IDSN-544: Transformative Artificial Intelligence in Society
Units: 4
Term—Day—Time: Fall 2024, Wednesdays, 5:00-7:50pm
Location: Online

Instructor:
Office: Remote
Office Hours: TBD
Contact Info: titusa@usc.edu

IT Help: https://uscedu.sharepoint.com/sites/IYAStudent/SitePages/IT-Resources.aspx
Hours of Service: 8:30 a.m. – 6:30 p.m.
Contact Info: iyahelp@usc.edu

Course Description
This is a programming course steeped in an assessment of how technology is shaping society. Students will write code and build modern, state-of-the-art Artificial Intelligence (AI) models. At the same time, this course delves into the profound and expanding influence of AI on society, examining both its transformative benefits and complex challenges. Students will explore AI's role across various sectors, understanding its potential to revolutionize many fields. The curriculum critically analyzes AI development, deployment, and its far-reaching implications.

Key topics include ethical considerations of AI, such as privacy, bias in algorithmic decision-making, and the societal impacts of automation. Through interactive discussions and case studies, students will evaluate the balance between technological advancements and ethical responsibility. The course also addresses the future of work in an AI-driven world, considering how AI may reshape job markets and necessitate new skills.

Students will engage in intersectional learning, combining insights from computer science, social sciences, and humanities to develop a holistic understanding of AI's societal impact. By examining AI through a socio-technological lens while actually building these tools, the course aims to foster responsible AI development and application, preparing students to become informed contributors in this rapidly evolving field.

Students will tackle AI problems by writing code and by reading, watching, and listening to current events and primary literature through research papers, developing a critical perspective on those topics. This course is intended to offer valuable perspectives for those interested in technology, ethics, policy-making, and the broader societal implications of AI.

Learning Objectives
Modern AI is not one thing, nor is it a single set of tools, so this course is designed to teach students how to use everything at their disposal to build modern AI applications. We are going to use everything from the [fast.ai course](#) to ChatGPT to build our AI applications as quickly and efficiently as possible. We are embracing the transformative nature of AI in this course. The hardest part about AI these days is keeping up with the latest tools available to developers. Through this course students will:
- Identify learning material and build a plan for themselves
- Use Python, PyTorch, and the fast.ai library for AI model development
- Identify and build AI-ready datasets
- Identify problems that are good candidates for AI
- Plan, develop, and deploy AI solutions to target problems
- Use GitHub to manage, give, and receive feedback on code
- Read primary research literature and use open-source AI tools
- Use chatbots, such as ChatGPT, responsibly and effectively
- Analyze how the US and global policy landscape is shifting in AI

- Analyze how AI is impacting various industries and read, listen, and watch news about current events and understand the concerns and excitement
- Build a methodology to constantly learn, prototype, and leverage new AI technologies as the industry shifts and new tools become available.

Mode/Format: The course is one day per week for three hours, fully remote. The in-class time will be broken up between:

- One hour of traditional lecture
- One hour of student-led presentations on a topic of AI in Society
- One hour of critical review of an academic paper

This is designed to give students weekly exposure to the science, how to build the technology, and the impact in society. Students will be expected to watch roughly 1-2 hours of video resources outside of class per week and the rest of the out of class time is spent on assignments; roughly 7-8 hours per week.

Prerequisite(s): None
Co-Requisite(s): None
Concurrent Enrollment: None
Recommended Preparation: a minimum of 1 year of Python programming experience, and prior enrollment in IDSN 542 Machine Intelligence or equivalent expertise, are expected; previous experience with machine learning and PyTorch is recommended.

Course Notes
The course is for a letter grade. All assignments and lecture notes will be posted to Brightspace.

Technological Proficiency and Hardware/Software Required
Students will need laptops and access to high-speed internet. The course will leverage free cloud-based resources such as Colab for AI development.

Required Readings and Supplementary Materials
Fast.ai Practical Deep Learning for Coders
Deep Learning for Coders with PyTorch and fast.ai
Various additional readings will be identified in real-time as current events unfold.

