

CSC 232: Data Structures

Catalog Description:

A continuation of CSC 131. Topics will include: algorithm design; complexity analysis; abstract data types and encapsulation; basic data structures and their application, including stacks, queues, linked lists and binary trees; dynamic memory allocation; recursion; sorting and searching; debugging techniques. 4(3-2) F,S

Prerequisites for this course: "C" or better in CSC 130 and CSC 131; and MTH 215 or MTH 315 or concurrent enrollment.

This course is a prerequisite for: CSC 325 and 333.

Required Texts:

Data Structures and Algorithms in C++, 2nd ed., Michael T. Goodrich, Roberto Tamassia, David M. Mount

Major Topics (including information for course sequence or transition)

1. Introduction to C++ programming language
2. Data structures and use, specifically:
 - a. Stacks, queues, linked lists and binary search trees
 - b. Use of data structures from Standard Template Library
 - c. Implementation of data structures in C++
3. Complexity analysis, Big-Oh notation.
4. Algorithm design and implementation:
 - a. Sorting
 - b. Searching
 - c. Recursion
5. C++ programming and language features
 - a. Classes, functions, containers, iterators, exceptions, etc.
 - b. Command-line execution, IDE use, and debugging

Student Outcomes Assessed in CSC 232

- a. Students will attain an ability to apply knowledge of computing and mathematics appropriate to the discipline.
- b. Students will attain an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
- c. Students will attain an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.

CAC Characteristics Enabled But Not Assessed in CSC 232

- h. Students will attain recognition of the need for and an ability to engage in continuing professional development.
- i. Students will attain an ability to use current techniques, skills, and tools necessary for computing practice.
- j. Students will attain an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

k. Students will attain an ability to apply design and development principles in the construction of software systems of varying complexity.

Table 1. Student Outcomes assessed by CSC 232

CSC 232 Student Outcomes	CSC 232 Performance Indicators	CSC 232 Assessment Goals
<p>CSC 232 contributes to SO a. Students will attain an ability to apply knowledge of computing and mathematics appropriate to the discipline.</p>	<p>PI 232-1a: Big-O analysis. PI 232-1b: Recursion PI 232-1c: Binary Search Tree</p>	<p>PI 232-1a: 80% or more students receive passing grade PI 232-1b: 80% or more students receive passing grade PI 232-1c: 80% or more students receive passing grade</p>
<p>CSC 232 contributes to SO b. Students will attain an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.</p>	<p>PI 232-2a: Analyze Stack and Queue PI 232-2b: Analyze Recursion PI 232-2c: Analyze Binary Search Tree PI 232-2c: Analyze Big-O</p>	<p>PI 232-2a: 80% or more students receive passing grade PI 232-2b: 80% or more students receive passing grade PI 232-2c: 80% or more students receive passing grade PI 232-2d: 80% or more students receive passing grade</p>
<p>CSC 232 contributes to SO c. Students will attain an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.</p>	<p>PI 232-3: An assignment that uses an STL implementation of a stack or queue</p>	<p>PI 232-3: 80% or more students receive passing grade</p>

Table 2. CAC Characteristics enabled by CSC 232

CSC 232 CAC Characteristics	CSC 232 Methods used to Enable
CSC 232 enables Characteristic h. Students will attain recognition of the need for and an ability to engage in continuing professional development.	CE 232-1. Lab exercises will demonstrate multiple C++ development environments.
CSC 232 enables Characteristic i. Students will attain an ability to use current techniques, skills, and tools necessary for computing practice.	CE 232-2. Lab exercises will demonstrate multiple C++ development environments. Students discuss with the instructor in a class setting the techniques, skills, and tools necessary for computing practice.
CSC 232 enables Characteristic j. Students will attain an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.	CE 232-3. Programming assignments and lab exercises will demonstrate Discrete Math principles and concepts.
CSC 232 enables Characteristic k. Students will attain an ability to apply design and development principles in the construction of software systems of varying complexity.	CE 232-4. Programming assignments and lab exercises will use increasingly complex structures and algorithms.

