TEXAS
The University of Texas at Austin

AI 395T, AI for Healthcare

50485

Spring 2025

Online Asynchronous, see announcements for office hours

Instructor: Dr. Ying Ding
Pronouns: she/her
Office hours: Weds 3-4PMCT on Zoom https://utexas.zoom.us/j/5128555388 and by appointment
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COURSE DESCRIPTION

UNIVERSITY CATALOG COURSE DESCRIPTION

Recently, the U.S. healthcare industry has surpassed manufacturing and retail to become the largest employer in the country, with every 1 out of 8 Americans working in this sector. Policies and incentives have been established to promote IT in health to improve care and delivery. In this course, we will explore the major components of health IT systems, ranging from data semantics (ICD10), data interoperability (FHIR), diagnosis code (SNOMED CT), to workflow in clinical decision support systems. After establishing the good understanding of the fundamentals of health IT systems, we will dive deep into how AI innovations (e.g., machine learning, deep learning, computer vision, generative AI) are transforming our healthcare system by introducing new concepts related to clinical practices. This course will offer hands-on tutorials based on the real-world Electronic Health Record (EHR) data from MIMIC III (https://mimic.physionet.org/) released by MIT Critical Data. MIMIC-III (Medical Information Mart for Intensive Care III) contains de-identified health information from over forty thousand patients who stayed in critical care units of the Beth Israel Deaconess Medical Center between 2001 and 2012. These tutorials aim to enhance data search and analytic skills by providing practices related to database search, natural language processing, data visualization, machine learning, deep learning, and generative AI.

LEARNING OUTCOMES

- Be aware of current healthcare initiatives to deliver quality care
- Understand the basic technologies of health IT systems including data semantics, data interoperability, workflow, and clinical decision support systems

- Be familiar with electronic health record systems (EHR systems)
- Gain the overview of AI innovations in healthcare
- Master practical skills of data search and analytics including database search, natural language processing, data visualization, machine learning, and deep learning

HOW WILL YOU LEARN?

TEACHING MODALITY INFORMATION

This is an online, asynchronous course. All course materials are available through Canvas.

COMMUNICATION

The course Canvas site can be found at utexas.instructure.com. Please keep in touch with the teaching staff via Ed Discussion and the course email (onlineAIinHealthcare@austin.utexas.edu). You are responsible for ensuring that the primary email address you have recorded with the university is the one you will check for course communication.

ASKING FOR HELP

We highly suggestion posting questions about coursework to Ed Discussion so that you can seek help from your peers. If you have a personal issue, accommodation request or concern that is private, please email or create a private post on Ed Discussion.

UNIVERSITY POLICIES AND RESOURCES

For a list of important university policies and helpful resources that you may need as you engage with and navigate your courses and the university, see the University Policies and Resources Students Canvas page. The page includes the language of the University Honor Code, Title IX legal requirements for Texas employees, and information about how to receive support through the office of Disability & Access.

COURSE REQUIREMENTS AND GRADING

REQUIRED MATERIALS

A Google account to access of Google CoLab

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SHARING OF COURSE MATERIALS IS PROHIBITED

No materials used in this class, including, but not limited to, lecture hand-outs, videos, assessments (quizzes, exams, papers, projects, homework assignments), in-class materials, review sheets, and additional problem sets, may be shared online or with anyone outside of the class without my explicit, my written permission. Unauthorized sharing of materials may facilitate cheating. The University is aware of the sites used for sharing materials, and any materials found online that are associated with you, or any suspected unauthorized sharing of materials, will be reported to Student Conduct and Academic Integrity in the Office of the Dean of Students. These reports can result in initiation of the student conduct process and include charge(s) for academic misconduct, potentially resulting in sanctions, including a grade impact.

GETTING HELP WITH TECHNOLOGY

Students needing help with technology in this course should contact the ITS Service Desk or [insert contact information for your local support unit(s) and for course materials, software, hardware, or other technology used in your course].

ARTIFICIAL INTELLIGENCE

[The office of Student Conduct and Academic Integrity recommends including a statement about the use of artificial intelligence tools in class and outlines three levels of permissibility to choose from, please tailor the below statement to meet your needs:

"The creation of artificial intelligence tools for widespread use is an exciting innovation. These tools have both appropriate and inappropriate uses in classwork. The use of artificial intelligence tools (such as ChatGPT) in this class is permitted for students who wish to use them, provided the content generated by AI is properly cited.

