Syllabus

CSE 6730 A—Modeling and Simulation / CS 4230 A—Computer Simulation

Fall 2026 · Georgia Tech-Atlanta Campus · CRN 89226 / 89227

Course Snapshot

Associated Term	Fall 2026
Subject / Course Number	Computational Science & Engineering / CSE 6730 / CS 4230
Title	Model & Simulation: Foundations & Implementation / Computer Simulation
Section / Schedule Type	A / Lecture
Credit Hours / Grade Mode	3 / Letter Grade
Instructor	Chen, Peng
Meeting Pattern	Monday and Wednesday · 5:00 PM – 6:15 PM
Date Range	08/24/2026 – 12/17/2026
Location	Georgia Tech-Atlanta Campus · Instructional Center 211
Campus / CRN	Georgia Tech-Atlanta · 89226 / 89227

Instructor and Instructional Support

Instructor: Peng Chen

- Office hours: To be announced on Canvas.
- Teaching assistants and TA office hours: To be announced on Canvas.
- For routine course questions, use the course communication channels announced by the instructional team.

Course Description

Foundations and algorithms concerning the development of conceptual models for systems, and their realization in the form of computer software; discrete and continuous models.

Learning Goals

- Develop conceptual models for physical, engineered, or computational systems.
- Implement simulation software for discrete and continuous models.
- Apply core numerical methods used in scientific computing and simulation.
- Design computational experiments, interpret results, and communicate findings clearly.

Prerequisites

Students are expected to have a solid foundation in undergraduate calculus and linear algebra (for example derivatives and integrals, multivariable calculus basics, matrix and vector operations, and eigenvalues/eigenvectors), along with some exposure to differential equations. On the computing side, students should be comfortable writing and debugging short programs, working with arrays and matrices, making plots, and running numerical experiments. Python, MATLAB, and Julia are all suitable choices;

C/C++ or another compiled language is also acceptable if paired with appropriate numerical libraries. No prior experience with numerical methods is assumed, but students should be prepared for a course that combines mathematics, implementation, and experimentation.

Primary Text and Useful Resources

Primary text: Michael Heath, Scientific Computing: An Introductory Survey.

Additional resources will be provided in canvas.

Course Logistics

- Scheduled lecture meetings: Mondays and Wednesdays, 5:00 PM–6:15 PM, Instructional Center 211.
- Official course dates: August 24, 2026 through December 17, 2026.
- Canvas should be treated as the primary hub for announcements, handouts, and assignment logistics.
- Students are strongly encouraged to attend lecture and participate actively, even when supporting materials are posted online.

Assessment and Grading

The grading structure follows the spring offering.

- 50% Quizzes. The lowest quiz score is dropped. Quizzes are expected to be timed and delivered online through Canvas or another announced platform.
- 50% Final project. The project is a semester-long, team-based modeling and simulation effort.

Final letter grades follow this scale: A = 90–100, B = 80–89, C = 70–79, D = 60–69, F = 0–59.

There are no extra-credit opportunities in the course.

Project

- The project is a team-based activity on a topic chosen by the team.
- Teams should generally consist of 3–5 students, unless the instructor approves another arrangement.
- The goal is to build, analyze, and communicate a simulation model for a system of genuine interest.
- Expected deliverables include a written report, presentation or video component, and the code developed by the team.
- Each student must make a clearly identifiable contribution, including substantial software work related to the simulation model.

We will have the following milestone sequence: team formation, literature review, two progress checkpoints, and a final report/presentation, with exact deadlines announced on Canvas.

Tentative Topic Schedule

The spring offering covered the topics below in roughly this order. For Fall 2026, the list should be treated as a tentative to be adjusted by the instructor.

Week of	Primary topics
Aug 24, 2026	Introduction to the course; modeling and simulation overview.
Aug 31, 2026	Linear systems I.
Sep 7, 2026	Linear systems II.

Week of	Primary topics
Sep 14, 2026	Linear systems III.
Sep 21, 2026	Eigenvalue problems I.
Sep 28, 2026	Eigenvalue problems II; SVD/POD I.
Oct 5, 2026	SVD/POD.
Oct 12, 2026	Optimization.
Oct 19, 2026	Numerical integration and differentiation.
Oct 26, 2026	Initial-value problems for ODEs.
Nov 2, 2026	Boundary-value problems for ODEs.
Nov 9, 2026	PDEs I.
Nov 16, 2026	PDEs II.
Nov 23, 2026	Project workshop / review / adjusted holiday schedule as announced.
Nov 30, 2026	Project help, synthesis, and final presentations or wrap-up activities.

Attendance and Participation

Students are not required to attend every class meeting, but students who attend regularly generally perform better. Participation, questions, and office-hour engagement are strongly encouraged.

Late Work

Quizzes should be completed within the announced windows. The dropped-quiz policy is intended to absorb one low or missed quiz without undue penalty. Additional flexibility, if any, will be communicated by the instructor.

Collaboration Policy

Quizzes are intended to be individual work. They may be open-book and open-internet, but students should not directly collaborate with others or obtain outside solutions. For the final project, collaboration is expected within each team, but each student must make a clear, individual contribution and may not simply rely on external software or another team's code.

AI Policy

This course emphasizes conceptual modeling, numerical methods, and implementation. AI tools can help with learning and productivity, but they can also short-circuit the skills the course is designed to build. The policy below is adapted directly from the spring syllabus.

1. You are responsible for your work. Anything you submit—text, mathematics, code, figures, citations, or results—must be understood by you and defensible in discussion.
2. AI output is not automatically correct. Treat AI as an unreliable assistant that can hallucinate mathematics, citations, and code behavior.
3. Transparency is required. Meaningful AI use must be disclosed.
4. Learning objectives come first. If AI replaces the thinking an assessment is designed to measure, that use is not allowed.

On quizzes, students may use AI only for low-level clarification or debugging help that does not provide the actual solution, derivation, or final answer. Asking AI to solve a quiz question, choose answers, or provide the main reasoning is not allowed.

On the project, AI may be used for brainstorming, debugging, refactoring, writing support, docstrings, and similar productivity tasks. However, the core conceptual model, the numerical-method choices, and the substantial original code must remain the work of the student team, and the team must be able to explain and validate all submitted results.

Any meaningful AI use in milestone reports, the final report, or the repository should be disclosed in an AI Use Statement that identifies the tool, what it was used for, which files or sections were affected, and how the output was verified.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Any student suspected of cheating or plagiarizing on an exam, quiz, or assignment may be reported through the Institute's academic integrity process.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services as soon as possible to discuss your needs and obtain an accommodations letter. Please also communicate with the instructor early in the semester so that appropriate arrangements can be made.