**Reedley College** **Spring 2020**
**CSCI 26 – Discrete Mathematics for Computer Science**


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| **Office Hours** | MTWTh 1pm – 2pm (room: FEM 1D)<br>or by Appointment |
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**This is an online class** using interactive book on wwww.zybooks.com, new **assignments** every **Tuesday**
1. Sign in or create an account at learn.zybooks.com
2. Enter zyBook code: REEDLEYCOLLEGECSCI26GertnerAcademicYear2020
3. Subscribe

## Course Overview

As the role of computer science in modern careers continues to grow, the importance of discrete mathematics increases as well. Discrete math is the study of finite and countable sets. Topics include logical reasoning (if x then y), algorithms about integers (and applications to cryptography), and counting (the basis of discrete probability). In contrast to the more-familiar mathematics of continuous numbers like calculus, discrete mathematics forms the foundation of much of computer science. As such, the need to learn discrete mathematics expands to more programs and graduate school.

### Course Objectives

In the process of completing this course, you will be able to

1. Determine the truth-value of propositions using truth tables.
2. Prove mathematical principles using mathematical induction method.
3. Learn computational models, starting with stateless logical gates, state-full Fine State Machines and most powerful Turing Machines.
4. Convert numbers between decimal number system, binary number system, and hexadecimal number system.
5. Write algorithms for solutions to problems and analyze the complexity of algorithms.
6. Count objects using permutation and combination methods.
7. Understand and apply the fundamentals of graph theory.
8. Build and traverse binary trees.

### Course Outcomes:

Upon completion of this course, you will be able to:

1. Apply fundamental proving techniques of discrete mathematics in computer science. These techniques include proofs by mathematical induction.
2. Demonstrate knowledge of algorithms, recursive algorithms, and the analysis of algorithms.
3. Give precise statements about the growth of functions and the complexity of algorithms using the big O, omega, and theta notations.
4. Write C++ programs to implement various algorithms.
5. Demonstrate different traversal methods for trees and graphs.

### Course Outline:

A. Logic and Proofs
   1. Propositions
   2. Conditional Propositions and Logical Equivalence
   3. Proofs

B. Computation
   1. Boolean functions
   2. Gates and Circuits
   3. Finite State Machines
   4. Turing Machines

C. Algorithms:
   1. An Introduction to algorithms
   2. Asymptotic growth of functions

3. Analysis of Algorithms
4. Recursive Algorithms and Program Implementation
5. Complexity of Algorithms

D. Integer Properties and Introduction to Cryptography
1. Prime factorizations Permutations
2. Introduction to cryptography
3. The RSA cryptosystem

E. Graph Theory and Trees
1. Paths and Cycles
2. Hamiltonian Cycles and the Traveling Salesperson Problem
3. Representations of Graphs

F. Trees
1. Terminology and Characterizations of Trees
2. Binary Trees and Program Implementation
3. Tree Traversals and Program Implementation

G. Probability
1. Introduction to Probability
2. Unions and Intersections
3. Conditional Probability and Independence
4. Random Variables
5. Probability Calculations in Hashing
6. Conditional Expectations, Recurrences, and Algorithms

**Lab Content:**

Following lecture content is practiced by students in one of the computer laboratory exercises.
* Algorithms: counting methods and recurrence relations.
* Tree traversal.

## Course Prerequisite:

Programming Concepts and Methodology, I (CSCI 40)
or Programming for Scientists and Engineers (ENGR 40)

## Textbook:

Required: Discrete Mathematics, an interactive book published by zybooks.com. Rent for one semester.
Optional book: Discrete Mathematics and Its Applications, 7th Edition, By Kenneth Rosen, McGraw Hill.

## Learning Management System: CANVAS:

CANVAS is used to post course information, assignments, and announcements.
To log-in Reedley College CANVAS:
**Username**: Your 7-digit student ID number.
**Password**: If you have not previously changed your password, it is:
*First name initial* (upper case) + *last name initial* (lowercase) + *date of birth* (mmddyy)
**Example**: John Smith born on July 9th of 1988 Password =Js070988

## Grading:

60% of your final grade points are from the average of test scores, tests every 4 weeks.
20% of your final grade points are from the average of homework assignments.
10% of your final grade points are from online discussion scores.
10% of your final grade points are from program assignments.
Final letter grade is assigned using following scale:

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| 90-100 | points | A | 60- 69 | points | D |
| 80- 89 | points | B | < 60 | points | F |
| 70- 79 | points | C | | | |

## Important Dates:

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| Class begin | Tuesday | 01/14//2020 |
| Last day to register | Friday | 01/31/2020 |

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| Last day to drop this class to avoid a "W" | Friday | 02/02/2020 |
| Last date to drop this class | Friday | 03/13/2020 |
| No classes, campus is closed | | |
| Martin Luther King, Jr Day | Monday | 01/20/2020 |
| Lincoln Day | Monday | 02/14/2020 |
| Spring Recess | Mon- Fri | 04/06/2020 – 04/10/2020 |
| **Final Exam** | **Tuesday** | **05/19/2020 8:00am – 8:00 pm** |

## Attendance (Also see Attendance Policy under Academic Regulations in Class Schedule):

This is an online class, missed homework assignments will be graded 0 (Zero) and marked as absent.

## Student Conduct (Also see Student conduct under Campus Policies in Class Schedule):

Students are expected to conduct themselves in a responsible manner. Specific rules and regulations have been established in Board Policy 5410. A copy of this policy is available in the college library, the Admissions Office, the Vice President of Student Services, the Vice President of Instruction's Office, and in the Student Activities Office. Failure to adhere to the accepted standards will result in disciplinary action.

## Plagiarism and Cheating Policy (See Cheating and Plagiarism under Campus Policies):

Cheating and plagiarism is prohibited in the class. Incidents of cheating and plagiarism will result a failing grade on the particular examination or assignment in question.

## Accommodations

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.