

Introduction to High Performance Computing

CS1645 / CS2045

University of Pittsburgh

Department of Computer Science

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Schedule: Class meets Monday and Wednesday 6:00-7:15pm in Sennott Square 5129.

Webpage: <http://people.cs.pitt.edu/~bmills/pages/cs1645.html>

Goal

This course is an introduction to the architecture of and software techniques for parallel and high performance computing systems. The content includes fundamental architecture aspects of shared-memory and distributed-memory systems, as well as paradigms, algorithms and languages used to program parallel systems. Students will complete a number of projects demonstrating specific applications on parallel processing systems.

Resources

The official textbook is “An Introduction to Parallel Programming” by Peter Pacheco (Morgan Kaufman, 2011, ISBN:978-0123742605).

Other resources will be made available via the course website.

Prerequisites

This course has the following prerequisites:

- CS 449: Introduction to Systems Software.
- CS 1501: Algorithm Implementation.

The programming assignments assume the student is familiar with the C programming language and basic unix skills.

Topics

- High performance computing systems
- Parallel programming patterns
- Multiprocessor architectures
- Cache coherence in symmetric multiprocessors
- Shared-memory programming with OpenMP
- Accelerators programming with OpenMP extensions
- Models of parallel processing
- Performance metrics
- Distributed-memory programming with MPI
- Parallel algorithms
- Map Reduce

Grading

Homework/Assignments & CS2045 Project	50%
Mid-term	20%
Final Exam	30%

Policy on Cheating

The highest academic integrity standard is expected from every student in this course. The solutions to all the assignments and examinations in this course should be the result of the student's individual effort. Presenting the words or ideas of somebody else under your name hinders your skills in problem solving and violates the university's policy on academic integrity (<http://www.provost.pitt.edu/info/ai1.html>). Cheating on an exam or plagiarizing a homework will result in a score of "0" for all the students involved. Multiple violations to this policy will result in a final grade "F" in the course.

Students with Disability

Contact the Office of Disability Resources and Services, 216 William Pitt Union (412-648-7890), as soon as possible in the term. They will determine a reasonable accommodation for this course.