MATH 2305 Discrete Mathematics I  
Department of Mathematics and Statistics  
Spring 2020

A. COURSE INFORMATION

Course number/section: CRN 22421, MATH 2305.001
Class meeting time: MWF 9 AM – 9:50 AM
Class location: BH-201
Course Website: https://bb9.tamucc.edu

B. INSTRUCTOR INFORMATION

Instructor: Dr. Yu Fan
Office location: CI-314
Office hours: Tuesday 2:30 - 4:30 PM  
Friday 11 AM – 1 PM or by appointment
E-mail: yu.fan@tamucc.edu
Appointments: Via email

C. COURSE DESCRIPTION

Catalog 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.

D. PREREQUISITES/COREQUISITES

Prerequisites: MATH 1314 and 1316, or MATH 2312, or placement beyond MATH 2312.
Corequisites: None.

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Textbook

Supplies
Regular access to high speed internet and Microsoft Office applications (e.g., Word, PowerPoint).
F. **STUDENT LEARNING OUTCOMES AND ASSESSMENT**

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

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 Θ, O, and Ω, sequences, and relations on sets.

G. **INSTRUCTIONAL METHODS AND ACTIVITIES**

The course will be a combination of lectures, whole-class discussions, and individual investigations. Students will be required to give individual or group presentations. If needed, there will be alternative assignments in lieu of presentations. All participants are expected to engage in group and whole class activities by contributing knowledge and thoughtful evaluation of others’ contributions.

H. **MAJOR COURSE REQUIREMENTS AND GRADING**

Grades will be based on the percentage of total points the student earns. During the semester, for an approximation of your overall grade you may look in Blackboard/My Grades, the column Weighted Total. The exact overall grade will be known only at the end of the semester, when all the categories that compose the overall grade will be known. At the end of the semester, the final overall grade will be posted in the column Weighted Total. There will be points given on the following:

<table>
<thead>
<tr>
<th>ACTIVITY/ASSIGNMENT</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Homework/Blackboard Discussion Forum</td>
<td>20%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>15%</td>
</tr>
</tbody>
</table>
Presentation (narrated power point)  |  5%
---|---
Final Exam (comprehensive)  |  30%

Coming to class prepared and actively participating in class activities and Blackboard Discussion Forum, learning each lesson and doing the homework on time will contribute to your success in this class. Quizzes will be unannounced, and contain 1-2 problems from the current topics. There will be 7-8 quizzes, two of them with the lowest grades will be dropped. Specific directions for course activities/assignments (e.g., content, format, submission, deadlines, feedback) will be announced in class and/or posted on TAMUCC-Blackboard, at [https://bb9.tamucc.edu/](https://bb9.tamucc.edu/). Class participation will be graded based on attendance and your answers during class activities. For essay-type of questions or presentations, the following rubric will be used for grading:

<table>
<thead>
<tr>
<th>Category</th>
<th>4 Exemplary</th>
<th>3 Good</th>
<th>2 Satisfactory</th>
<th>1 Unsatisfactory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject knowledge 50%</td>
<td>Demonstrates subject knowledge throughout the entire assignment. All information is clear, appropriate, and accurate. The solutions to all problems are correct.</td>
<td>Demonstrates subject knowledge most of the time. Most of the information is clear, appropriate, and accurate. Most of the solutions to problems are correct, some solutions have minor errors.</td>
<td>Demonstrates some subject knowledge. Some information is clear, appropriate, and accurate. Some solutions to problems are correct.</td>
<td>Subject knowledge is not demonstrated. Information is confusing, insufficient, inappropriate, and inaccurate. Most of the problems have incorrect solutions.</td>
</tr>
<tr>
<td>Organization 30%</td>
<td>The sequence of information/proof is logical and well organized.</td>
<td>The sequence of information/proof is well organized.</td>
<td>Some parts of the sequence of information/proof is organized.</td>
<td>The sequence of information/proof is disorganized.</td>
</tr>
<tr>
<td>Communication (written and/or oral presentation) 20%</td>
<td>Excellent written communication of ideas/ excellent integration of spoken and visual presentation.</td>
<td>Good written communication of ideas, most of the time/good integration of spoken and visual presentation, most of the time.</td>
<td>Some parts are well written, and ideas are communicated effectively / some parts of the presentation are coordinated orally and visually.</td>
<td>The written paper is hard to follow, ideas are not communicated effectively / the presentation is hard to follow, the spoken and visual presentation are not integrated.</td>
</tr>
</tbody>
</table>

Final grades will be assigned according to the following table:
### Percentage Grade

<table>
<thead>
<tr>
<th>Grade Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥90.0%</td>
<td>A</td>
</tr>
<tr>
<td>≥80.0%</td>
<td>B</td>
</tr>
<tr>
<td>≥70.0%</td>
<td>C</td>
</tr>
<tr>
<td>≥60.0%</td>
<td>D</td>
</tr>
<tr>
<td>Below 60%</td>
<td>F</td>
</tr>
</tbody>
</table>

