Correlation of Math Is Everywhere! Content with MGF 1107 Course Objectives

Note: In *Part C* below, the numbered items listed below each lettered course objective refer to the Chapter and Section numbers in the textbook, *Math Is Everywhere! Explore and Discover It!* by James J. Rutledge, ©2010, Pearson Publishing, ISBN: 978-0-5587-3895-2

ST. PETERSBURG COLLEGE
APPROVED COURSE OUTLINE

Prefix	Number	Course Title	Cr.Hrs.
MGF	1107	MATHEMATICS FOR LIBERAL ARTS II	3

A. Course Description:

Prerequisite: MAT 1033 or appropriate score on the SPC mathematics placement test. The intent of MGF 1107 is to present topics demonstrating the beauty and utility of mathematics to the general student population and to provide knowledge and skills useful for college, life and career. The course will include topics related to patterns and reasoning, growth and symmetry, linear and exponential growth, and personal finance; mathematical connections with music, art, architecture and nature will be explored. History of mathematics, critical thinking skills, problem solving strategies and appropriate use of technology will be used throughout the course. This course is designed to satisfy three credits of the Gordon Rule which requires “Six semester hours of mathematics coursework at the level of College Algebra or higher” but is not a prerequisite to any other mathematics course. 47 contact hours.

B. Major Learning Outcomes:

1. The student will demonstrate a mathematical understanding of patterns and reasoning.
2. The student will demonstrate a mathematical understanding of natural growth patterns and symmetry.
3. The student will demonstrate a mathematical understanding of linear and exponential growth and decay models.
4. The student will demonstrate an understanding of financial mathematics.

C. Course Objectives Stated in Performance Terms:

1. The student will demonstrate a mathematical understanding of patterns and reasoning by:

a. identifying and illustrating a problem solving strategy.
    1. 1.1 Analytical Reasoning
    2. 1.2 Math Classics and Applied Reasoning

3. *Project:* Guards and Prisoners
4. *Project:* Cross-number Puzzle

b. illustrating and using critical thinking skills.
1. *Project:* Pascal's Famous Triangle
2. 2.1 Deductive and Inductive Reasoning
3. *Project:* A Riddling Good Time
4. *Project:* The Curious Date: 7-14-98
5. *Project:* Another Curious Date: 10-1-01
6. 2.4 Logical Thinking and Reasoning Backwards
7. *Project:* Puzzle Constructions
8. 2.5 Magic Squares: Sum Fun!
9. *Project:* Magic Squares

c. identifying, illustrating and constructing various patterns and codes.
1. 2.2 Pattern Recognition: Searching for Connections
2. 2.3 The nth Term: The Power of Generalization
3. *Project:* Sequence Creations
4. *Project:* Generalization—A Powerful Tool
5. 4.1 Understanding Other Number Bases: Places of Value
6. *Project:* The Banker's Dilemma
7. 4.2 The Binary System: Secret Language of Computers
8. *Project:* The ASCII code
9. 4.3 Number Base Applications
10. *Project:* Hexadecimals
11. 5.2 The Modulus in Action: Check Digits and Error Detection
12. *Project:* ISBN Numbers and Modulus Arithmetic
13. *Project:* ISMN Numbers and Modulus Arithmetic
14. 5.3 Cryptography: The Mathematics of Privacy
15. *Project:* Cryptograms
16. *Project:* Cryptoquotes

d. using and applying cryptography.
1. 5.3 Cryptography: The Mathematics of Privacy
2. *Project:* Chinese Trigrams and Binary Numbers
3. *Project:* Our Course Logo: A Hidden Message
4. *Project:* Cryptograms
5. *Project:* Cryptoquotes

e. identifying, illustrating and constructing magic squares.
1. 2.5 Magic Squares: Sum Fun!
2. *Project:* Magic Squares
3. *Project:* Magic Square Extensions

f. inferring relations between numbers by examining particular number patterns.
   1. 2.2 Pattern Recognition: Searching for Connections
   2. 2.3 The nth Term: The Power of Generalization
   3. *Project:* Generalization—A Powerful Tool
   4. 3.1 The Greeks: Students and Investigators
   5. *Project:* Polygonal Numbers

g. explaining another number system in terms of the base ten system.
   1. 3.3 Number Systems through the Ages: Stylistic and Diverse
   2. *Project:* Numeration in Other Cultures
   3. 4.1 Understanding Other Number Bases: Places of Value
   4. 4.2 The Binary System: Secret Language of Computers
   5. *Project:* The ASCII code
   6. 4.3 Number Base Applications: More Fun with Math!
   7. *Project:* Hexadecimals

