CS 668: Applied Large Language Models

COURSE INFORMATION

Class Days: Tuesday, Thursday

Class Times: 5:30 – 6:45 pm

Class Location: TBA

Mode of Delivery: Lecture, face-to-face

Instructor: Dr. Roger Whitney

Phone:619-594-3535

Email: rwhitney@sdsu.edu

Office location: GMCS 561

Office hours: 3:30 – 5:00 pm Tuesday, Thursday

This Course in your Degree:
Prerequisites: CS 450 or CS 549 or consent of instructor

COURSE DESCRIPTION:

The course will cover the steps needed to train and deploy a large language model. While SDSU does not have the resources for students to train an LLM the size of ChatGPT or CoPilot, the course will cover the basic process of training an LLM: code pipeline, preparing the training data, and fine-tuning the model to make it effective.

CATALOG DESCRIPTION

Large language Models (LLM), understanding how an LLM works, training and refining LLMs, preparing data to train an LLM, testing and debugging LLMs, hardening LLMs against attacks, and prompt engineering

STUDENT LEARNING OUTCOMES

- Create and evaluate a pipeline/workflow to train a large language model (LLM).

- Select and prepare datasets for LLM training.

- Test and debug LLMs

- Evaluate the effectiveness of an LLM.

- Fine-tune an existing LLM for specific usage.

- Develop and embed LLM clients in applications.

- Recommend pipelines and base models for LLMs for specific uses

- Compose effective prompts for LLMs

COURSE MATERIALS

The course will use material from multiple books and papers. All are available free online. See the course website for links to the books and papers.

Materials (including texts, readings, course fees, equipment, and any technology requirements)	Required or optional	Where and how it can be obtained
Speech and Language Processing, 3rd Ed Jurafsky and Martin	R	Online
Build a Large Language Model (From Scratch), Sebastian Raschka	R	Online
Designing Large Language Model Applications, Pai	R	Online
Prompt Engineering for Generative AI, Phoenix & Taylor, May 24	R	Online

GRADING POLICIES

There will be four assignments, two exams, and a project. Projects can be done in groups of two students or individually. Groups are not allowed in assignments. Students in the group project receive the same grade. The weights and grading scale are as follows.

	Weight
Assignments	40%
Exams	36%
Project	7

A	100 – 93%
A-	92.9 – 90%
B+	89.9 – 87%
B	86.9 – 83%
B-	82.9 – 80%
C+	79.9 – 77%
C	76.9 – 73%
C-	72.9 –70%
D	69.9 – 60%
F	< 60%

DEADLINES

Exam Date: March 17
Project proposal: Mar 26
Project Milestone: Apr 21
Exam Date: May 7
Project Due: May 12

UNIVERSITY POLICIES

Accommodations: If you are a student with a disability and are in need of accommodations for this class, please contact Student Disability Services at (619) 594-6473 as soon as possible. Please know accommodations are not retroactive, and I cannot provide accommodations based upon disability until I have received an accommodation letter from Student Disability Services Center.

Student Privacy and Intellectual Property: The Family Educational Rights and Privacy Act (FERPA) mandates the protection of student information, including contact information, grades, and graded assignments. I will use [Canvas / Blackboard] to communicate with you, and I will not post grades or leave graded assignments in public places. Students will be notified at the time of an assignment if copies of student work will be retained beyond the end of the semester or used as examples for future students or the wider public. Students maintain intellectual property rights to work products they create as part of this course unless they are formally notified otherwise.

Religious observances: According to the University Policy File, students should notify the instructors of affected courses of planned absences for religious observances by the end of the second week of classes.

Resources for students: A complete list of all academic support services--including the Writing Center and Math Learning Center--is available on the Student Affairs' Academic Success website. Counseling and Psychological Services (619-594-5220) offers confidential counseling services by licensed therapists; you can Live Chat with a counselor at http://go.sdsu.edu/student_affairs/cps/therapist-consultation.aspx between 4:00pm and 10:00pm, or call San Diego Access and Crisis 24-hour Hotline at (888) 724-7240.

