



Fall 2020

CSCI-41

**Programming Concepts and Methodology II  
Syllabus**

**Instructor:** Simon Sultana, Ph.D.

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**Response time:** < 24 hours

**Office Hours:** Thurs 11am-12pm, Fri 3-5pm

**Section Number:** 53088

**Dates:** 8/10/2020 – 12/7/2020

**Class Meeting:** Mon & Wed 2-5pm

**Location:** Online

**Classroom:** Zoom at

<https://cccconfer.zoom.us/j/95115102812?pwd=dE1BZzBzUkhxRHdpZ1BYQy9PNlIWQT09>

**Unit(s):** 4

**Prerequisites:** CSCI-40 or ENGR-40.

**Advisory:** ENGL-125 – Writing Skills for College and ENGL-126 Reading Skills for College

**Course Description:** This course introduces application of software engineering techniques to the design and development of large programs, data abstraction and structures, and associated algorithms. Topics include linear and non-linear data structures such as lists, stacks, queues, trees, and graphs, algorithms for recursion, searching, sorting, and traversal.

**Course Goals and Student Learning Outcomes:**

*Upon completion of this course, students will be able to:*

- 🔥 Analyze problems, design and develop computer programs to solve these problems.
- 🔥 Construct classic data structures used in all computer programs.
- 🔥 Use a software tool called a debugger to debug and test programs.
- 🔥 Write programs using advanced programming concepts.

**Objectives:**

*In the process of completing this course, students will:*

- 🔥 Write a total of 1000 to 2000 lines of program code.
- 🔥 Write programs using object-oriented programming and the C++ language.
- 🔥 Define and use dynamic arrays, linked list, stacks and queue data structures.
- 🔥 Write programs using pointers, recursion and file manipulation techniques.
- 🔥 Design, implement, and test the implementation of "is-a" relationships among objects using a class hierarchy and inheritance.
- 🔥 Create proper test cases to test computer programs.
- 🔥 Utilize binary search tree data structure.
- 🔥 Use string, stack and queue classes defined in C++ Standard Libraries.
- 🔥 Identify and correct syntax and logical errors in computer programs.

**Required or Recommended Textbooks and Materials:**

Textbooks:

1. **Required:** zyBooks, register and connect via Canvas (cost: \$58).
2. **Optional:** *Starting out with C++ From Control Structures through Objects*, 9th Ed, By Tony Gaddis, Pearson

Additional Resources:

Towson University Cybersecurity Modules: <https://cis1.towson.edu/~cssecinj/>

Learning Management System: CANVAS:

Canvas (<https://sccd.instructure.com/>) is used to post announcements, course information, programming assignments, and grade. You will submit your programming assignments on Canvas.

To log-in Reedley College CANVAS:

Username: Your 7-digit student ID number.

Password: If you have not previously changed your password, it is:

*First name initial (upper case) + last name initial (lowercase) + date of birth (mmddyy)*

Example: John Smith born on July 9th of 1988 Password = Js070988

Computer Lab:

Onsite face-to-face meetings will take place in FEM 3 on campus. Microsoft Visual Studio C++ compiler is used for this class.

**Topics:**

A. Classes

1. Classes and Members; Friend Functions
2. Constructors and Destructors
3. Using a Namespace, Header file, and Implementation file
4. Operator Overloading

B. Inheritance, Polymorphism, and Virtual Functions

1. Introduction to Inheritance
2. Protected members and Class Access
3. Constructors and Destructors in Base and Derived Classes
4. Redefining Base Class Functions
5. Class Hierarchies
6. Polymorphism and Virtual Member Functions
7. Abstract Base Classes and Pure Virtual Functions

