Glendale College

Course Outline of Record Report

Course ID 005200

Cyclical Review - May 2024

CS/IS125 : Discrete Structures For Computing

General Information

Author:	- Tony Biehl
Attachments:	DE Addendum_CS:IS_125 COR_09_01_2020 CoDE_09_26_2023.pdf.pdf
Course Code (CB01) :	CS/IS125
Course Title (CB02) :	Discrete Structures For Computing
Department:	CSIS
Proposal Start:	Winter 2025
TOP Code (CB03) :	(0706.00) Computer Science (transfer)
CIP Code:	(11.0701) Computer Science.
SAM Code (CB09) :	Non-Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	Yes
Course Control Number (CB00) :	CCC000564608
Curriculum Committee Approval Date:	05/08/2024
Board of Trustees Approval Date:	06/18/2024
Last Cyclical Review Date:	05/08/2024
Course Description and Course Note:	CS/IS 125 is a course in discrete structures that furnishes a strong foundation of mathematical tools for modeling problems and applications in computer science . Topics include logic operations, combinatorics, undirected and directed graphs, trees, relations and sets, proofs, Boolean algebra, algebraic systems, finite state automata, and discrete probability.
Justification:	Mandatory Revision
Academic Career:	- Credit
Author:	- Tony Biehl

Academic Senate Discipline

Primary Discipline:	- Computer Science
Alternate Discipline:	No value
Alternate Discipline:	No value

Course Development

Basic Skill Status (CB08)

Course is not a basic skills course.

□ Allow Students to Gain Credit by Exam/Challenge

Course Special Class Status (CB13)

Course is not a special class.

Pre-Collegiate Level (CB21)

Not applicable.

Grading Basis

- Grade with Pass / No-Pass Option

Course Support Course Status (CB26)

Course is not a support course

Transferability & Gen. Ed. Options

General Education Status (CB25)

Not Applicable

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

C-ID	Area	Status	Approval Date	Comparable Course
COMP	Computer Science	Approved	02/17/2015	COMP 152 - Discrete Structures

Units and Hours

Summary

Minimum Credit Units (CB07)	4
Maximum Credit Units (CB06)	4
Total Course In-Class (Contact) Hours	90
Total Course Out-of-Class Hours	126
Total Student Learning Hours	216

Credit / Non-Credit Options

Course Type (CB04)

Credit - Degree Applicable

Noncredit Course Category (CB22)

Credit Course.

Noncredit Special Characteristics

No Value

Course Classification Code (CB11)

Credit Course.

□ Variable Credit Course

Funding Agency Category (CB23)

Not Applicable.

□ Cooperative Work Experience Education Status (CB10)

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	3.5	7

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54

Laboratory Hours	1.5	0
Studio Hours	0	0

Course In-Class (Contact) Hours

Lecture	63
Laboratory	27
Studio	0
Total	90

Course Out-of-Class Hours

Lecture	126
Laboratory	0
Studio	0
Total	126

Time Commitment Notes for Students

No value

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Prerequisite

CS/IS135 - Programming In C/C++

Objectives

- Recognize programming problems on a function-by-function basis and develop structured/procedural code based on this approach.
- Demonstrate an understanding of object-oriented programming concepts and object-oriented design in creating a program.
- Program in the C++ language including use of objects, pointers, and structures.

AND

Advisory

MATH90 - Intermediate Algebra for BSTEM

Objectives

- Convert between percents, decimals and fractions.
- Solve introductory linear equations and inequalities.
- Add, subtract, multiply and divide polynomials.
- Graph introductory linear equations and inequalities.
- Find the equation of a line.
- Solve linear systems using graphing, substitution and elimination methods.
- Use algebra to solve applied problems.
- Factor polynomials.

Entry Standards

Entry Standards

Analyze a programming task to develop and communicate efficient algorithms to implement that task.

Course Limitations

Cross Listed or Equivalent Course

Specifications

Methods of Instruction

Methods of Instruction	Lecture
Methods of Instruction	Laboratory
Methods of Instruction	Multimedia
Methods of Instruction	Collaborative Learning

Out of Class Assignments

- Programming assignments (e.g. use finite state automata to create a simple vending machine)
- Discrete structure math assignments from textbook (e.g. propositional logic and truth tables)

Methods of Evaluation	Rationale
Exam/Quiz/Test	Final examination
Exam/Quiz/Test	Quizzes
Exam/Quiz/Test	Midterm examinations
Project/Portfolio	Programming projects

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN

Epp, Susanna	Discrete Mathematics and its Applications	Brooks Cole	2020	9781337694193

Other Instructional Materials (i.e. OER, handouts)

No Value

Materials Fee

No value

Learning Outcomes and Objectives

Course Objectives

Solve simple problems in combinatorics and build simple new algebras.

Apply searching and sorting for undirected graphs.

Write computer programs incorporating concepts such as graphs, automata, and discrete probabilities.

