

CIS-223-400 Computer Science II

Spring 2022

Instructor Name	Helen Wang	Credit Hours	4
Instructor Email	hwang@elgin.edu	Room Number	F126
Alternate Email	n/a	State Date	Jan 18, 2022
Instructor Phone	847-214-7498	End Date	May 18, 2022
Alternate Phone	847-214-7240 (Dean's Office)	Meeting Dates	Tuesday
Office Location	F129	Class Time	11:30 am – 1:10 pm

Office Hours

Monday	1:00 pm – 3:00 pm	Virtual
Tuesday	8:00 pm – 9:00 pm	Virtual
Wednesday	1:00 pm – 3:00 pm 8:00 pm – 9:00 pm	Virtual
Thursday	1:00 pm – 3:00 pm 8:00 pm – 9:00 pm	Virtual
Friday	1:00 pm – 2:00 pm	Virtual

Course Requirements

Textbook Required	Textbook: Problem Solving with C++ (10th edition) by Walter Savitch 2018. ISBN: 9780134448282
Course Pre-Requisites	Grade of C or better in CIS 121 or CIS 123 or MTH 123 or consent of instructor
Computer / Software Requirements	Access to a computer is required in order to visit the D2L course site. Microsoft Visio Studio as C++ Software environment USB Flash Drive for saving/storing your programs and data
D2L Requirements	Class information, all assignments, and required course content will all be posted on D2L. Students are expected to regularly check D2L and submit all assignments via D2L. You will use your AccessECC username and password to log on.
Other Required Materials	Access to MyProgrammingLab on Pearson is recommended.

* Note: This syllabus is subject to change, as needed, by the instructor at any time.

Course Description

This class builds upon topics covered in CIS 121 (the prerequisite) and continues exploring use of the C++ programming language to solve more complex programming problems. This course introduces advanced software development concepts such as dynamic memory allocation, object oriented software development, data structures, recursion, template classes, the standard template library, Exceptions, and performance analysis. Topics to be covered are contained in Chapters 9 - 18 in the *Problem Solving in C++* textbook.

This course will be delivered in a hybrid-asynchronous format. Part of it will be delivered online through D2L, and the other part will be conducted in the classroom. Students attend a face-to-face class once a week.

Course Learning Outcomes

By the end of this course, students will:

- Students should be able to select appropriate data structures and file methods for programs of varying complexity
- Students should be able to write clear computer programs to implement their designs.
- Students should be able to create a linked list, appending, traversing, searching and deleting a node.
- Students shall be able to use dynamic memory allocation techniques.
- Students should be able to analyze completed programs for correctness and efficiency.

Special topics coverage includes:

- Introduce to structure and classes
- Introduce the concepts of Classes, Objects Inheritance
- More about Classes
- Friends, Overloaded Operators,
- array and classes
- Sorting Timing
- Separation Namespaces
- Pointers, New operators
- Recursion, Binary Search
- Dynamic Array
- Linked List
- Stack, Queue
- Inheritance, Polymorphism
- Virtual Functions
- Exception Handling
- Template
- Standard Template Library

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Grading Standards

Grading Policies and Procedures

The final grade will be based upon the percentage of points earned on your quizzes, programming assignments/exercises, final project and midterm/final exam which includes content from the course.

There will be approximately 13 short quizzes. The questions will cover materials from current topic.

There will be a Lab Exercises for every module. It will be used for learning of the lecture concepts by the completion the exercises.

There will be 4 programming assignments throughout the semester. Each will be a program that will use concepts presented in class. These assignments are published online at our course's D2L site (ecc.desire2learn.com). Any incorrect submission format will result in a failure on the assignment.

Programs that were obviously thrown together at the last minute will not be graded and will be returned with a 0 for a grade. Programs that do not compile will be returned with a 0 for a grade.

Each assignment will be graded on three aspects:

- (1) Clarity and correctness of the solution and code.
- (2) Clarity of the documentation (comments and variable name selection).
- (3) Clarity and correctness of the program's output.

There will be Discussion questions for some specific topics. Students will also be graded on participation in the discussion. To earn a full participation grade, you will be expected to contribute to class discussion on a regular basis.

Grading Summary Table

Graded Items	Percent
Lab Exercises	28%
Quizzes	10%
Assignments	18%
Midterm Exams	15%
Final Exams	25%
Discussion and Participation	4%

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Make-up Exam and/or Late Work

Exams may be made up if a suitable reason is provided for missing exam class periods.

Late programming assignments will be accepted with a 10% deduction for every day. It is late up to five days. After five days, late work will not be accepted.

Grading Scale

Letter Grade	Minimum Points / Percentage	Maximum Points / Percentage
A	90%	100%
B	80%	89%
C	70%	79%
D	60%	69%
F	0	59%

Mid-term & Withdrawal Dates

Mid-Term Date	The Week of March 28th
The last day to withdraw from this course with a grade of W is:	Sunday, April 3, 2022

After the withdrawal date listed above, the only grades that will be assigned are A, B, C, D or F.

