DELAWARE STATE UNIVERSITY

MTSC 213-DISCRETE MATH I

SPRING 2014

Classes: PB 106, Tuesday, Thursday 13:30-14:45
Start date: Jan.13, 2014 End date: May. 1, 2014

Instructor: Dr. Sokratis Makrogiannis
Department of Mathematical Sciences
Delaware State University
ETV building, Room 221

Office: ETV 221
Office phone: 302-857-7058
E-mail: smakrogiannis@desu.edu
Office Hours: Mon, Wed 13:00-14:30, Fri 11:00-11:50 and by appointment.

COURSE DESCRIPTION:

Discrete Mathematics (MTSC 213) is a course designed to expose students to mathematical logic, proof and the language of sets, relations and functions.

Discrete Mathematics (MTSC 213) is a required course that is a prerequisite for many courses in the Mathematics, Mathematics Education, and Mathematics with Computer Science Programs which meets the General Education Across the Curriculum (AtC) Critical Thinking requirement. This course will help students develop their critical thinking and problem solving skills. This course is writing intensive and proof oriented. It will help the students to develop mathematical maturity needed to succeed in more advanced courses.

TEXT:

Required:
Discrete Mathematics, by Chartrand and Zhang
Recommended:
Mathematical Proof, by Chartrand, Polimeni and Zhang
Discrete Mathematics with Applications, by Susanna S Epp.
Discrete Mathematics: An Introduction to mathematical reasoning, by Susanna Epp.

PREQUISITES:

MTSC 251: Calculus I with a grade of 'C' or better, or consent from instructor.

COURSE OBJECTIVES:

Upon completion of the course, students will:
1. Acquire and demonstrate proficiency in deductive reasoning.
2. Acquire and demonstrate the ability to show that two statement forms are equivalent.

3. Demonstrate the ability to read, write and verbally express mathematical ideas.
4. Be able to express the negations, contrapositive, converse, and inverse of mathematical statements.
5. Be able to identify valid and invalid mathematical arguments.
6. Be able to produce counterexamples to disprove statements which are false.
7. Prove true statements using methods of direct proofs, contradiction, contraposition and mathematical induction.
8. Be able to start the process of determining if a mathematical statement is true or false.
9. Know the basic definitions of set theory, be fluent in set-builder and set-roster notation and be able to perform set operations.
10. Perform set-theoretic proofs using element and algebraic methods.
11. Demonstrate the capability to solve problems involving sets and the utilization of Venn Diagrams.
12. Know the definitions of relation,function, and related definitions, including but not limited to injectivity, surjectivity, bijectivity, composition, and equivalence relation.
13. Demonstrate a mastery of functions, their operations and their applications.

HOMEWORK AND GRADES OVERVIEW:

1. In general, there will be a homework assignment and/or a quiz due almost each week on Friday. Homework is prepared at home and quizzes are taken in-class at the end of the class.
2. There will be a closed-book and closed-notes midterm examination.
3. There will be a closed-book and closed-notes comprehensive final examination.
4. Your overall grade for the semester will be based upon the homework, quizzes and exams as defined in the schedule table.

Type of Assessment	**Weight of Assessment**
Homework	25%
Quizzes	20%
Midterm Exam	20%
Final Exam	30%
Attendance	5%

Percentage	**Grades**
90 – 100 %	**A**
80 – 89 %	**B**
70 – 79%	**C**
60 – 69%	**D**

READING ASSIGNMENTS:

Reading assignments will be given for each lecture period. Students are expected to complete the reading assignments prior to each lecture. Additional material will also be developed in class lectures, so missing class is not advisable.

ATTENDANCE POLICY:

Students are expected to attend all classes. Students are expected to arrive on time and be prepared for the class. Attendance may be taken at the beginning of each class. Please notify in advance if you are going to miss a class. Absence does not justify missed homework due dates and missed quizzes. If you miss a class, you are responsible for all material covered or assigned in class.

LATE WORK:

Homework assignments are due on their due date at (or before) the start of class; assignments handed-in up to one week after their due date lose 20%, after that they lose 50%.

