Data Structures and Algorithms
Syllabus

CIS 263
Winter 2022

Course Objective:

Students will learn about algorithms and data structures not previously covered in other courses and techniques to analyze them. Programming Projects and Homework will provide opportunities to use the data structures and to apply the analysis techniques. Students will apply algorithms and data structures to common programming activities, compare the efficiency of algorithms and data structures in domain problems and develop programs containing common data structure and algorithms.

Course Description:

Data structures and algorithms: From the catalog: "Advanced data structures, including lists, trees, sets and graphs. Analysis of algorithms. Emphasis on abstract data types, their representations and role as models in the development of computer algorithms."
Prerequisite: CIS241 and admitted to major

Instructor:

Christian Trefftz
Office Hours: MWF 9 am – 10 am
Office Location: C-2-110 MAK
Office Phone Number: (616)331-3646

Meeting Times:

Section 1: MWF 8 am – 8:50 am in MAK B-1-124
Section 2: T Th. 1 pm – 2:15 pm in MAK B-2-235

Required Text:

Data Structures and Algorithm Analysis (in Java) (in C++), by Mark Allen Weiss - Addison Wesley, 2013.

A significant portion of the source code from the book is available in the author's web page.

Grading:

1 Mid Term Exam (25%)
1 Final Exam (25%)
Several home-works and programming assignments (48%)
Filling Students' Evaluations (2%)
The assignments and home-works will be made available through Blackboard.

Percentages

100-93 = A	92-90 = A-	89-87=B+	86-83=B	82-80=B-
79-77=C+	76-73=C	72-70=C-	69-65=D+	64-60=D

Projects: Projects are completed on your own time outside of class. You will need to start early and budget sufficient time in the open labs or at home to complete the project. Projects are due at the BEGINNING of class on the due date.

While a certain amount of consultation between students in working on a project is encouraged, the work you submit must be your own. Do not create a difficult situation by representing someone else's work as your own. For more information, consult the University Catalog and the Student Code.

Tentative Schedule

Week of	Topic	Activity
January 10	The Collections Framework in Java	
January 17	Mathematical review Review of Lists, Stacks and Queues. Profiling programs.	Read sections 1.2, 1.4 and 1.5. Read section 1.6 and Chapter 3.
January 24	Trees Generic Trees, Binary Trees and Binary Search Trees	Read sections 4.1, 4.2 and 4.3
January 31	Trees (cont.) AVL trees, Tree Traversals and B+ trees	Read sections 4.4, 4.6 and 4.7
February 7	Trees (cont.) Sets and Maps	Read sections 4.8
February 14	Hash Tables and Priority Queues (Heaps)	Read chapters 5 and 6.

February 21	Review for the Midterm Exam The Midterm exam will be on Friday February 25.	
February 28	The Disjoint Set Class	Read chapter 8.
March 6	Spring Break	
March 14	Algorithm Design Techniques: Backtracking Algorithms	Read section 10.5
March 21	Revisiting Sorting Algorithms Special Cases	Read sections 7.1 through 7.10
March 28	A couple of Graph Algorithms: Minimum Spanning Tree Algorithms	Read sections 9.5
April 4	Dynamic Programming Shortest Editing Distance and Longest Common Subsequence	Read section 10.3 April 1 Break Day April 9 is the deadline to drop with a "W"
April 11	A short introduction to NP-Completeness How to solve a particular subset of NP-hard problems	Read Section 9.7
April 18	Review for the final exam	
April 25	Final Exam: Section 1 - Monday April 25 8:00 -9:50 AM Section 2 – Tuesday April 26 12:00 PM – 1:50 PM	

Contribution of this course to meeting the professional component: Computer Science graduates should be programmers who can use efficiently the main data structures and algorithms.

Relationship of course to program outcomes: This class is the last course in a sequence of courses that informs students about the most important and frequently used data structures and algorithms.

The Clay Mathematics Institute is offering a prize of one million dollars to the person(s) who solves any of several fundamental problems in Mathematics. The P = NP ? problem is one of them. The following link contains more information about the problem. P vs NP: A one million dollar problem

If there is any student in this class who has special needs because of learning, physical or other disability, please contact me and Disability Support Services (DSS) at 616.331.2490.
Furthermore, if you have a disability and think you will need assistance evacuating this

classroom and/or building in an emergency, please make me aware so I can develop a plan to assist you.

Course Policies

- All homework and programming projects, unless otherwise specified by the instructor, are to be completed individually. Students are encouraged to consult each other for instructional assistance only.
- The instructor reserves the right to modify course policies, the course calendar, and assignment point values and due dates.

Policies that apply to all courses at GVSU

There is a list of course policies that apply to all course at GVSU available here.