

CPSC 2108 – Data Structures

Fall/2014

Instructor

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Office Hours (Fall 2014): MTWR: 5:00pm-7:30pm

Class Meetings:

T R 7:30pm to 8:45 pm CCT 407

Course Prerequisites

CPSC 1302 with C or better

Textbook: Data Structures: Abstraction and Design Using Java
Second Edition
Elliot B. Koffman, Paul A. T. Wolfgang
Wiley, 2010
ISBN-13 978 - 0 - 470 - 12870 - 1

Course Catalog Description:

This course extends the concepts of primitive data types by teaching the student a set of data structures that pervades both the theoretical and practical domains of computer science. (3 credits).

Major Topics

1. List
2. Stack
3. Queues
4. Recursion
5. Trees
6. Sets and Maps
7. Sorting
8. Search Trees

ACADEMIC OBJECTIVES

- **Students will learn to understand the principles of efficiency of algorithms**
 - Strategies and Actions used to produce the outcome:
 - Introduction to the Big-O Analysis
 - ABET Criteria covered: B, C, D, and I.
 - Program Objectives covered: 2 and 3.
 - Assessment Methods: Programming Assignments, Quizzes, Midterm Test and Final Exam.
- **Students will learn to understand how to specify, design and implement Abstract Data Types**
 - Strategies and Actions used to produce the outcome:
 - Study of the definition of Abstract Data Types
 - Study of the implementation of ADTs in Java
 - ABET Criteria covered: B, C, D, and I.
 - Program Objectives covered: 2 and 3.
 - Assessment Methods: Programming Assignments, Quizzes, Midterm Test and Final Exam.
- **Students will learn to be able to implement and use data structures such as Lists, Stacks and Queues Data Structures.**
 - Strategies and Actions used to produce the outcome:
 - Study of specification of Lists, Stacks and Queues among others
 - Study of the implementation of Lists, Stacks, and Queues in Java among others
 - ABET Criteria covered: B, C, D, and I.
 - Program Objectives covered: 2 and 3.
 - Assessment Methods: Programming Assignments, Quizzes, Midterm Test and Final Exam.
- **Students will learn about and learn to use the concept of Recursion.**
 - Strategies and Actions used to produce the outcome:
 - Study of Recursion
 - Study of the uses of Recursion
 - ABET Criteria covered: B, C, and D.
 - Program Objectives covered: 2 and 3.
 - Assessment Methods: Programming Assignments, Quizzes, Midterm Test and Final Exam.
- **Students will learn to implement and use Binary Search Trees.**
 - Strategies and Actions used to produce the outcome:
 - Study of the concept of Binary Search Trees, Heaps, and Priority Queues
 - Study of the implementation and use of Binary Search Trees
 - ABET Criteria covered: B, C, and D.
 - Program Objectives covered: 2 and 3.

- Assessment Methods: Programming Assignments, Quizzes, Midterm Test and Final Exam.
- **Students will learn to implement and use Sets, and Maps.**
 - Strategies and Actions used to produce the outcome:
 - Study of the concept of Sets, Set Interface, Maps, and Maps Interface
 - Study of the implementation and use of Hash Table and Navigable Sets and Maps
 - ABET Criteria covered: B, C, and D.
 - Program Objectives covered: 2 and 3.
 - Assessment Methods: Programming Assignments, Quizzes, Midterm Test and Final Exam.
- **Students will learn to implement and use Sorting Algorithms.**
 - Strategies and Actions used to produce the outcome:
 - Study of the concept of Sorting Algorithms
 - Study of the use of Sorting Algorithms, such as Selection Sort, Bubble Sort, Insertion Sort, Shell Sort, Merge Sort, Heapsort, and Quick Sort.
 - ABET Criteria covered: B, C, and D.
 - Program Objectives covered: 2 and 3.
 - Assessment Methods: Quizzes, Midterm Test and Final Exam.
- **Students will learn to implement and use Self-Balancing Searching Trees.**
 - Strategies and Actions used to produce the outcome:
 - Study of the concept of Searching Trees and Searching Algorithms
 - Study of the use of AVL Trees, Red-Black Trees, 2-3 Trees, B-Trees, 2-3-4 Trees, and B+ Trees
 - ABET Criteria covered: B, C, and D.
 - Program Objectives covered: 2 and 3.
 - Assessment Methods: Quizzes, Midterm Test and Final Exam.

