

PAI 400/600: Data Wrangling and Visualization

Course Syllabus

F2025

Course Information

Class

Time: Tuesdays and Thursday, 2:00 PM - 3:20 PM

Location: Eggers 225B

Instructor

Professor Jack Reilly

Office: Eggers 225

Office Hours: Tuesday and Thursday, 11 AM - Noon, Wednesday 1:30-2:30 PM, and by appointment.¹

Zoom Hours: Friday, 1-3 ([schedule online](#))

Phone: 315-443-2687 (office)

e-mail: jlreilly@syr.edu

¹In addition to formal office hours, I have an open door policy - feel free to stop by if you see the door open. In particular, I stay around after class for up to half an hour if students come by - feel free to stay after and meet with me.

Course Description

This course serves as an introduction to the politics and policy of artificial intelligence. It presumes no particular prior knowledge of artificial intelligence, political science, public policy, or computer science; rather, it will introduce students to what artificial intelligence is as well as to the ethics of AI, its social implications, and the policy choices around AI that currently face governments, corporations, and organizations worldwide. This is a “non-technical” course: assignments will include reading, class discussion and leadership, debates, writing, and learning about the use of AI tools and prompts to generate output. Students will not be expected, however, to program or write any formal code.

Course Structure

Principle - Practice - Politics - Policy

The course has four sequential units. First, we start with an introduction to the philosophy of artificial intelligence itself. What is “intelligence” and “consciousness” in the first place? What are minds? What are agents and legal persons, and when are agents responsible for their actions? What is artificial intelligence, and what is artificial “general” intelligence? Second, we proceed to discuss the mechanics of current computational approaches to AI, with a particular focus on large language models (such as OpenAI’s ChatGPT), including approachable, non-technical overviews of the principles behind machine learning, neural networks, and assorted technologies that have given rise to the current state of the art in AI. Third, we consider the societal impacts of current artificial intelligence systems, including data practices as well as current AI applications, uses, risks, and ethics. Fourth, we turn to policy, examining the decisions in front of governments, companies, and organizations in the United States and worldwide as well as complications in the policy process for producing effective AI legislation.

Prerequisites

Introductory coursework in (any) related area(s). No particular knowledge is expected, but the reading level is high and this course may not be suitable for first year students.

While this course has no *formal* pre-requisites, it does have a substantial *informal* prerequisite: **motivation**. This class is conducted as a seminar, not a lecture, and interest and participation is presumed and required.

Learning Objectives

1. Explain the core technical, economic, and political forces that shape how modern AI models are developed, deployed, and governed.

2. Critically evaluate and debate alternate perspectives on contemporary AI policy issues, using evidence to construct and defend reasoned arguments.
3. Design and evaluate AI policy proposals by applying principles of data ethics, policy analysis, and policy design to real-world issue domains.

Materials

Books

- **Required**
 - None. All materials will be available online.
 - Materials may require logging in through the library for access.
- **Recommended**
 - Haugeland et al, 2023. Mind Design III: Philosophy, Psychology, and Artificial Intelligence.

Computing

We will use of AI models in class as end-users, so you should have a computer you can use to access them. No coding will be required in the course.

Syracuse University has a campus-wide license to the enterprise version of Anthropic's Claude, which gives you increased usage before being your compute is limited. Anthropic also guarantees Syracuse that it will not train Claude's models on your data. I recommend you use it when asked in course assignments if you do not have higher-level access to another LLM. [Syracuse University: Claude Enterprise](#)

Online Course Resources

Website

[This course website](#) is our primary source of course organization and material: here, you can find the course syllabus, daily content, assignments, and more.

Blackboard

Blackboard is our internet-based course platform: <http://blackboard.syr.edu>. In it, you will find submission portals for assignments and a link to our course webpage, along with (potentially) a few resources that are copyright protected and not suitable to post here.

Microsoft Teams

In addition to Blackboard, we'll have a class discussion channel in Microsoft Teams for discussion question sharing as well as for sharing news articles. Make sure you set up easy access for yourself wherever is convenient.

Course Requirements

Overview

1. Seminar Participation (20%)

- Attendance, Reading, and Participation
- Discussion Questions
- AI News Submissions
- Discussion Leadership

2. Prepared Work for Class (40%)

- Debates (30%)
- Short Assignments (10%)

3. Core Exam (20%)

4. Final Project (20%)

- Presentation
- Paper

Seminar Participation

Daily Attendance, Participation, and Reading

This is a preceptorial-style seminar taught at a high level: it only works if everyone takes part. I have a high opinion of your intellectual capability and a similarly high opinion of the quality of your potential contributions - make sure to show them to me!

Discussion Questions

Submit discussion questions or points (broadly construed) to the class by 9 AM on the day of class. Make sure to send messages to the course Teams chat so everyone can read them.

AI News Submissions

In class, we'll time in class to discuss AI news from the week. (Especially if something particularly interesting happens . . . which, because this is AI, happens a lot). If you come across interesting AI news - or broad tech industry news - submit it to our Teams chat.

