

Syllabus
CSC 76010 Parallel Scientific Computing
Fall 2025

Time and Place	Tuesday, 11:45 a.m. - 1:40 p.m., Room 4419
Instructor:	Dr. Feng Gu (Feng.Gu@csi.cuny.edu)
Office Hours	Tuesday, 1:40-2:40 p.m. or by appointment
Web Page:	http://www.cs.csi.cuny.edu/~gu/teaching/courses/csc76010/csc76010.html
Textbook	<ol style="list-style-type: none">1. Parallel Programming: Techniques and Applications using Networked Workstations and Parallel Computers (2nd ed.) by B. Wilkinson and M. Allen, Prentice Hall. ISBN-10: 0131405632 ; ISBN-13: 978-0131405639 (Optional)2. Parallel Processing for Scientific Computing by M. A. Heroux, P. Raghavan, and H. D. Simon, SIAM, ISBN: 978-0-89871-619-1. (Optional)3. Using MPI - 2nd Edition: Portable Parallel Programming with the Message Passing Interface (Scientific and Engineering Computation) by W. Gropp, E. Lusk, and A. Skjellum, MIT Press. ISBN: 0262571323. (Reference)
Course Description	Computationally complex problems cannot be solved in a single computer either because they are combinatorially complex (NP-Hard) or because they are large involving much data such as very large matrices or much computation. The framework we use to solve these kinds of problems in parallel is called MPI, short for Message Passing Interface. We examine combinatorial problems such as Boolean Satisfiability, Set Partitioning, Traveling Salesman and large problems such as might be in matrix multiplication or simulated annealing.
Learning Goals	<ul style="list-style-type: none">• Learn how to design algorithms in parallel environments• Learn how to use MPI in a parallel program• Learn how to use MPI in solving<ul style="list-style-type: none">▪ Clustering Problems▪ The Traveling Salesman Problem▪ The Set Partitioning Problem▪ Matrix Multiplication▪ Simulated Annealing▪ Optimization Problems▪ Graph Coloring▪ Graph Betweenness
Topics	<ul style="list-style-type: none">• MPI Tutorial• Amdahl's and Gustafson's Laws• Matrix Multiplication

- Boolean Satisfiability
- Set Partitioning
- Simulated Annealing
- Graph Coloring
- Graph Betweenness
- Large Optimization Problems

Grading

This course will include a midterm exam (open book, only class notes and printed slides allowed) and a term project, and each accounts for 50% of the final grade.

**Last Date for
Withdrawal**

September 15, 2025 (**double check with the registrar's office**)

Others

Disruptive classroom behavior will not be tolerated. Cell phones must be turned off during the class time. Class participation is strongly encouraged. Please refer to the policies of graduate center of CUNY on academic integrity, plagiarism, and cheating.

Disclaimer

This syllabus represents a general plan for the course and deviations from this plan may be necessary during the duration of the course.