Quinsigamond Community College
School of Math and Science

Instructor's Information:
Instructor: <Professor John Smith>
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Course Information:
Course: MAT 125 Discrete Mathematics – Section ##
Meets on: <Mondays, Wednesdays, Fridays from 8:00am – 8:50am>
Credits: 3 credit hours

Course Description:
This course provides an introduction to the basic concepts in Discrete Mathematics. Topics include predicate and propositional calculus, sets, proof techniques, permutations and combinations, probability, relations, closure, partial order, functions, graph connectivity and shortest paths, and an introduction to languages, grammars and nondeterministic finite-state machines.

Pre-requisite:
MAT 123 or appropriate placement score

Required Textbook/Materials/Website:
Textbook: *Discrete Math and Its Applications*, by Kenneth Rosen, McGraw Hill, 7th edition, © 2012.
Access Card: *Connect Plus 1-Semester Access Card for Discrete Math and Its Applications,* McGraw-Hill.
Materials: Scientific calculator
Website: Access to connect.mheducation.com/class/

Student Learning Outcomes & Instructional Objectives:
This course is designed to achieve the following student outcomes and objectives:
- Use inductive and deductive reasoning.
- Apply formal methods of symbolic, propositional and predicate logic.
- Describe how formal tools of symbolic logic are used to model real-life situations.
- Use formal logic proofs and logical reasoning to solve problems such as puzzles.
- Describe the importance and limitations of predicate logic.
- Outline the basic structure and give examples of direct proofs, proofs by contradiction and proofs using mathematical induction.
- Discuss which type of proof is best for a given problem.
- Relate ideas of mathematical induction to recursion.
- Explain, with examples, the basic terminology of functions, relations and sets.
- Perform the operations associated with sets, functions and relations.

- Demonstrate basic counting principles, including the use of the pigeonhole principle.
- Compute permutations and combinations of a set and interpret the meaning in the context of a particular situation.
- Calculate the probabilities of events and expectations of random variables for elementary problems such as games of chance.
- Differentiate between dependent and independent events.
- Apply Bayes' Theorem to dependent events.
- Illustrate, by example, the basic terminology of graph theory.
- Demonstrate different traversal methods for graphs.
- Model problems in computer science using graphs.
- Introduce applications of graph coloring.
- Demonstrate how grammars are used to generate the words of a language.
- Explain the relationship between finite-state machines and grammars.
- Demonstrate how Turing machines can be used to recognize sets.

Teaching Procedures:
Most classes will be a combination of lecture, group activities, and in-class assignments. You will be given homework assignments to be completed outside of class, with due dates/times. There will occasionally be a quiz or exam given in class.

Course Topics & Required Assignments/Readings:

The Foundations: Logic and Proofs
- Basic Operations, Propositions, Truth Tables
- Tautology
- Predicates, Quantifiers
- Inference
- Direct Proofs, Proof by Contradiction

Basic Structures: Sets, Functions, Sequences, Sums, and Matrices
- Basic Operations with Sets, Cardinality, Subsets and Power Sets, Cartesian Products
- Disjoint Sets, Set Equality
- Function Definitions, Total Functions, One-to-One, Onto

Induction and Recursion
- Mathematical Induction
- Recursive Definitions

Counting
- Basics of Counting, Pigeonhole Principle
- Permutations and Combinations

Discrete Probability
- Union and Intersection
- Basic Concepts (Events, Disjoint, and Independent)
- Conditional Probabilities
- Bayes' Theorem

Relations
- Properties of Relations

- Representation of Relations
- Closure
- Equivalence Relations, Partition of a Set
- Partial Orders

Graphs
- Introduction to Graphs
- Graph Terminology
- Connectivity
- Euler and Hamilton Paths
- Shortest Paths
- Coloring

Boolean Algebra
- Introduction to Languages and Grammars
- Introduction to Nondeterministic Finite State Machines
- Language Recognition
- Turing Machines

Assignment & Test Schedule:
<list all assignments, quizzes, & exam dates>

Grading Breakdown: (Sample)
25%   Homework
15%   Quizzes
10%   Attendance
20%   Exams
30%   Final Exam

A	95 – 100	B –	80 – 82	D +	67 – 69
A –	90 – 94	C +	77 – 79	D	63 – 66
B +	87 – 89	C	73 – 76	D –	60 – 62
B	83 – 86	C –	70 – 72	F	0 – 59

Attendance Policy:
Students are expected to attend all classes, for the entire period. Attendance will be taken during every class, and counts towards your final course grade. If you are absent from class, a doctor's note will excuse your absence.

Disability Statement:
If you have a disability which may require an accommodation, please notify me as soon as possible. You are responsible for forwarding your Accommodation Letter to me and discussing arrangements for this course. Your accommodations for this course begin upon my receipt of your Accommodation Letter; accommodations are not retroactive. You may request accommodations at any time during the semester, but instructors must be provided with reasonable notice prior to exams or deadlines.

Disability Services works to promote access to ensure an accessible college experience for students. If you have further questions, contact Disability Services. All discussions are confidential.

Contact Information for Disability Services & Assistive Technology:
Call: 508-854-4471
Sorenson Video Phone: 508-502-7647
Email: disabilityservices@qcc.mass.edu

Services for Veterans:
If you are a veteran of the armed forces, please visit the Veteran Affairs Office located in 258A (Administration Building) or contact them at veteranaffairs@qcc.mass.edu

Academic Honesty and Plagiarism:
Our purpose in the classroom is to seek the truth; this work requires trust and honesty between teacher and student. If we are not honest about what we know and don't know, our learning will always be impaired. Because our teaching and learning depends on this honest communication, we expect all students to understand what plagiarism is and why it is unacceptable.

Plagiarism means taking someone else's ideas or words and presenting them as one's own. The offense can take many forms including cheating on a test, passing in a paper taken from the Internet or from another student, or failing to properly use and credit sources in an essay. Sometimes the issue is subtle, involving getting too much help on an assignment from someone else. In every instance, plagiarism means cheating both oneself and the owner of the source. Since the cheating sabotages a student's learning experience, consequences range from no credit for the assignment to failure for the course and possible expulsion from the college.

For further information concerning plagiarism, refer to the QCC Student Handbook.