2. The student will demonstrate a mathematical understanding of natural growth patterns and symmetry by:

a. identifying and illustrating spiral growth patterns.
   1. *7.*3 Mathematics in Architecture and Nature: The Golden Section and Fibonacci
   2. *Project:* Fibonacci Numbers in Nature and the Arts
   3. *Project:* Logarithmic Spirals: Seashell Design

b. identifying the various types of mathematical symmetry and explaining their interrelationships.
   1. 7.2 Symmetry and Tilings: Mathematical Beauty and Artistry
   2. *Project:* Tilings in your Home
   3. *Project:* Symmetry and Tilings
   4. *Project:* The Mathematical Art of M.C. Escher

c. identifying and illustrating self-similar figures including fractals.
   1. 8.1 Mathematical Fractals: A Natural Geometry
   2. *Project:* Introduction to Fractals
   3. 8.2 Fractal Applications
   4. *Project:* Fractals in Nature
   5. 8.3 Famous Triangles: Sierpinski Meets Pascal
   6. *Project:* Triangle Connections

d. constructing the Fibonacci sequence of numbers and recognizing the occurrence of Fibonacci numbers in nature.
   1. 7.3 Mathematics in Architecture and Nature: The Golden Section and Fibonacci
   2. *Project:* The Amazing Rabbit Population
   3. *Project:* Fibonacci Numbers in Nature and the Arts

e. calculating the Golden Ratio and describing its relationship to the Fibonacci sequence and illustrating some of its uses in art and architecture.
    1. 7.3 Mathematics in Architecture and Nature: The Golden Section and Fibonacci
    2. *Project:* Golden Rectangles in your Home
    3. *Project:* Fibonacci Numbers in Nature and the Arts
    4. *Project:* Logarithmic Spirals: Seashell Design

f. recognizing and describing other applications of mathematics in music, art, architecture or other disciplines.
    1. 6.1 The Nature of Sound and Musical Scales: Good Vibrations
    2. *Project:* Creating Good Vibrations
    3. 6.2 The Mathematics of Stringed Instruments: Structured Harmony
    4. *Project:* Guitar Analysis
    5. 6.3 Digital Music and CD's: Applied Mathematics
    6. *Project:* Digital Music and Mathematics
    7. 7.1 Mathematical Perspective in Art: A Renaissance Breakthrough
    8. *Project:* Mathematical Perspective
    9. 7.2 Symmetry and Tilings: Mathematical Beauty and Artistry
    10. *Project:* Tilings in your Home
    11. *Project:* Symmetry and Tilings
    12. *Project:* The Mathematical Art of M.C. Escher
    13. 7.3 Mathematics in Architecture and Nature: The Golden Section and Fibonacci
    14. *Project:* The Amazing Rabbit Population
    15. *Project:* Golden Rectangles in your Home
    16. *Project:* Fibonacci Numbers in Nature and Beyond
    17. *Project:* Logarithmic Spirals—Seashell Design
    18. 8.2 Fractal Applications
    19. *Project:* Fractals in Nature
    20. *Project:* Fractal Music
    21. *Project:* Fractal Art

3. The student will demonstrate a mathematical understanding of linear and exponential growth and decay models by:

a. creating, interpreting and analyzing a scattergram.
    1. 9.3 Linear Models: Analytic and Predictive
    2. *Project:* How Does Your Lawn Grow?
    3. *Project:* How Does Your Garden Grow?

b. using correlation analysis to determine if a linear relationship exists and, if so, the strength and type.
    1. 9.3 Linear Models: Analytic and Predictive
    2. *Project:* How Does Your Lawn Grow?
    3. *Project:* How Does Your Garden Grow?

c. determining an appropriate linear model and predicting future outcomes given a set of environmental, medical or other data.
    1. 9.1 Mathematical Relationships and Functions: "Vary-ables" in Action
    2. 9.2 Linear Functions: A Deeper Look
    3. 9.3 Linear Models: Analytic and Predictive
    4. *Project:* How Does your Lawn Grow?
    5. *Project:* How Does your Garden Grow?

d. determining an appropriate exponential model and predicting future outcomes given a set of environmental, medical or other data.
    1. 10.1 Doubling Power: An Amazing Phenomenon
    2. 10.2 The Exponential Function: A Deeper Look
    3. *Project:* World Population Growth
    4. 10.3 Exponential Models and Applications
    5. *Project:* U.S. Population Growth
    6. *Project:* The Fastest Growing State in the U.S.?
    7. *Project:* Population Growth in Florida

4. The student will demonstrate understanding of financial mathematics by:

a. calculating and comparing simple and compound interest.
    1. 11.1 Compound Interest: A Key to Success
    2. *Project:* The Long-Term Results of Compound Interest

b. determining an investment strategy based upon the stock market.
    1. 11.2 Savings Plans: Don't Leave Home Without One!
    2. *Project:* Intro to Savings and Investment
    3. 11.3 Stocks, Bonds and Mutual Funds
    4. *Project:* Intro to Stocks, Bonds and Mutual Funds
    5. *Project:* Investment Strategies
    6. *Project:* A True and Amazing Story
    7. *Project:* Stock Market Investment Report

c. analyzing loans and mortgages.
    1. 11.4 Home Mortgages: Mathematical Revelations
    2. *Project:* The All-Powerful Interest Rate

d. preparing and analyzing elements of a financial plan, including investments and annuities.
    1. 11.2 Savings Plans: Don't Leave Home Without One!
    2. *Project:* Intro to Savings and Investment
    3. 11.3 Stocks, Bonds and Mutual Funds
    4. *Project:* Intro to Stocks, Bonds and Mutual Funds
    5. *Project:* Investment Strategies

e. analyzing the terms of credit card account agreements.
    1. 11.5 Credit Card Economics
    2. *Project:* Credit Reports and Credit Ratings: An Inside Look
    3. *Project:* The Truth about Credit Card Debt

D. Criteria Performance Standard:
Upon successful completion of the course the student will, with a minimum of 70% accuracy, demonstrate mastery of each of the above stated objectives through classroom measures developed by individual course instructors.

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Effective Session 19991			
C&I 10/23/01, BT 11/20/01			
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