

# CS 7651 Course Syllabus

Fall 2026

## Course Information

**Course Prefix and Number: CS7651**

**Course Name: Human and Machine Learning**

**Instructor: Varma, Sashank**

## Course Description

There is a growing gap between the theories and models of cognitive science and the approaches that have been developed by AI and ML researchers. This course bridges this gap. The first module will cover the classical cognitive science literature on knowledge representation and acquisition. The second module will cover the cognitive science literature on a range of cognitive abilities and how they are learned: language understanding, mathematical thinking, reasoning. The third module will cover fundamental concepts in machine learning, which we will approach from a statistical learning point of view. The final module will introduce the neural correlates of human cognition and learning and cover how this information is feeding back to influence and inspire ML researchers. Throughout, we will stay focused on the question: ***Can ML algorithms provide new and insightful explanations of human learning and cognition?***

Students should be comfortable in the Python programming language to complete the assignments and to carry out the final project. It is desirable to have taken a prior course in cognitive science, artificial intelligence, machine learning, or statistical modeling.

## Additional Criteria for Successful Completion of the Course

There are no formal pre-requisites for this course. However, it is desirable to have taken a prior course in cognitive science, artificial intelligence, machine learning, or statistical modeling. Students should also be comfortable in the Python programming language to complete the assignments and to carry out the final project.

## Course Learning Outcomes

By enrolling in this course, students will:

1. Learn about the theories, methods, and models that comprise cognitive science, and the critical experimental data on human cognition to be explained.

2. Learn about core techniques in machine learning and statistical learning.
3. Master these techniques through the completing of ~8 homework assignments.
4. Develop the ability to read the primary literature in cognitive science, artificial intelligence, and machine learning.
5. Explore a topic at greater depth in a final project completed with 2-3 other students that applies an ML approach to account for empirical data on human learning and cognition.

### Required Course Materials

The readings for this course will come from a variety of sources. Some will be chapters from textbooks such as:

- James, G., et al. (2023). *An introduction to statistical learning with applications in Python*. Springer. <https://www.statlearning.com/>

Others will be journal articles, book chapters, conference papers, and in one case an online tutorial. All will be available on the Canvas site.

### Grading Policy

This course is graded on an A–F basis.

Grading will be based on 5 components.

- Discussion Posts 10%
- Homework assignments 40%
- Draft Abstract + References 5%
- Recorded Presentation 5%
- Final Paper 40%

Grades will be assigned based on the following cut-offs.

- A: percentage  $\geq 90$
- B:  $90 > \text{percentage} \geq 80$
- C:  $80 > \text{percentage} \geq 70$
- D:  $70 > \text{percentage} \geq 60$
- F:  $60 > \text{percentage}$

Note that your final percentage will not be rounded up. For example, an 89.6% will be assigned a grade of B.

### Attendance Policy

This will be an active classroom. You will be expected to attend class and to participate in class discussions.

### Academic and Research Honesty/Integrity Statement

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 the [Student Code of Conduct](#) and the [Academic Honor Code](#), especially [Appendix A: Graduate Addendum to the Academic Honor Code](#).

Students are expected to perform research in an ethical and responsible manner. All Doctoral and Master's Thesis students are required to take the [Responsible Conduct of Research training](#), and it is expected that students abide by the principles taught in that training while performing research for this thesis course.

Allegations of scientific or scholarly misconduct are handled in accordance with the procedures outlined by the [Policy for Responding to Allegations of Scientific or Other Scholarly Misconduct](#).

### Core IMPACTS

Not applicable.

### 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 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.

### Expectations of Advisors and Advisees

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 [Expectations of Advisors and Advisees](#) articulates 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.