Capital Community College
Course Outline
Topics in Contemporary Mathematics

SECTION I

SUBJECT AREA & COURSE NUMBER: MAT* G135
COURSE TITLE: Topics in Contemporary Mathematics
COURSE CATALOG DESCRIPTION: This course emphasizes areas of mathematics that may be applied directly to practical, real-world situations. Topics include: the mathematics of voting, distribution of power, sharing fairly, optimal routing, and at least two of the following – networks, scheduling, spiral growth, population growth, geometric symmetry, fractal geometry, statistics. This course requires use of a scientific calculator. (Fall and Spring)
LECTURE HOURS PER WEEK: 3 **CREDIT HOURS:** 3
PREREQUISITE(S): MAT* G094 or qualifying Mathematics Placement Test score

SECTION II

A. SCOPE:
The particular objective of MAT* G135 is to introduce students to significant areas of mathematics that find application in meaningful real-world situations. Topics representing these areas do not rely on layers of mathematical technique. Students who take this course should develop a better understanding of the connection between mathematics and their lives, and they should more readily be able to debate the question, "What's mathematics good for?"

B. REQUIRED WORK: Determined by the instructor as described in the course syllabus

C. ATTENDANCE AND PARTICIPATION: Students are expected to attend each class, arrive on time, take exams at the scheduled times, and participate in the in-class learning process. (Specific instructor policies are included in the course syllabus.)

D. METHODS OF INSTRUCTION: The methods of instruction are determined by each instructor and may include but are not limited to lecture, lecture/discussion, small group collaborative learning, experiment/exploration, distance learning, student presentations, use of technologies such as audio-visual materials, computer, language laboratory, and calculator.

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E. OBJECTIVE, OUTCOMES, ASSESSMENT

The following objectives and outcomes represent the department's core requirements for student achievement.

LEARNING OBJECTIVES	**LEARNING OUTCOMES**	***ASSESSMENT* METHODS**
To demonstrate an understanding of:	**Student will:**	**As measured by:**
Application of mathematics to social decisions - Voting	a) Use different voting methods to arrive at a decision. b) Compare outcomes of various voting methods. c) Identify voting paradoxes. d) Apply weighted-voting systems and evaluate power - coalitions, dictators, vetoes, powerlessness.	Written in-class quizzes, tests, and examinations; out-of-class projects, written reports; portfolios; homework assignments
Application of mathematics to social decisions - Fair Division	Apply various mathematical methods to divide fairly a set of objects among a group of people.	
Application of mathematics to social decisions – Apportionment Problems	Apply different methods to apportion a set of objects proportionately, such as seats in a legislature.	
Application of mathematics in Management Science -Routing Problems	a) Solve basic problems related to graphs. b) Apply algorithms to find Euler circuits and Hamilton circuits. c) Use graph theory to design routes for delivering goods and services to several locations.	
At least two of the following areas of study		
Application of mathematics in Management Science -	Apply graph theory algorithms to design networks that minimize distance, cost, etc.	
Application of mathematics in Management Science -	Apply directed graphs, priority lists, the decreasing-time algorithm, and critical-path algorithm to schedule a set of tasks.	
Application of mathematics to growth and symmetry - Spiral growth in nature	a) Solve problems involving the Fibonacci Sequence. b) Relate the Fibonacci sequence to the Golden Ratio and spiral growth.	
Application of mathematics to growth and symmetry – population growth	Solve population growth problems using linear, exponential, and logistic models.	
Application of mathematics to growth and symmetry – geometric symmetry	Use rigid motions (reflection, rotation, translation, glide-reflection) to transform an object.	
Application of mathematics to growth and symmetry - shapes in nature	Solve problems in fractal geometry related to the Koch snowflake, the Sierpinski gasket, and the Mandelbrot Set.	

Note 1: The foregoing table of learning outcomes should not be considered exhaustive; other learning outcomes may also support the objectives. The list is not intended to limit the learning outcomes that can be used to support the objectives.

Note 2: The order in which the learning outcomes are addressed and the relative emphasis given to each will vary from instructor to instructor.

Note 3: There is no expectation that an instructor will employ all the assessment methods or any particular subset of them. Also, the particular list of assessment methods is not exhaustive. Other methods that measure the learning outcomes may be used.

Note 4: It is important to recognize that courses are not delivered in a social vacuum. Any bona fide assessment of a course must take account of out-of-class life demands on students that adversely impact academic success.

F. TEXTS AND MATERIALS: A text selected by the Mathematics Section of the Science and Mathematics Department with content and presentation that support the Learning Objectives and Outcomes given in Part E above.

G. INFORMATION TECHNOLOGY: Scientific calculator