Course Syllabus: CSCI 26 – Discrete Mathematics for Computer Science

CSCI 26-52001 **Reedley College**
100% Online Fall 2023
Instructor: Mr. Steven Zook Email: steven.zook@reedleycollege.edu
Phone: (559) 638-3641 ext. 3279 Office: MAS 129
Office Hours:
M 1:00 – 1:50pm; W 1:00 – 1:50pm Virtual Office (click to open zoom)
Th 12:00 – 12:50pm T 11:00 – 11:50am, F 11:00 – 11:50am

Course Description:
This course studies elements of discrete mathematics which have applications to computer science. Topics include sets, propositional and predicate logic, relations and functions, proof techniques, graphs, trees, and discrete probability.

Course Prerequisites:
CSCI 40

Course Advisories:
English 1A or 1AH

Student Learning Outcomes:
Upon completion of this course, students will be able to:

1. Apply fundamental proving techniques of discrete mathematics, including those by mathematical induction.
2. Demonstrate different traversal methods for trees and graphs.
3. Give precise statements about the growth of functions and the complexity of algorithms using the big O, omega, and theta notations.
4. Use various objects and relationships in discrete mathematics, such as sets, sequences, number systems, relations, and functions.
5. Write programs to implement various algorithms that involve topics in discrete mathematics.

Student Learning Outcomes are statements about what the discipline faculty hope you will be able to do at the end of the course. This is NOT a guarantee: the ultimate responsibility for whether you will be able to do these things lies with you, the student. In addition, the assessment of Student Learning Outcomes is done by the department in order to evaluate the program as a whole, and not to evaluate individual faculty performance.

Course Objectives:
In the process of completing this course, students will learn about:

1. Apply the fundamentals of graph theory.
2. Apply the pigeonhole principle to determine if an item has a given property or not.
3. Determine the truth values of propositions using truth tables.
4. Build and traverse binary trees.
5. Use the language of mathematics: sets, sequences, number systems, relations, and functions.
6. Count objects using permutation and combination methods.

7. Analyze the complexity of algorithms.
8. Apply the binomial theorem to independent events and Bayes' theorem to dependent events.
9. Convert numbers between decimal number system, binary number system, and hexadecimal number system.
10. Prove mathematical principles using mathematical induction method.
11. Demonstrate knowledge of algorithms, recursive algorithms, and the analysis of algorithms.
12. Develop teamwork skills while engaging in group inquiry learning.

Course Outline:

In the process of completing this course, students will learn about:

1. Logic and Proofs
    a. Propositions
    b. Conditional Propositions and Logical Equivalence
    c. Proofs
    d. Mathematical Induction
2. Language of Mathematics
    a. Sets
    b. Sequences and Strings
    c. Number Systems
    d. Relations
    e. Functions
3. Algorithms: Counting Methods, and Recurrence Relations
    a. Notation of Algorithms
    b. The Euclidean Algorithm and Program Implementation
    c. Recursive Algorithms and Program Implementation
    d. Complexity of Algorithms
4. Counting Methods and the Pigeonhole Principle
    a. Permutations, Combinations, and Program Implementation
    b. Binomial Coefficients and Combinatorial Identities
    c. The Pigeonhole Principle
5. Graph Theory and Trees
    a. Paths and Cycles
    b. Hamiltonian Cycles and the Traveling Salesperson Problem
    c. Representations of Graphs
6. Trees
    a. Terminology and Characterizations of Trees
    b. Binary Trees and Program Implementation
    c. Tree Traversals and Program Implementation
7. Probability
    a. Introduction to Probability
    b. Unions and Intersections
    c. Conditional Probability and Independence
    d. Random Variables
    e. Probability Calculations in Hashing
    f. Conditional Expectations, Recurrences, and Algorithms

Lab Outline

1. Propositional logic
2. Proofs
3. Sets
4. Functions
5. Induction
6. Recursion
7. Counting
8. Graph theory
9. Tree traversal
10. Discrete probability

Required Text:

zyBooks Discrete Mathematics, register and connect through Canvas (cost: $64)

1. Click any zyBooks assignment link in Canvas (Do not go to the zyBooks website and create a new account)
2. Subscribe

Office Hours:

I will be holding regular and virtual office hours. I want to be available to you if you need assistance outside of class. Please visit me during the scheduled times for drop-in questions. You may come unannounced during those times. If the scheduled office hours do not suit your schedule, you may arrange a time to meet with me by sending me an email. Please don't hesitate to take advantage of these since I want you to succeed – it's what I am here for.
This semester some of my office hours are in person in my office in the new math and science building (MAS 129); the others are virtual at the following link: Virtual Office

Communication:

There are a variety of ways to reach me. I will do my best to respond to messages and emails that are received Monday-Friday between 9am and 5pm as soon as possible, but no later than 24 hours. If you don't hear back from me in 24 hours, assume I did not receive your message/email and please resend it. On weekends, please give me additional time - I will respond to messages/emails received over the weekend (after Friday 5pm) on Monday mornings. Please identify yourself in the email with your full name and course number (e.g. Steven Zook, CSCI 26-51061).

Preferred:

1. Message me using the "Inbox" feature in Canvas.
2. Email me directly: steven.zook@reedleycollege.edu
3. Visit me in my office: MAS 129
4. Drop by my virtual office (zoom) during my scheduled office hour: Virtual Office
5. Consider posting a general course question in the Q&A discussion thread on Canvas.

Other:

6. Call me on my office phone: 559.638.3641 extension 3279. If leaving a message, please let me know your full name and the course you are taking along with a call-back number.

Attendance and Drop Policy:
The primary way that you "attend" class is by participating in class discussions and completing assignments (homework and exams). It is important that students regularly and consistently participate in the course from the very beginning. For this reason I have the following guidelines for when I may drop students from the course. If I intend to drop you, I will always message you a warning before I do, so don't be anxious about being dropped "out of the blue". If you do have missing assignments, I encourage you to reach out to me, so we can make a plan to get you on track - the sooner the better!

1. Introduce yourself to me and to your classmates by participating in the **Introduction discussion** during the first week. Otherwise, I may drop you as a "no-show".
2. Start strong! Complete **all assignments** during the first two weeks of class. If you miss an assignment during the first two weeks, I may drop you from the course.
3. If you miss **more than ten (10) assignments**(discussion, homework, exam, etc.) during the first 9 weeks of the semester, I may drop you from the course for poor attendance.

Drop Deadline:
Friday, October 6

Assignments:
1. Homework assignments can be worked on any time before they are due. Please contact me if you need an extension on the homework.
2. Discussions that are submitted late will only earn points for the initial post (3 out of 5 points possible). Since your classmates depend on your thoughtful, consistent, and timely participation, you will not receive credit for responses to classmates that are late.
3. Exams cannot be made up late for any reason. However, to safeguard against any unavoidable and unforeseen circumstances, I drop the lowest exam score. I do allow you to take an exam early, if it is prearranged.

Assignment Categories and Weighting:

Assignment	*Weighting*
Homework (Participation & Challenge Activities)	15%
Lab Activities (POGIL)	15%
Discussions	10%
Programming Activities	10%
Exams	50%

Final Grades:

Letter Grade	*Percent*
A	90 – 100
B	80 – 89
C	70 – 79
D	60 – 69
F	0 – 59

Special Needs Requests:
If you have a verified need for an academic accommodation or materials in alternate media (i.e., Braille, large print, electronic text, etc.) per the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act, please contact me as soon as possible.

Plagiarism and Academic Honesty:
Please refer to the policies in the 2023-2024 Reedley College catalog, pages 48, 49. Academic honesty is of utmost importance and the college policies will be followed.