**GRADUATE COURSE SYLLABUS**1

## IST 688 – Building Human-Centered AI Applications

**Instructor**: Jeffrey S. Saltz

**Office**: 233 Hinds Hall                          **Email**:  jsaltz@syr.edu

**Office Hours:  TBD**

**Course Time**:  TBD                              **Classroom**:     TBD

### Course Description:

Learn to build Generative AI applications leveraging large language models. Through hands-on projects, students will use libraries and APIs to create conversational agents, Q&A bots, and goal-oriented assistants. Topics covered include prompt engineering, AI conversational memory, output evaluation, and responsible AI practices.

### Additional Course Description

This hands-on course teaches techniques for developing and deploying intelligent applications powered by large language models. Students will gain technical skills in prompt engineering, knowledge enhancement, conversational interface design, and evaluating model outputs. Responsible AI development practices related to ethics, bias mitigation, and accessibility will be woven throughout. No prior AI experience required. Final projects provide an opportunity to apply concepts to build an AI system.

### Prerequisite / Co-requisite:

Knowledge of Python Programming or IST 687

### Audience:

Any graduate student interested in understanding how to build and deploy Gen AI applications.

### Credits:

3 credits

### Course Fees and/or Costs

Students will be responsible for LLM (ex. OpenAI) usage fees.

*This should be less than $10 (but it depends on how you are using the LLMs, and which LLMs you use).*

# GRADUATE COURSE SYLLABUS2

## Learning Objectives:

**After taking this course, students will be able to:**

1. Explain concepts of large language models
2. Engineer effective prompts by applying techniques for tone, formatting, conditional logic, and mitigating risks.
3. Develop applications leveraging large language model APIs and libraries.
4. Implement memory and knowledge techniques such as retrieval augmentation to enhance application capabilities.
5. Describe how applications can integrate LLMs (Large Language Models) with actions (such as sending an email) and external data stores (databases, data services)
6. Build ethical AI systems by considering potential biases, harms, and real-world impacts.

## Required Texts / Supplies:

There is no required textbook. However, the following will be helpful:

1. OpenAI: https://platform.openai.com/docs/introduction
2. Openai-cookbook (python): https://github.com/openai/openai-python
3. Streamlit: https://docs.streamlit.io/get-started
4. Langchain: https://python.langchain.com/v0.2/docs/introduction/
5. Ollama: https://github.com/ollama/ollama

## Course Requirements and Expectations:

- 5 Labs – done in class.
- 7 HWs – due the night before the start of the next class
- Team Topic Presentation
- Team Project – details provided later in the semester [group of 2 people]
- 2 in class exams
- Class participation

## Grading:

- 5 Labs: 5 points (each 1 point)
- 7 HW: 20 points (each worth 1 - 4 pts)
- Topic Presentation: 15 points [4 people] – half presentation, half class assignment
- Final Project: 25 points [group of 2 people]
- Exam 1: 20 points
- Exam 2: 10 points
- Class participation: 5 points

## GRADUATE COURSE SYLLABUS3

### Grading Table

| Grades | Grade Points /Credit | Percentage Range | Total Points |
|---|---|---|---|
| A | **4.000** | 93% - 100% | 93-100 |
| A- | **3.66** | 90% - 92% | 90-92 |
| B+ | **3.33** | 87% - 89% | 87-89 |
| B | **3.00** | 83% - 86% | 83-86 |
| B- | **2.66** | 80% - 82% | 80-82 |
| C+ | **2.33** | 77% - 79% | 77-79 |
| C | **2.00** | 73% - 76% | 73-76 |
| C- | **1.66** | 70% - 72% | 70-72 |
| F | **0** | 0% - 69% | 0-69 |

* source: http://www.syr.edu/registrar/students/grades/faq.html

[1]Grades of D and D- may not be assigned to graduate students.


## Course Specific Policies on attendance, late work, make up work, examinations if outside normal class time, etc.:

- **Registration**: Students must register prior to the first class or may be restricted from registering. If you are registered but not present at the first class, you run the risk of being administratively deregistered from this course so that your seat can be given to a student on the wait list.

- **Late Policy for Assignments**: To ensure fast return, all assignments should be submitted on time. One-hour grace period is given to accommodate any incidents around deadline. Late policy will be enforced starting from the second hour. You are free to discuss the assignments with your classmates, but you must write up the report all by yourself. Plagiarism cases will be reported to the university.

- **Communications:** This course will use Blackboard as the main communication platforms for class exercises and notifications. Students are required to check their Blackboard accounts on a regular basis.

