Data Structures - ECE 218

Syllabus and Schedule of Classes
Spring 2024 - Dr. Murrell

Credit and contact hours:

Prerequisite knowledge:

Instructor:	Stephen Murrell	Term:	Autumn 2024
Teaching Assistant:			
Office:	EB 516	Class Meeting Days and Time:	Tue/Thur, 2:00 - 3:15
Office Hours:	Send an email including your free times	Class Location:	LC 182
E-Mail:	s.murrell@miami.edu	Lab Location:	

Course Description & Objectives

<u>Bulletin Description</u>

Continuation of Programming with emphasis on C++ and the skills required of a capable programmer. Essential data structures and algorithms, and introducing algorithm analysis. Basic sorting, searching, and data management. Dynamic and static memory management. Object oriented programming.

Learning Objectives

<u>Specific outcomes of instruction:</u> The student will be able to:

1. Create complete working programs making suitable use of any of the well known data structures and algorithms.
2. Make use of the essential features of object oriented programming as provided by C++.
3. Provide an elementary analysis of the time and space complexity of basic algorithms.
4. Understand how memory is organised in standard programming languages, and make use of that understanding.

Diversity & Inclusion Statement

The College of Engineering embraces a notion of intellectual community enriched and enhanced by diversity along a number of dimensions, including race, ethnicity and national origins, gender and gender identity, sexuality, class and religion. In order to create a learning environment for my students that supports a diversity of thoughts, perspectives and experiences:

- If you have a name and/or set of pronouns that differ from those that appear in your official UM records, please let me know!

- If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with me. I want to be a resource for you. You can also notify me of the issue through another source such as your academic advisor, a trusted faculty member, or a peer. If for any reason you do not feel comfortable discussing the issue directly with me, I encourage you to seek out another, more comfortable avenue to address the issue.

- I (like many people) am still in the process of learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me about it.

Required Texts, Materials, and/or Resources

Recommended text: C++ programming: Program design including data structures. D. S. Malik, Course Technology, inc., ISBN 978-1337117562, 2006 or newer.

iClicker required for this class. Available from U.M. book shop.

Teaching Strategies

This is an in-person class, meaning that you are required to attend on campus.

Attendance will be taken.

If you become ill or otherwise unable to attend class, you must let the instructor know, and you will be given a link allowing you to attend remotely until the emergency has passed.

Topical Course Outline

1. Object Oriented Programming and C++:
    2. Classes, objects, and data representation
    3. Class definition, members, methods, and related functions
    4. Constructors and Destructors
    5. Encapsulation, Abstraction, and Implementation hiding (protected, public)
6. Essential Algorithms and Associated Data Structures
    7. Essential sorting and searching algorithms
    8. Linked lists: structures and algorithms
    9. Binary Trees: structures and algorithms
    10. Vectors, flexible arrays, bounds-tested arrays, and related structures
11. Programming Techniques:
    12. Dynamic (heap) versus stack and global memory allocation
    13. Pointer operations, allocation, arithmetic; arrays as pointers
    14. Pointers to objects, arrays, arrays of pointers, pointers to arrays, etc: applications
    15. Recursive design of functions and data structures
16. Software Engineering:
    17. Structured program development, planned programming, handling larger projects
    18. Time analysis of algorithms and functions, big-O notation
    19. Efficiency analysis: memory usage, memory/time/flexibility trade-offs

Grading/Evaluation

Assessment	Percent of Final Grade
Attendance	10%
Assignments	45%
Examinations	45%
Total	100%

Course Policies: Coursework & Assignments

Late Work Policy: Assignments are always due by midnight on the specified date. You will always be given at least a week to complete an assignment. The maximum grade for each assignment starts at 10 and is reduced by 1 for every day (or part of a day) that it is late. After 10 days of lateness it is too late.

Extra Credit Policy: Extra credit may be available for going above and beyond the requirements for an assignment in some useful way.

Grades of "Incomplete": Incompletes are only given if you are truly unable to complete the course due to some reason that is not your fault. Evidence is required.

Group Work Policy: No group work allowed. Individual effort only. Studying in groups is encouraged, but when it comes to assignments, split.

Course Policies: Technology & Media

Email: Send me an email whenever you want. I do not sit in front of the computer all day just waiting for emails, but do check for them fairly frequently, even at weekends.