### I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>Date (By Week)</th>
<th>Topics</th>
<th>Chapters/Sections</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 20</td>
<td>The Language of Mathematics</td>
<td>Chapter 1 Speaking Mathematically 1.1 Variables 1.2 The Language of Sets 1.3 The Language of Relations and Functions</td>
<td>Discussion Forum (Topic: The Language of Mathematics)</td>
</tr>
<tr>
<td>Jan. 27</td>
<td>Logic of Propositions/ Statements</td>
<td>Chapter 2 Logic of Compound Statements 2.1 Logical Form and Logical Equivalence 2.2 Conditional Statements 2.3 Valid and Invalid Arguments</td>
<td>Discussion Forum (Topic: Logic of Propositions/Statements)</td>
</tr>
<tr>
<td>Feb. 3</td>
<td>Logic of Propositions and Predicates</td>
<td>Chapter 3 Logic of Quantified Statements 3.1 Predicates and Quantified Statements I 3.2 Predicates and Quantified Statements II 3.3 Statements with Multiple Quantifiers 3.4 Arguments with Quantified Statements</td>
<td>Discussion Forum (Topic: Logic of Predicates)</td>
</tr>
<tr>
<td>Feb. 10</td>
<td>Logic</td>
<td>Chapters 1-3</td>
<td>Discussion Forum: Midterm Review Midterm Exam 9/19</td>
</tr>
<tr>
<td>Feb. 17</td>
<td>Proofs</td>
<td>Chapter 4: Elementary Number Theory and Methods of Proof 4.1 Direct Proof</td>
<td>Discussion Forum (Topic: Proofs)</td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
<td>Pages</td>
<td>Discussion Forum (Topics)</td>
</tr>
<tr>
<td>------------</td>
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<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Feb. 24</td>
<td>Proofs</td>
<td>4.6 Indirect Argument: Contradiction and Contraposition</td>
<td>Discussion Forum (Topics: Proofs, Presentation)</td>
</tr>
<tr>
<td>Mar. 2</td>
<td>Mathematical Induction</td>
<td>Chapter 5 Sequences, Mathematical Induction</td>
<td>Discussion Forum (Topic: Mathematical Induction)</td>
</tr>
<tr>
<td>Mar. 9</td>
<td>Sets</td>
<td>Chapter 6 Set Theory, 6.1 Set Theory</td>
<td>Discussion Forum (Topic: Sets)</td>
</tr>
<tr>
<td>Mar. 16</td>
<td>Counting and Probability</td>
<td>Chapter 9 Counting and Probability</td>
<td>Discussion Forum (Topic: Counting)</td>
</tr>
<tr>
<td>Mar. 30</td>
<td>Graphs and Trees</td>
<td>Chapter 10 Graphs and Trees</td>
<td>Discussion Forum (Topic: Graphs and Trees)</td>
</tr>
<tr>
<td>Apr. 6</td>
<td>Graphs and Trees</td>
<td>10.5 Trees</td>
<td>Discussion Forum (Topics: Graphs and Trees)</td>
</tr>
<tr>
<td>Arp. 13</td>
<td>Algorithm Efficiency</td>
<td>Chapter 11 Analysis of Algorithm Efficiency (optional)</td>
<td>Discussion Forum (Topic: Algorithm Efficiency)</td>
</tr>
</tbody>
</table>
Note: Changes in this course schedule may be necessary and will be announced to the class by the instructor. The assignments, quizzes and exams shown are directly related to the Student Learning Outcomes described in Section F.

J. COURSE POLICIES

Attendance/Tardiness
You are expected to attend every class session and arrive on time. There is no make up for class activities, you need to be present to participate. All the absences will be considered “unexcused” unless you have an exceptional situation (e.g., documented illness, family situation), and you email the instructor about it.

Late Work and Make-up Exams
Late assignments will not be accepted, unless exceptional circumstances prevent you from completing them. Extension of deadlines will be at the instructor’s discretion. Late assignments may result in partial or total loss of credit. There are NO make-ups for quizzes, exams or in-class activities.

Extra Credit
There will be no extra credit for this course.

Cell Phone Use
Please silence phones before coming to class. If you need to take a call, please go outside the classroom.

Laptop Use
In general, you cannot use your laptops during class activities or exams. For special circumstances (e.g., presentations), or special needs, please talk with the instructor.

Food in Class
Refrain from bringing food to class. For special needs or occasions, please talk with the instructor.

Missed Exam
Exceptional circumstances (e.g., documented illness, family situations) may be considered at the instructor’s discretion.
Participation
You are expected to come to class prepared every time, and participate in class activities.

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)**
  I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. 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](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](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) 825-816 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) 825-816.

  [http://disabilityservices.tamucc.edu/](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**

• **Academic Advising**
The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

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.