# GRADUATE COURSE SYLLABUS4

## Course Schedule:

| Week | Date | Topic | Required Assignment |
|------|------|-------|---------------------|
| Week 1 | Aug 29 | Introduction to LLMs, | HW 1 |
| Week 2 | Sep 5 | Basic apps (using OpenAI API and streamlit) | HW 2 |
| Week 3 | Sep 12 | Basic Conversational Agents (using OpenAI API; streamlit, short term memory); Prompt Engineering | HW 3 |
| Week 4 | Sep 19 | Retrieval augmentation (RAG) | HW 4 |
| Week 5 | Sep 26 | Using Functions within LLMs Overview of student topic presentations | HW 5 Select Presentation Topic |
| Week 6 | Oct 3 | AI in the real world Course Review | HW 6 Work on group presentation Start working on your project |
| Week 7 | Oct 10 | Presenting HW 7 Responsible and Ethical AI How to test / regression test | HW 7 – with NO coding Study for exam |
| Week 8 | Oct 17 | Exam Work on Student Presentations | Work on Student Presentations |
| Week 9 | Oct 24 | Student Topic Presentations: Long term memory Higher level APIs (langchain) | Final Project - proposal due |
| Week 10 | Oct 31 | Student Topic Presentations: Running a (smaller) model locally Model Fine Tuning | |
| Week 11 | Nov 7 | Student Topic Presentations: LLMs and audio (talking to chatbots) LLMs and Images/Videos | Final Project – Approach & milestones |
| Week 12 | Nov 14 | Student Topic Presentations: Graph RAG or regression Testing Multi-Agent Systems or AGI | |
| Week 13 | Nov 21 | Exam 2 Project work | Final Project - Milestone update |
| | Nov 28 | No Class - Thanksgiving | |
| Week 14 | Dec 5 | Project Presentations | Final Project |

# GRADUATE COURSE SYLLABUS5

## SYRACUSE UNIVERSITY STUDENT POLICIES & SERVICES

### iSchool Values
Excellence; Discovery & Innovation; Integrity; Diversity & Inclusion; Global Citizenship and Engagement

***Syracuse University has a variety of policies designed to guarantee that students live and study in a community respectful of their needs and those of fellow students.  These statements are an official part of this course syllabus.***

### University Attendance Policy
Attendance in classes is expected in all courses at Syracuse University. Students are expected to arrive on campus in time to attend the first meeting of all classes for which they are registered.  Students who do not attend classes starting with the first scheduled meeting may be academically withdrawn as not making progress toward degree by failure to attend.

### Academic Integrity Policy
As a pre-eminent and inclusive student-focused research institution, Syracuse University considers academic integrity at the forefront of learning, serving as a core value and guiding pillar of education. Syracuse University's Academic Integrity Policy provides students with the necessary guidelines to complete academic work with integrity throughout their studies. Students are required to uphold both course-specific and university-wide academic integrity expectations such as crediting your sources, doing your own work, communicating honestly, and supporting academic integrity. The full Syracuse University Academic Integrity Policy can be found by visiting class.syr.edu, selecting, "Academic Integrity," and "Expectations and Policy."

Upholding Academic Integrity includes the protection of faculty's intellectual property. Students should not upload, distribute, or share instructors' course materials, including presentations, assignments, exams, or other evaluative materials without permission. Using websites that charge fees or require uploading of course material (e.g., Chegg, Course Hero) to obtain exam solutions or assignments completed by others, which are then presented as your own violates academic integrity expectations in this course and may be classified as a Level 3 violation. All academic integrity expectations that apply to in-person assignments, quizzes, and exams also apply online.

Students found in violation of the policy are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered. Students may not drop or withdraw from courses in which they face a suspected violation. Any established violation in this course may result in course failure regardless of violation level.

### Use of Artificial Intelligence in Course
Based on the specific learning outcomes and assignments in this course, artificial intelligence is permitted on the following: Labs, HW, Projects. See each assignment for more information

about what artificial intelligence tools are permitted and to what extent, as well as citation requirements. If no instructions are provided for a specific assignment, then no use of any artificial intelligence tool is permitted. Any AI use beyond that which is detailed in course assignments is explicitly prohibited except when documented permission is granted. If in doubt, ask.

**Academic Integrity Online: Conduct of Online Assessments**
All academic integrity expectations that apply to in-person quizzes and exams also apply to online quizzes and exams. In this course, all work submitted for quizzes and exams must be yours alone. Discussing quiz or exam questions with anyone during the quiz or exam period violates academic integrity expectations for this course.