SDSU Economic Crisis Response Team: If you or a friend are experiencing food or housing insecurity, or any unforeseen financial crisis, visit sdsu.edu/ecrt, email ecrt@sdsu.edu, or walk-in to Well-being & Health Promotion on the 3rd floor of Calpulli Center.

Academic Honesty: The University adheres to a strict policy prohibiting cheating and plagiarism. Examples of academic dishonesty include but are not limited to:
- copying, in part or in whole, from another's test or other examination;
- obtaining copies of a test, an examination, or other course material without the permission of the instructor;
- collaborating with another or others in work to be presented without the permission of the instructor;
- falsifying records, laboratory work, or other course data;

- submitting work previously presented in another course, if contrary to the rules of the course;
- altering or interfering with grading procedures;
- assisting another student in any of the above;
- using sources verbatim or paraphrasing without giving proper attribution (this can include phrases, sentences, paragraphs and/or pages of work);
- copying and pasting work from an online or offline source directly and calling it your own;
- using information you find from an online or offline source without giving the author credit;
- replacing words or phrases from another source and inserting your own words or phrases.

The California State University system requires instructors to report all instances of academic misconduct to the Center for Student Rights and Responsibilities. Academic dishonesty will result in disciplinary review by the University and may lead to probation, suspension, or expulsion. Instructors may also, at their discretion, penalize student grades on any assignment or assessment discovered to have been produced in an academically dishonest manner.

Classroom Conduct Standards: SDSU students are expected to abide by the terms of the Student Conduct Code in classrooms and other instructional settings. Violation of these standards will result in referral to appropriate campus authorities. Prohibited conduct includes:
- Willful, material and substantial disruption or obstruction of a University-related activity, or any on-campus activity.
- Participating in an activity that substantially and materially disrupts the normal operations of the University or infringes on the rights of members of the University community.
- Unauthorized recording, dissemination, or publication (including on websites or social media) of lectures or other course materials.
- Conduct that threatens or endangers the health or safety of any person within or related to the University community, including
    1. physical abuse, threats, intimidation, or harassment.
    2. sexual misconduct.

Medical-related absences: Students are instructed to contact their professor/instructor/ coach in the event they need to miss class, etc. due to an illness, injury or emergency. All decisions about the impact of an absence, as well as any arrangements for making up work, rest with the instructors. Student Health Services (SHS) does not provide medical excuses for short-term absences due to illness or injury. When a medical-related absence persists beyond five days, SHS will work with students to provide appropriate documentation. When a student is hospitalized or has a serious, ongoing illness or injury, SHS will, at the student's request and with the student's consent, communicate with the student's instructors via the Vice President for Student Affairs and may communicate with the student's Assistant Dean and/or the Student Disability Services.

Sexual violence / TItle IX mandated reporting: As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I am a

mandated reporter in my role as an SDSU employee. It is my goal that you feel able to share information related to your life experiences in classroom discussions, in your written work, and in our one-on-one meetings. I will seek to keep the information you share private to the greatest extent possible. However, I am required to share information regarding sexual violence on SDSU's campus with the Title IX coordinator, Jessica Rentto 619-594-6017. She (or her designee) will contact you to let you know about accommodations and support services at SDSU and possibilities for holding accountable the person who harmed you. Know that you will not be forced to share information you do not wish to disclose and your level of involvement will be your choice. If you do not want the Title IX Officer notified, instead of disclosing this information to your instructor, you can speak confidentially with the following people on campus and in the community. They can connect you with support services and discuss options for pursuing a University or criminal investigation. Sexual Violence Victim Advocate 619-594-0210 or Counseling and Psychological Services 619-594-5220, psycserv@sdsu.edu. For more information regarding your university rights and options as a survivor of sexual misconduct or sexual violence, please visit titleix.sdsu.edu or sdsutalks.sdsu.edu.