C. Pointers and Dynamic Memory

1. Pointers and arrays as parameters
2. A container class with a dynamic array
3. String class

D. Linked Lists

1. A fundamental node class for linked lists
2. A linked-list toolkit
3. A container class with a linked list

E. Software Development with Templates, Iterators, and the STL

1. Template functions
2. Template classes
3. Standard template classes and their iterators

## F. Stacks

1. Stacks and the STL stack
2. Stack Applications

## G. Queues

1. Queues and the STL queue
2. Queue Applications

## H. Recursion

1. Recursive functions
2. Recursive Applications

## I. Binary Search Trees

1. Binary trees
2. Binary tree representations
3. Binary tree nodes
4. Binary tree traversals
5. Binary search trees

## J. Graphs

1. Graph Definition
2. Graph Implementation
3. Graph Traversal
4. Path Algorithm

## K. Further topics

1. Hash Tables
2. Heaps
3. Sets
4. Secure programming

## Tentative Schedule:

	Assignment Points	Date
<b>Week 0: CSCI-40 Topics Review</b>	<b>10</b>	<b>8/10/2020</b>
Class 2pm online		8/10/2020
Class 2pm online		8/12/2020
zyBooks Participation Activities	10	8/22/2020
<b>Week 1: More on Objects &amp; Classes</b>	<b>37</b>	<b>8/17/2020</b>
Class 2pm online		8/17/2020
Reading: Starting Out with C++ (SOWC++) Ch. 9.8, 9.10, 13.9, 14		8/19/2020
Class 2pm online		8/19/2020
In-Class Activity	10	8/21/2020
zyBooks Participation Activities	7	8/22/2020
Schedule One-on-One	20	8/23/2020
<b>Week 2: Inheritance &amp; Abstract Classes</b>	<b>57</b>	<b>8/24/2020</b>
Reading: SOWC++ Ch. 15		8/26/2020
Class 2pm online		8/24/2020
Class 2pm online		8/26/2020
In-Class Activity	10	8/27/2020
zyBooks Participation Activities	7	8/28/2020
Program #1 - C++ Fundamentals	40	8/30/2020
<b>Week 3: Templates, Containers, &amp; the STL</b>	<b>60</b>	<b>8/31/2020</b>
<b>Class 2pm online</b>		<b>8/31/2020</b>
Reading: SOWC++ Ch. 16.2-16.4, 17.1-17.5		9/2/2020
zyBooks Participation Activities	10	9/2/2020
<b>Class 2pm online</b>		<b>9/2/2020</b>
In-Class Activity	10	9/3/2020
Program #2 - Inheritance	40	9/6/2020
<b>Week 4: Quiz</b>	<b>60</b>	<b>9/7/2020</b>
No class meeting (Labor Day)		9/7/2020
Class 2pm online (Quiz Review)		9/9/2020
Exam #1	60	9/11/2020
<b>Week 5 : Introduction to Data Structures &amp; Algorithms</b>	<b>58</b>	<b>9/14/2020</b>
Class 2pm online		9/14/2020
Reading: SOWC++ Ch. 11, 17.6		9/16/2020
zyBooks Participation Activities	8	9/16/2020
<b>Class 2pm online</b>		<b>9/16/2020</b>
In-Class Activity	10	9/17/2020
Program #3 - Container with Array	40	9/20/2020
<b>Week 6: Searching &amp; Algorithm Analysis</b>	<b>57</b>	<b>9/21/2020</b>
Class 2pm online		9/21/2020
Reading: SOWC++ Ch. 8.1, 8.2, Read Early Objects Ch. 9.6		9/23/2020
zyBooks Participation Activities	7	9/23/2020
Class 2pm online		9/23/2020
In-Class Activity	10	9/24/2020