Discussion Leadership

Each class has an assigned discussion leader from among the students. While all students are under an obligation to read (or listen, or watch) the material each day from class, the discussion leader has a special role as the person to starts our discussion for the day rolling, and steps in should our discussion of the day's material falter.

Participation Grading Policy

A seminar like this doesn't work if everyone only seeks to do the bare minimum. Informed class participation is expected and required each day in class; you shouldn't be counting things like "*I submitted a number of news articles already this semester, so I no longer need to submit news articles or talk in class*". Participate across all elements of the seminar as and when the spirit moves you, and keep that participation up through the semester, and you'll do fine for this portion of the class.²

With that said, it is useful to have some baselines and expectations for everyone to keep in mind. A few that are useful:

- *Attendance*: One of the guiding principles of my class is that you are adults, and thus, capable of managing your own obligations and time. I have little interest in policing your lives, and I understand that everyone has bad days, things that come up, etc.³ You can miss up to three days of class without excuse or penalty, unless that day is a day you have a special obligation. If you are supposed to be a discussion leader, or giving a presentation, taking part in a debate, or miss more than three days, make sure to send me a note.
- *Discussion Questions*: At least one each day. (Although do note: you should sometimes submit more than one, too!)
- *In-Class Participation*: We should hear your contributions every day. We'll have systems in class to make sure that everyone gets a turn. I won't be keeping exact tallies of who said what, or how much, but I will take note of your general contribution tendencies.
- *News Submissions*: At least two news submissions per semester (hopefully more)!

²For the grade for this section, I hope and expect to be able to simply award full points to everyone based on apparent enthusiasm and contributions across the whole semester.}

³I also understand that some of these things that come up may be things you don't want to discuss with your professor. That's OK! The attendance policy is designed so that you typically don't have to tell me you missed because you have a medical emergency or a family matter you'd rather not discuss.

- *Discussion Leadership:* Split evenly according to the number of students in the class.
\end{itemize}

Prepared Class Work

Debates

We will have six formal debates in the class, following a modified Lincoln-Douglas debate format (if you are unfamiliar with these rules, don't worry! We'll cover them.) Each student will have a role in each debate, although not all roles are equal: it is easier to *judge* than it is to *affirm* or *negate*. All students will have equal debate responsibilities across the class.

Short Assignments

Small assignments about AI tools will be given throughout the semester. They may involve presentations to the class.

Core Exam

An in class test on AI basics, held in the middle of the semester.

Final Project

A final research project on an aspect of AI policy. (There will be options.) Graduate students will have higher expectations than undergraduates.

Course Expectations & Guidelines

Etiquette & Decorum

This is an upper level undergraduate and graduate course: I take it for granted that you have a basic interest in the material and an enthusiastic attitude toward participation. A university classroom is fundamentally a learning community that operates on respect: be courteous to fellow students and the professor, attend class on time, listen to fellow seminar participants when they talk, and disagree (or agree) with others' arguments professionally. Keep cell phones and other technology silenced and out of sight unless doing something directly relevant to the discussion in the class.⁴

⁴Remember that technology presents a significant negative externality: it is not just you that is distracted, but it is you who are distracting others as well with the bright shiny colors on your screen.

Office & Consultation Hours, Appointments

I encourage you to chat with me at any point if you have questions about the course. You are always welcome to drop by my office hours, and can schedule a meeting with me by going to my website here: <http://jacklreilly.github.io>. You do not need an appointment for regularly scheduled drop-in office hours: they are there for you! Furthermore, I have a general open-door policy: feel free to stop by to see if my door is open, and if it is, just come on in. (Don't feel like you're intruding! I'll tell you if it's not a good time.)

E-mail

Email is the best way to contact me. I'm usually pretty responsive, but as a baseline, I always aim to get back to you in a modified 24-hour fashion: by the end of the business day the day after you email. So if you email me at 2 PM Tuesday, I'll get back to you by 6 PM Wednesday at the latest; if 10 PM Thursday, by 6 PM Friday; if you email me at 3 PM on Friday, by 6 PM Monday, etc.⁵

i Note

If your email requires a long response, expect me to encourage you to meet with me in person so we can have a more effective discussion.

Artificial Intelligence and Class Technology Policy

To be discussed (and decided upon!) in class on a per-assignment basis.

Learning Objective Assessment

Course Assessment Plan

Learning Objective	Assessment Measure
Explain the core technical, economic, and political forces that shape how modern AI models are developed, deployed, and governed.	Core Exam

⁵Usually I aim to be much much faster! But if you don't hear from me by this baseline, feel free to bump a reminder.

