

Towson University
Department of Computer and Information Sciences
COSC 237 Introduction to Computer Science II
Fall 2023

Dr. Charles Dierbach
Rm. 464 (7800 York Rd)

Office Hours: Mon 5:00-6:30pm, Wed 4:30-6:00pm
All office hours via Zoom ([here](#))

Course Description

Development of programming and problem-solving skills, with a focus on object-oriented programming and design. Students will design and develop programs using encapsulation, inheritance, and polymorphism. Introduction to data structures and their implementations (lists, stacks, queues), recursion, searching and sorting algorithms, and algorithm analysis. Includes two laboratory hours per week.

Prerequisite: COSC 236 and (MATH 211 or MATH 273)

Course Objectives

- Utilize the basic components and structures of the Java Programming Language, including classes, packages, and exception handling
- Explain and use fundamental concepts of object-oriented programming, including encapsulation, inheritance and polymorphism
- Use this understanding to write object-oriented programs in Java.
- Apply unit testing concepts to the construction and execution of tests for Java classes.
- Explain basic concepts of algorithmic analysis, including rate of growth.
- Explain the use of a variety of data structures, including linked lists, stacks, queues, and trees.
- Use data structures to solve various computing problems.
- Appropriately apply recursive and iteration for problem solving.

Recommended Textbook

Building Java Programs: A Back to Basics Approach (any edition), Reges and Stepp, Pearson (publisher) The 5th edition (2019) is the latest edition of this book. However, ANY EDITION back to the 2nd edition (2010) is completely fine for this course. (Older editions of this textbook can be found on Amazon for a little as \$6.00.) This is the same textbook used for COSC 236.

Email Address (with required subject heading)

You may email me at cdierbach@towson.edu. You MUST INCLUDE the following subject heading:

COSC 237 – Your full name

otherwise, your email will not be properly directed.

Blackboard

All materials for the course will be placed on the class Blackboard site.

Information on Blackboard is at <https://www.towson.edu/technology/training/blackboard/students.html>

Office Hours

All office hours will be via Zoom. The Zoom link for office hours is on Blackboard and at the top of this syllabus and on Blackboard.

Department Policies

Two Attempts Policy

Students are allowed only two attempts at passing department courses. There will not be any third attempts considered.

University Policies

Policies on Cheating and Plagiarism

Students determined to have cheated on in-class exams, either by copying from other students' papers, or by possession of disallowed materials or devices, will be given an 'F' for the course and reported to the Office of Student Conduct.

Students determined to have cheated on programming assignments, either by copying from other students' work, by use of unauthorized online materials, or otherwise determined not to be the student's own work will be given an 'F' for the course and reported to the Office of Student Conduct.

A statement on cheating and plagiarism may be found in the Undergraduate Catalog, Appendix F. Students may appeal any charges of cheating or plagiarism.

Distribution of Course Materials

My lectures and course materials, including, but not limited to power point presentations, tests, outlines, and similar materials, are protected by copyright. I am the exclusive owner of copyright of those materials I create. You may take notes and make copies of course materials for your own use, however, you may not, nor may you allow others to, reproduce or distribute lecture notes and course materials publicly whether or not a fee is charged without my express written consent. Similarly, you own copyright in your original papers and exam essays. If I am interested in posting your answers or papers on the course web site, I will ask for your written permission.

Disability Accommodations

If you need an accommodation due to a disability please contact me privately to discuss your specific needs. A memo from Disability Support Services (DSS) authorizing your accommodation will be needed.

COVID Requirements

You are expected to follow the current COVID requirements of the university (e.g., wearing of masks and reporting of COVID status).

Available Online Resources

Department Technical Documents

[CIS-TechHub](#) (main page)

[Installing Apache Netbeans](#) (How To)

Remote Access to H Drive Files

[Browser Access to Student H: Drive Files](#)

How to Get Technical Help

[Technical Help via Voice and Text in Browser](#) (using Discord)

[How to Install Discord](#)

[Discord Student Manual](#)

Assignments

Lab Assignments

You may collaborate on labs with other students during lab period. Labs are to be completed and submitted by the end of the lab period. Full credit for the lab will be given for working on and submitting it, even if incomplete.

You may use the **repl.it** web-based program development platform for this, which allows simultaneous collaboration on the same file (see documentation on Blackboard under Resources).

