

Course Outline for MATH 1001, Nature of Modern Mathematics

MATH 1001 Nature of Modern Mathematics (3 units)

Prerequisite: Appropriate Math Placement or MATH 1000.

Concepts from contemporary mathematics, their development, applications, and role in society. Graph theory, critical path analysis, statistical inference, coding, game theory, and symmetry. 3 lectures. Fulfills GE Area 2 with a grade of C- or better. Formerly MATH 112.

Course Learning Objectives	
1	Describe problems from contemporary mathematics using the appropriate language and notation.
2	Represent mathematical information symbolically, visually, numerically and verbally.
3	Interpret and draw inferences from mathematical models such as formulas, graphs, tables, and schematics.
4	Use mathematical techniques from areas such as graph theory, coding theory, or game theory to solve problems from contemporary mathematics.
5	Critically evaluate mathematical arguments.

Expanded Course Content

Textbooks, materials, and/or other resources
"The Heart of Mathematics: An Invitation to Effective Thinking", by Edward B. Burger and Michael Starbird, Second Edition, Key College Publishing, Emeryville
"For All Practical Purposes: Mathematical Literacy in Today's World", by Consortium for Mathematics and its Applications (COMAP), Tenth Edition, W.H. Freeman & Company
Instructors can choose topics from the textbooks above or from other resources. A sample outline of the course content is provided below.

Week	Readings	Topics of Discussion
1	Sections 1.1, 1.2, 1.3 of Burger/Starbird	Introduction to rigorous thought, conundrums that evoke techniques of effective thinking
2	Sections 1.4, 2.1 of Burger/Starbird	Strategies in mathematics, counting, the Pigeonhold Principle
3	Sections 2.2, 2.3 of Burger/Starbird	Fibonacci numbers, prime numbers
4	Sections 2.4, 2.5 of Burger/Starbird	Modular arithmetic, encrypting information using modular arithmetic and primes
5	Sections 4.1, 4.2 of Burger/Starbird	The Pythagorean Theorem, computational geometry
6	Sections 4.3, 4.4 of Burger/Starbird	The golden rectangle, symmetries
7	Sections 4.5, 4.6 of Burger/Starbird	Platonic solids, non-Euclidean geometries
8	Sections 6.1, 6.2, 6.3 of Burger/Starbird	Dynamical systems, fractals
9	Sections 6.4, 6.5 or Burger/Starbird	Julia sets, Mandelbrot sets, mathematical chaos
10	Sections 1.1, 1.2 of COMAP	Graph theory, Euler circuits
11	Sections 1.4, 2.1 of COMAP	Urban graph traversal problems, Hamiltonian circuits
12	Section 2.2, 2.3, 2.4 of COMAP	Traveling salesman problem, minimum cost spanning trees
13	Sections 2.5, 3.1 of COMAP	Critical-path analysis, scheduling tasks
14	Sections 3.2, 3.3 of COMAP	Critical-path schedules, independent tasks
15	Sections 3.4, 3.5 of COMAP	Bin packing, resolving conflict via coloring, the Four Color Problem

Method of Assessment

The possible methods of assessment are written individual examinations, quizzes, in-class worksheets or presentations, projects, and homework. All exams are to be proctored in-person, and one or more midterms and a cumulative final exam are required.

Instructional Mode

The instructional mode for this class is face-to-face. This designation means that the essential academic standards of the course require in-class student engagement, and thus remote instruction is not appropriate.