CS 2020: INTERMEDIATE PROGRAMMING

Semester Hours: 3.0  
Coordinator: Ronald Conway  
Text: Starting Out with C++ from Control Structures through Objects  
Author(s): TONY GADDIS  
Year: 2014

SPECIFIC COURSE INFORMATION

Catalog Description:

Introduction to object-oriented programming techniques. Constructors, destructors, operator overloading. Inheritance and polymorphism. Elementary data structures including linked lists. Dynamic storage allocation concepts. Prerequisite: Corequisite of MATH 1260 or MATH 1280 or MATH 1300 (Precalculus) or higher and grade of C or better in CS 2010. Approved for distance education.

Course type: REQUIRED

SPECIFIC COURSE GOALS

- I can understand and can implement search and sorting algorithms.
- I can implement programs using arrays and linked lists.
- I can use dynamic memory techniques in implementing programming design.
- I can use fundamental object-oriented programming techniques, including encapsulation, inheritance, polymorphism, and virtual functions.

COMPUTER SCIENCE STUDENT OUTCOMES ADDRESSED BY THIS COURSE

- CS 1 Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions
- CS 2 Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline
• CS 6 Apply computer science theory and software development fundamentals to produce computing-based solutions

SOFTWARE ENGINEERING STUDENT OUTCOMES ADDRESSED BY THIS COURSE

• SE 1 An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

LIST OF TOPICS COVERED

• Arrays (2 weeks)
• Intro To Unix (0.5 weeks)
• Searching and Sorting (1.5 weeks)
• Structured Data (2 weeks)
• Pointers (1 week)
• Linked Lists (2.5 weeks)
• File Operations (0.5 weeks)
• Classes (2 weeks)
• Composition, Friend Classes and Friend Functions (0.5 weeks)
• Operator Overloading (1.5 weeks)
• Polymorphism, Virtual Functions (2 weeks)
Faculty who recently offered CS 2020 have discussed and identified a list of topics related to computer security in this course. Below is a list for instructors to incorporate. (*) indicates topics that are mandatory.

<table>
<thead>
<tr>
<th>Security Topic</th>
<th>Description</th>
<th>Textbook Reference¹</th>
<th>Estimated Class Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Bounds Checking</td>
<td>Pointer manipulations, array access – index and pointers</td>
<td>Chapter 9</td>
<td>&lt;1</td>
</tr>
<tr>
<td>*Principle of Least Privilege</td>
<td>Default private struct – default public; other access modifiers. Class access modifiers</td>
<td>Chapter 11</td>
<td>&lt;1</td>
</tr>
<tr>
<td>*Access Control</td>
<td>inheritance, polymorphism, lack of security with friendship</td>
<td>Chapter 13</td>
<td>1</td>
</tr>
<tr>
<td>*Obfuscation</td>
<td>Obscures intended meaning; for example, operator overloading</td>
<td>Chapter 14</td>
<td>&lt;1</td>
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</tbody>
</table>

¹Starting Out with C++ from Control Structures through Objects, Tony Gaddis, 9th Edition.