Course Methods

1. The class will be a lecture course, taught face to face.
2. Online discussion is encouraged.
3. Students will be expected to complete hands-on exercises and a series of programming assignments.

Student Responsibilities

As a student in this course, you are responsible to:

- manage your time and maintain the discipline required to meet the course requirements,
- come to class prepared to ask questions to maximize your understanding of the material,
- complete all readings,
- complete all assignments,
- complete all quizzes and exams,
- actively participate in discussions,
- read any e-mail sent by the instructor and respond accordingly.

“I didn’t know” is **NOT** an acceptable excuse for failing to meet the course requirements. If you fail to meet your responsibilities, you do so at your own risk.

Instructor Responsibilities

As your instructor in this course, I am responsible to:

- lead the class discussion and answer students' questions,
- post weekly lessons outlining the assignments for the week,
- read all responses to discussion questions and comments to responses,
- actively participate in discussions when necessary,
- grade assignments, quizzes, and exams, and post scores within one week of the end of the week in which they are submitted, and
- read any e-mail sent by the you and respond accordingly within 48 hours.

Although I will read every posted discussion question and response, I will not necessarily respond to every post.

Methods for Evaluating Students

The evaluation methods will include homework and a comprehensive final exam. In addition there is a “class participation” component to the grade.

Programming Assignments	20%
Class attendance/discussion	10%
Class Test	20%
Mid-Term Exam	20%
Final Exam	30%

The Exams: All exams will be given in class. They may be either open–book or closed–book, depending on the context. The time allocated will be the standard.

The Mid–Term Exam will be one and half–hour exam.

The Final Exam will be two–hour and comprehensive exam.

Assignment of Letter Grades

The method of assigning letter grades based on overall course averages is fairly standard. The basic method for assigning grades is described as follows:

Average	Letter Grade
90 – 100	A
80 – 89	B
70 – 79	C
60-69	D
Below 60	F

Student Portfolio

Students are encouraged to keep and maintain a portfolio of all of their work (assignments, projects, etc.) throughout their academic program. It is recommended that you keep a copy on your personal H: drive at CSU and back it up regularly on your own portable media.

Tentative Topic Schedule

Week	Date	Topics to be covered	Ch	Asgn	Test
1	8/19	Introduction to the class			
	8/21	List (slides 1-29)	2		
2	8/26	List (slides 30-73)	2		
	8/28	List (slides 74-99)	2		
3	9/2	List (slides 100-128)	2		
	9/4	Assignment 1/Test Discussion	2		
4	9/9	Stacks (slides 1-33)	3	A1	T1(2)
	9/11	Stacks (slides 34-67)	3		
5	9/16	Queues (slides 1-30)	4		
	9/18	Queues (slides 30-56. Not required 57-72) Assignment 2	4		
6	9/23	Recursion (slides 1-44)	5	A2	
	9/25	Recursion (slides 44-70. Not required 70-95)	5		
7	9/30	Trees (slides 1-45)	6		T2(3,4,5)
	10/2	Trees (slides 46-82)	6		
8	10/7	Trees (slides 82-139, Not required: 101-105)	6	A3	
	10/9	Midterm (Chapter 2-5)			
9	10/14	Fall break, no class			
	10/16	Trees (slides 139-157, Not required: 157-168)	6		
10	10/21	Assignment 3 and 4		A4	
	10/23	Sets and Maps (slides 1-36)	7		
11	10/28	Sets and Maps (slides 36-81)	7		
	10/30	Sets and Maps (slides 81-97, 129-139, not required: 97-129)	7		
12	11/4	Sorting (slides 1-106)	8		T3(6,7)
	11/6	Sorting (slides 106-167)	8	A5	
13	11/11	Sorting (slides 167-275)	8		
	11/13	Sorting (slides 275-353)	8		
14	11/18	Sorting (slides 353-414, not required: 415-429)	8		
	11/20	Search Trees (slides 1-81)	9		
15	11/25	Thanksgiving break, no class			
	11/27	Search Trees (slides 82-169)	9	A6	
16	12/2	Search Trees (slides 170-239)	9		T4(8,9)

	12/4	Search Trees (slides 240-294, not required: 295-331)			
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Course Assistance

Student assistants in the Computer Center can help you with basic computer–related problems (such as logging on to the network, saving your work, etc.), but they are not trained to help you with your assignments. We have several tutors at the Department of Computer Science who can help you with programming assignments. Their schedule is posted at the department office. You can always contact me during the posted office hours or by appointment. The best way to get in touch with me is by e–mail at **yang_jianhua@columbusstate.edu**.

