

Gannon University (GU) Course Syllabus Department of Electrical and Cyber Engineering (ECE)

Instructor: Dr. Shayan (Sean) Taheri

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Office Hours: Fridays, 2:00 PM – 3:30 PM, or by Appointment: Please email your inquiries beforehand.

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Class Location: IHK 206

Class Time: Tuesdays and Thursdays, 4:30 PM – 5:50 PM

Final Exam Date and Time: May/02/2023, 4:00 PM – 6:00 PM

University Profile: www.gannon.edu/FacultyProfiles.aspx?profile=taheri001

ECE 111: Introduction to C and C++ Programming Spring 2023

Course Description:

This course is designed for students to build an introductory foundation in problem solving with common procedural and object oriented HLL programming languages. Exploring the common C and C++ programming syntax and programming techniques. Contents of the course include: program structures, data types, identifiers, flow control, functions, C++ I/O, arrays and pointers.

Credit Hours: 3

Prerequisite: None.

Course Outcomes:

1. Comprehend basic computer programming concepts, techniques, and instructions.
2. Gain ability to use C++ programming language in developing meaningful software programs.
3. Demonstrate utilization of advanced software development and testing practices for creation of real-world applications.

Course Outline:

The lecture plan is according to the following. The subjects of each item are presented based on time availability.

Item	Lecture Topic	Duration
1	Chapter 1: An Overview of Computers and Programming Languages	3 Sessions
2	Chapter 2: Basic Elements of C++	3 Sessions
3	Chapter 3: Input/Output	3 Sessions
4	Chapter 4: Control Structures I (Selection)	2 Sessions
5	Chapter 5: Control Structures II (Repetition)	2 Sessions
6	Chapter 6: User-Defined Functions	3 Sessions
7	Chapter 7: User-Defined Simple Data Types, Namespaces, and the string Type	1 Session
8	Chapter 8: Arrays and Strings	3 Sessions
9	Chapter 9: Records (structs)	2 Sessions
10	Chapter 10: Classes and Data Abstraction	2 Sessions

Course Assessment Methods:

Assessment Methods	Outcome 1	Outcome 2	Outcome 3
Assignments	X	X	X
Examinations	X	X	X

Course Assessment Method Details:

1. Assignments: They evaluate knowledge and comprehension of lecture topics. The assignment plan is according to the following.

Item	Assignment Topic
1	Chapter 1: An Overview of Computers and Programming Languages
2	Chapter 2: Basic Elements of C++
3	Chapter 3: Input/Output
4	Chapter 4: Control Structures I (Selection)
5	Chapter 5: Control Structures II (Repetition)
6	Chapter 6: User-Defined Functions
7	Chapter 7: User-Defined Simple Data Types, Namespaces, and the string Type
8	Chapter 8: Arrays and Strings
9	Chapter 9: Records (structs)
10	Chapter 10: Classes and Data Abstraction

2. Examinations: The midterm and the final exams should contain problems based on the lectures and the assignments to assess the gained knowledge and skills.

Course Textbooks:

Malik, D.S., 2014. **C++ programming: Program design including data structures**. Cengage Learning.

Course Policies:

- Integrity: Cheating in any form will not be tolerated. Willfully misrepresenting your work in this class may result in an “F” grade for the course. Please refer to the *Gannon University Code of Academic Integrity*.
- Testing: The test procedure will be announced prior to the examinations. Anyone violating the testing procedure will be dropped from class.
- Submission: Assignments should be completed and submitted by the due date. **No late homework assignments will be accepted.**
- Attendance:
 - Two unexcused absences will invoke the Early Alert and Referral System (EARS).
 - Two more unexcused absences from class, after an EARS will result in a grade of **F**.
- Participation: Active participation in course class sessions/meetings is expected for all students. For each submitted assignment, students should be prepared to explain their solutions to the class.
- Individual Assignments: Students are allowed to discuss course topics and assignments with each other. **However, duplicate assignments are not allowed. All submissions must represent your own work.**

Grading Policy:

Course Outcomes Assessment Criteria: The course outcomes and the corresponding student outcomes are assessed by the construction of the **EAMU** vectors - Excellent (**E**), Adequate (**A**), Minimal (**M**), and Unsatisfactory (**U**). The construction of the EAMU vectors used for course assessment applies the following scoring in all cases and based on the **Accreditation Board for Engineering and Technology, Inc. (ABET)** criteria for accrediting engineering programs [Ref. 1]: **Excellent** (E) is scoring 90 or better of the total points possible, **Adequate** (A) is 75 or better, **Minimal** (M) is 60 or better, and **Unsatisfactory** (U) is anything below 60.