Optional Readings and Supplementary Materials
Practical Deep Learning for Coders part 2: *Deep Learning Foundations to Stable Diffusion*

Description and Assessment of Assignments
There will be assignments most weeks and a four-part final project. Most weeks will include a Small Assignment that is designed for students to demonstrate the concepts developed in lecture and out-of-class work that week; these will be assigned by the instructor. There are also Large Assignments that are small projects where students will build a full model and deploy it to a resource like HuggingFace or GitHub—these, too, will

be assigned by the instructor. The final project will focus on solving a problem identified by the student, with the four components of the project designed to help students make progress and receive feedback.

Participation
Students are expected to participate in class discussions. This course is designed to discuss, debate, and think critically about AI and its impact on society.

Grading Breakdown

Table 1 Grading Breakdown

Assignment	Points	% Grade
Class Presentation	100	10%
Participation	100	10%
Small Assignments (10 total)	200	20%
Large Assignments (4 total)	200	20%
Final Project (4 parts)	400	40%
TOTAL	1000	100%

Grading Scale
Course final grades will be determined using the following scale:

Table 2: Course Grading Scale

Letter grade	Corresponding numerical point range
A	100-95
A-	94-90
B+	89-87
B	86-83
B-	82-80
C+	79-77
C	76-73
C-	72-70
D+	69-67
D	66-64
F	63 or below

Assignment Submission Policy
Class Presentation: Students will have an hour to present to the class and guide a discussion around a contemporary topic in AI. This can come from personal interests, current events, or even a chance for students to dive deeper into a technical topic and get the class input on how to solve problems.

Small Assignments: Small Assignments are to be completed by Sunday 11:59 pm the week they are assigned.

Large Assignments and Final Project: Large Assignments are due at 11:59 pm on the due date included in the assignment. The 4 parts of the final project will have different lengths and specific due dates, but all will be due at 11:59 pm on their respective due dates.

Grading Timeline
It is anticipated that most grading will be completed within one week of the due date.

Late Work
Assignments submitted up to 24 hours late will receive a 20% deduction.
Assignments between 24 and 48 hours will receive a 50% deduction.
Assignments more than 48 hours late will receive a grade of 0.
Any exceptions to this late grading policy must be requested and approved in advance.

Course Attendance Policy
The Academy maintains rigorous academic standards for its students and on-time attendance at all class meetings is expected. Each student will be allowed two absences over the course of the semester for which no explanation is required. Students are admonished to not waste excused absences on non-critical issues, and to use them carefully for illness or other issues that may arise unexpectedly. Except in the case of prolonged illness or other serious issue (see below), no additional absences will be excused. Each unexcused absence will result in the lowering of the final grade by ⅓ of a grade (e.g., an A will be lowered to A-, and A- will be lowered to a B+, etc.). In addition, being tardy to class will count as one-third of an absence. Three tardies will equal a full course absence.

Students remain responsible for any missed work from excused or unexcused absences. Immediately following an absence, students should contact the instructor to obtain missed assignments or lecture notes and to confirm new deadlines or due dates. Extensions or other accommodations are at the discretion of the instructor.

Automatically excused absences normally may not be used for quiz, exam or presentation days. Using an excused absence for a quiz, exam or presentation, such as in the case of sudden illness or other emergency, is at the discretion of the instructor.

In the case of prolonged illness, family emergencies, or other unforeseen serious issues, the student should contact the instructor to arrange for accommodation. Accommodation may also be made for essential professional or career-related events or opportunities. Additionally, students who need accommodations for religious observations should provide advanced notice to instructors and student athletes should

provide Travel Request Letters. All accommodations remain at the discretion of the instructor, and appropriate documentation may be required.

Unless students provide an accommodation letter from USC's Office of Student Accessibility Services (OSAS) or a letter from IYA Student Services detailing visa or travel restrictions, attendance and active participation is expected in the classroom. Any student with such accommodations should submit their accommodation document to the instructor as soon as possible to discuss appropriate accommodations.

Students who are experiencing illness should not attend class in person. Please inform the instructor in advance of any class sessions that you can't attend for medical reasons, and accommodations will be arranged to view recorded lectures and submit alternatives to any missed class participation. Students will not be penalized for not attending class in person under these circumstances.

Iovine and Young Hall Cleanout
The Academy is unable to store student projects and materials beyond the end of the semester. Students must remove all projects and personal materials from the Creators Studio, lockers/locker room, and other classrooms by the end of each semester. **All projects and materials left in Iovine and Young Hall will be discarded the day after final exams end. No exceptions.**

Classroom Norms
This course is designed to facilitate deep thinking and debate about topics in AI. That means we may, and hopefully will, disagree on many things throughout the course. Discussion and debate need to be kept impersonal and respectful. Technology is changing everyone's lives and all of our perspectives are important.

