

Inver Hills Community College

CS 1118: Discrete Structures of Computer Science

A. COURSE DESCRIPTION

Credits: 4

Lecture Hours/Week: 4

Lab Hours/Week: 0

OJT Hours/Week: *.*

Prerequisites: None

Corequisites: None

MnTC Goals: Goal 04 - Mathematical/Logical Reasoning

Introduces theoretical concepts of computer science, number systems coding schemes, formal logic, sets and relations, induction, recursion, recurrences, graphs, proofs of program correctness, analysis of algorithms, asymptotic complexity measure at an advanced level. CS 1118 has greater mathematical depth than CS/MATH 1108 and satisfies transfer requirements for most 4 year computer science programs.

Prereq: CS 1114 or CS 1116 or CS 1119 or equivalent, and MATH 1118 or MATH 1127 or equivalent.

B. COURSE EFFECTIVE DATES: 01/01/1998 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Analysis of Algorithms
2. Automata, Grammars
3. Complexity analysis
4. Graph Theory
5. Information coding: integer, character, and real numbers
6. Logic and truth tables
7. Notions of logarithms, exponentials, queues, and stacks
8. Notions of selection and repetition
9. Number systems
10. Permutations and Combinations
11. Proof by Mathematical Induction, contradiction, contraposition, counterexample
12. Propositions, Logical Equivalence, Quantifiers
13. Quantifiers \exists Applications to program assertions, proofs, and arguments
14. Recurrence relations
15. Relational algebra
16. Sets and Relations

D. LEARNING OUTCOMES (General)

1. Be able to construct different types of mathematical proofs
2. Gain the mathematical foundations necessary to analyze and describe programs in a formal mathematical manner
3. Understand how to construct finite state automata and regular expressions to describe languages
4. Understand number systems common to computer processing (integer and fixed-point numbers)
5. Understands and can generate coding systems of fixed and variable lengths
6. Understands set and relations
7. Analyze recursive and divide-and-conquer algorithms using recurrence relations and their solutions
8. Analyze loops and verify that a loop computes what we think it ought to
9. Understand the basic concepts and algorithms of computer graph theory

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

Goal 04 - Mathematical/Logical Reasoning

1. Illustrate historical and contemporary applications of mathematical/logical systems.
2. Clearly express mathematical/logical ideas in writing.
3. Explain what constitutes a valid mathematical/logical argument(proof).
4. Apply higher-order problem-solving and/or modeling strategies.

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted