XCS224U: Natural Language Understanding

Syllabus and Course Information

Welcome

Welcome to XCS224U: Natural Language Understanding! This professional course is based on graduate-level material from Stanford's on-campus course CS224U, adapted for a professional certificate format. In this course you will:

- Learn from Stanford graduate lecture videos (Spring 2021) that have been edited and segmented by topic for easier navigation, reference, and review.
- Complete three guided homework assignments that lead to development of an original system of your own, and enter that system into a class-wide bakeoff.
- Complete a final project of your own choosing. (Previous course examples can be seen here.)
- Receive support from Stanford-affiliated Course Facilitators.
- Connect to a cohort of peers from diverse locations and professional backgrounds.

Course Launch

All lecture videos and assignments will be available on the first day of the course **(January 24th) at 12:00pm Pacific Time**.

Getting Started

This course will use different tools to distribute content, run assignments, and deliver support. They are:

1) **SCPD Learning Management System** – accessed via the mystanfordconnection site which you used to apply to and enroll in this course.
2) **GitHub** – to distribute programming assignment code.
3) **Slack** – for additional course support and class discussions.

Joining Slack

In addition to individual support from Course Facilitators (more details and guidelines in Course Facilitators, Support, and Guidelines section below), the cohort will have a Slack workspace to ask additional questions and discuss course topics. An email invitation to http://xcs224u-scpd.slack.com/ will be sent to your email address on file with SCPD on **January 21st**.

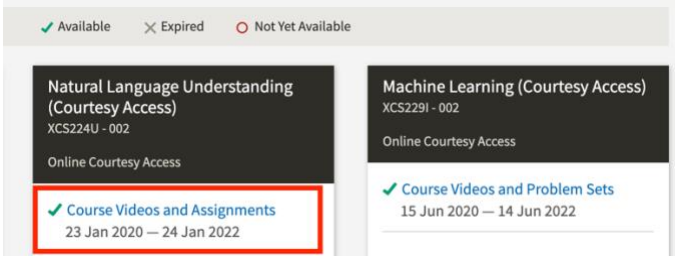
If you have previously joined an SCPD or Stanford Slack Workspace for a different course in the AI Professional Program, we have found that Slack does not send a notification when our staff invites you to an additional workspace. Instead, you are automatically re-activated in the system. On **January 21st** you should proceed directly to http://xcs224u-scpd.slack.com/ → I have a guest account → Log in using your credentials.

GitHub

Course notebooks and homework will be posted in a public GitHub repository. (If you took a different AI professional course, **this is different** from the system for that course – the private team will not be needed). If you don't have one already, you should create a GitHub account to be able to access everything.

Accessing Your Course

1. On **January 24th after 12pm Pacific Time**, log in to the mystanfordconnection account you used when applying for the Artificial Intelligence Professional Program.
2. XCS224U: Natural Language Understanding will be visible as a live course. Click the link titled "Course Videos and Assignments" to enter our learning management system.



Course Calendar

Below is a ***potential*** pacing guide for moving through the course, where we have mapped relevant modules to their associated homework and quizzes. You are welcome to move through the videos at a different pace if you prefer.

WEEK	POTENTIAL VIDEO PACING	ASSIGNMENTS	
1	Module 1: Introduction and Resources Module 2: Vector-space Models	**All Assignments Open/Available**	**January 24**
2	Module 3: Sentiment Analysis	Assignment 1/Quiz 1 Due	**February 4**
3	Module 4: Contextual Representations	Assignment 2 Due/Quiz 2 Due	**February 13**
4	Module 5: Grounding Module 6: Natural Language Inference	Assignment 3 Due/Quiz 3 Due Register Project in Google Form	**February 25** **February 25**
5	Module 9: Analysis Methods		
6	Module 10: Experimental Methods and Metrics	Literature Review/Quiz 4 Due	**March 6**
7	Module 11: Presenting Your Work		
8	*Module 7: NLU and Information Retrieval*	Experimental Protocol Due	**March 20**
9	*Module 8: Relation Extraction*		
10		Final Paper Due	**April 3**

Assignments and Quizzes

There are three homework assignments, each broken into three components:

1. **Homework Questions**: Traditional prompts that will ask you to complete tasks related to the module material.
2. **Original System**: Here you will develop your own original system to perform an additional task. You are encouraged to be creative and experiment with new approaches.
3. **Bake-off**: In this step you will take your Original System from #2 and test it on a previously unseen data set. Results are reported on the honor system, and **you are asked to not modify your Original System before running your bake-off entry, and to only run your system once**. All entries (no matter the score) will receive the point of credit associated with completing this step.

   After the submission deadline closes, Course Facilitators will evaluate the results, analyze trends, and create a report/summary highlighting key takeaways and interesting approaches. This is one of the key learning mechanisms of the course.

