

ESE 565 Parallel Processing Architectures Fall 2023

The goal of this course is to provide in-depth understanding of modern parallel computer architectures and the introduction to parallel programming with ISPC, Pthreads, OpenMP, CUDA, and MPI. We will seek to understand the fundamental design issues, engineering tradeoffs, and essential interplay of hardware and software that cut across parallel machines, rather than simply consider a descriptive taxonomy. The emphasis is on shared memory and data parallel systems. Students will undertake either an HDL multi-core processor design project or a parallel programming project (both given by Instructor) or a system design/analysis/parallel programming project of their own choice (that has to be approved by Instructor).

Prerequisites: ESE 545 or equivalent. 3 credits

Web page: <http://www.ece.sunysb.edu/~midor/ESE565/index.html>

Instructor: Prof. Mikhail Dorojevets

Office: 243 Light Engineering, 632-8611

Office hours: Wednesday 10:00 am -12:00 pm

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Lectures: Thursday 5:30-8:20 pm 154 Light Eng. Bldg.

Textbooks (recommended):

- D. Culler and J. Singh, Parallel Computer Architecture, ISBN 1-55860-343-3, Morgan Kaufmann Publishers, 1999
- P. S. Pacheco and M. Malensek, An Introduction to Parallel Programming, 2nd ed., ISBN: 978-0-12-804605-0, Morgan Kaufmann Publishers, 2022
- Dubois, Annavaram, Stenstrom, Parallel Computer Organization and Design, Cambridge Univ. Press, 2012.
- J. Hennessy and D. Patterson, Computer Architecture: A Quantitative Approach, Sixth edition, Morgan Kaufmann Publishers (Elsevier), 2019, ISBN: 978-0-12-811905-1.

Course Grading:

- **Individual** parallel programming assignments with MPI, CUDA, POSIX threads, OpenMP, and ISPC - 45%
- Mid-term exam - 25%
- Project (one- or two-student teams) - 30%

If you have a physical, psychological, medical or learning disability that may impact on your ability to carry out assigned course work, I would urge that you contact the staff in the Disabled Student Services office (DSS), room 133 Humanities, 632-6748/TDD. DSS will review your concerns and determine, with you, what accommodations are necessary and appropriate. All information and documentation of disability is confidential.