##### BARTON COMMUNITY COLLEGE

**COURSE SYLLABUS**

### GENERAL COURSE INFORMATION

Course Number: MATH 1840

Course Title: Introduction to Contemporary Mathematics

Credit Hours: 3 credits

Prerequisites: MATH 1828 College Algebra with a grade of C or better OR MATH 1826

College Algebra with Review with a grade of C or better OR appropriate

placement score

Division/Discipline: Academics Division/Mathematics

Course Description: This course explores uses of mathematics in the contemporary world. Topics include: management science, statistics, coding of information, social choice and decision making, geometry of growth and symmetry.

### INSTRUCTOR INFORMATION

### COLLEGE POLICIES

# Students and faculty of Barton Community College constitute a special community engaged in the process of education. The College assumes that its students and faculty will demonstrate a code of personal honor that is based upon courtesy, integrity, common sense, and respect for others both within and outside the classroom.

Plagiarism on any academic endeavors at Barton Community College will not be tolerated. The student is responsible for learning the rules of, and avoiding instances of, intentional or unintentional plagiarism. Information about academic integrity is located in the Student Handbook.

The College reserves the right to suspend a student for conduct that is determined to be detrimental to the College educational endeavors as outlined in the College Catalog, Student Handbook, and College Policy & Procedure Manual. [Most up-to-date documents are available on the College webpage.]

Any student seeking an accommodation under the provisions of the Americans with Disability Act (ADA) is to notify Student Support Services via email at [disabilityservices@bartonccc.edu](mailto:disabilityservices@bartonccc.edu).

### COURSE AS VIEWED IN THE TOTAL CURRICULUM

This course is offered primarily for education majors wishing to take a mathematical course beyond College Algebra. It will bring the concepts of contemporary mathematical thinking to the non-specialist, as well as help him or her to develop the capacity to engage in logical thinking and to read critically the technical information with which our contemporary society abounds.

### ASSESSMENT OF STUDENT LEARNING

Barton Community College is committed to the assessment of student learning and to quality education. Assessment activities provide a means to develop an understanding of how students learn, what they know, and what they can do with their knowledge. Results from these various activities guide Barton, as a learning college, in finding ways to improve student learning.

Upon successful completion of this course, the student will be able to:

1. Design optimal and heuristic routes.
   1. Determine by observation if a graph is connected.
   2. Identify vertices and edges in a given graph.
   3. Construct the graph of a given street network.
   4. Determine by observation the valence of each vertex of a graph.
   5. Define an Euler circuit.
   6. List the two conditions for the existence of an Euler circuit.
   7. Determine whether a graph contains an Euler circuit.
   8. Add a minimum number of edges to “eulerize” a graph.
2. Investigate the mathematics of business efficiency.
   1. Give the definition of a Hamiltonian circuit.
   2. Calculate the number of Hamiltonian circuits in a graph.
   3. Define algorithm.
   4. Explain the term heuristic algorithm.
   5. Use the Nearest-Neighbor algorithm.
   6. Use the Sorted-Edge algorithm.
   7. Give the definition of a tree.
   8. Determine a minimum-cost spanning tree using Kruskal’s algorithm.
   9. Identify the critical path in an order-requirement digraph.
   10. Explain the difference between a graph & a directed graph.
3. Construct schedules that make the best use of resources.
   1. Describe the list-processing algorithm.
   2. Explain how a bin-packing problem differs from a scheduling problem.
4. Organize, display analyze, and interpret data.
5. Explain the difference between a population and a sample.
6. Calculate a sample proportion.
7. Explain the difference between the experimental and control group in a sample.
8. Describe the placebo effect.
9. Calculate the mean, median, and quartiles.
10. Construct a histogram.
11. Identify outliers.
12. Draw a scatterplot and an estimated line fit.
13. Explain what is meant by the probability of an outcome.
14. Describe a normal curve.
15. Explain the 69-95-99.7 rule.
16. Compute expected value of an outcome.
17. Apply mathematics to voting theory and social choice.
    1. Explain the difference between the majority rule and the plurality method.
    2. Use the Borda count method.
    3. Describe insincere voting.
    4. Discuss Arrow’s impossibility theory.
    5. Identify winning and losing coalitions in a weighted voting system.
    6. Calculate the number of coalitions for a given weighted voting system.
    7. Explain the difference between a winning coalition and a minimal winning coalition.
18. Use cryptography to encode and decode information.
19. Given an identification number and the scheme used to determine it, decide if the number is valid for that scheme.
20. Know what binary code is.
21. Compute check-digits for code words given the parity-check sums for the code.
22. Connect key principles of geometry to real world applications.
23. Determine the scaling factor from original and scaled dimensions.
24. Determine similarity of geometric objects.
25. Describe the concept of area-volume tension.
26. Describe the difference between arithmetic and geometric growth.
27. State Euclid’s parallel postulate.
28. Describe a physical model for hyperbolic and elliptic geometry.
29. Define space-time.
30. Compute the Lorentz-Fitzgerald factor for various velocities.
31. List the first ten terms of the Fibonacci sequence.
32. List the numerical ratio for the golden rectangle.
33. Name and define the 4 transformations in the plane.

### INSTRUCTOR'S EXPECTATIONS OF STUDENTS IN CLASS

### TEXTBOOKS AND OTHER REQUIRED MATERIALS

### REFERENCES

### METHODS OF INSTRUCTION AND EVALUATION

### ATTENDANCE REQUIREMENTS

### COURSE OUTLINE