

CS 8001 OAH Syllabus

Optimization Algorithms in Hardware, Section OAH, 1 credit hour

Fall 2026

Instructor Information

Instructor	Email
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General Course Information

Description

This seminar provides an overview of optimization algorithms and the hardware built to run them. Optimization searches for the extreme values of an objective function whose variables may be continuous or discrete. This seminar focuses on the discrete case through three classic problems: Boolean satisfiability (SAT), maximum cut (MAX-CUT), and the traveling salesman problem (TSP). These problems appear in many practical applications, including task scheduling, physical simulations, and circuit layout. This course covers key algorithmic concepts as well as specialized hardware accelerators: custom chips, analog circuits, and quantum machines. Through discussions, this seminar will leave students with a vivid picture of the main algorithmic and hardware approaches to these problems and the ideas behind them.

Course Learning Outcomes

Upon successful completion of this course, you should be able to:

- Define SAT, MAX-CUT, and TSP and formulate a practical problem as an instance of one of them.
- Describe the main algorithmic strategies for discrete optimization.
- Explain how a discrete optimization problem is mapped to a hardware accelerator and how a hardware accelerator arrives at a solution.
- Identify one to two challenges in running optimization algorithms on specialized hardware

Required Course Materials

No textbooks are required. We will provide all readings through Canvas.

Grading Policy:

This course uses pass/fail grading. There are no exams and no projects. The course includes synchronous meetings, but your grade is based entirely on participation in the online discussion (Ed Discussion).

How to Pass

To earn a passing grade, you need to accumulate at least 4.0 points by the end of the semester.

- On-time submission: Earns 1.0 point (submitted by the post's deadline).
- Late submission: Earns 0.5 points (submitted after the deadline, but by the final cutoff November 24, 23:59:59 Anywhere on Earth)
- Invalid submission: Earns 0 points.

Discussion Posts & Point System

- The Posts: The instructor will publish 8 **graded posts** over the semester on Ed Discussion. Each specifies a question and a deadline.
- Point Limit: You can earn points for at most one response per **post**. Two late submissions still earn a total of 0.5 points.
- Final Cutoff: No comments posted after **November 24, 23:59:59 Anywhere on Earth** will be counted.
- Flexibility: You can reach 4.0 points through any combination of on-time or late submissions.
- What makes a "Valid" comment: To qualify for points, your response must:
 - Be related to the graded post you are commenting on.
 - Be at least 100 words long.
 - Be written by you (AI-generated text will not be counted).
 - DO NOT DELETE your graded comment before the final cutoff November 24, 23:59:59 Anywhere on Earth.

Non-graded Part

- You are encouraged to post or interact with other students in the Ed Discussion, but these interactions will not be graded.
- The attendance at synchronous meetings is encouraged but neither required nor graded.

Logistics

- You can check your points on Canvas after we grade.
- If Ed Discussion becomes unavailable, an announcement will be posted on Canvas to show an alternative way to submit your comments. You will need to follow the instructions from that announcement.

USG Required Course Policies

Attendance and/or Participation

Synchronous meetings

Three to six synchronous meetings will be held over the semester. The day and time are not yet fixed. We will poll enrolled students and post the final schedule on Canvas. Attendance at these synchronous meetings is neither required nor graded. However, we encourage you to attend.

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. Review [Georgia Tech's Honor Code](#) and the student [Code of Conduct](#).

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Core IMPACTS

Not applicable.

Additional Georgia Tech Required Policies

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, [contact the Office of Disability Services](#) (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. [The Student-Faculty Expectations](#) articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Optional Course Expectations, Policies, and Resources

Not applicable.

Pre- &/or Co-Requisites

No pre-requisites.

Extra Credit Opportunities

Not applicable.

Collaboration, Group Work, and Use of Generative AI

See Section “Grading Policy”.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

See Section “Grading Policy”.

Inclement Weather and Digital Learning Days

Not applicable.

Student Use of Mobile Devices in the Classroom

Not applicable.

Additional Course Policies

Not applicable.

Campus Resources for Students

Not applicable.

Additional Syllabus Components

Not applicable.