Important Dates

SPRING SEMESTER 2022

Tues., Jan. 4	Offices Reopen
Tues., Jan. 11 – Wed., Jan. 12.....	New Full-Time Faculty Orientation
Thurs., Jan. 13	College Convocation
Fri., Jan. 14	New Student Convocation
Mon., Jan. 17.....	All Facilities Closed: Martin Luther King, Jr. Day
Tues., Jan. 18	Spring Semester Begins
Mon., Feb. 21	All Facilities Closed: Presidents' Day
Tues., Feb. 22.....	12-Week Spring Session Begins
Mon., Mar. 14	2 nd 8-Week Spring Session Begins
Mon., Mar. 21 – Sun. Mar. 27.....	All Facilities Closed: Spring Recess
Wed., May 18.....	Spring Semester Classes End
Thurs., May 19.....	Grading Day/Semester Ends
Fri., May 20	High School Equivalency Graduation Ceremony
Sat., May 21	Graduation
Mon., May 23.....	Grades Due by 4:00 p.m.
Mon., May 30.....	All Facilities Closed: Memorial Day

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Classroom Policies

Attendance, Tardiness, and Student Illness Policy

Students are expected to attend all classes in which they are enrolled and to know the attendance policy of each of their instructors. Under no circumstances should a student stop attending class without formally withdrawing. This can result in a failing grade on the student's permanent record. Attendance at the first class is expected.

Instructor's Attendance Policy	You are expected to attend synchronous class section on time and in its entirety. Weekly participation and assignments submissions.
Instructor's Student Illness Policy	Documentation is required.

Behavioral Expectations

Professional classroom behavior is expected during class. Students are expected to abide by the Elgin Community College Student Code of Conduct (see www.elgin.edu/codeofconduct). Any behavior that violates the conduct norms will not be tolerated. Professionalism consists of demonstrating a public persona that is suitable for the classroom. This includes

- attending all classes
- arriving on time
- handing in work on time
- having consideration and respect for others.

Academic Integrity / Plagiarism / Cheating Policy

ECC strives to foster an environment of respect for and achievement of the highest levels of academic integrity for all members of its academic community. Academic integrity and honesty are essential hallmarks of the institution's contributions to the great society and cannot be abridged without considerable harm to those who must rely upon the intellectual pursuits of the institution.

Plagiarism, submitting someone else's work as your own, is a serious offense. Having a parent, spouse, classmate, or friend of your work, knowingly or unknowingly, accomplishes nothing except placing unreasonable demands on people who care for you. This includes work on assignments as well as tests and quizzes. Furthermore, plagiarism is easy for an instructor to spot. I reserve the right to give a zero for any plagiarized work including, but not limited to, assignments and tests. Repeated cases may result

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in a withdrawal from the class or a failing grade.

Academic Integrity (for information see www.elgin.edu/academicintegrity)

For more information on how to avoid academic integrity violations, see the [Plagiarism Modules](#) available in D2L under the Student Support link at the top. Students may also use the ECC Library [resources for citing sources](#) at or seek assistance from the Write Place staff.

Course Outline and Schedule

Evaluation/Assessment Methods – Course Assignments

The grading rubrics and the point values assigned to each assignment will be posted on D2L.

Course Outline

Class Meeting Date	Topic Covered	Assignments	Due Date	
Module 1	Introduce, Basic C++ programming review, Structures			
Module 2	Introduce to classes and objects			
Module 3	Classes, Objects, Intro to Inheritance	Asn One		
Module 4	Pointers, New operators, Dynamic Arrays			
Module 5	Vectors, Friends members		Asn one Due	
Module 6	Overloaded Operators	Asn Two		
Module 7	Arrays and classes Sorting and Searching algorithms, Sorting timing			
Module 8	Separate Compilation		Asn Two Due	
Module 9	Node structure, Linked List Midterm	Midterm		
Module 10	Linked lists, Stacks, Queues	Asn Three		
Module 11	Recursion, Recursive functions more searching and sorting algorithms			
Module 12	Inheritance, Derived classes, Redefining functions		Asn Four Due	
Module 13	Polymorphism, Virtual Functions	Asn Four		
Module 14	Exception Handling Template			
Module 15	Standard Template Library Final review	Final Exam	Asn Four Due	

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1. Structure and Classes

- Introduces structures and implementation
- Learn how to define classes and to create and use objects
- Constructors
- Destructors
- Define member functions
- Public and private members
- Initialize the constructors
- Protecting member data
- Abstract Data Types
- hiding class implementation details from client programs

2. ADT Inheritance

- What is inheritance?
- Protected members and class access
- Illustrates the difference between is-a and has-a relations
- Inheritance Basics
- Implementing a Derived Class
- Protected Members and Class Access
- Class Access Specifies
- Passing Arguments to Base Class
- Redefining Base Class Functions

