Math 111
Mathematical Applications

Advising

This core course, together with its sister course Math 110 - Mathematical Explorations, are **mathematics for liberal arts courses**. These courses are designed to enable students to develop a broader understanding of mathematics and more positive appreciation of mathematics - one that is not dominated by an ability simply to perform rote procedures.

Math 110 and Math 111 are appropriate for all students. In fact, these courses should be considered the default recommendation for all students who do not: i) require specific mathematics courses for their major, or ii) express a specific interest in another mathematics course for specific programmatic reasons.

Students may take both Math 110 and Math 111 for credit and to satisfy core requirements. **Math 110 and Math 111 can be taken in either order or even simultaneously.**

Math 110 is **not** a remedial, basic skills, nor mathematical literacy course. Students are expected to bring an appropriate level of mathematical preparation to the course.

Catalog Description

An introductory course designed to provide the liberal arts major with opportunities to investigate ways in which mathematics is used to solve real world problems in a variety of disciplines. Applications may include such topics as voting schemes, fair division, networks, scheduling, finance, probability and statistics. Prerequisite: High School Algebra II or MATH 0103.

Objectives & Requirements

Most college preparatory mathematics courses focus on acquiring new mathematical tools, skills, and techniques. In contrast, the focus of this course is on new mathematical objects, perspectives, ideas, and connections to other areas using tools that the students have already learned. This enables students to develop a **broader understanding of mathematics** and more **positive appreciation of mathematics** - one that is not dominated by an ability simply to perform rote procedures.

Math 111 is **not** a remedial, basic skills, nor mathematical literacy course. While it is appropriate to address some basic skills and literacy issues - one must do this in virtually any course - it is not appropriate for this to become a significant focus of the course.

The content of Math 110 and Math 111 must be kept as disjoint as possible as they are sister courses that many students will take together to fulfill their core requirement in mathematics. Math 110 satisfies the "Traditional Mathematics" sub-area and is meant to cover topics that are not generally considered "applied mathematics". In contrast, Math 111, which also satisfies the "Traditional Mathematics" sub-area of the mathematics core, is expected to cover "applied" topics.

Possible Topics: Possible topics for Math 111 may include: linear programming, voting theory, apportionment, interpretive statistics, descriptive statistics, game theory, fair division, graph

theory, networks and scheduling, mathematical modeling, population growth, coding and cryptography, orienteering, financial mathematics.

Topics to Avoid: Topics that should, generally, be left to Math 110 include: mathematical reasoning, patterns, the infinite, number theory, topology, chaos and fractals, the history of mathematics, mathematics and the arts, symmetry, and modern geometry.

Appropriate Texts: Appropriate texts that have been used in the past include:
Excursions in Modern Mathematics, 5th edition, by Arnold and Tannenbaum, Prentice Hall. (ISBN: 013-100-1914)
[Parts I, II, and IV, "The Mathematics of Social Choice", "Management Science", and "Statistics" are more appropriate for Math 111. While the remaining part, Part III, "Growth and Symmetry" is more appropriate for Math 110]
For All Practical Purposes, 7th edition, COMAP (Consortium for Mathematics and its Applications), W.H. Freeman. (ISBN: 07-167-59659 hardcover, 07-167-69018 paperback)

Core Status

Math 111 is a core mathematics course satisfying the "Traditional Mathematics" sub-area. It satisfies these areas in the following ways (from the 1997 Core Inclusion Form):

COURSE OBJECTIVES

1. Recognize, understand, utilize, integrate and communicate mathematical concepts, mathematical methods and logical reasoning.

This course utilizes previously developed concepts and skills in arithmetic, algebra and geometry. As new topics are examined, students will integrate these new concepts and methods in a problem solving setting.

2. Apply mathematical concepts, mathematical methods, and mathematical reasoning within an analytic framework.

Problem solving strategies together with standard algorithms will be applied to solving problems across the disciplines.

3. Conceptualize and utilize algorithms and formal mathematical structures.

Within the mathematical structures of the topics examined, students will develop and apply algorithms for problem solving.

COURSE REQUIREMENTS (APPLIED MATHEMATICS)

1. Introduce traditional mathematical concepts, constructs, systems, algorithms, and methods of inquiry and analysis.

The concepts, constructs, systems, algorithms and methods of inquiry and analysis of traditional algebra and geometry will be applied and utilized to develop algorithms and problem solving techniques as new topics in mathematics are explored, students will integrate the new concepts and methods to applied problems.

2. Provide an environment where students can construct, investigate, learn, and/or apply those attributes described in Course Requirement 1.

Classroom lecture and discussion are used with possible group solving sessions or student reports.