MATH-1100: MATHEMATICAL EXPLORATIONS

Cuyahoga Community College

Viewing:MATH-1100 : Mathematical Explorations

Board of Trustees:
2016-03-31

Academic Term:
2016-08-23

Subject Code
MATH - Mathematics

Course Number:
1100

Title:
Mathematical Explorations

Catalog Description:
Survey of mathematical topics. Introduction to basic concepts of problem solving, set theory, logic, number theory, and college geometry.

Credit Hour(s):
3

Lecture Hour(s):
3

Requisites

Prerequisite and Corequisite
MATH-0955 Beginning Algebra; or MATH-0990 Math Literacy for College Students; or sufficient score on Math assessment test; or departmental approval: equivalent coursework.

Note: MATH-0950 Beginning Algebra I taken prior to Fall 2016 will also be accepted to meet the prerequisite requirement for this course.

I. ACADEMIC CREDIT

Academic Credit According to the Ohio Department of Higher Education, one (1) semester hour of college credit will be awarded for each lecture hour. Students will be expected to work on out-of-class assignments on a regular basis which, over the length of the course, would normally average two hours of out-of-class study for each hour of formal class activity. For laboratory hours, one (1) credit shall be awarded for a minimum of three laboratory hours in a standard week for which little or no out-of-class study is required since three hours will be in the lab (i.e. Laboratory 03 hours). Whereas, one (1) credit shall be awarded for a minimum of two laboratory hours in a standard week, if supplemented by out-of-class assignments which would normally average one hour of out-of class study preparing for or following up the laboratory experience (i.e. Laboratory 02 hours). Credit is also awarded for other hours such as directed practice, practicum, cooperative work experience, and field experience. The number of hours required to receive credit is listed under Other Hours on the syllabus. The number of credit hours for lecture, lab and other hours are listed at the beginning of the syllabus. Make sure you can prioritize your time accordingly. Proper planning, prioritization and dedication will enhance your success in this course.

The standard expectation for an online course is that you will spend 3 hours per week for each credit hour.

II. ACCESSIBILITY STATEMENT

If you need any special course adaptations or accommodations because of a documented disability, please notify your instructor within a reasonable length of time, preferably the first week of the term with formal notice of that need (i.e. an official letter from the Student Accessibility Services (SAS) office). Accommodations will not be made retroactively.

For specific information pertaining to ADA accommodation, please contact your campus SAS office or visit online at http://www.tri-c.edu/accessprograms. Blackboard accessibility information is available athttp://access.blackboard.com.

Eastern (216) 987-2052 - Voice
Metropolitan (216) 987-4344 -Voice
Western (216) 987-5079 - Voice
III. ATTENDANCE TRACKING

Regular class attendance is expected. Tri-C is required by law to verify the enrollment of students who participate in federal Title IV student aid programs and/or who receive educational benefits through other funding sources. Eligibility for federal student financial aid is, in part, based on your enrollment status. Students who do not attend classes for the entire term are required to withdraw from the course(s). Additionally, students who withdraw from a course or stop attending class without officially withdrawing may be required to return all or a portion of the financial aid based on the date of last attendance. Students who do not attend the full session are responsible for withdrawing from the course(s).

Tri-C is responsible for identifying students who have not attended a course, before financial aid funds can be applied to students’ accounts. Therefore, attendance will be recorded in the following ways:

For in-person courses, students are required to attend the course by the 15th day of the semester, or equivalent for terms shorter than 5-weeks, to be considered attending. Students who have not met all attendance requirements for an in-person course, as described herein, within the first two weeks of the semester, or equivalent, will be considered not attending and will be reported for non-attendance and dropped from the course.

For blended-learning courses, students are required to attend the course by the 15th day of the semester, or equivalent for terms shorter than 5-weeks, or submit an assignment, to be considered attending. Students who have not met all attendance requirements for a blended-learning course, as described herein, within the first two weeks of the semester, or equivalent, will be considered not attending and will be reported for non-attendance and dropped from the course.

For online courses, students are required to login in at least two (2) times per week and submit one (1) assignment per week for the first two (2) weeks of the semester, or equivalent to the 15th day of the term. Students who have not met all attendance requirements for an online course, as described herein, within the first two weeks of the semester, or equivalent, will be considered not attending and will be reported for non-attendance and dropped from the course.

At the conclusion of the first two weeks of a semester, or equivalent, instructors report any registered students who have “Never Attended” a course. Those students will be administratively withdrawn from that course. However, after the time period in the previous paragraphs, if a student stops attending a class, wants or needs to withdraw, for any reason, it is the student’s responsibility to take action to withdraw from the course. Students must complete and submit the appropriate Tri-C form by the established withdrawal deadline.

Tri-C is required to ensure that students receive financial aid only for courses that they attend and complete. Students reported for not attending at least one of their registered courses will have all financial aid funds held until confirmation of attendance in registered courses has been verified. Students who fail to complete at least one course may be required to repay all or a portion of their federal financial aid funds and may be ineligible to receive future federal financial aid awards. Students who withdraw from classes prior to completing more than 60 percent of their enrolled class time may be subject to the required federal refund policy.

If illness or emergency should necessitate a brief absence from class, students should confer with instructors upon their return. Students having problems with class work because of a prolonged absence should confer with the instructor or a counselor.

IV. CONCEALED CARRY STATEMENT

College policy prohibits the possession of weapons on college property by students, faculty and staff, unless specifically approved in advance as a job-related requirement (i.e., Tri-C campus police officers) or, in accordance with Ohio law, secured in a parked vehicle in a designated parking area only by an individual in possession of a valid conceal carry permit.

