

Syllabus

(Summer 2024)

ECE 4122: Advanced Programming Techniques for Engineering Applications

<u>Instructor</u>	<u>Email</u>	<u>On-Campus Office Location & Hours</u>
Jeff Hurley	jeffery.hurley@gtri.gatech.edu	In-person: TBD

Description:

Course covers a number of programming techniques for distributed and parallel computing and other advanced methods, such as multithreading, OpenMP, sockets, GPU/HPC programming, OpenMPI, OpenGL, etc.

Required Textbook: None. Will be using online textbooks through GaTech library and online resources.

Assignments & Grading:

Seven Programming Assignments (70%) must be written in C++ running on PACE-ICE
Final Project (TBD) (30%) can be either C++ or python running on different OS. Can be individual or teams of up to 5 students. I will provide a default individual final project, but you can propose your own individual or team project.

Self-directed laboratory section:

Ungraded: Reading or small ungraded programming problems.

If possible bring your laptop to class so that you can work along with the class examples.

Final grades will be assigned according:

A = [90, 100]; B = [80,89]; C = [70,79]; D = [60,69]; F = [0,59]

Grading disputes should first be directed at the person grading the assignment (e.g., the GTA or UTA for homework & project grades, Prof. Hurley for exams, participation, etc.), but any dispute can be escalated to Prof. Hurley as needed. Also, it is expected that any grading concerns be raised within one week of the grade being posted, because it isn't possible to address a large number of issues in the last weeks of the semester.

Course Goals and Outcomes:

- Learn to apply object orientated programming (OOP) techniques.
- Learn to apply the different methodologies of multi-threaded software development.
- Develop ability to design and implement multi-threaded applications using standard threading libraries and automated compiler generated multithreaded software.
- Ability to design and develop distributed software applications using a high-performance computing (HPC) cluster.
- Ability to design and develop software applications that utilize Graphic Processing Units (GPUs).
- Ability to design and develop network communication software using transmission protocols such as Transmit Control Protocol (TCP) and/or User Datagram Protocol (UDP).

ACADEMIC HONESTY: Although students are encouraged strongly to work together to learn the course material, all students are expected to program assignments individually, following all instructions stated in conjunction with the assignments. You **MAY NOT** copy code from others in any way. You **MAY NOT** use solutions that others have developed as the sole basis for your solutions. However, you **ARE** allowed to discuss the problems with others, including fellow students, teaching assistants, and the instructor. Automatic plagiarism detection algorithms will be used to compare source code against all students in the course. You **ARE** allowed to solicit and obtain help in design and debugging your solutions. You **CAN** show others your **BROKEN** code and ask for advice about why it is not working or how to make it work better. But to be totally clear, you **MUST** implement your own solution. If someone helps you, **YOU still MUST enter every line of code of your solution personally, and you MUST fully understand every part of your submission.** Students should be prepared to explain the solution to an assignment. All conduct in this course will be governed by the Georgia Tech honor code. Additionally, it is expected that students will respect their peers and the instructor such that no one takes unfair advantage of any other person associated with the course. Any suspected cases of academic dishonesty will be reported to the Dean of Students for further action.

AI Code generating tools can be used as a reference, but cannot be turned in as a solution to any class work. This action is considered a form of cheating. You can use these tools similar to asking a friend for help.

The URL for the GT honor code is:

<http://www.policylibrary.gatech.edu/student-affairs/academic-honor-code>

BACKING UP WORK: It is each student's responsibility to create back-ups of work performed in this class. Lost work or time due to computer/disk/web server failures is not a valid excuse for late submissions.

STUDENT WELL-BEING: Dr Voss and his team will help you if you need

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES: If you are a student with learning needs that require special accommodation, contact me and Mrs Corinne Guyot, as soon as possible with your accommodations letter.

STUDENT-FACULTY EXPECTATIONS AGREEMENT: At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See [this catalog page](#) for an articulation of some basic expectation that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

INFORMATION RELATED TO COVID-19:

Students are expected to be familiar with and abide by the Institute guidelines, information, and updates related to Covid-19. Find campus operational updates, Frequently Asked Questions, and details on campus surveillance testing and vaccine appointments on the [Tech Moving Forward site](#).