

MATHEMATICS 103  
INTRODUCTION TO CONTEMPORARY MATHEMATICS

I. Introduction

A. Catalog Description

This course provides an introduction to contemporary mathematics and its applications. It includes topics from management science, statistics, social choice, the geometry of size and shape, and mathematics for computer science. These topics are chosen for their basic mathematical importance and for the critical role their application plays in a person's economic, political, and personal life. This course is designed to be accessible even to students with a minimal background in mathematics. This course is not designed to prepare students for further work in mathematics; however, it is an ideal course to take to meet the core. No credit will be given for MATH 103 if the student has prior credit for another mathematics course above the level of intermediate algebra. **This course is not intended for freshmen.** Prerequisite: One year of high school mathematics. Satisfies the Mathematical Reasoning core requirement.

B. Objectives

Math 103 is designed to bring the excitement of contemporary mathematics to non-specialists, and to help them develop the ability to think logically, and to read critically technical information. This course will give students a more accurate perception of the nature of mathematics, a greater appreciation for its influence on the quality of their daily lives, and a better understanding of some important mathematical concepts and the problem solving process.

This course satisfies the Mathematical Approaches category of the university's core curriculum by developing an appreciation of the power of Mathematics and formal methods to provide a way of understanding a problem unambiguously, describing its relation to other problems, and specifying clearly an approach to its solution. A student in this course will develop a variety of mathematical skills, an understanding of formal reasoning, and a facility with applications. Specifically, this course will provide the student with the ability to work with numeric data, to reason from those data, and to understand what can and can not be inferred from those data.

C. Prerequisites

One year high school algebra.

D. Intended Audience:

Students taking Math 103 are expected to be those who have been unsuccessful in traditional math courses in which symbolic manipulation and computation play a dominant role. Humanities students, in particular, will benefit from this course, which focuses on writing and discussion of mathematical ideas, rather than computational techniques. This course is not appropriate for students of mathematics or science, and is not recommended for students whose mathematical background has adequately prepared them for other mathematical reasoning core courses.

E. Recommendations:

Math 103 should not be taken by first semester freshmen just to satisfy the mathematical reasoning core requirement, since other math courses, also satisfying the core, may better serve their future course of study. We recommend that freshmen who are unsure of their major field wait until they can determine the math course best suited to their major, before registering for a math class. Therefore, we suggest that only one section of Math 103, for upperclass students, be offered each fall semester, then, two or three sections in the spring.

II. Content and Syllabus:

This course includes written work, discussion, and computer applications. Topics are drawn from statistics, graph theory, growth and decay, and the mathematics behind environmental, social, and economic issues. The syllabus follows.

A. Required Topics

1. Statistics
  - Data Collection
  - Data Analysis
  - Probability
  - Statistical Inference
2. Management Science -- Graph Theory
  - Hamilton and Euler Circuits
  - Traveling Salesman and Postman Problems

B. Optional Topics

1. Statistics
  - Counting Methods
2. Management Science -- Graph Theory
  - Scheduling and Planning
  - Linear Programming
  - Trees and their Applications
3. Social Choice
  - Voting
  - Weighted Voting Systems
  - Game Theory
  - Fair Division
  - Apportionment
4. Computers
  - Computer Algorithms
  - Codes
  - Data Storage
  - Graphics
5. Size and Shape
  - Patterns
  - Growth and Form
  - Financial Formulas
  - Population Size

III. Bibliography

COMAP , For All Practical Purposes: An Introduction to Contemporary Mathematics, W.H. Freeman and Company

Tannenbaum, Peter and Robert Arnold, Excursions in Modern Mathematics, Prentice Hall

Jacobs, Harold R., Mathematics A Human Endeavor, W.H. Freeman and Company

Johnson, David R. and Thomas A. Mowry, Mathematics A Practical Odyssey, PWS Publishing Company

Roberts, Wayne A., Faces of Mathematics, Harper Collins

McCown, Jack R. and Michael Sequeira, Patterns in Mathematics, PWS Publishing Company

IV. Assessment Tools

Assessment of the extent to which a student meets the course objectives could be measured with homework, worksheets, projects, quizzes, and exams.