Zoom Etiquette
This course will be fully-online via Zoom.

Statement on Academic Conduct and Support Systems
Policy for the Use of AI Generators

Use them liberally, but make sure that you maintain the intellectual integrity, ownership, and most importantly, responsibility of your work. We'll explore how to use these tools effectively while still doing all of that. But by all means, use every tool at your disposal.

The section below about academic integrity is critical to the privilege of using these types of AI tools in our work. It cannot be emphasized enough, that we will use these tools while maintaining the highest standards of academic integrity, and we'll discuss what that means and how to think about the intersection of these topics.

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the USC Student Handbook. All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

Academic dishonesty has a far-reaching impact and is considered a serious offense against the university. Violations will result in a grade penalty, such as a failing grade on the assignment or in the course, and disciplinary action from the university itself, such as suspension or even expulsion.

For more information about academic integrity see the student handbook or the Office of Academic Integrity's website, and university policies on Research and Scholarship Misconduct.

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment or what information requires citation and/or attribution.

Course Content Distribution and Synchronous Session Recordings Policies
USC has policies that prohibit the recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. (Living our Unifying Values: The USC Student Handbook, page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to

providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the internet, or via any other media. ([Living our Unifying Values: The USC Student Handbook](), page 13).

Course Evaluations

At the end of the semester, you will have the opportunity to provide feedback on this course and help me continue to improve it for future iterations. Since this is a new course, this is particularly helpful to me and future instructors ensure this is as useful as possible! I will also ask you for informal feedback throughout the semester so I can use continuous improvement with the course.

Course Schedule

Table 3 Course schedule

Weeks	Topics/Daily Activities	Readings/Preparation	Deliverables
Week 1	Introduction to AI and this course; Introduction to fast.ai; Convolutional Neural Networks (CNNs)	Practical Deep Learning for Coders: Getting Started — Deep Learning for Coders with PyTorch and fast.ai Chapter 1 — JC: ImageNet Classification with Deep Convolutional Neural Networks	Small Assignment 0 – *sign up for your presentation slot and register GitHub* Small Assignment 1 – *fast.ai lesson 1 model of your own*
Week 2	Setting up our development environment; Deep dive into AI tools at our disposal; Variational Autoencoders (VAEs)	Practical Deep Learning for Coders: Deployment — Deep Learning for Coders with PyTorch and fast.ai Chapter 2 — JC: Auto-Encoding Variational Bayes JC (Optional): An Introduction to Variational Autoencoders	Small Assignment 2 – *fast.ai lesson 2 model of your own* Large Assignment 1 – *HuggingFace Spaces deployment*
Week 3	Reading AI research literature; How to think about Final Projects; Generative Adversarial Networks (GANs)	Practical Deep Learning for Coders: Neural net foundations — Deep Learning for Coders with PyTorch and fast.ai Chapter 4 — JC: Generative Adversarial Networks	Small Assignment 3 – *fast.ai lesson 3 model of your own*
Week 4	Brainstorming Final Project topics; Recurrent Neural Networks (RNNs)	Practical Deep Learning for Coders: Natural Language (NLP) — Deep Learning for Coders with PyTorch and fast.ai Chapter 10 — JC: Recurrent Neural Networks (RNNs): A gentle Introduction and Overview	Small Assignment 4 – *fast.ai lesson 4 model of your own* Large Assignment 2 – *Build a model and submit it to Kaggle competition of your choice*