The **PI** is an abbreviation for **Performance Indicator** and **SO** is an abbreviation for **Student Outcomes** in the following:

1. Comprehend basic computer programming concepts, techniques, and instructions.

ECE_ABET_PI_2_3 (ECE_ABET_SO_2): Implement the designed solution to meet the specifications.

Key Assignment: **Assignment 4** for “**Chapter 4: Control Structures I (Selection)**”.

Justification: Assignment 4 includes writing and implementing a program in the C++ programming language as the designed solution to meet the specification of calculating a customer’s bill for a local cable company. The input to the solution is the customer’s account number, customer code, number of premium channels to which the user subscribes, and, in the case of business customers, number of basic service connections. Its output is customer’s account number and the billing amount. All of these items together are suitable indicators to gauge student performance for **PI_2_3**.

Reflection: ECE: CO_1; abet_PI_2_3; SO_2

Assignment 4: There were 28 undergraduate students in the ECE 111 course. All of the students, except one student demonstrated satisfactory performance in completion of this assignment. In overall, 22 students received complete score for this assignment. The action item is to have more related in-class exercises to further guide the future students.

2. Gain ability to use C++ programming language in developing meaningful software programs.

- **ECE_ABET_PI_1_2 (ECE_ABET_SO_1):** Apply deterministic mathematical methods including single and multi-variable calculus, transforms, linear algebra, and/or discrete math to problem solving in electrical engineering.

Key Assignment: Assignment 6: Question 1 for “Chapter 6: User-Defined Functions”.

Justification: Assignment 6: Question 1 includes writing a program in C++ programming language that implements the major electrical formulas for calculating the parameters of voltage, current, power, inductive reactance, capacitive reactance, and resonant frequency. All of these items together are suitable indicators to gauge student performance for PI_1_2.

Reflection: ECE: CO_2; abet_PI_1_2; SO_1

Assignment 6, Question 1: There were 28 undergraduate students in the ECE 111 course. All of the students, except two students demonstrated satisfactory performance in completion of this assignment. In overall, 26 students received complete score for this assignment. Two students did not have any submission for this assignment. One of them did not attend half of the class sessions, did not submit half of the assignments, did not take two out of three exams, and eventually failed the class. The action item is to have more related in-class exercises to further guide the future students.

- **CYENG_ABET_PI_1_2 (CYENG_ABET_SO_1):** Apply discrete mathematics techniques or cryptographic technique/algorithms to problem solving when appropriate.

Key Assignment: Assignment 8 for “Chapter 8: Arrays and Strings”.

Justification: Assignment 8 includes applying "Exclusive-OR (XOR) cryptographic technique/algorithm to problem solving according to which the students are required to implement method of XOR symmetric encryption-decryption in the C++ programming language that can protect our data from adversaries. All of these items together are suitable indicators to gauge student performance for PI_1_2.

Reflection: CYENG: CO_2; abet_PI_1_2; SO_1

Assignment 8: There were 28 undergraduate students in the ECE 111 course. All of the students, except two students demonstrated satisfactory performance in completion of this assignment. In overall, one student received complete score for this assignment. One student did not have any submission for this assignment. He did not attend half of the class sessions, did not submit half of the assignments, did not take two out of three exams, and eventually failed the class. The action item is to have more related in-class exercises to further guide the future students.

3. Demonstrate utilization of advanced software development and testing practices for creation of real-world applications.

ECE_ABET_PI_5_1 (ECE_ABET_SO_5): Demonstrate collaborative effort to the work of the team and establish process for communication to follow through the agreed-upon roles and responsibilities.

Key Assignment: Assignment 6: Question 2 for “Chapter 6: User-Defined Functions”.

Justification: Assignment 6: Question 2 includes asking the students to create a team of two/three members with their classmates to strengthen their collaborative skills. In this regard, they need to establish process for communication to follow through the agreed-upon roles and responsibilities to complete writing of a program in the C++ programming language. The program uses a random number generator to generate a two-digit positive integer and allows the user to perform certain operations, such as reversing the digits and raising to multiple mathematical powers. Their program should not contain any global variables and each of the requested operations must be implemented by a separate function. Also, their program should be menu driven. All of these items together are suitable indicators to gauge student performance for PI_5_1.

Reflection: ECE: CO_3; abet_PI_5_1; SO_5

Assignment 6, Question 2: There were 28 undergraduate students in the ECE 111 course. All of the students, except two students demonstrated satisfactory performance in completion of this assignment. In overall, 25 students received complete

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score for this assignment. Three students did not have any submission for this assignment. One of them did not attend half of the class sessions, did not submit half of the assignments, did not take two out of three exams, and eventually failed the class. The action item is to have more related in-class exercises to further guide the future students.