If you are considering the use of AI writing tools but are unsure if you are allowed or the extent to which they may be utilized appropriately, please ask."

ASSIGNMENTS

The following table represents how you will demonstrate your learning and how we will assess the degree to which you have done so.

Assignments	Points Possible	Percent of Total Grade
0. Participation	5	5%
1. CITI Training and MIMIC Access	5	5%
2. MIMIC Visualization	10 + 1 Bonus	50%
3.MIMIC SQL	10 + 1 Bonus	
4. MIMIC NLP	10 + 1 Bonus	
5. Using ML/DL with Data	10 + 1 Bonus	
6. LLM Tutorial	10 + 1 Bonus	
7. Self-Learning Tutorial	15 + 1 Bonus	15%

Assignments	Points Possible	Percent of Total Grade
8. High-risk Project	25 + 4 Bonus	25%

LATE WORK AND MAKING UP MISSED WORK

Late work will not be accepted without a proper excuse. Asking for an exception after an assignment deadline will require an extraordinary circumstance. Reach out to the teaching team if you think you have a circumstance that qualifies.

RELIGIOUS HOLY DAYS

By UT Austin policy, you must notify me of a missed deadline because of a religious holy day as far in advance as possible of the date of observance. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

EXTRA CREDIT

Most assignments allow you to earn bonus points. See the rubric for more information.

GRADE BREAKS

[Include the grade breakdown for your class.]

Grade	Cutoff
A	94%
A-	90%
B+	87%
B	84%
B-	80%
C+	77%
C	74%
C-	70%
D+	67%
D	64%
D-	60%
F	<60%

ACADEMIC INTEGRITY EXPECTATIONS

Students who violate University rules on academic misconduct are subject to the student conduct process. A student found responsible for academic misconduct may be assigned both a status sanction and a grade impact for the course. The grade impact could range from a zero on the assignment in question up to a failing grade in the course. A status sanction can include a written warning, probation, deferred suspension or dismissal from the University. To learn more about academic integrity standards, tips for avoiding a potential academic

misconduct violation, and the overall conduct process, please visit the Student Conduct and Academic Integrity website at: http://deanofstudents.utexas.edu/conduct.

COURSE OUTLINE

All instructions, assignments, readings, rubrics and essential information will be on the Canvas website at utexas.instructure.com. Check Canvas regularly. **Changes** to the schedule may be made at my discretion if circumstances require. I will announce any such changes in class and will also communicate them via a Canvas announcement. It is your responsibility to note these changes when announced, and I will do my best to ensure that you are notified of changes with as much advance notice as possible.

[Syllabus must include all major course requirements and assignments, along with the dates of exams and assignments that count for 20% or more of the class grade. Also, recall that per the General Information Catalog no exam counting for more than 30% of the final course grade may be given during the last week of class, or during no-class days/reading days preceding the final exam period.]

Week	Date	Class Topic	Assignments Due
1.	1/13/25	**Module 1: AI in Health Overview**	
2.	1/20/25	**Module 2: Introduction and MIMIC dataset**	
3.	1/27/25	**Module 3: Evidence Based Care**	CITI Training and MIMIC Access
4.	2/3/25	**Module 4: EMR Semantics – ICD Diagnosis Code**	MIMIC Visualization
5	2/10/25	**Module 5: EMR Semantics – SNOMED CT**	MIMIC SQL
6	2/17/25	**Module 6: NLP I**	
7	2/24/25	**Module 7: NLP II**	MIMIC NLP
8	3/3/25	**Module 8: EMR Semantics - LOINC and RxNorm**	
9	3/10/25	**Module 9: Readmission Prediction**	Self-learning Tutorial
10	3/24/25	**Module 10: Data Share - FHIR**	
11	3/31/25	**Module 11: Length of Stay Prediction**	MIMIC ML/DL
12	4/7/25	**Module 12: Explainable AI in Medicine**	
13	4/14/25	**Module 13: LLM in Healthcare**	LLM Tutorial
14	4/21/25	**Module 14: Medical Imaging**	
	4/28/25		High-risk Project