

CSECE 8735: Unsupervised Learning

Fall Semester 2020

Instructor:

Dr. Yunxin Zhao
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Website:

Mizzou Canvas <https://www.courses.missouri.edu/>

Class setup and schedule:

Class lectures will be on **Zoom** delivered in the synchronous mode on TuTh 9:30 am-10:45 am.

Please install Zoom (<https://umsystem.zoom.us/download>) on your computer;
Before each class, you need to first sign into Zoom using the SSO of **umsystem**:
<https://teachingtools.umsystem.edu/support/solutions/articles/11000093081-signing-into-zoom>
and then use the link below to join the Zoom:

<https://umsystem.zoom.us/j/96698003744?pwd=SHRSeDVJV243ak9xMW9CVHQ1UkIXUT09>

Meeting ID: 966 9800 3744

Passcode: 914504

The Zoom video will be recorded and posted on Canvas.

If the reliability of wi-fi connection becomes a serious issue for our class in this semester, as a backup plan, we may switch to the asynchronous mode by using **PanoptoVideo** to prerecord the class lectures and posting them on Canvas.

Office hour setup and schedule:

Office hours will be hosted on **Zoom** on Tu 11:00 am-12:30 pm.

Please use the link below to join the Zoom office hour:

<https://umsystem.zoom.us/j/95306514330?pwd=UnZMR1kyQnJORWNlZ0l1dmN6ZXZuZz09>

Meeting ID: 953 0651 4330

Passcode: 187519

Communications:

For communicating with the instructor outside the class or office hours through email, please include **CSECE8735** in the subject field. I will respond to you in a timely manner.

Prerequisite:

CS/ECE 4270/7720 or consent of instructor

Textbook:

Pattern Recognition by Sergios Theodoridis and Konstantinos Koutroumbas, Academic Press, 2008, 4th ed.

Reference books:

Machine Learning – A Bayesian and Optimization Perspective, by Sergios Theodoridis, Academic Press, 2015
Deep Learning by Ian Goodfellow, Yoshua Bengio, Aaron Courville, and Francis Bach, The MIT Press, 2016

The first two ebooks are on reserve for our class. Please use the following links to access them:

ECE 8735:

<http://merlin.lib.umsystem.edu/search~S1?pZhao/pzhao/1%2C1%2C4%2CB/frameset&FF=pzhao+yunxin+mu+engr&3%2C%2C4>

CS 8735:

<http://merlin.lib.umsystem.edu/search~S1?pZhao/pzhao/1%2C1%2C4%2CB/frameset&FF=pzhao+yunxin+mu+engr&4%2C%2C4>

Course topic outline:

Major topics	Text	Time
1. Introduction and basic concepts	Chapter 1 & 11	2 weeks
2. Clustering algorithms: Sequential, hierarchical, function optimization, etc.	Chapters 12-16	3 weeks
3. Mixture model and estimation: EM, mixture density, model decomposition, etc.	Chapter 2 & 14	2 weeks
4. Dimension reduction and latent variable modeling: PCA, SVD, ICA, NMF, MDS, ISOMAP, t-SNE, etc.	Chapter 6	4 weeks
5. Deep learning, semi-supervised learning, generative models: RBM, DBN, auto-encoder (AE), CNN, RNN, GAN, VAE, self-taught learning, attention, etc.	Chapter 4 & 10	4 weeks

Course work:

There are short quiz questions for each lecture class (starting from the second class), 3 homework assignments, one exam, and one final project. The table below summarizes the planned schedule for these activities. The schedule may be adjusted in case of interruptions by unexpected events. The assignments will need MATLAB, and RemoteApp will be provided.

Week	Homework		Exam	Final project
	Assign	Due		
1 (8/24-)				
2 (8/31-)				
3 (9/7-)				
4 (9/14-)	HW1 (9/17)			
5 (9/21-)		HW1 (9/24)		
6 (9/28-)	HW2 (10/1)			
7 (10/5-)		HW2 (10/8)		
8 (10/12-)				
9 (10/19-)	HW3 (10/22)			
10 (10/26-)		HW3 (10/29)		
11 (11/2-)				
12 (11/9-)				Proposal (11/10 5pm)
13 (11/16-)			11/19	
14 (11/23-)	Thanksgiving			
15 (11/30-)				
16 (12/7-)				Presentations
17 (12/14-)				Report (12/16 5pm)

Exam:

This class will use **Proctorio** for online proctoring the exam. For this purpose, you need to have a webcam and install Google Chrome and an extension software on your computer. Prior to the exam, there will be a practice test to help you get familiarized with the procedure.

Late policy:

Assignments are due at the beginning of class on the due dates. Late homework will be penalized by 10% of total points each day passing the due date, and will not be accepted 3 working days after the due date.

If you have a justifiable schedule conflict for a scheduled event, e.g., a quiz, you need to communicate with the instructor ahead of time for arranging an alternative schedule.