CYENG_ABET_PI_4_1 (CYENG_ABET_SO_4): Demonstrate the ability to recognize ethical issues in professional settings.

Key Assignment: Assignment 7 for “Chapter 7: User-Defined Simple Data Types, Namespaces, and the string Type”.

Justification: Assignment 7 includes asking the students to study research articles and demonstrate their abilities in analyzing how a software function can lead to ethical issues in professional settings. All of these items together are suitable indicators to gauge student performance for **PI_4_1**.

Reflection: CYENG: CO_3; abet_PI_4_1; SO_4

Assignment 7: There were 28 undergraduate students in the ECE 111 course. All of the students, except five students demonstrated satisfactory performance in completion of this assignment. In overall, 21 students received complete score for this assignment. Two students did not have any submission for this assignment. One of them did not attend half of the class sessions, did not submit half of the assignments, did not take two out of three exams, and eventually failed the class. The action item is to have more related in-class exercises to further guide the future students.

Action Items for All: The action items to further guide the future students are: (1) Ask the future students in the first week of the semester to prepare their personal computers and/or laptops with suitable Windows and Ubuntu operating systems to install, run, and use the required software tools for the laboratory components. (2) Make sure that the future students have all of the required software tools installed on their computers within the first two weeks of the semester. (3) Emphasize to the future students in the first week of the semester to become technically ready (i.e., programming in Unix Shell scripting language, proper usage of features from different operating systems, and so forth). (4) Emphasize to the future students to dedicate enough weekly time to work on their assignments and do not postpone them until the last day of deadlines. (5) Provide more in-class exercises to be completed individually and collaboratively. (6) Ask the future students to demonstrate their efforts on the laboratory components of their assignments during the class sessions. (7) Ask the future students to present each of the completed laboratory components physically. (8) Provide more step-by-step reading and watching materials related to the laboratory components.

Grading:

The following is the overall grading for the class.

- Exams: 50%
- Assignments: 50%

Letter Grade	Percentage
A+	100-97
A	96-90
A-	89-88
B+	87-85
B	84-80
B-	79-78
C+	77-75
C	74-70
C-	69-67
D	66-60
F	59 or Below

Gannon University (GU) Course Syllabus Department of Electrical and Cyber Engineering (ECE)**Relationship of Objective Evidence to ECE Performance Indicator, Student Outcome, and Course Outcome:**

Performance Indicator Met (Student Outcome)	Course Outcome	Objective Evidence
ECE_ABET_PI_1_2 (ECE_ABET_SO_1): Apply deterministic mathematical methods including single and multi-variable calculus, transforms, linear algebra, and/or discrete math to problem solving in electrical engineering.	1	Assignment 6: Question 1
ECE_ABET_PI_2_3 (ECE_ABET_SO_2): Implement the designed solution to meet the specifications.	2	Assignment 4
ECE_ABET_PI_5_1 (ECE_ABET_SO_5): Demonstrate collaborative effort to the work of the team and establish process for communication to follow through the agreed-upon roles and responsibilities.	3	Assignment 6: Question 2

Relationship of Objective Evidence to CYENG Performance Indicator, Student Outcome, and Course Outcome:

Performance Indicator Met (Student Outcome)	Course Outcome	Objective Evidence
CYENG_ABET_PI_1_2 (CYENG_ABET_SO_1): Apply discrete mathematics techniques or cryptographic technique/algorithms to problem solving when appropriate.	2	Assignment 8
CYENG_ABET_PI_4_1 (CYENG_ABET_SO_4): Demonstrate the ability to recognize ethical issues in professional settings.	3	Assignment 7

Contribution to Professional Component:

An introduction to the C and C++ programming languages provides the student the basics of using, further developing, and testing the software tools in engineering systems. The C programming language is the most used programming language for various systems in our daily lives, while the C++ programming language is an advanced and growing object-oriented computing language to create and/or improve emerging software applications. Problem solving using a computer language provides concepts, techniques, instructions, and skills to decompose complex problems and make manageable solutions for them.

Accessibility Support Services:

The University will make reasonable accommodations for students with disabilities in compliance with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. The purpose of accommodations is to provide equal access to educational opportunities for eligible students with academic and/or physical disabilities. Gannon students who require accommodations due to a documented diagnosed physical, emotional or learning disability should contact Gannon's Office of Disability Services at extension 5522 or find more information at:

<https://mygannon.edu/studentresources/studentsuccesscenter/disabilitysupportservices/Page/default.aspx>

Prepared by:

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