CS 3653 – Discrete Mathematics for Computer Science

Instructor

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Office Hours: MW 2:30pm – 4:00pm (Central Time) or by appointment.

Description

This course covers elementary discrete mathematics for computer science and engineering. It emphasizes mathematical definitions and proofs as well as applicable methods. Topics include formal logic notation, proof methods, sets, functions, algorithms, number theory, induction and recursion, counting principles, discrete probability, relations, elementary graph theory, trees, etc.

Prerequisites

The prerequisite for the course is MATH 2144.

Goals

The goal of this course is to introduce students to ideas and techniques from discrete mathematics that are widely used in Computer Science. The course aims to present these ideas "in action"; each one will be geared towards a specific significant application. Thus, students will see the purpose of the techniques at the same time as learning about them.

Objectives

Upon completion of CS 3653, students will be able to explain and apply basic methods of discrete mathematics in computer science. They will be able to use these methods in subsequent courses in the design and analysis of algorithms, computability theory, software engineering, and computer systems. In particular, students will be able to:

- Use logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions, and integers.
- Reason mathematically about basic data types and structures, such as numbers, sets, graphs, and trees used in computer algorithms and systems.
- Evaluate elementary mathematical arguments and identify fallacious reasoning.
- Model and analyze computational processes using analytic and combinatorial methods.
- Apply principles of discrete probability to calculate probabilities and expectations of simple random processes.
- Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction.

Textbook

- Kenneth H. Rosen, "Discrete Mathematics and its Applications", 7th Edition, McGraw Hills, ISBN: 978-0073383095 *(OR 8th Edition, McGraw Hills, ISBN: 978-1259676512).*

Additional Books

- Edward R. Scheinerman, "Mathematics: A Discrete Introduction", 1st Edition, Brooks Cole, ISBN: 978-0534356385.
- Susanna S. Epp, "Discrete Mathematics with Applications", 5th Edition, CENGAGE Learning, ISBN: 978-1337694193.
- Gary Chartrand, Ping Zhang, "Discrete Mathematics", 1st Edition, Waveland Pr Inc., ISBN: 978-1577667308.
- David J. Hunter, "Essentials of Discrete Mathematics", 4th Edition, Jones & Bartlett Learning, ISBN-13: 978-1284184761.

Instructor Response Time

It is expected, all correspondence should be done in the classroom. But, if you need to contact me on an individual basis, the most preferred way is in the office hours or through email. If you contact me through emails, I will try my best to respond you within 24 hours, though sometimes it could be as long as 48 hours or more, especially in case of a weekend or holiday. To ensure that I perceive your email, please make sure to begin the subject line of your email with the course number in square brackets, followed by the message subject; for example:

> ***[CS 3653] Unable to view grades on Canvas***

Providing grades and/or feedback for assignments may take up to 2 weeks of the assignment due date.

Participation Expectations

Students should expect this course to be more challenging and take a lot of effort. You are going to learn an elementary mathematics course, the only way to become proficient is to do a lot of practice in solving different problems in it.

The typical rule of thumb is that you should expect to spend 2-3 hours for every hour of the class. It is expected that, you should plan to spend 6-9 hours per week on average reading, doing homework and other assignments.

To do well in this course, students are expected to

- Keep up with the course material, including the homework assignments.
- Read or view the instructional material posted to Canvas frequently.
- Ask for help if any of the material covered is not clear.
- Complete the assignments and submit them before their deadlines.
- Regularly check Canvas for announcements.

Grading Policy

Grades in this course will be calculated according to the completion of following assignments:

Assignment	Value in Points (Max)	Percentage of Total Grade
Quizzes	300	30%
Assignment	300	30%
One Mid-term Exam	200	20%
Final Exam	200	20%
Total	**1000**	**100%**

Final grades will be assigned according to the following scale:

Grade	Percentage Earned
A	90 – 100%
B	80 – 89.99%
C	70 – 79.99%
D	60 – 69.99%
F	0 – 59.99%

Quizzes

There will be Homework - Quizzes after completion of each section / chapter, which will also be completed through the Canvas.

