# MGF1107 Course Outline

***Contemporary Math***................................................................................................................... *(3) (P)*

Description:  The intent of this course is to present topics which demonstrate the beauty and utility of mathematics to the general student population.  Along with MGF1106, it is designed as a terminal course for students who do not intend to take other mathematics courses.

General Education Learning Outcome: The primary General Education Learning Outcome (GELO) for this course is Quantitative Reasoning, which is to understand and apply mathematical concepts and reasoning, and analyze and interpret various types of data. The GELO will be assessed through targeted questions on either the comprehensive final or an outside assignment.

Prerequisite:  MGF1100 with a grade of "C" or better; OR MAT1033 or MAT1034  with a grade of "D" or better, OR the equivalent.

Rationale:  In an increasingly complex world, mathematical thinking, understanding, skill, and appreciation are more important than ever.  This course provides the student with skills to think critically about, and make decisions on, quantitative issues in their personal, business and civic lives.  It provides students with examples of the beauty and utility of mathematics in various past and present areas of human endeavor.

Impact Assessment: Wherever possible, concepts will be introduced using real world data from various areas; and other concepts will be reinforced by applying them to problems in areas of everyday life. Topics to be addressed in *Contemporary Math* are those that will enhance the quantitative reasoning of the student, and illustrate some areas where mathematics impacts decision making and/or quality of life.  These topics may be concrete, such as financial management and statistics, or esthetic, such as math history or math in art and nature.  The course applies toward the General Education mathematics requirement area A for an Associate of Arts degree.  *Contemporary Mathematics* is a terminal course.  It is not a prerequisite for any course, but it empowers the students with quantitative and analytical skills the students can use in many aptitude tests and satisfies other needs such as meeting the requirement for many degrees in business, the sciences, and the social sciences.

Broad Course Objectives:  This course supports the following goals of the Math Department:
- Engage students in sound mathematical thinking and reasoning.  This should include students finding patterns, generalizing, and asking/answering relevant questions.
- Provide a setting that prepares students to read and learn mathematics on their own.
- Explore multiple representations of topics including graphical, symbolic, numerical, oral, and written.  Encourage students to make connections among the various representations to gain a richer, more flexible understanding of each concept.
- Analyze the structure of real-world problems and plan solution strategies.  Solve the problems using appropriate tools.

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- Develop a mathematical vocabulary by expressing mathematical ideas orally and in writing.

- Enhance and reinforce the student's understanding of concepts through the use of technology when appropriate.

As a result of successfully completing MGF1107, students should be able to demonstrate the following:

- Analyze/interpret quantitative data verbally, graphically, symbolically and numerically.

- Communicate quantitative data verbally, graphically, symbolically and numerically.

- Appropriately integrate technology into mathematical processes.

- Use mathematical concepts in problem-solving through integration of new material and modeling.

Topical Outline with Specific Course Objectives:  The exact topics to be covered will be determined by the three topics chosen by the instructor to cover in this course.  Specific objectives are listed underneath the seven topics, with the numbers in parentheses indicating the topic(s) for which these objectives will be attained.

*Three* of these seven topics will be included in the course.

1. Exploratory data analysis

2. Sampling and decision making

3. Modeling - linear, quadratic and exponential

4. Financial mathematics

5. History of mathematics

6. Patterns, network and game theory

7. Mathematics in art, nature and daily life

For each topic chosen, the instructor will develop the ideas at a level appropriate to this class, and will emphasize the following concepts and skills.  Concepts with numbers in parentheses will be covered under those topics; concepts without numbers illustrate the approach of the class and may or may not be specifically addressed:

- Analyze real data sets using tools such as histograms, timelines, boxplots, tables, and descriptive statistics. (1, 2)

- Prepare a report based on an analysis of a real data set. (1,2)

- Understand basic types of sampling in opinion polls and interpret sampling error. (1,2)

- Recognize abuses and manipulations of data that occur in polling. (1,2)

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- Determine whether data can be modeled by functions such as linear, quadratic, or exponential. (3)

- Assess the model to determine its usefulness. (3)

- Use exponential functions to model data such as population growth and radioactive decay. (3)

- Make informed choices in areas such as credit card and long distance carrier offers. (4)

- Make informed choices in areas such as loans, mortgages, insurance, and investment plans. (4)

- Understand simple, compound, and effective interest rates; discounts, mark-ups and mark-downs. (4)

- Understand and appreciate man's evolving understanding of mathematics. (5)

- Understand other systems of numeration and modulus arithmetic. (5)

- Recognize the patterns or mathematics involved in man-made or natural occurrences: Golden ratio, Fibonnaci sequence, tessellation, fractals. (6,7)

- Recognize the patterns or mathematics involved in many games and recreations; network theory, game theory, magic squares, billiards. (6,7)

- Choose appropriate methods for solving problems: tables, graphs, equations, guess-and-check, and working backwards.

- Make an educated "guess" as to the reasonableness of results.

- Take basic concepts and apply them in situations that have not previously been specifically demonstrated.

- Explain the process used in solving the problem.

- Explain what the answer means in the context of the problem.

- Recognize patterns or relationships and express them in clear sentences that will be meaningful to another student.

- Solve problems and recognize the relationship among information presented numerically, algebraically, and graphically.

- Express generalizations discovered through investigations.

- Ask clarifying and extending questions related to the mathematics at hand.

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The following teaching techniques, which reflect the goals of the Math Department, will be especially encouraged in this course.

- Emphasize techniques that encourage the student to become an active, involved learner: less lecture, more group and cooperative learning, interesting and challenging problems, student presentations.

- Emphasize problem solving & mathematical modeling; less emphasis on manipulation for its own sake.

- Cover fewer topics but in deeper and more interesting ways.

- Use textbooks which reflect the NCTM and AMATYC standards.

- Use appropriate technology.

Evaluation:  Each instructor will determine the specific criteria for determining the final course grade.  These criteria and will be delineated in the first day handout provided to each student.  Each instructor will give a comprehensive final exam during the assigned final exam period.

Commonality:  Instructors will choose topics from those listed in the topical outline, and use a department-approved textbook.  Each instructor must choose at least three of these topics.