SLOs

Determine the correctness of algorithms. Expected Outcome Performance: 70.0

ILOs Core ILOs	Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.
	Use quantitative and/or analytical mathematical skills to solve problems and to interpret, evaluate, and process information and data to draw logical conclusions and support claims.
CSIS Computer Science - A.S. Degree Major	Prepare a software project to implement a single scientific, mathematical, business, or technical function.
CSIS Computer Science - Certificate	Prepare a software project to implement a single scientific, mathematical, business, or technical function.
CSIS Computer Support Technician	demonstrate an understanding of computer structure and operations
	possess a basic knowledge of computer operation and capabilities with the skills to troubleshoot problems or aid in user support.
CSIS Computer Software Technician	demonstrate the ability to independently create, save, modify and print a document using a word processing program and appropriate assistive technology
CSIS Web Development - Certificate	use industry standard tools and techniques to produce, publish and maintain Web sites and Web content.
CSIS Web Development - A.S. Degree Major	use industry standard tools and techniques to produce, publish and maintain Web sites and Web content.

Explain and draw graphs.

Expected Outcome Performance: 70.0

ILOs Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.
	Communicate clearly, ethically, and creatively; listen actively and engage respectfully with others; consider situational, cultural, and personal contexts within or across multiple modes of communication.
	Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.
CSIS Computer Science - A.S. Degree Major	Prepare a software project to implement a single scientific, mathematical, business, or technical function.
CSIS Computer Science - Certificate	Prepare a software project to implement a single scientific, mathematical, business, or technical function.
ILOs General Education	communicate clearly and logically in writing, speech, and other media as appropriate
CSIS Computer Support Technician	demonstrate an understanding of computer structure and operations
	possess a basic knowledge of computer operation and capabilities with the skills to troubleshoot problems or aid in user support.
CSIS Computer Software Technician	demonstrate the ability to independently create, save, modify and print a document using a word processing program and appropriate assistive technology
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Use DeMorgan's Law and Karnaugh Maps in simplifying Boolean expressions.

Expected Outcome Performance: 70.0

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	Use quantitative and/or analytical mathematical skills to solve problems and to interpret, evaluate, and process information and data to draw logical conclusions and support claims.
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Course Content

Lecture Content

Introduction to Discrete Structures (3 hours)

Logic and Sets (12 hours)

- Truth tables
- Logic and propositions
    - Universal and existential quantification
    - Modus ponens and modus tollens
    - Predicate logic
    - Normal forms
- Proofs
    - Direct
    - Mathematical Induction
    - Counterexample
    - Contradiction
- Correctness of algorithms
- Basic properties of sets
    - Venn diagrams, complements, Cartesian productions, power sets
    - Cardinality and countability

Relations and Functions (10 hours)

- Relations: reflexivity, symmetry, transitivity, equivalence
- Composition
- Functions: surjections, interjections, inverses, composition

Combinatorics (10 hours)

- Selecting elements
- Counting formulas
- Pigeonhole principle
- Patterns and partitions
- Algorithm analysis
- Inclusion-exclusion principle
- Sum and product rule
- Pascal's identity
- Binomial theorem
- Fibonacci

Discrete probability (10 hours)

- Probability space, measure, events
- Conditional probability, independence, Bayes' theorem
- Random variables

Graphs (11 hours)

- Undirected graphs
- Simple
    - Paths, cycles, and connectivity
    - Eulerian paths
    - Hamiltonian circuits
- Trees
    - Minimal spanning trees
    - Rooted trees
    - Sorting and searching
    - Traversals
- Directed graphs
    - Degrees, paths and cycles
    - Consistent labeling

Boolean Algebra (7 hours)

- Expressions
    - DeMorgan's Law
    - Minterms
    - Normal forms
    - Operators
    - Karnaugh Maps
- Switching theory
    - Circuit diagrams

    - Logic gates

Total hours: 63

Laboratory/Studio Content

Boolean Algebra (4 hours)

- Expressions
    - DeMorgan's Law
    - Minterms
    - Normal forms
    - Operators
    - Karnaugh Maps
- Switching theory
    - Circuit diagrams
    - Logic gates

Algebraic Systems (14 hours)

- Semigroups, monoids and groups
- Building new algebras
- Morphisms

Machines (9 hours)

- Finite state automata
- Without outputs
    - Definition of finite state automaton •
    - Language recognizers
- With outputs
    - Moore machines
    - Mealy machines
- Turing machines
    - Procedures
    - Function computers
    - Church-Turing thesis

Total hours: 27

Additional Information

Is this course proposed for GCC Major or General Education Graduation requirement? If yes, indicate which requirement in the two areas provided below.

Yes

GCC Major Requirements

No Value

GCC General Education Graduation Requirements

Communication and Analytical Thinking

Repeatability

Not Repeatable

Justification (if repeatable was chosen above)

No Value

Resources

Did you contact your departmental library liaison?

No

If yes, who is your departmental library liason?

No Value

Did you contact the DEIA liaison?

No

Were there any DEIA changes made to this outline?

No

If yes, in what areas were these changes made:

No Value

Will any additional resources be needed for this course? (Click all that apply)

No Value

If additional resources are needed, add a brief description and cost in the box provided.

No Value