Using websites that charge fees or require uploading of course material (e.g., Chegg, Course Hero) to obtain exam solutions or assignments completed by others and present the work as your own violates academic integrity expectations in this course and may be classified as a Level 3 violation, resulting in suspension or expulsion from Syracuse University

**Religious Observances Notification and Policy**
[Syracuse University's Religious Observances Policy](#) recognizes the diversity of faiths represented in the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their traditions. Under the policy, students are given an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance, provided they notify their instructors no later than the academic drop deadline. For observances occurring before the drop deadline, notification is required at least two academic days in advance. Students may enter their observances in MySlice under Student Services/Enrollment/My Religious Observances/Add a Notification.

**Disability-Related Accommodations**
Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. There may be aspects of the instruction or design of this course that result in barriers to your inclusion and full participation in this course. I invite any student to contact me to discuss strategies and/or accommodations (academic adjustments) that may be essential to your success and to collaborate with the Center for Disability Resources (CDR) in this process.

If you would like to discuss disability-accommodations or register with CDR, please visit [Center for Disability Resources](#). Please call (315) 443-4498 or email [disabilityresources@syr.edu](mailto:disabilityresources@syr.edu) for more detailed information.

The CDR is responsible for coordinating disability-related academic accommodations and will work with the student to develop an access plan. Since academic accommodations may require early planning and generally is not provided retroactively, please contact CDR as soon as possible to begin this process.

**Discrimination or Harassment**

Federal and state law, and University policy prohibit discrimination and harassment based on sex or gender (including sexual harassment, sexual assault, domestic/dating violence, stalking, sexual exploitation, and retaliation). If a student has been harassed or assaulted, they can obtain confidential counseling support, 24-hours a day, 7 days a week, from the [Sexual and Relationship Violence Response Team](#) at the Counseling Center (315-443-8000, Barnes Center at The Arch, 150 Sims Drive, Syracuse, New York 13244). Incidents of sexual violence or harassment can be reported non-confidentially to the University's Title IX Officer (Sheila Johnson Willis, 315-443-0211, [titleix@syr.edu](mailto:titleix@syr.edu), 005 Steele Hall). Reports to law enforcement can be made to the University's Department of Public Safety (315-443-2224, 005 Sims Hall), the Syracuse Police Department (511 South State Street, Syracuse, New York, 911 in case of emergency or 315-435-3016 to speak with the Abused Persons Unit), or the State Police (844-845-7269). I will seek to keep information you share with me private to the greatest extent possible, but as a professor I have mandatory reporting responsibilities to share information regarding sexual misconduct, harassment, and crimes I learn about with the University's Title IX Officer to help make our campus a safer place for all.

**Health and Wellness**

Mental health and overall well-being are significant predictors of academic success. As such it is essential that during your college experience you develop the skills and resources effectively to navigate stress, anxiety, depression, and other mental health concerns. Please familiarize yourself with the range of resources the Barnes Center provides ([https://ese.syr.edu/bewell/](https://ese.syr.edu/bewell/)) and seek out support for mental health concerns as needed. Counseling services are available 24/7, 365 days, at 315-443-8000.

**Course Evaluations**

At the end of the term, the iSchool will ask you to share course feedback through [EvaluationKIT](#) [https://coursefeedback.syr.edu]. Log in to [EvaluationKIT](#) using your NetID and password. Please take the time to share your feedback about this course and your experience in it; all ratings and comments are completely anonymous.  The iSchool carefully reviews your feedback. Our instructors use this feedback to fine tune course delivery and instruction; our professors of record use this feedback to fine tune course content and assignments. All feedback is factored into iSchool decisions about course, program, and instructor development.

**Use of Blackboard**

This class will use the Blackboard Learning Management to house the syllabus, course content, links to external course materials, assignments, quizzes, exams, feedback, and grades. Note when submitting materials that the University's Blackboard Learning Management System is on Eastern Time.

Information about Blackboard is available on [Answers Blackboard](#); alternatively, you can contact Information Technology Services by sending an email to [help@syr.edu,](mailto:help@syr.edu) calling 315.443.2677, or in-person at the ITS Service Center, located at 1-227 CST in the Life Sciences

Complex. Business hours for the Service Center can be found on the ITS Website
at http://its.syr.edu/its_service_center/

**Academic work**
Academic work completed during a semester may be used by professors for educational
purposes in courses during the semester. Students' registration and continued enrollment
constitute consent for this purpose. Before using students' work for educational purposes in
subsequent semesters, professors will either request students' permission in writing or render
the work anonymous by removing all personal identification.