Assignment Descriptions

- All assignments should be submitted **ONLY** through Canvas.
- **As this is a mathematics course, it is expected to submit the scanned copy of hand- written solutions to the assignments.**
- 10% penalty of available points per day late. However, you cannot receive negative points for an assignment.
- Not all assignments will be of same complexity.
- An Incomplete assignment will not be considered for grading.
- No make-up exams will be scheduled except in extreme cases.
- If you are going to miss an exam or assignment, contact the instructor in advance.
- Exceptions can be made if a serious family or personal emergency arises.

Exams

There will be one midterm exam during the semester and a final exam during finals week; Both exams may be online proctored exams (may have to pay extra for each, *subject to university policy) and may be using Examity through Canvas. You can access detailed Information regarding Examity – Students Quick Guide, available on Canvas.

Collaboration

Discussion of concepts, ideas, and techniques is acceptable. After discussion, each student must write up his/her own solution. Copying another person's work, in part or in whole, is not allowed. Giving another student your work, in part or in whole, is considered cheating as well. If you are unsure whether your collaboration is acceptable, speak with the instructor in advance. Take care that your solutions are not exposed to or by other students.

Students who do not comply with the collaboration policies described above will be assigned sanctions in accordance with OSU policy 2-0822 (Academic Integrity). Depending on the circumstances of the violation, the sanctions may result in a score of zero on an assignment, a final grade of F! for the course, or dismissal from the OSU graduate program. In all instances, the violation will be reported to the appropriate institutional officials.

Disabilities Act

If any student feels that he/she has a disability and needs special accommodations of any nature whatsoever, the instructor will work with you and Student Disability Services, 315 Student Union, to provide reasonable accommodations to ensure that you have a fair opportunity to perform in this class. Please advise the instructor of such disability and the desired accommodations at some point before, during, or immediately after the first scheduled class period.

Tentative Course Schedule

SN	Module	Date	Week	Quizzes & Assignments	Due
1.	CH-1: The Foundation – I	Jan 10 – Jan 16	1	Quiz-1 & Assignment-1	Jan 17
2.	CH-1: The Foundation – II	Jan 17 – Jan 23	2	Quiz-2 & Assignment-2	Jan 24
3.	CH-1: The Foundation – III	Jan 24 – Jan 30	3	Quiz-3 & Assignment-3	Jan 31
4.	CH-2: Basic Structures – I	Jan 31 – Feb 6	4	Quiz-4 & Assignment-4	Feb 7
5.	CH-2: Basic Structures – II	Feb 7 – Feb 13	5	Quiz-5 & Assignment-5	Feb 14
6.	CH-3: Algorithms	Feb 14 – Feb 20	6	Quiz-6 & Assignment-6	Feb 21
MID TERM EXAM - Feb 27 & 28 - Based on CH-1 to CH-3 (SN 1 to 6)					
7.	CH-4: Number Theory	Feb 21 – Feb 27	7	--	--
8.	CH-5: Induction & Recursion	Feb 28 – Mar 6	8	Quiz-7 (CH-4&5) & Assignment-7 (CH-4&5)	Mar 7
9.	CH-6: Counting CH-8: Advance Counting	Mar 7 – Mar 13	9	Quiz-8 & Assignment-8	Mar 21
Students SPRING Break: Mar 14 – Mar 20					
10.	CH-7: Discrete Probability – I	Mar 21 – Mar 27	10	Quiz-9 & Assignment-9	Mar 28
11.	CH-7: Discrete Probability – II	Mar 28 – Apr 3	11	Quiz-10 & Assignment-10	Apr 4
12	CH-9: Relations – I	Apr 4 – Apr 10	12	Quiz-11 & Assignment-11	Apr 11
13.	CH-9: Relations – II	Apr 11 – Apr 17	13	Quiz-12 & Assignment-12	Apr 18
14.	CH-10: Graphs	Apr 18 – Apr 24	14	Quiz-13 & Assignment-13	Apr 25
15.	CH-11: Trees	Apr 25 – Apr 30	15	--	--
FINAL EXAM - May 4 & 5 - Based on CH-1 to CH-11 (SN 1 to 15)					