3. Pointers and Dynamic Array

- Definition of pointer
- Initialize pointers, compare pointers
- Pointers and functions
- Dynamic memory allocation, and more
- Manage memory
- Static variables and automatic variables
- Dynamic arrays
- Create and use dynamic arrays

4. More about Classes

- Define accessor functions
- Private member functions
- Define friend functions
- Create friend of classes
- How to use non-member functions
- Overloaded operators
- Convert objects
- Constant member functions and static members
- Classes and Arrays

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5. Separate Compilation and Namespaces, Vectors

- Organize a C++ program into separate parts
- Using #ifndef
- Define other libraries
- Namespaces and using directives
- Creating a Namespace

6. Searching, Sorting, and Algorithm Analysis

- Introduce the basics of vector
- How to define a vector
- Vector size and capacity
- Learns some searching algorithms for information stored in arrays
 - Linear Search, Binary Search,
- Sorting algorithms
 - Bubble Sort, and Selection Sort algorithms
- A brief introduction to algorithm analysis
 - Compare between different algorithms and determine which more efficient is.

7. Linked List

- Nodes and Linked List
- Accessing items in a node
- NULL operator
- Building a Linked Lists S
- Linked List operations insert, remove, display
- Searching a Linked List
- Memory Leak
- Binary Tree

8. Stacks and Queues

- Introduction to the Stack ADT
- Stack Operations and Functions
- Dynamic Stacks
- Introduction to the Queue ADT
- Implementation
- Dynamic Queues
- Eliminating Recursion

9. Recursion

- Discuss recursion and its problem solving
- Discuss recursion applications.
- Introduce recursive algorithms
- Perform a binary tree
- Quick sort

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10. Inheritance, Polymorphism and Virtual Functions

- Class Hierarchies
- Constructor
- Polymorphism
- Requires References or Pointers
- Virtual Function Basics
- Redefining vs. Overriding
- Abstract Base Classes and Pure Virtual Functions
- Multiple Inheritance

11. Exception Handling

- Introduction to exception
- Throw-try-catch
- Exception Handling Mechanism
- Defining an Exception Class
- Throwing a Class Type
- Multiple Throws and Catches
- Exception Class DivideByZero
- Exception Specification
- Derived Classes and Exceptions
- When to Throw an Exception?
- Nested try-catch Blocks
- Exception Class Hierarchies

12. Template

- Definition of template
- The advantages of template
- Templates for Functions
- Class Template
 - Declaring Template Class Objects
 - Defining the Member Functions
 - Template Functions with Template Class Parameters
- typedef and Templates

13. Standard Template Libraries

- Introduction to STL
- Advantages of using STL
- Types of data structures in the STL: containers and iterators
- Creating Container Objects
- Relationship between Containers and Iterators
- The STL list Container

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- Defining an STL-based Stack
- Using STL algorithms
- Learn a linked list class template and STL list.

Resources

Tutoring and Study Labs

Tutoring and study labs are available to students. For more information, visit www.elgin.edu/tutoring

Student Resource Guide

To view the Student Resource Guide PDF document click here: [Student Resource Guide](#)

Emergency Closing Information

For information regarding emergency closing situations at ECC please visit: [Rave Alert - Emergency Notification System](#)

ECC Technical Help

ECC is committed to supporting students who will be transitioning to alternative modes of instruction, particularly online, and to addressing the technology needs of ECC students to the greatest extent possible. For more information, visit <https://elgin.edu/life-at-ecc/services-resources/technical-help/>

ECC Library

For information regarding the ECC Library please visit: [ECC Renner Library](#)

Accessibility and Disability Accommodations

Elgin Community College (ECC) views disability as an important aspect of diversity and is committed to providing an equitable and accessible learning environment for all students. The Student Access & Disability Services office collaborates with students who have disabilities to provide and arrange reasonable accommodations to foster full participation in courses and campus experiences.

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If you have a disability (e.g., vision, hearing, speech, psychological, ADHD, TBI, health, intellectual, autism, learning, physical, etc.), please visit <http://www.elgin.edu/ada>, complete the “Registration Form” under “New to Student Disabilities Services,” gather documentation on your disability, and schedule an intake appointment.

Wellness Services

Focuses on health and well-being to maximize personal and academic growth and development. The mission of wellness services is to provide support for personal well-being so students can focus on academic success. We offer students one-on-one sessions about psychosocial issues that impact academic performance. Students may drop in and/or make an appointment in the Student Success office, Building B, room 120. Office hours at Mon-Thurs: 8 am - 7 pm and Friday: 8 am - 4 pm.

Veterans' Assistance Policy

Elgin Community College would like to thank you for your military service! Whether you are starting college for the first-time or re-entering college, we have services to make your transition from troop to student a little easier. If you have any questions, or for additional information please contact Anitra King, Career and Veterans Specialist, at (847) 214-7531 or email: aking@elgin.edu.

<http://www.elgin.edu/students.aspx?id=8412>

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