Programming Assignments

Programming assignments must be done individually, with the following requirements:

- Your name MUST be included at the top of ALL program files.
(For programs with multiple program files, EACH FILE must have your name at the top)
- Program will be marked 10% off for each day late.

Exams / Quizzes

There will be short quizzes given at the start of lab periods (as indicate on the syllabus schedule).

There will also be two semester exams and a comprehensive final exam.

Final Exam Date

Thursday, December 14th 8:00-10:00am

Grading

Lab Assignments	5%
Practicums	10%
Quizzes	15%
Program Assignments	20%
Exams (2)	30%
Final Exam	20%

Grading Scheme

A	95-100	B-	80-82.9	D	63-66.9
A-	90-94.9	C+	75-79.9	F	Below 63
B+	87-89.9	C	70-74.9		
B	83-86.9	D+	67-69.9		

NOTE: The lowest quiz grade and the lowest lab grade will be dropped.

Missed Quizzes

If you miss a quiz, it will be considered the lowest quiz grade to be dropped for the calculation of final grades. Additional missed quizzes will be assigned a grade of 0. (There are no makeup quizzes)

Missed Labs

If you miss a lab, it will be considered the lowest lab grade to be dropped for the calculation of final grades. Additional missed labs will be assigned a grade of 0.

Syllabus

Aug 28th

Week 1

Java Review

Identifiers, reserved words, operators, expression evaluation, data types, String data type, control structures, assignment operators, standard input and standard output, arrays, streams and stream objects (files) in Java

PRACTICUMS: Java Review, 1-15 (Due by lab period next week)

LAB PERIOD

Basic Java Program (review)

The Netbeans Development Environment (professional IDE)
Program Debugging in Netbeans
Required Program Documentation and Style for Class
Namespaces (*Java packages and the import statement*)
Using the Java API
The repl.it Site (online IDE)
Introduction to the Practicums for the Course

Chapters 1-7 (review)

(skip supplemental section 3G)

Sept 4th

Week 2

Java Review (cont)

PRACTICUMS: Java Review, 16-20 (Due by lab period next week)

LAB PERIOD

Quiz 1 – Java Review Practicums 1-15

Lab 1 – Java Review

Sept 11th

Week 3

Objects and Their Use

Chapter 8

Creating Object Instances (*the new operator*)
Objects and Reference Variables (*Strings as Objects in Java*)
Accessing Object Members (*the dot member access operator*)
Comparing and Assigning Objects (objects as references in Java)
The *equals* method (vs. == operator) in Java

PRACTICUMS: TBA

Classes

Defining Classes (*instance variables / methods*)
Encapsulation (*class members / class scope / public vs. public access*)
Constructors (default “no arg” constructors / alternate constructors, copy constructor)
Getters (Accessors) and Setters (Mutators)
Operator Methods (*methods specific to the class type*)
The *toString* method in Java
Special variable *this* for self-reference

LAB PERIOD

Quiz 2 – Java Review topics

Lab 2 – Height and Weight Class (User-Defined Classes in Java)

Sept 18th

Week 4

Composition (of classes)

Composition of Classes (objects containing objects)

More on Classes

Static members of a class
Finalizers

Exception Handling

Catching Exceptions ("Exception Handling")

Throwing Exceptions

PRACTICUMS: TBA

LAB PERIOD

Quiz 3 – Classes

Lab 3 – Person Class (Composition of Classes in Java)

PROGRAM 2 – TBA

Sept 25th

Week 5 Inheritance (Subclasses)

Defining Subclasses (*isa relationship*)

Superclass/Subclass Constructors (*special reference super*)

Subclasses as Subtypes (*the instanceof operator*)

Overriding Methods vs. Overloaded Methods

Single vs. Multiple Inheritance

Multi-Typed Classes (*Java Interfaces*)

Chapter 9

sections 9.1 and 9.2

PRACTICUMS: TBA

LAB PERIOD

Quiz 4 – Composition of Classes

Lab 4 – Student and Professor Classes (Subclasses in Java)

Oct 2nd

Week 6 Polymorphism

Abstract Methods and Classes

Polymorphism and Subtypes

Circle, Square, Triangle Classes Example

Discussion of Vehicle Rental Program

Chapter 9

sections 9.3 - 9.6

PRACTICUMS: TBA

LAB PERIOD

Quiz 5 – Subclasses

Lab 5 – Temperature Class (Polymorphism in Java)

