Discrete Mathematics I
Department of Mathematics and Statistics
Summer 2015

A. COURSE INFORMATION
   Course number/section: MATH2305/001
   Class meeting time: Monday through Thursday from 12:30 to 1:55 PM
   Class location: Center for Instruction room 127
   Course Website: TBD

B. INSTRUCTOR INFORMATION
   Instructor: David R. Thomas
   Office location: Center for Instruction Room 319
   Office hours: TBD, or by appointment
   Telephone: 361-825-2475
   E-mail: david.thomas@tamucc.edu
   Appointments: at lecture, by email or serendipity (please knock)

C. COURSE DESCRIPTION
   Catalog Course Description
   An introduction to topics in Discrete Mathematics with an emphasis on applications in Mathematics and Computer Science. Topics include formal logic, graphs, trees and related algorithms, and combinatorics and discrete probability.

   Extended Course Description
   In overview, we will be concerned with introductory concepts in areas of mathematics to include mathematical logic, set theory, combinatorics, probability, relations on sets, and graph theory. Topics considered are of considerable significance in computer science.

   These topics, although unrelated in some regards, all involve "discrete" ideas as opposed to "continuous" ones. Roughly, “discrete” refers to the idea that the objects being studied are separated by some nonzero minimum distance. In this sense the sets \{1, 2, 3\} and \{1, 2, 3, \ldots\} are discrete, while the set of all real numbers and the closed interval \([0, 1]\) are not.

D. PREREQUISITES AND COREQUISITES
   Prerequisites: MATH 1314 and 1316, or MATH 2312, or placement beyond MATH 2312.

   Corequisites: none
E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)

Optional Textbook(s) or Other References: none

Supplies none

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

By the end of this course, students should be able to:

1. Demonstrate knowledge of elementary formal logic.
2. Apply knowledge of general-purpose proof methods, including direct proof, proof by contradiction, and mathematical induction to construct or understand elementary proofs in discrete mathematics.
3. Demonstrate knowledge of fundamental properties of graphs and trees.
4. Apply elementary combinatorial methods to the solution of counting and discrete probability problems.
5. Exhibit knowledge of other topics to include (as time permits) the asymptotic functional notations $\Theta$, $O$, and $\Omega$, sequences, and relations on sets.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Lecture and discussion, examination topic reviews, written examinations

H. MAJOR COURSE REQUIREMENTS AND GRADING

Course grades will be determined by two examinations whose contents will be guided by the previously described learning outcomes, and by and a optional set of supplemental homework problems. The examinations will consist of problems and examples selected from the course textbook, definitions, theorem statements, and related material. A detailed list of examination topics will be distributed in class no later than the week before each examination.

Each examination will contribute equally towards the examination average. The supplemental homework problems will contribute an additional 5 points to be added to your examination average to determine your “course score.” This course score will be used to assign grades using a “traditional” 90, 80, 70, 60 percent distribution for “A”, “B”, “C”, and “D”, respectively. The examinations will occur during the third week and on the last day of the term.
I. COURSE CONTENT/SCHEDULE

We will proceed guided by the outline that follows.

<table>
<thead>
<tr>
<th>Week</th>
<th>Meeting #</th>
<th>Date</th>
<th>Text Section(s)</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>6-1</td>
<td>general introduction</td>
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<td>2</td>
<td>6-2</td>
<td></td>
<td>1.1 Variables</td>
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<td></td>
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<td>1.2 The Language of Sets</td>
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<td>1.3 The Language of Relations and Function</td>
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<td>3</td>
<td>6-3</td>
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<td>2.1 Logical Form and Logical Equivalence</td>
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<td>2.2 Conditional Statements</td>
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<td>4</td>
<td>6-5</td>
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<td>2.3 Valid and Invalid Arguments;</td>
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<td></td>
<td>3.1 Introduction to Predicates and Quantified Statements I</td>
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<td>2</td>
<td>5</td>
<td>6-8</td>
<td>3.2 Introduction to Predicates and Quantified Statements II</td>
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<td>3.3 Statements with Multiple Quantifiers</td>
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<td>6</td>
<td>6-9</td>
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<td>3.4 Augments with Quantified Statements</td>
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<td>7</td>
<td>6-10</td>
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<td>4.1 Direct Proof and Counterexample I: Introduction</td>
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<td>4.2 Direct Proof and Counterexample II: Rational Numbers</td>
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<td>6-11</td>
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<td>4.3 Direct Proof and Counterexample III: Divisibility</td>
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<td>4.6 Indirect Proof Contradiction and Counterexample</td>
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<td>9</td>
<td>6-15</td>
<td>5.1 Sequences</td>
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<td>5.2 Mathematical Induction</td>
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<td>10</td>
<td>6-16</td>
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<td>6.1 Basic Definitions of Set Theory</td>
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<td>11</td>
<td>6-17</td>
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<td>9.1 Introduction (NOT included on examination #1)</td>
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<td>9.2 Possibility trees and the Multiplication Rule (NOT on examination #1)</td>
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<td>12</td>
<td>6-18</td>
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<td>Examination #1</td>
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<td>13</td>
<td>6-22</td>
<td>9.3 Counting Elements of Disjoint Sets: the Addition Rule</td>
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<td>9.4 Counting Subsets of Sets: Combinations</td>
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<td>14</td>
<td>6-23</td>
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<td>10.1 Graphs: An Introduction 11.5 Trees</td>
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3
15  6-24  10.5 Trees
16  6-25  10.5 Trees
5  17  6-29  10.2 Paths and Circuits
18  6-30  5.6 Recursive Definitions
19  7-1  7.4 Cardinality with Applications to Computability
6  20  7-2  Examination #2

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

J. COURSE POLICIES

Everyone is expected to conduct themselves in a manner appropriate for University Students. Hence, should you arrive late please enter quietly.

K. COLLEGE AND UNIVERSITY POLICIES

- **Academic Integrity (University)**
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- **Classroom/Professional Behavior**
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic
classrooms, labs, discussion groups, field trips, etc.

- **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- **Deadline for Dropping a Course with a Grade of W (University)**
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar (http://www.tamucc.edu/academics/calendar/) for the last day to drop a course.

- **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or
visit Disability Services in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

http://disabilityservices.tamucc.edu/

- **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

L. **OTHER INFORMATION**

  None

M. **GENERAL DISCLAIMER**

  I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.