

# EEL 3370 – C++ Programming for Embedded Systems Spring 2025 Page 1

Department of Electrical and Computer Engineering

## C++ Programming for Embedded Systems

**Instructor** : Dr. Herman Watson  
**Office Hours** : Zoom by appointment

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**Classroom/Time:**

RVC: Online

**Web Page** : <http://web.eng.fiu.edu/watsonh/>

**Catalog Description:**

Object-oriented programming in C++ with emphasis on evaluation of alternative program design strategies applicable to Embedded Computing. Data Abstraction, Encapsulation, Inheritance, Polymorphism, Class design with data structures, Template Library, and wxWidgets applications library. These concepts work on big or small systems – Raspberry Pi (3 Credits)

**References: Open source materials are used as instruction materials**

<b>Programming principles and practice using C++</b> <b>Bjarne Stroustrup</b> <b>978-0-321-54372-1</b>	<b>C++ Primer</b> <b>Lippman, Lajoie, Moo</b> <b>ISBN 0-321-71411-3</b>
<b>Object-Oriented Programming in C++,</b> <b>Fourth Edition</b> <b>Robert Lafore</b> <b>ISBN 0-672-32308-7</b>	Cplusplus.com C++ Tutorial <a href="http://cplusplus.com/doc/tutorial/">http://cplusplus.com/doc/tutorial/</a>

**Course Objectives:**

Through successful completion of the course, the student will:

1. Recognize the stages of the engineering problem solving process and their relationship to the development of software for its implementation.
2. Utilize an Integrated Development Environment for programming
3. Interpret how to use C++ class syntax and semantics.
4. Explain the steps for Programming in C++ Object Oriented Language
5. Utilize the C++ programming language, as a vehicle for the solution of engineering problems.

**Relationship of course to program outcomes:**

- 1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- 2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- 4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- 6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- 7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

**Topics Covered:**

- Introduction to C++ Programming
- Structures
- Class, Objects, and Strings
- Functions and Recursion
- Arrays and Vectors
- Pointers
- Overloading
- Encapsulation
- Inheritance
- Polymorphism
- Stream I/O
- Data Structures
- wxWidgets C++ library for Windows applications
- wxPong, wxTetris
- Maze Creation and Solution Project

Grading Scale:		
A	92-100	"Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook."
A-	90-92	
B+	88-90	
B	82-88	
B-	80-82	
C+	78-80	
C	70-78	
D	60-69	
F	< 60	

### Department Regulations Concerning Incomplete Grades

To qualify for an Incomplete, a student:

1. Must contact (e.g., phone, email, etc.) the instructor or secretary before or during missed portion of class
2. Must be passing the course prior to that part of the course that is not completed
3. Must make up the incomplete work through the instructor of the course
4. Must see the Instructor. All missed work must be finished before last two weeks of the following term.

**NOTE: This course requires consistent participation in class, homework, attendance, materials, and milestones. The final grade consists of contributions from all these elements.**

**Grading Scale: NOTE: There is *no makeup exams* offered**

Topic	Percentage
Exam 1 <i>no makeup</i>	20%
Exam 2 <i>no makeup</i>	20%
Exam 3 <i>no makeup</i>	25%
Homework	10%
Program of the Week	10%
DFS Project	10%
Participation	5%
Attendance	Unexcused Absence Penalty based on in class policy

**Policies:**

1. **Academic Misconduct:** For work submitted, it is expected that each student will submit their own original work. Any evidence of duplication, cheating or plagiarism will result in at least a failing grade for the course.
2. **Absences:** Resolution of absences and materials missed are student responsibility
  - o **Unexcused Absences:** Two unexcused absences are permitted during the term. More than two will result in the loss of points from your final grade. (1 point per absence above two, 3 points per absence above 5).
  - o **Excused Absences:** Only emergency medical situations or extenuating circumstances are excused with proper documentation.
    - 1. Request Mitigating Circumstances form
    - 2. Complete and submit form for review
3. **On Time:** As in the workplace, on time arrival, preparation, and submissions are required.
4. **Deadlines: Work is due before midnight on the date specified.** Late submissions within one week will receive up to half credit. **After one week, late work will not be accepted.** Late submissions are graded after the final exam. If you get a low score correct and resubmit your work before the deadline.

Participation deadlines are absolute – no late completions or makeups
5. **Submissions: This class is paperless.** Submissions are made using the web form listed on the class web site (online and in class sections) See class web site for instructions. All submissions must have:
  1. Captures of work must be whole screen images (include time and calendar)
  2. Everything placed in a single word or pdf document stored on your own cloud storage
  3. Contain your name, date, and time of completion within the document
  4. Permission: accessible by anyone with link and readable with a browser
  5. Use a single URL link to view the document
6. **DO NOT** submit work by email.
7. Instructor reserves right to change course materials or dates as necessary.

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<b>Mod</b>	<b>Date</b>	<b>3370 Weekly Topic Spring Spring 2024</b>	<b>Homework: Due</b>
01	01/06	Introduction to Bjarne Stroustrup and C++ V1, V2	<b>HW01</b> 01/14
02	01/13	Software Installation – IDE, Compiler, Application Library V3, V4 (MLK Holiday Monday 01/15)	<b>HW02</b> 01/21
03	01/20	Functions, Pointers, Structures V5, V6	<b>HW03, PW3</b> 01/28
04	01/27	Classes, constructors, destructors V7, V8	<b>HW04, PW4</b> 02/04
05	02/03	Classes, overloading, pointers, this V9 <b>Thur PQ1Classes</b>	<b>HW05, PW5</b> 02/11
06	02/10	<b>Tue 02/11 Review V10</b> <b>Thur 02/13 Exam 1</b>	
07	02/17	STL & History V11 Iterators V12	<b>HW06, PW6</b> 03/04
	02/24	Spring Break	
08	03/03	Iterators V13 Templates, Algorithms V14 <b>Thur: PQ2Iterator</b>	<b>HW07, PW7</b> 03/11
09	03/10	Templates, Containers V15	<b>HW08, PW8</b> 03/18
10	03/17	<b>Tue 03/18 Review V16</b> <b>Thur 03/20 Exam 2</b> (03/18 Last Drop Day)	DFS-L1 03/25
11	03/24	WxWidgets – Tue: wxHelloWorld, V17 wxSmith and RenderTimer, wxPong V18 V19	<b>HW09</b> 04/01 wxPong DFS-L2
12	03/31	wxWidgets – wxPong internals, Thur: WxWidgets – wxTetris, Gaming V20 <b>Thur: PQ3Pong</b>	<b>HW10</b> 04/08 wxTetris DFS-L3
13	04/07	WxWidgets –Maze Create and Solve VTBD V19 Audacity, Applications V22	04/15 DFS-L4
14	04/14	Tuesday Review V23 <b>Thursday 04/17 Exam 3</b> Friday: Senior Design Day 04/17	
15	04/21	<b>Finals Week (No final exam for this course)</b>	