As a Tri-C student, your behavior on campus must comply with the student code of conduct which is available on page 29 within the Tri-C student handbook, available athttp://www.tri-c.edu/student-resources/documents/studenthandbook.pdfYou must also comply with the College's Zero Tolerance for Violence on College Property available athttp://www.tri-c.edu/policies-and-procedures/documents/3354-1-20-10-zero-tolerance-for-violence-policy.pdf

Outcomes
Course Outcome(s):
Solve problems utilizing various techniques.

Objective(s):
1. Define, compare, and contrast inductive and deductive reasoning.
2. Define and work with different types of sequences such as arithmetic, geometric, Fibonacci, and successive differences.
3. Use inductive reasoning to identify the next term or statement of a sequence.
4. Discuss and apply various problem solving strategies using Polya's Four-Step Method.
5. Use estimations to approximate answers to applications.
Course Outcome(s):
Demonstrate knowledge in the basic concepts of set theory.

Objective(s):
1. Determine if two sets are equivalent.
2. Determine the number of subsets and proper subsets of a given set, and identify all subsets.
3. Use Venn diagrams to show the relationship between one or more sets.
4. Perform set operations including union, intersection, difference between, and Cartesian product operations on two or more sets.
5. Apply De Morgan's Laws to two sets.
6. Apply Venn diagrams to graphical analysis of sets such as survey results.
7. Define and use the basic terminology and notation of set theory including: set, element, empty set, complement, subset, proper subset, universal set, union, and intersection.
8. Write sets using the descriptive method, set-builder notation, and ellipses
9. Classify sets as finite or infinite.
10. Define and determine the cardinality of a set.

Course Outcome(s):
Demonstrate a knowledge of the basic principles and terminology of symbolic logic.

Objective(s):
1. Identify statements including compound statements, their components, and logical connectives.
2. Define and form the negation of a statement, including the use of De Morgan's Laws, and detect incorrect negations.
3. Represent statements using standard logical symbols (p, q, ~,\(\lor\),\(\land\)).
4. Identify and correctly use universal and existential quantifiers.
5. Read and construct truth tables to find the truth values of conjunctives, disjunctives, conditional and biconditional statements.
6. Define equivalent statements and determine whether or not two statements are equivalent.
7. Recognize conditional statements and identify the antecedent and consequent of such statements.
8. Define and determine the negation, converse, inverse, and contrapositive of a conditional statement.
9. Write a conditional statement as a disjunction.
10. Determine statements equivalent to conditional statements.
11. Define the relationship between the truth values of a conditional statement and the truth values of related conditional statements (converse, inverse, and contrapositive).
12. Identify logical arguments and identify premise and conclusion
13. Determine the validity of an argument and distinguish between valid and invalid (fallacy) arguments, including the use of truth tables and Venn (Euler) Diagrams.

Course Outcome(s):
Convert between various bases.

Objective(s):
1. Count, add and subtract in a variety of different bases.
2. Convert between base ten and other bases such as binary, octal, and hexadecimal.
3. Convert between bases other than base ten.

Course Outcome(s):
Categorize numbers using various topics in number theory.

Objective(s):
1. Define and classify numbers to be prime or composite.
2. Define and find special primes such as Mersenne Primes.
3. Determine if a number is perfect, abundant, or deficient.
4. Explore other number relationships including friendly numbers, Goldbach's Conjecture, twin primes, and Fermat's Last Theorem.
5. Find the greatest common factor and least common multiple using prime factorization, division by primes, and the Euclidean Algorithm.
6. Discuss the relationship between the Fibonacci Sequence and the Golden Ratio and give examples of their manifestation in art, nature, and architecture.

Course Outcome(s):
Demonstrate and use the principles of transformational, non-Euclidean, and fractal geometries in modeling the universe.

Objective(s):
1. Identify regular tessellations and semi-regular tessellations.
2. Explain Euclid's Fifth Postulate and its significance in the discovery and development of non-Euclidean geometries.
3. Compare and contrast Euclidean geometry with non-Euclidean geometries and provide examples from each.
4. Explain the history of chaos theory and fractal geometry.
5. Discuss fractal behavior in nature.

Methods of Evaluation:
1. Homework
2. Quizzes
3. Projects
4. Periodic exams
5. In class collaborative work
6. Comprehensive final exam

Course Content Outline:
1. Problem Solving
   a. Inductive and Deductive Reasoning
   b. Number patterns
   c. Strategies for Problem Solving
   d. Calculation and Estimation
2. The Basic Concepts of Set Theory
   a. Symbols and Terminology
      Venn Diagrams and Subsets
   b. Set Operations and Cartesian Products
   c. Cardinal Numbers
3. Introduction to Logic
   a. Statements and Quantifiers
   b. Truth Tables and Equivalent Statements
   c. The Conditional and Related Statements
   d. Analysis of Arguments with Euler Diagrams
   e. Analysis of Arguments with Truth Tables
4. Base Conversions
   a. Conversion between Number Bases
   b. Counting, Adding, and Subtracting in Different Bases
5. Number Theory
   a. Prime and Composite Numbers
   b. Special Prime Numbers
   c. Perfect Numbers, Deficient and Abundant Numbers, Amicable “Friendly” Numbers, Goldbach’s Conjecture, Twin Primes, Fermat’s Last Theorem
   d. Greatest Common Factor and Least Common Multiple using Various Methods
   e. The Fibonacci Sequence and the Golden Ratio
6. College Geometry
   a. Non-Euclidean Geometry
   b. Chaos and Fractal Geometry

Resources


Resources Other
1. MyMath Lab Software
2. Enhanced Web Assign

Instructional Services

OAN Number:
TMMSL

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