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:


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:


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.

Course Policies about repeating the course or adding the course late

**Repeating the course**

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

**Adding this course during the Drop/Add Period**

If you added this course during the drop/add period, after class began on Monday, you are responsible for immediately notifying the instructor by email that you joined the course late. Be aware that 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.

Course Policies and Procedures on Academic Integrity

**Collaboration/Collusion**

Working together on CS310 assignments is NOT permitted.

**All assignments submitted in CS310 must be completed on your own.**

You can discuss the assignments with others, but you are not allowed to show another student any of your code.
Additionally, all CS310 programming assignment requirements are copyrighted. It is therefore illegal to upload or post any of the assignment requirements to any non-Regis website.

Therefore, it is also violation of the Regis Academic Integrity Policy to do either of the following, either during the time you are taking the course or after course completion.

- Provide another student access to any of your completed programming assignments
- Upload or post any completed programming assignments to any website other than zyBooks or WorldClass

**Plagiarism**

Plagiarism is submitting someone’s ideas as your own. Plagiarism includes submitting code or other work that was obtained from another person, a publication, or an internet web source.

In cases of suspected collusion, plagiarism, or any other form of cheating in CS310, the faculty member will discuss the matter with the student(s) involved. The faculty member 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 the Academic Integrity Board for possible further action.

**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:

<table>
<thead>
<tr>
<th>Topic/Week</th>
<th>Topics</th>
<th>Online Content and Textbook Readings (3rd edition)*</th>
<th>Assignments and Associated Points**</th>
</tr>
</thead>
</table>
| 1 Intro to Data Structures  
OOP Concepts  
UML  
Java: Javadoc and NetBeans | *Online Content*: Overview  
Topic 1  
*Textbook*:  
Chapter 1 and Appendix B  
*Optional, if needed by student*: 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% |
<table>
<thead>
<tr>
<th>Assignment</th>
<th>Value (percent of overall course grade)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming Assignments</td>
<td>56%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>16%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>16%</td>
</tr>
<tr>
<td>Forum Participation</td>
<td>12%</td>
</tr>
<tr>
<td>Course Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

**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.*

**CC&IS Grading Scale**

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Percentage</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93 to 100</td>
<td>4.00</td>
</tr>
<tr>
<td>A–</td>
<td>90 to less than 93</td>
<td>3.67</td>
</tr>
<tr>
<td>B+</td>
<td>87 to less than 90</td>
<td>3.33</td>
</tr>
<tr>
<td>B</td>
<td>83 to less than 87</td>
<td>3.00</td>
</tr>
<tr>
<td>B–</td>
<td>80 to less than 83</td>
<td>2.67</td>
</tr>
<tr>
<td>C+</td>
<td>77 to less than 80</td>
<td>2.33</td>
</tr>
<tr>
<td>C</td>
<td>73 to less than 77</td>
<td>2.00</td>
</tr>
<tr>
<td>C–</td>
<td>70 to less than 73</td>
<td>1.67</td>
</tr>
<tr>
<td>D+</td>
<td>67 to less than 70</td>
<td>1.33</td>
</tr>
<tr>
<td>D</td>
<td>63 to less than 67</td>
<td>1.00</td>
</tr>
<tr>
<td>D–</td>
<td>60 to less than 63</td>
<td>.67</td>
</tr>
<tr>
<td>F</td>
<td>Less than 60</td>
<td>0</td>
</tr>
</tbody>
</table>

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](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](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 HIPPA 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 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.