



Be The Difference.

COEN 4690 – Computer Systems Programming

Fred J. Frigo, Ph.D.

Spring 2027

Course Description:

This course introduces the principles and practice of systems-level programming grounded in computer systems architecture. Students examine how software executes on computer systems, including interactions among processes, processors, and system components. Topics include system-level I/O, processes, inter-process communication, network programming, multithreaded programming, synchronization, and parallel programming using multicore CPUs and GPUs. Students develop, test, debug, profile, and optimize systems software using Linux system interfaces, C/C++, and CUDA. Software development lifecycle practices are integrated throughout the course.

Course Learning Outcomes:

Upon successful completion of this course, students will be able to develop, debug, and optimize systems-level software using C/C++ in a Linux environment; implement system-level I/O, process management, inter-process communication, network protocols, and multithreaded applications; apply synchronization and parallel programming techniques using multicore CPUs and NVIDIA CUDA GPUs; evaluate software correctness and performance through systematic testing and profiling; and apply software development lifecycle practices, including requirements analysis, version control, collaborative development, and software integration, to deliver reliable and maintainable software systems.

Schedule:

Class meets on Tuesdays & Thursdays: 3:30pm-4:45pm

In person – or live stream available via Microsoft Teams.

Grading:

Homework and Projects: 60%

Mid-term exam: 20%

Final exam: 20%

Recommended Texts:

Randall E. Bryant, David R. O'Hallaron, *Computer Systems – A Programmer's Perspective*, 3rd edition, 2016.
ISBN: 9780138105396

Other Notes:

Students are required to comply with all policies outlined in the Undergraduate Bulletin, including the Marquette University Honor Code and Honor Policy. Attendance is required. Excessive unexcused absences may result in grade of 'WA' or 'WF'. Class notes and lecture recordings will be shared on D2L. Assignments will be given at least 2 weeks prior to the due date.

Office Hours:

By appointment; using Microsoft Teams or in-person Haggerty Hall – Room 235

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