Week 5	Selecting Final Projects; Transformers	[Practical Deep Learning for Coders: From scratch model](#) — [Deep Learning for Coders with PyTorch and fast.ai](#) Chapter 4 & 9 — JC: [Attention Is All You Need](#)	Small Assignment 5 – *fast.ai lesson 5 model of your own from scratch*
Week 6	Finding data for Final Projects; BERT models	[Practical Deep Learning for Coders: Random Forests](#) — [Deep Learning for Coders with PyTorch and fast.ai](#) Chapter 9 — JC: [BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding](#)	Small Assignment 6 – *fast.ai lesson 6 model of your own* Large Assignment 3 – *Build a model and submit it to Kaggle competition of your choice*
Week 7	Preparing data for Final Projects; Graph Neural Networks (GNN)	[Practical Deep Learning for Coders: Collaborative filtering](#) — [Deep Learning for Coders with PyTorch and fast.ai](#) Chapter 8 — JC: [Graph Neural Networks: A Review of Methods and Applications](#)	Small Assignment 7 – *fast.ai lesson 7 model of your own*
Week 8	Building a Final Project analysis plan; Diffusion models	[Practical Deep Learning for Coders: Convolutions (CNNs)](#) — [Deep Learning for Coders with PyTorch and fast.ai](#) Chapter 13 — JC: [High-Resolution Image Synthesis with Latent Diffusion Models](#)	Small Assignment 8 – *fast.ai lesson 8 model of your own* Large Assignment 4 – *Identify and clean the dataset you will use for your final project*
Week 9	Getting started on Final Projects; AlphaFold	[Practical Deep Learning for Coders: Data Ethics](#) — [Deep Learning for Coders with PyTorch and fast.ai](#) Chapter 3 — JC: [Highly accurate protein structure prediction with AlphaFold](#)	Small Assignment 9 – *fast.ai lesson 8a model of your own*

Week 10	Working on Final Projects; DALL-E	[Practical Deep Learning for Coders](#) — [Deep Learning for Coders with PyTorch and fast.ai](#) — JC: [Zero-Shot Text-to-Image Generation](#)	Small Assignment 10 – *Submit a proposal summary of your final project. 1000 words max.*
Week 11 – No Lecture	Working on Final Projects;	[Practical Deep Learning for Coders](#) — [Deep Learning for Coders with PyTorch and fast.ai](#)	*N/A*
Week 12	Working on Final Projects; YOLO	[Practical Deep Learning for Coders](#) — [Deep Learning for Coders with PyTorch and fast.ai](#) — JC: [You Only Look Once: Unified, Real-Time Object Detection](#)	*N/A*
Week 13	Working on Final Projects; AI Model Cards	[Practical Deep Learning for Coders](#) — [Deep Learning for Coders with PyTorch and fast.ai](#) — JC: [Model Cards for Model Reporting](#)	Final Project Part 1 – *Completed model with detailed documentation and repo instructions*
Week 14 – No Lecture	Working on Final Projects;	[Practical Deep Learning for Coders](#) — [Deep Learning for Coders with PyTorch and fast.ai](#)	Final Project Part 2 – *Publicly deployed model on HuggingFace Spaces with detailed documentation and instructions*
Week 15	Working on Final Projects Tension between AI ethics and corporate priorities	[We read the paper that forced Timnit Gebru out of Google. Here's what it says.](#) — JC: [On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?](#)	Final Project Part 3 – *Final project report in the format of an academic preprint*
FINAL	Presenting Final Projects	Wrapping up Final Projects	Final Project Part 4 – *Final project presentation in the format of an academic poster*

Statement on University Academic and Support Systems

Students and Disability Accommodations:
USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Student Financial Aid and Satisfactory Academic Progress:
To be eligible for certain kinds of financial aid, students are required to maintain Satisfactory Academic Progress (SAP) toward their degree objectives. Visit the Financial Aid Office webpage for undergraduate- and graduate-level SAP eligibility requirements and the appeals process.

Support Systems:
Counseling and Mental Health - *(213) 740-9355 – 24/7 on call*
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

988 Suicide and Crisis Lifeline - *988 for both calls and text messages – 24/7 on call*
The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline consists of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

Relationship and Sexual Violence Prevention Services (RSVP) - *(213) 740-9355(WELL) – 24/7 on call*
Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - *(213) 740-5086*
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - *(213) 740-2500*
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - *(213) 740-0776*
OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - *(213) 740-0411*
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

[Diversity, Equity and Inclusion](#) - (213) 740-2101
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

[USC Emergency](#) - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

[USC Department of Public Safety](#) - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call
Non-emergency assistance or information.

[Office of the Ombuds](#) - (213) 821-9556 (UPC) / (323-442-0382 (HSC)
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

[Occupational Therapy Faculty Practice](#) - (323) 442-2850 or otfp@med.usc.edu
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.