Learning Objective	Assessment Measure
Critically evaluate and debate diverse perspectives on contemporary AI policy issues, using evidence to construct and defend reasoned arguments.	Debates
Design and evaluate AI policy proposals by applying principles of data ethics, policy analysis, and policy design to real-world issue domains.	Final Project

Course Schedule

Week	Topic	Tools
	Preliminaries	
1	Course Introduction	Scripts; R and RStudio
2	Reproducible Data Analyses	Markup Languages; Quarto
3	File Management & Version Control	Filesystems; git; GitHub
4	A Field Guide to Data	Data Formats; surveys, readr; tidyverse
5	Structural Data Manipulation	dplyr; srvyr
6	Data Visualization I	Grammar of Graphics; ggplot2
7	Data Visualization II	ggplot2
8	Core Exam (Thursday, October 16)	
9	Workflow & Data Retrieval	tidycensus; APIs; database/SQL overview
10	Social Networks & Network Data	iGraph; statnet
11	Cartography	tidyverse mapping; color scales; projection
12	Geographic Data	sf; tigris; mapgl; mapbox; osm
13	GIS Day, Catch Up, and Project Work	
14	Statistics & Flow Control	Loops, ttest(), lm(), glm()
15	Project Presentations	
F	Finals Week (Project Due)	

Advanced Topics (*if we have time*)

Week	Topic	Tools
	Text Data & Data Scraping	
	Statistical Models	
	Missing Data	
	Web Apps & Visualization	quarto, shiny
	AI Pair Programming & “Vibe Coding”	github copilot
	Local LLMs	

Campus Academic Resources & Policies

The following reflects the approved campus-wide academic policies of Syracuse University. For more information and detail, please consult the full documentation of University policies [here](#).

Academic Drop Deadline

As part of our efforts to track satisfactory academic progress, the Academic Drop Deadline and the Financial Drop deadline will both occur on September 15, 2025, for the fall semester and February 2, 2026, for the spring semester. Students may still withdraw from courses after these deadlines; this would place a ‘WD’ grade on their transcripts. Students enrolled in “flex” classes (Flexibly formatted classes) have different deadlines and will need to check MySlice for the Academic and Financial Drop deadlines that pertains to their class.

Academic Integrity

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 viewed by visiting the [Syracuse University Policies](#) website.

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.

Artificial Intelligence

Based on the specific learning outcomes and assignments in this course, artificial intelligence is permitted on the following: all weekly assignments. Artificial intelligence is *not* permitted in tests and practicums. See each assignment, quiz, or exam instructions 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.

Please also see Syracuse University's [general campus AI policies here](#).

Academic Integrity Online

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.

Attendance Policy

Attendance in classes is expected in all courses at Syracuse University. It is a federal requirement that faculty promptly notify the university of students who do not attend or cease to attend any class. Faculty will use Early-Semester Progress Reports and Mid-Semester Progress Reports in Orange SUccess to alert the Registrar and Financial Aid Office on non-attendance. For more information visit:

Faculty: Information for Faculty: Non-attendance or Stopped Attending Students: Information for Students: Non-attendance or Stopped Attending

If a student is unable to participate in-person or virtually for an extended period of time (48 hours or more), the student may request an absence notification from their home school/college Dean's Office or through Student Outreach and Support office. Instructors will be notified via the "Absence Notification" flag in Orange SUccess.

Barnes Center at the Arch (Health, Counseling, etc.) staff will not provide medical excuse notes for students. When Barnes Center staff determine it is medically necessary to remove a student from classes, they will coordinate with Student Outreach and Support case management staff to provide appropriate notification to faculty through Orange Success. For absences lasting less than 48 hours, students are encouraged to discuss academic arrangements directly with their faculty.

Additional information may be found at [Student Outreach and Support: Absence Notifications](#).

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. Due dates and times in Blackboard are stored in Coordinated Universal Time (UTC) and displayed for each user based on the time zone setting of their computer and data from their internet browser. The system will always display the time zone being used. If an instructor sets a due date of 11pm Eastern time, a student in the Pacific time zone will see a due date of 8pm."

Information about Blackboard is available on [Answers Blackboard](#); alternatively, you can contact Information Technology Services by sending an email to 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](#).

Discrimination and Harassment

The University does not discriminate and prohibits harassment or discrimination related to any protected category including creed, ethnicity, citizenship, sexual orientation, national origin, sex, gender, pregnancy, reproductive health decisions, disability, marital status, political or social affiliation, age, race, color, veteran status, military status, religion, sexual orientation, domestic violence status, genetic information, gender identity, gender expression or perceived gender.

Any complaint of discrimination or harassment related to any of these protected bases should be reported to Sheila Johnson-Willis, the University's Chief Equal Opportunity & Title IX Officer for Faculty and Staff. She is responsible for coordinating compliance efforts under the

various laws including Titles VI, VII, IX and Section 504 of the Rehabilitation Act. She can be contacted at Equal Opportunity, Inclusion, and Resolution Services, 621 Skytop Road, Suite 1001, Syracuse University, Syracuse, NY 13244-1120; or by email: equalopp@syr.edu; or by telephone: 315-443-4018.

Diversity

It is the intent of this course for students from all diverse backgrounds and perspectives to be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength, and benefit. It is also critical to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let your instructor know ways to improve the effectiveness of the course for you personally or for other students or student groups.

Inclusion

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 the Center for Disability Resources. Call (315) 443-4498 or email disabilityresources@syr.edu for more 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 are not provided retroactively, please contact CDR as soon as possible.

Faith and Religious Accommodations

[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.

Health and Wellness

Well-being and mental health are significant predictors of academic success. It is critical to take care of yourself physically and emotionally and to effectively navigate stress, anxiety, and depression. Please familiarize yourself with the range of resources the Barnes Center provides <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.