Blackboard: Blackboard will be used only for submitting assignments and reporting grades.

Laptop Usage: Laptops are useful, but it is important to pay attention rather than just copy down every single thing as quickly as you can.

Classroom Devices: No calculators or recording devices.

Course Policies: Student Expectations

Attendance Policy: Attendance will be taken every day.

Late Policy: Don't be late.

Phone Usage: No phoning, phone gazing, texting, social media, or web surfing.

Academic Ethics: Academic dishonesty in any form will not be tolerated. The instructor of this course supports the [University of Miami Honor Code](). Cheating, plagiarism, or other forms of academic dishonesty in this course is subject to the provisions of the Honor Code.

Class Recordings: Students are expressly prohibited from recording any part of this course. Meetings of this course might be recorded by the University. Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Recordings may not be reproduced, shared with those not in the class, or uploaded to other online environments. If the instructor or a University of Miami office plans any other uses for the recordings, beyond this class, students identifiable in the recordings will be notified to request consent prior to such use.

Resources

Disability Access: Students in need of academic accommodations for a disability may consult with Office of Disability Services (ODS) to arrange appropriate accommodations. Students are required to give reasonable notice prior to requesting an accommodation.

The Office of Disability Services (ODS) is located in the Camner Center for Academic Resources in Whitten University Center 2400. ODS staff can be reached at 305-284-2374 (Voice) or 305-284-1999 (Fax). Office hours are 8:30 am to 5:00 pm, Monday through Friday. Individuals may email the office staff for quick responses to questions.

Sexual Misconduct/Sexual Harassment Reporting: The University of Miami seeks to maintain a safe learning, living, and working environment free from all types of sex-based and gender-based discrimination prohibited by state and federal laws, including Title IX and Title VII, and in keeping with the University's culture of belonging, DIRECCT values and expected behaviors.

The University's ***Sexual Misconduct Policy*** applies to all members of the University community, including students, faculty, staff, and visitors. The procedures for investigation and adjudication of complaints is determined by the status of the individual who is alleged to have engaged in sexual misconduct ("Respondent").

Free Tutoring at University of Miami: On-campus tutoring and writing assistance is available for students at University of Miami. The Learning Commons supports learning at the University of Miami through the co-location, coordination and enhancement of existing academic services. The University of Miami Libraries' Learning Commons is the result of collaboration with campus partners including the Camner Center for Academic Resources, Academic Technologies, Writing Center, and Math Lab. To learn more at the Learning Commons, please visit the Richter Library, call 305-284-4722, or e-mail learningcommons@miami.edu.

University Writing Center: If needed, please provide information about the University's writing center.

Important Dates to Remember

Add a short statement that describes that all the dates and assignments are tentative, and can be changed at the discretion of the professor.

Last day to add: 24th January

Last day to drop without a 'W': 31st January

Last day to drop: 12th April

Final Examination: Not yet released.

Religious Observances: All students have a right to expect that the University of Miami will reasonably accommodate their religious observances, practices and beliefs. If you observe religious holidays, you should plan your allowed absences to include those dates. Students are expected to notify their instructor **in advance** if they intend to miss class to observe a holy day of their religious faith. [Religious Holy Day Policy and Calendar](#).

SAMPLE Student Consent for Class Recording

I, (the undersigned), understand that I am attending class sessions or events that may be audio or video
recorded. I was informed or made aware of this by the instructor before the start of the event. I hereby permit the University of Miami to release education records that consist of my voice or likeness as I participate in these classes or events. I am consenting to allow these materials to be used for educational purposes, including for institutional review of instruction and for the education of other students. I understand that I will receive no money or remuneration of any kind from the University related to this consent and release, or the materials covered by this consent or release. I acknowledge that I do not have the right to approve any materials developed by the university as authorized.

I understand that my consent here is independent of and separate from any other directive or consent I may have given to the University with regard to the release of my voice or likeness (such as for the release of Directory Information).

I understand my consent and release are voluntary and not a condition or requirement of my participation in this class or event.

_____ I agree to the above terms

_____ I do not agree to the above terms

Course Number and Title _____

Semester and Year _____

Course Instructor _____

Student name (please print) _____

Student signature _____ Date _____

Parent/guardian name if under 18 (please print) _____ Date
_____

Parent/guardian signature if under 18 _____ Date _____