Program #4 - String Class Implementation	40	9/27/2020
<b>Week 7: Sorting Algorithms</b>	<b>20</b>	<b>9/28/2020</b>
Class 2pm online		9/28/2020
Reading: SOWC++ Ch. 8.3, 8.4, 20.8		9/30/2020
zyBooks Participation Activities	10	9/30/2020
Class 2pm online		9/30/2020
In-Class Activity	10	10/1/2020
<b>Week 8: Linked Lists</b>	<b>82</b>	<b>10/5/2020</b>
Class 2pm online		10/5/2020
Reading: SOWC++ Ch. 18		10/7/2020
zyBooks Participation Activities	12	10/7/2020
Class 2pm online		10/7/2020
In-Class Activity	10	10/8/2020
Program #5: Recursion & Sorting	60	10/11/2020
<b>Week 9: Stacks &amp; Queues</b>	<b>13</b>	<b>10/12/2020</b>
Class 2pm online		10/12/2020
Reading: SOWC++ Ch. 19		10/14/2020
zyBooks Participation Activities	3	10/14/2020
Class 2pm online		10/14/2020
In-Class Activity	10	10/15/2020
<b>Week 10: Exam #2</b>	<b>60</b>	<b>10/19/2020</b>
Class 2pm online (Exam Review)	60	10/19/2020
Exam #2		10/23/2020
<b>Week 11: Hash Tables</b>	<b>56</b>	<b>10/26/2020</b>
Class 2pm online		10/26/2020
Reading: Online resources (see Canvas)		10/28/2020
Class 2pm online		10/28/2020
Program #6 - Linked List	40	11/1/2020
zyBooks Participation Activities	6	10/28/2020
In-Class Activity	10	10/29/2020
<b>Week 12: Trees</b>	<b>62</b>	<b>11/2/2020</b>
Class 2pm online		11/2/2020
Reading: SOWC++ Ch. 21		11/4/2020
zyBooks Participation Activities	12	11/4/2020
Class 2pm online		11/4/2020
In-Class Activity	10	11/5/2020
Program #7 - Stacks and Queues	40	11/15/2020
<b>Week 13: Graphs</b>	<b>25</b>	<b>11/9/2020</b>
Class 2pm online		11/9/2020
Reading: Malik Ch. 20 or online resources (see Canvas)		11/11/2020
<b>(No classes - Veterans Day)</b>		<b>11/11/2020</b>
zyBooks Participation Activities	15	11/12/2020
In-Class Activity	10	11/19/2020
<b>Week 14: Balanced Trees &amp; Heaps</b>	<b>22</b>	<b>11/16/2020</b>
Class 2pm online		11/16/2020

Reading: Online resources (see Canvas)		11/18/2020
zyBooks Participation Activities	12	11/18/2020
Class 2pm online		11/18/2020
In-Class Activity - Secure Programming	10	11/19/2020
Program #8 - BST tree (lowest 40-point program score dropped)	-	11/22/2020
<b>Week 15: Exam #3</b>	<b>60</b>	<b>11/23/2020</b>
Class 2pm online (Exam Review)		11/23/2020
Exam #3	60	11/27/2020
<b>Week 16: Sets &amp; Optimal Algorithms</b>	<b>80</b>	<b>11/30/2020</b>
Class 2pm online		11/30/2020
Reading: SOWC++ Ch. 20 (skim)		12/2/2020
zyBooks Participation Activities	10	12/2/2020
Class 2pm online		12/2/2020
In-Class Activity	10	12/4/2020
Program #9 - Graphs	60	12/6/2020
<b>Week 17: Finals Week</b>	<b>181</b>	<b>12/7/2020</b>
Final Exam 2pm online	150	12/7/2020
Professionalism	31	
<b>TOTAL</b>	<b>1000</b>	

### Subject to Change:

This syllabus and schedule are subject to change. If you are absent from class meeting, it is your responsibility to check on any changes made while you were absent.

### Evaluation:

Students will be evaluated on the basis of their performance on various assignments according to the following scale. The instructor reserves the right to adjust scores as it may be required throughout the semester.

Points in the course total 1000 and are distributed as follows:

zyBooks Participation Activities (13)	119
In-Class Activities (14)	140
Programming Assignments (9, lowest dropped)	360
Exams (4)	330
Professionalism & 1:1	51

Final grade is assigned using following scale:

900-1000 points	A
800- 899 points	B
700- 799 points	C
600- 699 points	D
< 600 points	F

### Attendance

Attendance for onsite and synchronous online meetings will be taken at beginning of each class. Students who leave before the end of class will be marked tardy. For synchronous online meetings you are expected to have your camera turned on and will have the best experience if you use earbuds/headphones. Please make sure to stay muted until you have a question or something to add so as to cut down on background noise.

Students will be dropped from the class if they fail to attend the first class session of the semester. During the semester up to final drop date, any student who missed two weeks of class meetings (cumulative) will be dropped from this class (i.e. 4 classes).

