Programming for Electrical Engineers II

EEL 4837

Class Periods: Tuesday 10:40 AM – 11:30 AM, Thursday 10:40 AM –12:35 PM

Location: Larsen Hall 239

Academic Term: Spring 2023

Instructor

Name: Ivan Ruchkin
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Office Phone Number: (352) 273-2171
Office Hours: Tuesday 11:30 AM – 12:30 PM, Larsen Hall 334B (behind large wooden doors)

Teaching Assistants/Peer Mentors/Supervised Teaching Students

Please contact through the Canvas website

Name: Qiangeng Yang
Email: q.yang@ufl.edu
Office hours: Friday 4:00 PM – 6:00 PM on Zoom/in NEB 401 (flexible hours, fill out the weekly poll)

Name: Haritha Vk
Email: harithavk@ufl.edu
Office hours: N/A

Course Description

Programming has become an essential component of virtually every aspect of Engineering. However, writing correct and efficient programs requires an understanding of the underlying foundations, including implementation, manipulation, and analysis of structured data, understanding how algorithms are built on top of such data, and navigating trade-offs between program performance and resource constraints. This course covers the foundations of programming specifically targeted toward Electrical Engineers. It will cover the implementation and use of data structures in solving programming problems, including stacks, queues, matrices, trees, and graphs. Students will practice programming a variety of algorithms, and several algorithmic design techniques (recursion, divide-and-conquer, greedy algorithms, dynamic programming) will be presented. The course will include excursions illustrating the application of these techniques in Electrical Engineering.

Credits: 3.

Course Pre-Requisites / Co-Requisites

EEL 3834 Programming for Electrical Engineering, or equivalent proficiency in programming.

Two prerequisites are strongly recommended before taking this course:

- At least 2 courses/semesters of programming experience in any language
- Basic knowledge of C or C++, obtained by self-study or in COP2274 C++ Programming for Engineers

Basic knowledge of linear algebra (matrices, systems of linear equations) is recommended.

Course Objectives

Upon completing the course, students will:

- Have a grasp of the fundamentals of data structures and algorithms: lists, queues, stacks, divide-and-conquer, dynamic programming, and so on
- Be able to assess the impact of data structures and algorithms on program performance
- Have hands-on experience on implementing and using important data structures and algorithms in C++
- Have experience of applying specific data structures in various Electrical Engineering applications

Materials and Supply Fees
N/A

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
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	High
3. An ability to communicate effectively with a range of audiences	Medium
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	Medium
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	Low
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	High
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium

* Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software

- Mark Allen Weiss: Data Structures and Algorithms in C++ 4th Edition, Addison-Wesley (Required)

Recommended Materials

- Ellis Horowitz, Sartaj Sahni,Susan Anderson-Freed. Fundamentals of Data Structures in C, 2nd Edition (Recommended)
- Cormen, Leiserson, Rivest, Stein: Introduction to Algorithms 3rd Edition, MIT Press (Optional)
- Deitel & Deitel, C++: How to Program, 10th edition, Pearson (Recommended to those new to C++)
- Savitch, Absolute C++, 6th edition, Pearson (Optional)

Course Schedule

Week	Content	Assignments
1	Course Overview, Big-Oh Notation, Asymptotic Complexity Analysis	
2	Arrays, Stacks, C++ Templates	
3	Sorting Algorithms, Recursion	HW1 out
4	Matrices, Excursion 1	Excursion 1 out
5	C++ Pointers, Linked Lists, Queues	HW1 due
6	C++ Classes, Strings, STL	HW2 out
7	Binary Trees, Search Trees	
8	C++ Streams, Files	HW2 due
9	Midterm Exam	Excursion 1 due
10	Heaps, Excursion 2	HW3 out, Excursion 2 out
11	Graphs	

12	Greedy Algorithms, Dynamic Programming	HW3 due, HW4 out
13	Hashing, Maps	
14	Shortest Path and Spanning Tree Problems	HW4 due
15	Review, Additional Topics (Time Permitting)	Excursion 2 due

Attendance Policy, Class Expectations, and Make-Up Policy
This is an in-person class. Students are strongly encouraged to attend the classes in person for the sake of better engagement, participation in exercises, giving feedback, and generally improved learning.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with the university attendance policies.

Evaluation of Grades

Assignment	**Percentage of Final Grade**
Homeworks (4)	40%
Excursions (2)	20%
Midterm Exam	20%
Final Exam	20%

The midterm exam will be held in class during the week of March 6th (the week before the Spring Break).

The non-cumulative final exam will be held via Honorlock+Canvas on May 4th, 5:30 PM – 7:30 PM.

Grading Policy

Percent	**Grade**	**Grade Points**
90.0 - 100	A	4.00
86.7 - 89.9	A-	3.67
83.4 - 86.6	B+	3.33
80.0 - 83.3	B	3.00
76.7 - 79.9	B-	2.67
73.4 - 76.6	C+	2.33
70.0 - 73.3	C	2.00
66.7 - 69.9	C-	1.67
63.4 - 66.6	D+	1.33
60.0 - 63.3	D	1.00
56.7 - 59.9	D-	0.67
0.00 - 56.6	E	0.00

This class will not be curved down. If everyone does well, everyone can get an A.

More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Collaboration and Plagiarism
The assignments in this course are to be completed *individually* by the students. Discussing ideas and challenges is encouraged, but sharing and collaborating on code is prohibited.

Any external (e.g., online) sources from which the code or writing is borrowed need to be *explicitly and appropriately credited*. Submission of uncredited borrowed code/writing constitutes plagiarism.

Students Requiring Accommodations
Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation
Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

University Honesty Policy
UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

In-Class Recording
Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.
A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.
Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services.
A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Commitment to a Safe and Inclusive Learning Environment
The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

• Your academic advisor or Graduate Program Coordinator
• Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@ufl.edu
• Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
• Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use
All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy
There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

Campus Resources:

Health and Wellness

U Matter, We Care:
Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: https://counseling.ufl.edu, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic Resources

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; https://career.ufl.edu.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Academic Tutoring, https://academicresources.clas.ufl.edu/tutoring/. Various forms of academic support to help students succeed in their studies, free to UF students.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus*:* https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/;https://care.dso.ufl.edu.

On-Line Students Complaints*: https://distance.ufl.edu/state-authorization-status/#student-complaint*.