determine if a number is prime (Sieve of Eratosthenes is an option), and knowing that there are an infinite number of prime numbers.
5.4 Demonstrate an understanding of the Unique Factorization Theorem, and write numbers as a product of prime factors. 5.5 Determine if a number is perfect, deficient or abundant.
5.6 Demonstrate an understanding of the Fibonacci sequence and its relationship to the Golden Ratio.
5.7 Understand and demonstrate mathematical conjectures that have not been proven (such as Goldbach's Conjecture and the Twin Prime Conjecture).

Unit 6 : Graph Theory

General Outcome
6.0 Recognize and understand relationships among different kinds of graphs, circuits, and trees.

Specific Learning Outcomes
6.1 Demonstrate an understanding of graphs, subgraphs, walks, paths, circuits, and isomorphisms.
6.2 Determine if a graph is a tree.
6.3 Demonstrate knowledge of a spanning tree of a graph, and use Kruskal's Algorithm to find a minimum spanning tree.
6.4 Demonstrate an understanding of Hamilton circuits, and use the Brute Force Algorithm and the Nearest Neighbor Algorithm to find minimum Hamilton circuits.
6.5 Demonstrate an understanding of Euler circuits, use Euler's Theorem to determine if an Euler circuit exists, and use Fleury's Algorithm to find one.
6.6 Read classic problems in graph theory and apply the ideas of this unit to solve them.

Unit 7 : Voting and Apportionment Theory

General Outcome
7.0 Apply the methodology of social choice theory to election scenarios and apportionment problems, and assess the attributes and deficiencies of each method.

Specific Learning Outcomes
7.1 Apply various methods to determine the outcome of an election, including (but not restricted to) the following five methods: majority, plurality, pairwise comparison, Borda, and Hare.
7.2 Rate each voting method in terms of how many of the four desirability principles it satisfies; namely, the majority criterion, the Condorcet criterion, the monotonicity criterion, and the irrelevant alternatives criterion.
7.3 Read Arrow's Impossibility Theorem and interpret its societal implications on democratic decision-making processes.
7.4 Apply various historical and current methods to apportionment problems, including (but not restricted to) the following five methods: Hamilton, Jefferson, Webster, Adams, and Huntington-Hill.

7.5 Evaluate each apportionment method in terms of the following four fairness standards: the Quota Rule, the Alabama Paradox, the Population Paradox, and the New States Paradox.
7.6 Read Balinski and Young's Impossibility Theorem and interpret its societal implications on democratic decision-making processes.