Make-up tests are limited to students who have made arrangements with the instructor **prior** to the announced testing date or those students who have been excused by High School Attendance Office. Exam material is constructed from class discussions, assigned readings, guest lectures, video presentations, and special assignments. **Unless the student receives prior approval from the instructor, no make-up tests will be allowed.**

### Grading Policy

zyBooks Participation Activities:

ZyBooks participation activities must be completed before announced due date (typically at start of class on Wednesday for full credit, exception in the first two weeks). These activities allow you to actively engage each week's content. Points will be attributed according to the number of responses required and the percentage of the activities a student completes before class. Reference the following rubric:

Percentage Completed	Before Wednesday Class Points Awarded	After Wednesday Class by End of Week Points Awarded
90%+	100% of points	90% of points
80%+	90% of points	80% of points
70%+	80% of points	70% of points
60%+	70% of points	60% of points
50%+	60% of points	50% of points
25%+	40% of points	30% of points
13%+	20% of points	10% of points

In-Class Activities:

In-class activities will be completed in groups of 2-3 during class meeting time with some outside of class time, as necessary. Only one assignment needs to be submitted per group. Be sure to include names of all students in the group or credit will not be given.

Programming Assignments:

Nine programming mini-projects are assigned in this course. Students will work individually and in groups of 2-3 (Program #5 and #8 only) and NOT share code with other individuals or groups. Projects are suggested to be turned in for grading by the due date indicated on the course calendar. However, these can be turned in up to one month later at no penalty (with the exception of Program #7 - #9 as all assignments are due before the final exam). Please be careful as it is not a good idea to get too far behind and the work will build up and you will likely have a difficult time succeeding in the class. Consideration is given to the following criteria: functionality, error-proofing/exception handling, efficient use of course concepts, documentation, and readability in addition to test case results. All programming exercises must include your name at the top of all programs submitted, or you will not receive credit.

Exams:

There are three midterm exams and one final exam. All will be timed. See course calendar for timing, content covered, and points allotted. Exams will consist of multiple-choice questions on syntax, program flow, etc. There will also be small programming problems. A more difficult late exam can only be arranged if you have an excuse verified by an impartial party (i.e., a doctor or a court note).

## **College Policies:**

**Cheating & Plagiarism**, see Cheating and Plagiarism under Campus Policies:

Cheating and plagiarism is prohibited in the class. Incidents of cheating and plagiarism will result a failing grade on the particular assignment in question. Please see Student Conduct Standards at <https://www.reedleycollege.edu/about/about-us/policies-and-procedures/student%20conduct%20standards.html> for more information about academic integrity.

Each student is expected to assist in the overall environment of the classroom making it conducive to learning.

## **Accommodations for Students with Disabilities**

If you have a verified need for an academic accommodation or materials in alternate media (i.e., Braille, large print, electronic text, etc.) per the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act, please contact the Reedley College Disabled Students Programs & Services (DSP&S) Department at (559) 638-0332. You can find more information at <https://www.reedleycollege.edu/student-services/disabled-student-programs-and-services/index.html>.

**Reedley College is committed to creating accessible learning environments consistent with federal and state law. To obtain academic adjustments or auxiliary aids, students must be registered with the DSP&S office on campus. DSP&S can be reached at (559) 638-3332. If you are already registered with the DSP&S office, please provide your Notice of Accommodation form as soon as possible.**

## **Important College Dates Fall 2020**

Class begin	Monday	08/10/2020
Last day to drop a full-term class for a full refund	Friday	08/21/2020
Last day to register	Friday	08/28/2020
Last day to drop this class to avoid a “W” in person	Friday	08/28/2020
Last day to drop this class to avoid a “W” on Web	Sunday	08/30/2020
Last date to drop this class	Friday	10/09/2020
No classes, campus is closed		
Labor Day	Monday	09/07/2020
Veterans Day	Wednesday	11/11/2020
Thanksgiving	Thurs-Fri	11/26/2020 – 11/27/2020
<b>Final Exam</b>	<b>Monday</b>	<b>12/07/2020 2:00 – 3:50 pm</b>