MAKEUP QUIZZES/EXAMS:

If any student misses a quiz or exam for any valid and documented reason, the student needs to make up the quiz/exam **within a week** to receive credit. Most of the missed quizzes need to be taken before the next class session to make it fair for all the students. Exams cannot be made up unless there is an extreme and documented emergency.

GROUP WORK:

While students are encouraged to work together in order to reach the learning objectives, each student is evaluated independently in homework and quizzes.

(TENTATIVE) SCHEDULE:

Week #	Week Beginning Date	Description	Work Due	Text Reference
1	1/13/2014	**Course Overview** **Logic** -Statements -Negation of a Statement -Disjunction and Conjunction of Statements		Chartrand & Zhang Chapter 1
2	1/20/2014	-Logical Equivalence -Fundamental Properties of Logical Equivalence -Implications -More on Implications	HW,QZ	Chartrand & Zhang Chapter 1
3	1/27/2014	-The Bi-conditional -Tautologies and contradictions -Supplement: Application Circuit Diagrams **Sets**	HW	Chartrand & Zhang Chapter 2

		-Describing a Set -Subsets -Set Operations -Indexed Collections of Sets		
4	2/3/2014	-Cartesian Products of Sets -Partitions of Sets **Direct Proofs and Proof by Contraposition** -Quantified Statements -Characterization of Statements -Trivial and Vacuous Proofs -Direct Proofs	HW,QZ	Chartrand & Zhang Chapter 3
5	2/10/2014	-Proof by Contraposition -Cases -Proof Evaluation **More on Direct Proofs and Proof by Contraposition** -Divisibility -Congruence -Real Numbers -Sets -Fundamental Properties of Sets	HW	Chartrand & Zhang Chapter 3
6	2/17/2014	**Existence and Proof by Contradiction** -Counterexamples -Existence Proofs -Disproving Existence Proofs -Proof by contradiction -Review of the three proof techniques	HW,QZ	Chartrand & Zhang Chapter 3
7	2/24/2014	MIDTERM Exam		
8	3/3/2014	**Mathematical Induction** -The Principle of Mathematical Induction -Examples of Mathematical Induction -Sequences	HW	Chartrand & Zhang Chapter 4
9	3/17/2014	-The Strong Principle of Mathematical Induction **Prove or Disprove** -Conjectures in Mathematics -Revisiting Quantified Statements -Testing Statements Note: This Chapter should mostly be a 1 day discussion and an assignment	HW,QZ	Chartrand & Zhang Chapter 5
10	3/24/2014	**Relations and Functions** -Definition -The set of all functions from A to B -Injective/Surjective Functions -Bijections	HW	Chartrand & Zhang Chapter 5

		-Composition		
11	3/31/2014	-Inverse Functions -Permutations Supplement: Growth of functions, Landau Notation **Equivalence Relations** (Should be skipped in favor of Cardinalities if course is slow) -Equivalence Relations -Properties of Equivalence Classes -Congruence Modulo n	HW,QZ	Chartrand & Zhang Chapter 5
12	4/7/2014	Cardinalities of Sets -Numerically equivalent sets -Denumerable sets -Uncountable sets -Comparing Cardinalities of Sets Supplement: Russell's Paradox, The Halting Problem	HW	Chartrand & Zhang Chapter 5
13	4/14/2014	**Topics from Number Theory and Combinatorics** (Selection based on Available Time, Student Interest, and Upcoming Courses.) -Divisibility -The Division Algorithm -GCD's	HW,QZ	Chartrand & Zhang Chapter 7
14	4/21/2014	-Euclid's Algorithm -Relatively Prime Integers -The Fundamental Theorem of Arithmetic	HW	Chartrand & Zhang Chapter 7
15	4/28/2014	**Supplement: Counting** a. The Multiplication Principle b. The Addition Principle c. Permutations and Combinations d. Binomial Theorem e. Inclusion/Exclusion f. Discrete Uniform Probability Spaces Supplement: Pigeonhole Principle	HW,QZ	Chartrand & Zhang Chapter 8
16	5/8/2014	FINAL Exam		

NOTE:

If you have a disability which is documented with the Student Accessibility Services Office and wish to discuss academic accommodations with me, please contact me as soon as possible.