MATH-2010: INTRODUCTION TO DISCRETE MATHEMATICS

Cuyahoga Community College

Viewing: MATH-2010 : Introduction to Discrete Mathematics

Board of Trustees:
2007-05-24

Academic Term:
Spring 2019

Subject Code
MATH - Mathematics

Course Number:
2010

Title:
Introduction to Discrete Mathematics

Catalog Description:
Foundation course in discrete mathematics with applications. Topics include logic, methods of proof, elementary number theory, set theory, functions, efficiency of algorithms, and mathematical induction.

Credit Hour(s):
4

Lecture Hour(s):
4

Requisites

Prerequisite and Corequisite
MATH-1530 College Algebra or MATH-153H College Algebra or MATH-1580 Precalculus; or sufficient score on assessment test; or departmental approval: equivalent coursework.

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 at http://access.blackboard.com.

Eastern (216) 987-2052 - Voice
Metropolitan (216) 987-4344 – Voice. (216) 987-4048 – TTY.
Western (216) 987-5079 – Voice. (216) 987-5117 – TTY.
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 based in part on 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 their 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 is recorded in the following ways:

• For in-person and blended-learning courses, students are required to attend the course by the 15th day of the semester (or equivalent for terms shorter than five weeks) to be considered attending. Students who have not met all attendance requirements for in-person and blended courses, as described herein, within the first two weeks or equivalent, will be considered not attending.

• For online courses, students are required to login at least two times per week and submit one assignment per week for the first two weeks of the semester, or equivalent to the 15th day of the term. Students who have not met all attendance requirements for online courses, as described herein, within the first two weeks or equivalent, will be considered not attending.

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 or 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 coursework due to a prolonged absence should confer with the instructor or a counselor.

IV. LEARNING OUTCOMES ASSESSMENT

Occasionally, in addition to submitting assignments to their instructors for evaluation and a grade, students will also be asked to submit completed assignments, called ‘artifacts,’ for assessment of course and program outcomes and the College’s Essential Learning Outcomes (ELOs). The artifacts will be submitted in Blackboard or a similar technology. The level of mastery of the outcome demonstrated by the artifact DOES NOT affect the student’s grade or academic record in any way. However, some instructors require that students submit their artifact before receiving their final grade. Some artifacts will be randomly selected for assessment, which will help determine improvements and support needed to further student success. If you have any questions, please feel free to speak with your instructor or contact the Learning Outcomes Assessment office.

V. 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.pdf You 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):
Apply logical analysis to compound statements.

Objective(s):
1. Construct truth tables for compound, conditional, and biconditional statements.
2. Apply DeMorgan’s Laws.
3. Determine the negation, contrapositive, converse, and inverse of a conditional statement.
4. Prove or disprove the validity of an argument.
5. Recognize and apply the argument forms of modus ponens and modus tollens.
Course Outcome(s):
Apply logical analysis to quantified statements.

Objective(s):
1. Prove or disprove the validity of an argument with quantified statements.
2. Find the truth set of a predicate.
3. Prove the truth or falsity of universal statements and existential statements.
4. Determine the negation of universal statements and existential statements.
5. Interpret and negate multiply-quantified statements.

Course Outcome(s):
Apply basic methods of proof to elementary number theory.

Objective(s):
1. Prove existential statements with constructive proof of existence.
2. Disprove universal statements with a counterexample.
3. Prove theorems and statements using the methods of direct proof, proof by contradiction, and proof by contraposition.

Course Outcome(s):
Apply basic methods of proof to set theory.

Objective(s):
1. Define and apply the basic properties of and operations on sets.
2. Recognize and form partitions of sets, power sets, and Cartesian products.
3. Prove or disprove subset relations and set identities.
4. Define and apply the properties of a Boolean algebra.

Course Outcome(s):
Apply properties of functions to evaluate the efficiency of an algorithm.

Objective(s):
1. Graph basic functions in the Cartesian plane, including power functions, functions defined on sets of integers, multiples of functions, increasing and decreasing functions, exponential functions, and logarithmic functions.
2. Determine the order of a function using $O$, $\Omega$, and $\Theta$-notations.
3. Evaluate the efficiency of an algorithm.

Course Outcome(s):
Apply mathematical induction to prove conjectures about the outcomes of processes.

Objective(s):
1. Define and apply the basic properties of sequences.
2. Compute and apply properties of summations and products.
3. Prove conjectures by mathematical induction and strong mathematical induction.

Course Outcome(s):
Apply methods and ideas learned throughout this course to computer science.

Methods of Evaluation:
1. A minimum of 3 periodic exams
2. Quizzes
3. Homework
4. In-class collaborative work
5. Computer application problems
6. Comprehensive final exam
Course Content Outline:

1. Logic
   a. Truth tables
      i. Compound statements
      ii. Conditional and biconditional statements
         1. negation
         2. contrapositive
         3. converse
         4. inverse
   b. DeMorgan’s Laws
   c. Validity of an argument
      i. Modus ponens
      ii. Modus tollens
      iii. Contradiction rule

2. Quantified statements
   a. Truth set
   b. Universal statements
      i. Truth or falsity
      ii. Negation
   c. Existential statements
      i. Truth or falsity
      ii. Negation
   d. Multiply-quantified statements
      i. Truth or falsity
      ii. Negation
   e. Arguments with quantified statements

3. Number theory and proofs
   a. Proof of existence
   b. Counterexample
   c. Direct proof
   d. Proof by contradiction
   e. Proof by contraposition

4. Set theory and proofs
   a. Properties of and operations on sets
      i. Subset
      ii. Proper subset
      iii. Union
      iv. Intersection
      v. Difference
      vi. Complement
      vii. Partition
      viii. Power set
      ix. Cartesian product
   b. Proofs
      i. Subset relations
      ii. Set identities
   c. Boolean algebras
      i. Definition
      ii. Proofs

5. Functions and proofs
   a. Basic functions
   b. Boolean functions
   c. One-to-one functions
   d. Onto functions
   e. One-to-one correspondences
   f. Inverse functions
   g. Composition of functions

6. Efficiency of an algorithm
a. Graph basic functions
   i. Power functions
   ii. Functions defined on sets of integers
   iii. Multiples of functions
   iv. Increasing and decreasing functions
   v. Exponential functions
   vi. Logarithmic functions
b. Order of a function
   i. O-notation
   ii. Omega-notation
   iii. Theta-notation
7. Mathematical induction
   a. Sequences
   b. Sums and products
   c. Proofs by mathematical induction
   d. Proofs by strong mathematical induction

Resources


Resources Other

Instructional Services
OAN Number:
TMMSL

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