There will also be four short quizzes.

Late Assignments and One-time Penalty Waiver

All assignments can be turned in up to five days late and are assessed a penalty of -1 point per day. After five days, the submission link will close and entries will no longer be accepted.

We understand that personal or professional events may cause you to miss a deadline on an assignment. Each student is able to use a **one-time penalty waiver to remove a late penalty.** The penalty waiver cannot be split into smaller parts (e.g. you cannot use two days on Assignment 2 and three days on Assignment 3.). In order to use your penalty waiver, contact your Course Facilitator and SCPD staff.

Honor Code

Students are asked to review and maintain the standards set forth by the Stanford Honor Code when completing quizzes and assignments in this course. You can review the section labeled *Violations of the Honor Code* for representative examples relevant to this course.

We encourage students to form study groups. Students may discuss and work on homework problems in groups. However, each student must write down the solutions independently, and without referring to written notes from the joint session. **In other words, each student must understand the solution well enough in order to reconstruct it by him/herself.** Further, because we occasionally reuse problem set questions from previous years, we expect students not to copy, refer to, or look at the solutions in preparing their answers. It is an honor code violation to intentionally refer to a previous year's solutions.

After completing this course, you are welcome to share your experience and credential with others; However, **it is considered a violation of the honor code to share assignment solutions including on public platforms such as GitHub**. Faculty in the computer science department have strongly encouraged us to refrain from posting solutions for assignments, thus we ask that you **DO NOT** share the exact code.

Project

The second half of the course is devoted to completion of a final project. Projects are required to be related in a substantive way to at least one of the topics of the course. The course contains additional lectures, readings, and other resources on methods, metrics, and best practices for completing and presenting a project. The project is divided into three parts:

- Literature Review
- Experimental Protocol
- Final Paper

Further details about each project component will be provided in the SCPD learning portal accessed at course launch. You can see examples of previous projects here.

Project Teams

Final projects can be done in groups of 1–3 people; in our experience, groups of 3 lead to the best outcomes, so we encourage you to form a team of that size. For those interested in forming groups, there will be two primary ways to explore connecting with potential teammates:

- Slack channel dedicated to project brainstorming and idea posting.
- Optional Zoom calls for networking and connecting with others.

Passing the Course and Earning the Certificate

In order to earn the Certificate of Achievement for this course, you must achieve a final cumulative score of 70% or higher. Once you have successfully completed the course and the post-class survey, a digital Record of Completion will be emailed to you and the Certificate of Achievement will be mailed in approximately two weeks. The grading will be calculated as follows:

- Homeworks and Bake-offs: 30 points
- Quizzes: 10 points
- Literature Review: 15 points
- Experimental Protocol: 20 points
- Final Project Paper: 25 points

100 points total for the course, and >= 70 points is passing.

Videos and Slides

As noted, this course utilizes content originally delivered in the CS224U graduate course. A few things you will notice about this adaptation process:

- At times you will hear instructors make reference to the final presentation video. This assignment has been removed for the current version of XCS224U and you need not worry about the reference.
- Instructors may make reference to “Week 1”, “Week 2”, “Week n” of the course, in relation to topics covered or assignment dues dates – do not worry about these references. The order of the course has been rearranged from its original delivery to better streamline the experience for the AI Professional Certificate Program format.
- In some sections you will see that the slide numbers in the downloadable decks do not exactly match the videos. This is due to the fact that some decks were updated/corrected over time – while the downloadable decks reflect these corrections, the originally delivered classroom lectures do not.
- In a few specific cases you may see names and/or faces blurred. In general this is usually due to guidelines regarding student privacy.

Course Facilitators, Support, and Guidelines

You have a wide range of support available to you throughout the course. You will be assigned and receive contact information for an individual Course Faciltiator (CF) who will act as your primary point of contact.

Below is a summary of the available resources and course support:

Office Hours

Your CF will be in touch with availability and scheduling logistics for video conference office hours. Office hours may be conducted using the Zoom conference service or via Slack video (more information below on the course Slack workspace). Your CF will provide further information on how they will schedule and run office hour sessions.