Exam 1 Review Exercises Due Tues. 10-19

Oct 9th

Week 7 Linked Lists

Basic List Operations (*find, append, insert, delete*)

Arrays (static arrays) vs ArrayList class (dynamic arrays) in Java

Creating Linked Lists (*Java classes as nodes*)

Traversing and Appending to a Linked List

Inserting and Deleting Items in Linked Lists

Example Use of Linked Lists

Chapters 10, 11

sections 10.1 and 11.1 only

Chapters 16

sections 16.1 - 16.4

Lecture Notes

PRACTICUMS: TBA

LAB PERIOD

Quiz 6 – Polymorphism

Lab 6 – NameList Class (Linked Lists in Java)

PROGRAM 3 – TBA

Oct 16th

Week 8 EXAM WEEK

Tues Review for Exam 1

Thurs **Exam 1** (on weeks 1-6)

LAB PERIOD

(no lab meeting this week)

Oct 23rd

Week 9 **Linked Lists (cont.)**

LAB PERIOD

Quiz 7 – Linked Lists

Lab 7 – Modified NameList Class (search/insert/delete of linked lists)

Oct 30th

Week 10 **Recursion**

Recursive Definitions (recurrence relations)
Recursion vs. Iteration
Problem Solving Using Recursion
Tail Recursion

Applications of Recursion

Recursive Binary Search Algorithm
MergeSort Algorithm
Towers of Hanoi Problem

PRACTICUMS: TBA

LAB PERIOD

Quiz 8 – More on Linked Lists

Lab 8 – Algorithm Rate of Growth (using recursion)

PROGRAM 4 – TBA

Chapter 12

sections 12.1 - 12.4

Nov 6th

Week 11 **Searching/Sorting and Big-Oh Analysis**

Sequential vs. Binary Search (recursive implementation)
Simple Sorting Algorithms: Selection Sort, Insertion Sort, Bubble Sort
Empirical vs. Analytical Analysis of Algorithm Complexity (Big-Oh Notation)
Sorting Algorithms and Their Rate of Growth
Analysis of MergeSort vs. QuickSort

PRACTICUMS: TBA

LAB PERIOD

Quiz 9 – Recursion

Lab 9 – Comparative Algorithm Rate of Growth

Chapter 13

section 13.1 (pp. 834 - 838)
sections 13.2 - 13.4

Nov 13th

Week 12 **Stacks and Queues**

Stack and Queue Operations
Array vs. Linked List Implementation of Stacks and Queues

Applications of Stacks and Queues

Function Invocation Implementation (stack use)
Expression Evaluation and Conversion (stack use)
Print Queues (chronological vs. priority queue use)

PRACTICUMS: TBA

Chapter 14

section 14.1 - 14.3

LAB PERIOD

Quiz 10 – Sorting and Searching Algorithms

Lab 10 – Expression Evaluation (stack use)

PROGRAM 5 – TBA

Nov 20th

Week 13 Binary Trees

Definition of a Tree (tree vs. graph)
Binary Trees / Binary Search Trees
Binary Tree Traversals
Issues of Implementing Binary Trees
Search Trees
Expression Trees

Chapter 17

Lecture Notes

LAB PERIOD

Quiz 11 – Stacks and Queues

Lab 11 – Binary Search Trees

Exam 2 Review Exercises Due Tuesday 11-28

* THANKSGIVING BREAK *

Nov 27th

Week 14 EXAM WEEK

Tues Review for Exam 2

Thurs **Exam 2** (on weeks 7-12)

LAB PERIOD

(no lab meeting this week)

Lab 12 – Secure Coding (on your own)

[Cyber4All Website](#)

[Video](#) Secure Programming

Dec 4th

Week 15 REVIEW

Review for Final Exam

LAB PERIOD

(no lab meeting this week)

FINAL EXAM Thursday, December 14th 8:00-10:00am

This will be a comprehensive final exam, covering all topics of the semester.

NOTES:

August 31st Last day to add/drop courses (with no grade posted on transcript).

November 6th Last day to withdraw from a course with a grade of 'W', or to change to Pass/Fail or Audit status.