Dropping the Course

We hope that you will complete the course and profit from it. If it is necessary for you to withdraw from the course during the semester, you must follow all official CSU procedures for withdrawing. It is not sufficient to notify the instructor; you must use the ISIS system and withdraw officially. For details on how to withdraw from a course, see the web page

<http://aa.columbusstate.edu/advising/w.htm#Withdrawal%20from%20a%20Course>.

I would appreciate it if you were first to consult with me before starting the procedure for withdrawing from the course. In some cases, we can agree on an arrangement that will allow you to complete the course with minor adjustments.

Academic Honesty

Academic dishonesty includes, but is not limited to, activities such as cheating and plagiarism (<http://aa.columbusstate.edu/advising/a.htm#Academic Dishonesty/Academic Misconduct>). It is a basis for disciplinary action. Any work turned in for individual credit must be entirely the work of the student submitting the work. All work must be your own. You may share ideas but submitting identical assignments (for example) will be considered cheating. You may discuss the material in the course and help one another with debugging; however, any work you hand in for a grade must be your own. A simple way to avoid inadvertent plagiarism is to talk about the assignments, but don't read each other's work or write solutions together unless otherwise directed. For your own protection, keep scratch paper and old versions of assignments to establish ownership, until after the assignment has been graded and returned to you. If you have any questions about this, please see me immediately. For assignments, access to notes, the course textbooks, books and other publications is allowed. All work that is not your own, MUST be properly cited. This includes any material found on the Internet. Stealing or giving or receiving any code, diagrams, drawings, text or designs from another person (CSU or non-CSU, including the Internet) is not allowed. Having access to another person's work on the computer system or giving access to your work to another person is not allowed. It is your responsibility to keep your work confidential.

No cheating in any form will be tolerated. Penalties for academic dishonesty may include a zero grade on the assignment or exam/quiz, a failing grade for the course, suspension

from the Computer Science program, and dismissal from the program. All instances of cheating will be documented in writing with a copy placed in the Department's files. Students will be expected to discuss the academic misconduct with the faculty member and the chairperson. For more details see the Faculty Handbook: <http://aa.columbusstate.edu/faculty/FacHandbook0203/sec100.htm#109.14> and the Student Handbook: <http://sa.columbusstate.edu/handbook/handbook2003.pdf>

ADA Accommodation Notice

If you have a documented disability, as described by the Rehabilitation Act of 1973 (P.L. 933-112 Section 504) and the Americans with Disabilities Act (ADA) and subsequent amendments and would like to request academic and/or physical accommodations, please contact the Office of Disability Services in the Schuster Student Success Center (room 221), 706-507-8755, as soon as possible. Course requirements will not be waived, but reasonable accommodations may be provided as appropriate. **It is then your responsibility to contact and meet with the instructor. It is also your responsibility to present the instructor with a letter from the Center for Academic Support. Without this letter detailing the required accommodations, the instructor cannot help you.** The Center for Academic Support can assist you and the instructor in formulating a reasonable accommodation plan and provide support in developing appropriate accommodations for your disability. Course requirements will not be waived but accommodations may be made to assist you to meet the requirements. Technical support may also be available to meet your specific need. For more information on services and support available, refer to http://uc.columbusstate.edu/disability_services.htm.

ABET Criteria:

- A. An ability to apply knowledge of computing and mathematics appropriate to the discipline;
- B. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
- C. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;
- D. An ability to function effectively on teams to accomplish a common goal;
- E. An understanding of professional, ethical, legal, security, and social issues and responsibilities;
- F. An ability to communicate effectively with a range of audiences;
- G. An ability to analyze the local and global impact of computing on individuals, organizations and society;
- H. Recognition of the need for, and an ability to engage in, continuing professional development;
- I. An ability to use current techniques, skills, and tools necessary for computing practice.
- J. 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. An ability to apply design and development principles in the construction of software systems of varying complexity.

CS Program Objectives:

Our graduates will have achieved:

- 1) a broad general education assuring an adequate foundation in science and mathematics relevant to computing.
- 2) a solid understanding of concepts fundamental to the discipline of computer science.
- 3) good analytic, design, and implementation skills required to formulate and solve computing problems.
- 4) the ability to function and communicate effectively as ethically and social responsible computer science professionals.