

Syllabus

Course Number: CS 310

Course Title: Data Structures

Course Description:

CS 310. DATA STRUCTURES (3). Continues practice with software development techniques with an emphasis on intermediate set, map, linked list, stack, queue, tree, and object data structures, including implementation and analysis of searching and sorting algorithms that operate upon these structures.

Prerequisite Courses:

CS210 – Introduction to Programming

Course Overview

In this course, students will learn how to implement various data structures and files to store and manipulate program data. Students will also be introduced to algorithm analysis.

Ultimately, programming is a skill that requires the ability to put designs into practice. The only way to succeed is to practice this skill. Therefore, this course will require a *significant* amount of time each week to complete. Students should expect a *minimum* of **15 hours per week** of time for study, discussions, and assignments. If you are not willing or able to spend the necessary time, please reconsider whether this is the correct time to attend this class.

Course Outcomes:

Upon completion of this course, students should be able to:

- Begin to choose the appropriate data structure for modeling a given problem.
- Design, implement, and test programs that use each of the following data structures: objects, arrays, lists, stacks, queues, sets, maps, and binary trees.
- Compare alternative implementations of data structures with respect to performance.
- Implement simple search algorithms, including quadratic and $O(n \log n)$ sorting algorithms, and explain the differences in their time complexities.
- Describe the implementation of hash tables, including collision avoidance and resolution.
- Discuss the runtime and memory efficiency of principle algorithms for sorting, searching, and hashing.

- Explain how object-oriented techniques are used to implement a collections hierarchy that includes: abstract data type interfaces and various class-based implementations of each data structure presented.

Course Materials:

Required Text:

Koffman, E.B. & Wolfgang, P.A. (2016). *Data Structures: Abstraction and Design Using Java* (3rd Ed). Hoboken, NJ: Wiley & Sons, Inc. ISBN : 978-1-119-23914-7.

Technology Tools:

1. A PC-compatible computer system running a version of the Windows operating system, And administrator rights to install new software.
2. The Java programming environment: Java Development Kit (JDK) with NetBeans from: <http://www.oracle.com/technetwork/java/javase/downloads/index.html>

Instructions for downloading JDK and NetBeans are included in the online course shell.

As with most of Regis learning activities, using various software applications to accomplish assignments requires students to exercise a great deal of responsibility for learning how to successfully operate the software applications.

Policies for Late Adds and/or Repeating the Course

If you added this course during the drop/add period, after class began on Monday, you are responsible for *immediately* notifying the instructor that you joined the course late. None of the course due dates will be extended for you. Even if a due date already passed when you added the course, late points will still be deducted.

If you are repeating this course (due to a previous withdraw or low grade), you are responsible for *immediately* notifying the instructor. Course assignments that you submitted when you last took the course cannot be repeated -- you will be required to complete alternate assignments.

Pre-Assignment

Complete the following tasks:

Students will read the first week's assigned reading in the textbooks (listed in the Course Assignments grid on the next page) before the day of class.

Be prepared to ask questions on unclear areas and to respond to questions about information in the assigned reading.

Online Format: Sign on to WorldClass and become familiar with the course navigation of the Web Curriculum.

Course Assignments and Activities:

Topic/ Week	Topics	Online Content and Textbook Readings (3 rd edition)*	Assignments and Associated Points**
1	Intro to Data Structures OOP Concepts UML Java: Javadoc and NetBeans	Online Content: Overview Topic 1 Textbook: Chapter 1 Appendix B <i>Optional, if needed by student:</i> Appendix A (CS210 review)	Participation in Discussions 12% for entire course Programming Assn 1: Domains and Tests – 8%
2	Lists: Arrays & ArrayLists	Online Content: Topic 2 Textbook: Appendix A.8 Chapter 2, Sec 2.2 – 2.4 Chapter 3	Participation in Discussions Programming Assn 2: Arrays & ArrayLists – 8%
3	Algorithm Efficiency: Big-O Lists: Linked Lists	Online Content: Topic 3 Textbook: Chapter 2, Sec 2.1, 2.5 – 2.10	Participation in Discussions Programming Assn 3: Linked Lists – 8%
4	Stacks and Queues	Online Content: Topic 4 Textbook: Chapter 4	Participation in Discussions Programming Assn 4: Stacks and Queues – 8% Midterm Exam – 16%
5	Sets, Maps, and Hashing	Online Content: Topic 5 Textbook: Chapter 7	Participation in Discussions Programming Assn 5: Hashing with Sets/Maps – 8%
6	Recursion Trees/Binary Trees	Online Content: Topic 7 Textbook: Chapter 5 Chapter 6, sec 6.1 – 6.5 only	Participation in Discussions Programming Assn 6: Binary Trees – 8%

7	Sorting	Online Content: Topic 6 Textbook: Chapter 8, sec 8.1 – 8.6 and 8.9 – 8.10 only	Participation in Discussions
8	Sorting (continued)		Programming Assn 7: Sorting – 8% Participation in Discussions Final Exam – 16%
			Maximum Possible: 100%

***Alternate Edition Reading Assignments:** Alternate reading assignments for the older edition of the textbook (2nd edition) will be available in your facilitator’s syllabus.

