

# CS390: Seminar in Artificial Intelligence: Natural Language Understanding Smith College, Spring 2025

Course Name: CS390: Seminar in Artificial Intelligence:  
Natural Language Understanding  
Room: Ford 241  
Time: Tuesdays and Thursdays, 1:20-2:35 PM EST  
Moodle: <https://moodle.smith.edu/course/view.php?id=51874>  
Slack: <https://csc-390lu-01-202503.slack.com>

Credits: 4 credits  
Type: Seminar  
Restriction(s): Not open to first-years and sophomores  
Prerequisites: CS231, CS250  
Approval: Instructor permission

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Phone: (413) 585-3789  
Office Hours: TBA

## Course Description:

This special topics course provides an introduction to artificial intelligence (AI) systems that can understand and interact with people through natural languages (such as English). The aim of this course is to go beyond “shallow” methods of parsing and computing word distributions and towards artificial intelligence systems that think, understand, and communicate like people do. This course will take a “cognitive AI” point of view which is not just interested in getting computers to perform “tasks” as well as people, but is interested in what building these systems can tell us about how humans think.

## Topics

Artificial intelligence is vast and has a long and rich history which is impossible to cover entirely in a single course. However, because understanding appears to require so much of the faculties of human intelligence, it provides a vehicle for touching on many of its aspects, such as story understanding, question answering, summarization, story generation, machine translation, semantics, meaning representation, knowledge representation, and commonsense reasoning. Dialog agents, chatbots, information retrieval, intelligent personal assistants (e.g. Siri), detecting malicious online behaviors, detecting trolling / flaming / bullying, and detecting escalation to violence are among the interesting modern-day applications of natural language understanding systems.

## Prerequisites and Requirements

Junior or senior class standing is required for this course. CSC 250 “Theory of Computation” is a required prerequisite for this course because you will be expected to know standard CS concepts about the connections between languages and computing machines. CSC 231 “Microprocessors and Assembly Language” is a required prerequisite to assure your comfort and maturity with computer systems. This course satisfies the CS major and minor breadth requirements for a “theory” course (although it should probably be “systems” as well). As a 300-level seminar course, this course fulfills the seminar requirement for the CS major and minor.

## Seminar Course Activities

In this seminar-style course, students will engage in the following activities:

- Reading and consuming academic literature on the subject, i.e. conference and journal papers, tech reports, book chapters, and their abstracts, keywords, citations, and bibliographies. We will usually read 2-3 papers per week.
- Giving in-class presentations on the literature we read. Each student will be expected to present several papers during the semester.
- Asynchronous discussion activities, such as submitting answers to reader response questions, close reading questions, and discussion questions on the literature in preparation for in-class discussions.
- Contributing to in-class synchronous discussions on papers when you are not the presenter, and other in-class activities.
- Programming assignments where you will develop natural language understanding systems, commonsense reasoning systems, and natural language generation systems. You will form small groups to complete these assignments and we will usually discuss your solutions in class.
- A research project to be determined by the student (more details below). It will require a project proposal (due around the middle of the semester) and a weekly log/diary of your research activities. At the end of the semester each student will give an in-class presentation on the results of the research, and submit a final paper on the project.

## **Class Participation**

All class sessions in this remote class will take place on Zoom, with links posted on Moodle. All students will be expected to attend synchronous class sessions. In-class discussions and activities are an important part of your learning in this seminar class and all students are expected to arrive on time prepared to engage as an active participant. Your participation grade will take into account the following factors: attendance, timeliness, contribution to group discussions, preparedness (composing answers to discussion questions before class and being ready to discuss them), your level of intellectual engagement as demonstrated in quality of your contributions, and respect for your fellow students and for the instructor. Make-up participation assignments may occasionally be provided to students facing extenuating circumstances.

## **Research Projects:**

You'll have an opportunity to conduct your own research project on some topic in AI systems for natural language understanding. Your project may be a computer implementation of a natural language understanding system or a "sub-system" of an understanding system. For example, you may choose to focus on evaluations or comparisons of existing NLU systems, executing them on existing corpora or novel corpora that you create. Your project could also be a entirely philosophical or introspective exploration of a topic such as meaning representation. However, all projects must have some part that involves a software implementation or a data analysis. In the case of a theoretical or philosophical exploration, your software implementation could be a simple demo implementation or a modification of an existing system that embodies your ideas.

## **Individual and Group Work**

All graded class activities are expected to be performed individually, except for the group programming assignments and the research project activities. It is your choice whether you would like to work on the research project in a group or individually. Groups can have a maximum of 4 members. If you work within a group, you will need to show that you are making an independent contribution to the project. Each project member submits their own proposal and final paper separately, references the group but describes their own independent contribution, and gives a separate final presentation describing their contribution. All students are expected to fully abide by Smith College's Academic Honor Code and policies regarding academic honesty and integrity.

## **Grading**

The grading scheme is as follows:

Paper presentations:	15%
Asynchronous discussion activities:	20%
Group programming assignments:	15%
General class participation:	15%
Research project proposal, diaries, presentation:	15%
Research project implementation/data and report:	20%

The majority of class activities, (e.g., in-class presentations, answers to close reading and discussion questions, group programming assignments) will be graded using a three-valued “check”, “check-minus”, “zero” classification system. A “check” represents work that meets expectations for full credit. A “check minus” is for work that is well below expectations and earns partial credit. “Zero” is reserved for no-shows, non-submissions, and “almost-nothing” submissions and earns no credit. The research project implementation (or data analysis) and report will be scored together using standard letter grading. Grading on the reading/discussion assignments (which is the asynchronous discussion activities part of your overall grade) has a “drop lowest 2” policy. The lowest two grades that you get on these assignments will not count towards your overall grade.

Grades for all assignments will be posted on Moodle. Students are expected to monitor their posted grades throughout the semester and address any grading inaccuracies with the instructor in a timely manner, no later than 7 days of the date when the grade is posted. All grades for assignments other than the research project will be considered final at the start of the final exam period. It is the student’s responsibility to check Moodle and Slack regularly for information about schedule changes for homework assignments and exams. Any special considerations for grading or lateness due to illness, injury, or emergency will be referred to the appropriate class Dean.

## Communication

As much as possible, written communication regarding this course will take place via Slack (a cloud-based team collaboration tool used by many tech companies for internal communication). This includes:

- Course announcements in the #announcements channel
- Questions about readings, assignments, or anything else in the #questions channel
- Sharing AI/tech/CS news or anything else (memes, humor) in the #random channel
- Messages between individual students via private direct message
- Private messages to the instructor (via direct message to @Jamie Macbeth ) for individual matters.

Links to the Slack workspace are posted on Moodle. You will be automatically added to the workspace based on your registration in this course. Although I will try my best, I cannot commit to checking Slack after hours (i.e., evenings and weekends), so please consider asking questions and posting comments publicly. Participants on Slack are expected to be good citizens and to be respectful of everyone’s names and pronouns both in written and verbal communication.

## Accommodations

Smith is committed to providing support services and reasonable accommodations to all students with disabilities. To request an accommodation, please register with the Accessibility Resource Center at the beginning of the semester. Information on how to register and request accommodations is provided on the Accessibility Resource Center website<sup>1</sup>.

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<sup>1</sup><https://www.smith.edu/your-campus/offices-services/accessibility-resource-center/request-accommodations>