

MSAI CS 6308: AI in Biomedicine

COURSE PREFIX, NUMBER, and TITLE: CS 6308 – AI in Biomedicine

CREDITS/LECTURE/LAB HOURS: 3-3-0

Catalog Description

This course introduces advanced topics and applications of artificial intelligence in biomedicine, including technical challenges in healthcare and meaningful healthcare solutions. A survey of technical tools currently available in the field is covered and the standards for evaluating the tools and solutions are introduced. Topics covered in this course include Healthcare Systems and Data, Healthcare Interoperability, and Future Facing Health Informatics Technologies.

Prerequisites

CS 5310 and CS 5332, or approval from the department.

Course Learning Outcomes

At the end of this course, each student will be able to:

1. Identify technical challenges in healthcare and propose potential solutions.
2. Produce meaningful healthcare solutions using design and programming skills
3. Apply technical tools currently available in the field and evaluate such tools according to standards

Course Topics

- **Healthcare Systems and Data** (Lectures 1-5) provides background on the structure of the US healthcare system, its key challenges and the efforts the federal government and others have made to spur the use of digital records and data standards to help overcome those challenges. It also provides a snapshot of the current state of the key informatics tools for providers, patients and data sharing among them.
- **Healthcare Interoperability** (Lectures 6-9) covers the key interoperability standards that are the 'digital plumbing' that support virtually all healthcare systems and tools. The course emphasizes the Fast Healthcare Interoperability Resource (FHIR) standard that supports data sharing and creates a 'universal health app platform' supporting innovative ways for providers and patients to use health data.
- **Future Facing Health Informatics Technologies** (Lectures 10-12) introduces three of the current cutting-edge areas of health informatics: mobile health (mHealth), public/population health and big data/analytics as well as a deep dive into application development.

Course Schedule

Lecture	Topic	Course LO
1	Introduction	1
2	US Healthcare	1
3	Electronic Health Records (EHRs)	1, 2
4	Patient Tools	1, 2, 3
5	Health Information Exchange (HIE)	1, 2
6	Data Standards	3
7	Pre-FHIR Interoperability Standards	3
8	The HL7 (Health Level Seven) FHIR Interoperability Standard	3
9	SMART A Universal Health App Platform	2
10	Mobile Health (mHealth)	2
11	Public and Population Health	1, 2
12	Analytics and Visualization	2, 3

Required Textbook

Edward H. Shortliffe, James J. Cimino, Biomedical Informatics: Computer Applications in Health Care and Biomedicine, Springer

Recommended Readings

1. Ton J. Cleophas, Aeilko H. Zwinderman, Machine Learning in Medicine - a Complete Overview, Springer
2. S. Kevin Zhou, Hayit Greenspan and Dinggang Shen, Deep Learning for Medical Image Analysis, Academic Press

Grading Policy

30% Midterm Exams (2)
 20% Final Exam
 30% Labs/Homework
 20% Project and Presentation

Your final course grade will be determined by the standard college formula based on your course average:

90-100 → "A", 80-89 → "B", 70-79 → "C", 60-69 → "D", 0-59 → "F"

Class Policies

Academic Honesty: Please refer to the Provost's office: [Academic Honesty Policy](#)

Accessibility and Statement of Reasonable Accommodations: Please refer to the Office of Disability Services: www.uhd.edu/disability/

Student Rights and Responsibilities: Please refer to ESO Resources: [PS-04.A.01 - Student Rights and Responsibilities | University of Houston-Downtown \(uhd.edu\)](#)

Attendance and Roster Certification:

Students are expected to participate regularly in classes as appropriate to modality of the course. If the class has scheduled meeting times, either online or in-person, students are expected to attend all class sessions. In addition to class meeting times, students are expected to dedicate time to relevant course work outside of class meeting times based on the number of credit hours per course. For a typical 3-credit course, students should budget an average of 6 additional hours per week outside of class. This may vary for lab, practicum, or other classes that do not have standard meeting times or formats. Your failure to attend class (in-person, hybrid, or synchronous online), engage through the Blackboard course (online asynchronous only), or make contact with faculty to adequately explain your absence by the 12th calendar day of the semester may result in your being administratively dropped from this course. Being dropped from this course may affect your enrollment status and/or your financial aid eligibility.