ECON 6930

Introduction to Neural Networks

FALL 2025 SYLLABUS

<u>CLASS INFORMATION</u> <u>INSTRUCTOR CONTACT</u>

Time: W 6:00pm–9:15pm Instructor: Fei Tan

Location: Davis-Shaughnessy Hall 260 Office: Davis-Shaughnessy Hall 469A Office Hours: TR 2:00pm—3:00pm Primary: discord.gg/SsrNPEeP2P

Web: github.com/econdojo/ai Secondary: tanf@slu.edu

GENERAL INFORMATION

COURSE DESCRIPTION

Artificial intelligence should be made accessible to all. To this end, we provide a spelled-out introduction to neural networks and their applications for students from all disciplines, regardless of their background or area of study. Starting with the classical problem of image recognition, students will delve into the intricacies of modeling multilayer perceptrons, backpropagation algorithm for optimization, model training and evaluation, as well as extensions and variants of the basic architecture. By empowering students with hands-on modeling and programming skills, we aim to democratize AI technology and foster a community of 'AI ninjas' capable of harnessing its transformative potential for innovation, economic growth, and the betterment of humanity.

PREREQUISITES

Although the lectures will be self-contained, students are required to have completed ECON 3010 (Introduction to Econometrics) or an equivalent undergraduate course in statistics. Students are also expected to be familiar with basic operations in Python, an interpreted high-level general-purpose programming language.

RESOURCES

- cs231n.stanford.edu CS231n: Deep Learning for Computer Vision, by Stanford University.
- github.com/karpathy/nn-zero-to-hero Neural Networks: Zero to Hero, by Andrej Karpathy.
- Deep Learning, by Ian Goodfellow, Yoshua Bengio, and Aaron Courville, MIT Press.

GRADING POLICY

PROBLEM SETS

There will be three required problem sets. Late submission is not graded and will be nullified. Each problem set is worth 20 points of the course grade; it will be submitted and evaluated on an individual basis. To prepare a submission, please type up your work in LaTeXand upload all source files (including Python programs) onto GitHub Classroom.

- LATEX typesetting: Visual Studio Code, Overleaf, Texmaker, Vim
- Python programming: Visual Studio Code, Codespaces, Jupyter Notebook, PyCharm

RESEARCH PROJECT

The project consists of a 10–15 pages term paper that makes judicious use of the neural network models covered in this course to study a practical problem of your interest. The project accounts for 40 points of the course grade; it will be conducted in teams of 2 to 4 members and evaluated based on collective endeavor. Please follow the same submission requirement as the problem sets.

GRADING SCALE

There is no grading curve used other than the scale below. However, the instructor reserves the right to adjust the grading scale based on overall class performance at the end of the semester.

	Max Points	Grade	Points
Problem Set 1	20	A	100–91
Problem Set 2	20	A-	90-86
Problem Set 3	20	B+	85–81
Research Project	<u>40</u>	В	80–76
Total	100	B-	75–71
		C+	70–66
		С	65–61
		C-	60-56
		D	55–51
		F	50 or less

COURSE OUTLINE

Below is a tentative outline; the instructor reserves the right to change it whenever needed. My goal is to proceed at an optimal pace: slow enough that important concepts are thoroughly learned, yet fast enough that the course does not drag. It is a delicate balance.

Part I	Preparation		
	Getting Started with AI Agents		
	Lecture 0: Python Tutorial		
Part II	Neural Networks		
	Lecture 1: Linear Classifiers		
	Lecture 2: Neural Networks		
	Lecture 3: A Minimal Case Study		
Part III	Applications		
	Lecture 4: Language Modeling		
	Lecture 5: Economic Forecasting		
	Lecture 6: Autonomous Trading		
	More applications to follow		

MISCELLANEOUS INFORMATION

Please read the following information thoroughly and carefully. I would assume that you have fully understood these rules.

- 1. In recognition that people learn in a variety of ways and that learning is influenced by multiple factors (e.g., prior experience, study skills, learning disability), resources to support student success are available on campus. The Student Success Center, which assists students with academic and career related services, is located in the Busch Student Center (Suite 331) and the School of Nursing (Suite 114). Students who think they might benefit from these resources can find out more about: [i.] course-level support (e.g. faculty member, departmental resources) by asking your course instructor; and [ii.] university-level support (e.g., tutoring services, university writing services, disability services, academic coaching, career services, and/or facets of curriculum planning) by visiting the Student Success Center.
- 2. All students experience stressors and challenges at some point, and seeking support is beneficial. Such challenges may be the result of academic concerns (such as those related to particular assignments or content in a course), or they may be more personal in nature (such as

concerns related to relationships, mental health, loss, identities, alcohol or drugs, housing or food security, or finances, among other things). For concerns related to this course, please contact me. I am invested in your success and will support your success in the ways I can. Additionally, you have access to the many resources SLU provides in support of your personal wellness. You will find a list of available resources on the Well-being page of the SLU website.

- 3. Students with a documented disability who wish to request academic accommodations must formally register their disability with the University. Once successfully registered, students also must notify their course instructor that they wish to use their approved accommodations in the course. Please contact the Center for Accessibility and Disability Resources (CADR) to schedule an appointment to discuss accommodation requests and eligibility requirements. Most students on the St. Louis campus will contact CADR, located in the Student Success Center and available by email at accessibility_disability@slu.edu or by phone at 314.977.3484. Once approved, information about a student's eligibility for academic accommodations will be shared with course instructors by email from CADR and within the instructor's official course roster. Students who do not have a documented disability but who think they may have one also are encouraged to contact to CADR. Confidentiality will be observed in all inquiries.
- 4. Academic integrity is honest, truthful and responsible conduct in all academic endeavors. The mission of Saint Louis University is "the pursuit of truth for the greater glory of God and for the service of humanity." Accordingly, all acts of falsehood demean and compromise the corporate endeavors of teaching, research, health care, and community service via which SLU embodies its mission. The University strives to prepare students for lives of personal and professional integrity, and therefore regards all breaches of academic integrity as matters of serious concern. Additionally, each SLU College, School, and Center has adopted its own academic integrity policies, available on their respective websites. It is the policy of Chaifetz School of Business that the "Giving and receiving of unauthorized assistance on any graded exercise constitutes academic dishonesty and may result in grade reductions and/or probation, suspension, or dismissal." All SLU students are expected to know and abide by these policies, which detail definitions of violations, processes for reporting violations, sanctions, and appeals. Please direct questions about any facet of academic integrity to your faculty, the chair of the department of your academic program, or the Dean/Director of the College, School or Center in which your program is housed.
- 5. Saint Louis University and its faculty are committed to supporting our students and seeking an environment that is free of bias, discrimination, and harassment. If you have encountered

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any form of sexual misconduct (e.g. sexual assault, sexual harassment, stalking, domestic or dating violence), we encourage you to report this to the University. If you speak with a faculty member about an incident of misconduct, that faculty member must notify SLU's Title IX coordinator, Anna R. Kratky (DuBourg Hall, room 36; akratky@slu.edu; 314-977-3886) and share the basic fact of your experience with her. The Title IX coordinator will then be available to assist you in understanding all of your options and in connecting you with all possible resources on and off campus. If you wish to speak with a confidential source, you may contact the counselors at the University Counseling Center at 314-977-TALK.