****Note to Classroom sections only:** Exact dates for reading assignments and programming assignments may differ from the above grid. The faculty syllabus, handed out the first night of class, will indicate any changes.

Summary of Assignments and Percentage Weight towards course grade

Assignment	Value (percent of overall course grade)
Programming Assignments 7 assns at approximately 8% each (1 st program slightly less) Total for Programming Assignments	56%
Midterm Exam	16 %
Final Exam	16 %
Forum Participation	12 %
Course Total	100 %

Programming Assignments

Each programming assignment will involve writing programs that implement the concepts discussed in the book and class.

Late Assignment Policy for Programming Assignments

Late programming assignments will be graded and then 2% will be deducted for each day the assignment is late, up to 5 days late. **No programming assignment will be accepted more than 5 days after the official due date.** Therefore, any programming assignment turned in more than 5 days late will be given a grade of zero, and no feedback will be given.

Exams

There will be a midterm exam and a final exam. Exam questions will be cumulative, taken from reading assignments and course content. ***Exams will not be accepted late.***

Participation

Class participation/effort is important because we can all learn from each other. Your participation points can make a difference in the final grade. Participation means:

1. a. Present in class every session (classroom)
b. Present in the forum every week (online)
2. a. Effectively responds to questions from the facilitator (classroom)
b. Regularly checks forum and posts all required items by the deadlines (online)
3. Interacts/replies to other students in classroom/forum discussions.

See Faculty Syllabus posted in course for forum participation point allocations.

Course Policies and Procedures

Plagiarism

Plagiarism includes submitting code or anything else that was obtained from another person, a publication, or an internet web source. ***All work submitted in CS310 must be completed on your own.***

In cases of suspected cheating or plagiarism, the instructor will discuss the matter with the student(s) involved. The instructor reserves the right to question any student orally or in writing about any assignment, and to use the evaluation of the student's understanding of the assignment and of the submitted solution as evidence of cheating. All cheating incidents will be reported to the Computer Science department, and may also be reported to the Academic Integrity Board for further action.

CC&IS Grading Scale

Letter Grade	Percentage	Grade Point
A	93 to 100	4.00
A-	90 to less than 93	3.67
B+	87 to less than 90	3.33
B	83 to less than 87	3.00
B-	80 to less than 83	2.67
C+	77 to less than 80	2.33
C	73 to less than 77	2.00
C-	70 to less than 73	1.67
D+	67 to less than 70	1.33
D	63 to less than 67	1.00
D-	60 to less than 63	.67
F	Less than 60	0

Additional information about grading can be found in the latest edition of the University Catalog, available at <http://www.regis.edu/Academics/Course%20Catalog.aspx>.

CC&IS Policies and Procedures

Each of the following CC&IS Policies & Procedures is incorporated here by reference. Students are expected to review this information each term, and agree to the policies and procedures as identified here and specified in the latest edition of the University Catalog, available at <http://www.regis.edu/Academics/Course%20Catalog.aspx> or at the link provided.

- The CC&IS Academic Integrity Policy.
- The Student Honor Code and Student Standards of Conduct.
- Incomplete Grade Policy, Pass / No Pass Grades, Grade Reports.
- The Information Privacy policy and FERPA. For more information regarding FERPA, visit the [U.S. Department of Education](#).
- The HIPAA policies for protected health information. The complete Regis University HIPAA Privacy & Security policy can be found here: <http://www.regis.edu/About-Regis-University/University-Offices-and-Services/Auxiliary-Business/HIPAA.aspx>.
- The Human Subjects Institutional Review Board (IRB) procedures. More information about the IRB and its processes can be found here: <http://regis.edu/Academics/Academic-Grants/Proposals/Regis-Information/IRB.aspx>.

The CC&IS Policies & Procedures Syllabus Addendum summarizes additional important policies including, Diversity, Equal Access, Disability Services, and Attendance & Participation that apply to every course offered by the College of Computer & Information Sciences at Regis University.

A copy of the CC&IS Policies & Procedures Syllabus Addendum can be found here: <https://in2.regis.edu/sites/ccis/policies/Repository/CCIS%20Syllabus%20Addendum.docx>.