CS 11 Course Outline as of Summer 2010

CATALOG INFORMATION

Dept and Nbr: CS 11 Title: DATA STRUCT & ALGORITHMS
Full Title: Data Structures and Algorithms
Last Reviewed: 3/27/2023

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	4.00	Lecture Scheduled	4.00	17.5	Lecture Scheduled	70.00
Minimum	4.00	Lab Scheduled	0	6	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	4.00		Contact Total	70.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 140.00 Total Student Learning Hours: 210.00

Title 5 Category:	AA Degree Applicable
Grading:	Grade or P/NP
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	CIS 11

Catalog Description:
Continued study of computer programming including specification and implementation of data structures, and analysis of associated algorithms. Topics include: abstract data types, dynamic memory, templated functions and classes, iterators, exception handling, linked lists, stacks, queues, recursion, trees, searching, sorting, and inheritance. Several significant programming projects are written in C ++.

Prerequisites/Corequisites:
Course Completion of CS 10

Recommended Preparation:
Eligibility for ENGL 1A or equivalent

Limits on Enrollment:

Schedule of Classes Information:
Description: Continued study of computer programming including specification and implementation of data structures, and analysis of associated algorithms. Topics include: abstract data types, dynamic memory, templated functions and classes, iterators, exception handling, linked lists, stacks, queues, recursion, trees, searching, sorting, and inheritance. Several

significant programming projects are written in C ++. (Grade or P/NP)
Prerequisites/Corequisites: Course Completion of CS 10
Recommended: Eligibility for ENGL 1A or equivalent
Limits on Enrollment:
Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**	Effective:	Inactive:
CSU GE:	**Transfer Area**	Effective:	Inactive:
IGETC:	**Transfer Area**	Effective:	Inactive:

CSU Transfer:	Transferable	Effective:	Spring 1991	Inactive:
UC Transfer:	Transferable	Effective:	Spring 1991	Inactive:

CID:
CID Descriptor: COMP 132 Programming Concepts and Methodology II
SRJC Equivalent Course(s): CS10C

Certificate/Major Applicable:
Major Applicable Course

COURSE CONTENT

Outcomes and Objectives:
Upon completion of the course, students will be able to:
1. Analyze algorithms for efficiency.
2. Use data abstraction as a tool for modeling.
3. Design the system life cycle through software engineering principles.
4. Construct linked lists, pointers, queues, stacks, and trees as abstract data types.
5. Design and construct iterative approaches to algorithm development.
6. Evaluate a variety of sorting and searching methods for efficiency.

Topics and Scope:

A. Abstract data types: operator overloading
   1. Overloading arithmetic, shorthand arithmetic, and relational operators
   2. Overloading the insertion and extraction operators
   3. Overloading the pre and post decrement and increment operators
   4. Overloading the square brackets (subscript) operator
   5. Overloading operators as member functions, free (global) functions, and friend functions.
   6. Default parameters
B. Pointers and Dynamic Memory
   1. Address operator
   2. Dereference (indirection) operator
   3. Pointer assignment

4. Arrow (dereference and select) operator
5. Arrays of pointers
6. NULL
7. Relationship of arrays and pointers
8. "new" operator
9. "delete" operator
10. Memory leaks
11. Reference types

C. Dynamic memory in classes
1. Assignment operator, including checking for self-assignment
2. Copy constructor
3. Destructor

D. Container Classes
1. Documenting member functions with pre/post conditions
2. Using std::size_t
3. Returning a reference
4. User defined namespaces

E. Linked lists

F. Templated functions and classes

G. Iterators, including user-defined

H. Standard Template Library

I. Exception handling

J. Stacks, including expression evaluation

K. Queues

L. Recursion
1.Development techniques
2.Analysis techniques

M. Trees: specification, implementation, and big-O analyses of
1.Binary search trees
2.Heaps

N. Searching: specification, implementation, and big-O analysis of
1.Sequential search
2.Binary search
3.Hashing

O. Sorting: specification, implementation, and big-O analysis of
1. Selection sort
2. Insertion sort
3. Bubble sort
4. Merge sort
5. Quicksort
6. Heapsort

P. Inheritance
1. Contrasted with composition
2. "is-a" relationship and "has-a" relationship
3. Protected
4. Constructors in inheritance
5. Initializor lists
6. Polymorphism and virtual functions
7. The slicing problem
8. Pure virtual functions and abstract classes

Assignment:

1. Read approximately 40 pages per week from text book.
2. Write computer programs.
3. Correct errors in programs with multiple runs of test data.
4. Write documentation for each program so that is easy to understand and use.
5. Take objective exams, including final exam.

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Written program documentation	Writing 10 - 20%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Computer programming assignments	Problem solving 20 - 60%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None	Skill Demonstrations 0 - 0%

Exams: All forms of formal testing, other than skill performance exams.

Multiple choice, true/false, matching items, completion, short answer & programming	Exams 20 - 60%

Other: Includes any assessment tools that do not logically fit into the above categories.

None	Other Category 0 - 0%

Representative Textbooks and Materials:
Data Structures and other Objects Using C++, by Michael Main and Walter Savitch, Addison Wesley Longman, 3rd edition, 2004.