Course Number and Title: MAT 263 Principles of Discrete Mathematics

Campus Location:
Georgetown, Dover, Stanton, Wilmington

Effective Date:
2018-51

Prerequisite:
MAT 190 or MAT 281

Co-Requisites:
None

Course Credits and Hours:
4.00 credits
4.00 lecture hours/week
1.00 lab hours/week

Course Description:
This course is a study of sets, logic, induction, the integers, functions, sequences, counting, and an introduction to graph theory. Proofs are emphasized throughout the course.

Required Text(s):
Obtain current textbook information by viewing the campus bookstore - https://www.dtcc.edu/bookstores online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:
None

Schedule Type:
Classroom Course

Disclaimer:
None

Core Course Performance Objectives (CCPOs):

1. Develop a foundation of mathematical logic. (CCC 2, 6)
2. Perform operations on discrete structures. (CCC 2, 6)
3. Determine the properties of functions. (CCC 2, 6)
4. Formulate solutions using combinatorics. (CCC 2, 6)
5. Apply graph theory to abstract modeling. (CCC 2, 6)
6. Construct mathematical proofs. (CCC 1, 2, 6)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):
Upon completion of this course, the student will:

1. Develop a foundation of mathematical logic.
    1. Identify statements and logical equivalence.
    2. Construct compound statements using quantifiers and connectives.
    3. Determine the validity of an argument.
2. Perform operations on discrete structures.
    1. Apply the division and Euclidean algorithms.
    2. Construct the greatest common divisor and least common multiple of two integers.
    3. Relate concepts of prime, relatively prime, and congruence.
    4. Compute, write, and transform sequences.
    5. Solve a recursive sequence using the characteristic polynomial.
3. Determine the properties of functions.
    1. Perform set operations.
    2. Construct binary relations from the Cartesian product of two sets and deduce their properties.
    3. Assess the characteristic(s) of a function, including one-to-one and onto.
    4. Find the inverse of a function, if it exists, and state the domain and range.
    5. Find the composition of functions, and state the domain and range.
    6. Apply concepts of functions to discover the cardinality and countability of a given set.
    7. Define an equivalence relation, and apply it to the partition of a set.
4. Formulate solutions using combinatorics.
    1. Apply the principles of inclusion and exclusion.
    2. Apply permutations and combinations.
    3. Apply the binomial theorem.
    4. Apply principles of counting to probability.
5. Apply graph theory to abstract modeling.
    1. Identify the characteristic(s) of a graph.
    2. Demonstrate whether an isomorphism exists between two graphs.
    3. Demonstrate whether a graph contains Hamiltonian cycles or Euler circuits.
    4. Employ diagrams to illustrate characteristics of trees.
6. Construct mathematical proofs.
    1. Construct proofs involving integers and rational numbers.
    2. Apply mathematical induction to proofs involving sequences.
    3. Prove set equivalence using the element argument and Boolean algebra.
    4. Construct proofs involving inverse and composition of functions.
    5. Apply the principles of induction.
    6. Construct sequences defined recursively and formulate the associated characteristic polynomial.

Evaluation Criteria/Policies:
Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	**–**	**100**	**=**	**A**
83	**–**	**91**	**=**	**B**
75	**–**	**82**	**=**	**C**
0	**–**	**74**	**=**	**F**

Students should refer to the Student Handbook - https://www.dtcc.edu/handbook for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):
None

Disabilities Support Statement:
The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the disabilities services - https://www.dtcc.edu/disabilitysupport web page or visit the campus Advising Center.