Grading policy:

Short quizzes and attendances (15%), assignments (25%), test (30%), project and report (30%),

85-100: A

75-85: B

60-75: C

Below 60: F

Note that the points that you receive from the class work will be posted on Canvas, and you will also see a course grade calculated automatically by Canvas. Please do not take the Canvas grade as your course grade. At the end of the semester, the instructor will assign the grade by taking into consideration of the class score distribution.

Additional Information (c.f. Provost website)

Decreasing the Risk of COVID-19 in Classrooms and Labs

MU cares about the health and safety of its students, faculty, and staff. To provide safe, high-quality education amid COVID-19, we will follow several specific campus policies in accordance with the advice of the Center for Disease Control and Boone County health authorities. This statement will be updated as information changes.

- **If you are experiencing any COVID-related symptoms**, or are otherwise feeling unwell, do not attend in-person classes and contact your health care provider and/or student health immediately. COVID symptoms include: fever greater than 100.4 or chills; cough, shortness of breath or difficulty breathing; fatigue; unexplained muscle or body aches; headache; new loss of taste or smell; sore throat; congestion or runny nose; nausea or vomiting; diarrhea.
- We will all wear **face coverings while in the classroom**, unless you have a documented exemption due to a disability or medical condition.
- We will maintain a **6-foot distance from each other at all times** (except in specific lab/studio courses with other specific guidelines for social distancing).
- We will enter the classroom and **fill the room starting at the front, filing all the way across a row**. When class ends, we will exit the row nearest to the door first; the instructor or TA will give the signal for the next row to exit, in the same manner.
- In any small section or lab class that requires them, **additional measures will be listed in the syllabus and be mandatory for class participation**.
- Online office hours will be available for all students.
- This course may be recorded for the sole purpose of sharing the recording with students who can't attend class. The instructor will take care not to disclose personally identifiable information from the student education records during the recorded lesson.

Compliance with these guidelines is required for all; anyone who fails to comply will be subject to the accountability process, as stated in the University's Collected Rules and Regulations, Chapter 200 Student Code of Conduct.

By taking the above measures, we are supporting your health and that of the whole Mizzou community. Thank you in advance for joining me and your peers in adhering to these safety measures.

Mental Health

The University of Missouri is committed to supporting student well-being through an integrated network of care, with a wide range of services to help students succeed. The MU Counseling Center offers professional mental health care, and can help you find the best approach to treatment based on your needs. Call to make an appointment at 573-882-6601. Any student in crisis may call or go to the MU Counseling Center between 8:00 – 5:00 M-F. After hours phone support is available at 573-882-6601.

Visit our website at <https://wellbeing.missouri.edu> to take an online mental health screening, find out about workshops and resources that can help you thrive, or learn how to support a friend. Download Sanvello, a phone app that teaches skills and strategies to help you maintain good mental health. Log in with your Mizzou e-mail to unlock all the tools available through Sanvello at no cost to you.

Academic Dishonesty

Academic integrity is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards breaches of the academic integrity rules as extremely serious matters. Sanctions for such a breach may include academic sanctions from the instructor, including failing the course for any violation, to disciplinary sanctions ranging from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, collaboration, or any other form of cheating, consult the course instructor.

ADA

Students with Disabilities:

If you anticipate barriers related to the format or requirements of this course, if you have emergency medical information to share with me, or if you need to make arrangements in case the building must be evacuated, please let me know as soon as possible.

If disability related accommodations are necessary (for example, a note taker, extended time on exams, captioning), please establish an accommodation plan with the [MU Disability Center](#), S5 Memorial Union, 573-882-4696, and then notify me of your eligibility for reasonable accommodations. For other MU resources for persons with disabilities, click on "Disability Resources" on the MU homepage.

Intellectual Pluralism

The University community welcomes intellectual diversity and respects student rights. Students who have questions or concerns regarding the atmosphere in this class (including respect for diverse opinions) may contact the departmental chair or divisional director; the director of the [Office of Students Rights and Responsibilities](#); the [MU Equity Office](#), or equity@missouri.edu.

All students will have the opportunity to submit an anonymous evaluation of the instructor(s) at the end of the course.

Class recording (adapted for our class)

The class lectures that are delivered in Zoom will be recorded and posted on our Canvas course website. University of Missouri System Executive Order No. 38 lays out principles regarding the sanctity of classroom discussions at the university. The policy is described fully in Section 200.015 of the Collected Rules and Regulations. In this class, students may make audio or video recordings of class lecture activities. However, the redistribution of audio or video recordings of statements or comments from the course to individuals who are not students in the course is prohibited without the express permission of the faculty member and of any students who are recorded. Students found to have violated this policy are subject to discipline in accordance with provisions of [section 200.020](#) of the Collected Rules and Regulations of the University of Missouri pertaining to student conduct matters.