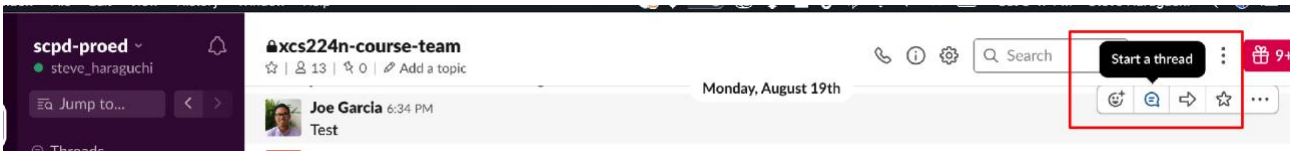
Email

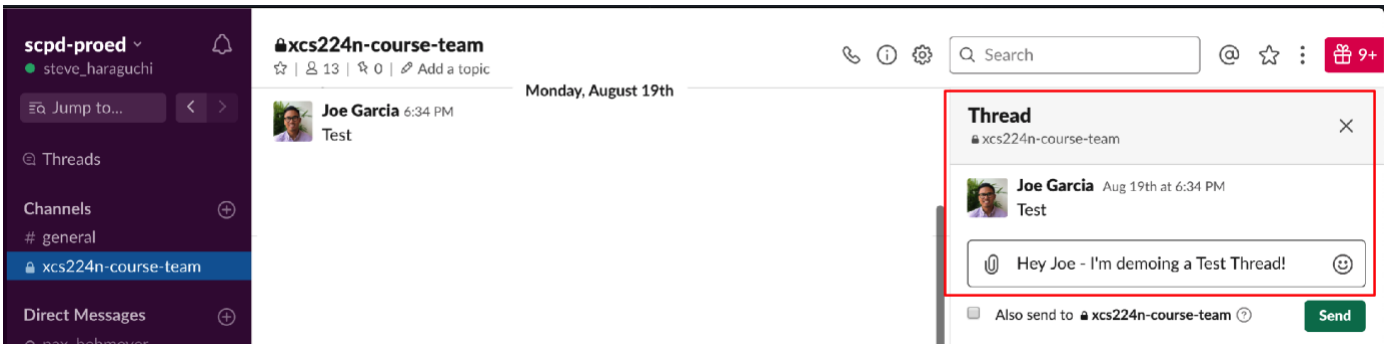
Your CF will also be available to answer questions via email – a Stanford contact address will be provided when you are first connected to your CF.

Slack Workspace – Usage and Guidelines

In addition to the individual and small group support provided by CFs, Slack will be a place where questions may be posed to the entire community (this is the fastest way to get an answer!). **In order to keep the Slack workspace readable, searchable, and useful to all, please follow the following guidelines:**

Reply in Threads to Keep Conversation Organized – When you are replying to a post or joining a conversation, respond by starting or joining a threaded conversation, rather than responding in the full flow of the standard timeline. See below for an example of how to respond in a threaded conversation to Joe's test message:





Use Multi-line Messages – Even if messages are threaded, you will soon see that Slack becomes unmanageable unless people use **single, multi-line messages instead of multiple, single-line messages**. Especially for mobile Slack users, it gets out of control!

Rather than the following:
"Hey all I have a question" [RETURN] <-- Creates new message
"I am a little confused about the quiz" [RETURN] <-- Creates new message
"I'm getting F for Question 40, but it seems like T is better" [RETURN] <-- Creates new message
---
Instead, try this!
"Hey all I have a question" [SHIFT+RETURN] <-- Creates new line in SAME message
"I am a little confused about the quiz" [SHIFT+RETURN] <-- Creates new line in SAME message
"I'm getting F for Question 40, but it seems like T is better" [SHIFT+RETURN] <-- Creates new line in SAME message
{RETURN} <-- Posts message

Note on Code Assignments and Debugging

While the course team is here to help and support your experience, it is ultimately your responsibility to write, test, and de-bug your own code. CFs may view and provide guidance on your work, however they will not send you exact answers on what to insert into your assignments. Additionally, before reaching out to a CF or Slack for help, it's expected that you have taken the reasonable steps of reading and performing an analysis yourself. This policy is meant to ensure that you leave the course having mastered the material and enable CFs to focus attention on questions where their guidance is most impactful.

Note on Course Facilitator Assignments + Projects

Your CF may change once you have officially formed/selected a project team after the homework assignments have been completed. For example, if a team of three forms but each of the three individuals comes from a different CF group, the SCPD team will work to 're-appoint' a single CF point of contact for that team, based on load balances across the cohort.

Drop/Transfer Policy

You may drop this course for a full refund up until January 24th, 2022 – the first day of the course. Once the course has begun, if you request to drop the course by Friday at 5:00pm PST on the third week of the cohort (**February 11th, 2022**) you will be reimbursed 100% of your tuition minus a drop fee of $100. Beyond the third week of the course, tuition refunds are not granted. Up until **February 11th, 2022** you may also request to transfer your enrollment to a future cohort of XCS224U or another course in the AI Professional Program, also for a transfer fee of $100. To drop or transfer the course, send an email to xcs224u-staff@stanford.edu

Questions and Contacts

For course-specific questions or concerns (content, assignments, CF support), please contact your designated Course Facilitator.

For other course related questions, email xcs224u-staff@stanford.edu