

Department of Health Outcomes & Biomedical Informatics

GMS 6805 Information Modeling in Biomedicine

Course Instructors: Mei Liu, PhD; Rui Yin, PhD
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Semester/Year: Spring 2024
Class Meetings: Thursdays 9:35am – 12:35pm
Classroom: Conference Room 7126, Malachowsky Hall
Credit Hours: 3 hours
Course Format: In-person only, no Zoom option

Office Hours: By appointment
Canvas URL: <http://elearning.ufl.edu/>
Department Website: <https://hobi.med.ufl.edu/>

PREREQUISITES: None

DESCRIPTION OF COURSE CONTENT

Course Description

This course introduces students to how information is structured and modeled in biomedicine. Students will learn the basic principles of designing and building ontologies and how biomedical data is encoded and standardized to enable information sharing between disparate systems. Students will gain practical skills on how biomedical ontologies/terminologies can be applied in real-world use cases.

Course Objectives & Goals

Upon successful completion of this course, the student will be able to:

1. Understand the motivation and basic principles of designing and building ontologies for biomedicine
2. Describe techniques for aligning and integrating disparate ontologies
3. Describe and apply common biomedical ontologies, including
 - a. Medical terminologies: ICD, SNOMED, CPT, RxNorm, LOINC, etc.
 - b. Biological terminologies: GO, OBO, etc.
4. Describe and apply common information interchange standards and data models for interoperability
 - a. Information exchange standards including HL7, FHIR, and CDISC
 - b. Clinical data models including I2B2, OMOP, PCORnet CDM
5. Describe ontology applications in biomedical research, including
 - a. Ontology in clinical decision support systems, clinical NLP, literature mining, and machine learning
 - b. Application of bio-ontologies in bioinformatics research
 - c. Social determinant of health (SDoH) data standardization

TEXTBOOKS/READING MATERIALS

Reading materials relevant to the weekly topics will be made available in Canvas a week prior to each class.

CLASS SCHEDULE

Date	Week	Topic(s)	Lecturer	Quiz/Assignments Due
1/11	#1	<i>Course mechanics</i> <i>Data Standards in Biomedical Informatics</i>	Liu/Yin	
1/18	#2	<i>Medical terminologies (e.g., ICD, SNOMED, CPT, RxNorm, LOINC)</i>	Liu/Yin	
1/25	#3	<i>Introduction to EHR and OMOP</i> <i>Use of ontologies for semantic harmonization of heterogeneous data</i>	Yin/Liu Guest – Dr. Bill Duncan	
2/1	#4	<i>Basics in bioinformatics, genomic data formats and resources</i>	Yin/Liu	Quiz 1 – in-class closed book (max 30 min)
2/8	#5	<i>Interoperability – clinical data models and information exchange standards</i>	Liu/Yin	
2/15	#6	<i>Use of ontology in clinical decision support systems</i>	Liu/Yin	Quiz 2 – in-class closed book (max 30 min)
2/22	#7	<i>Biomedical data mining I – genomic data</i> Course Project Specifics (requirement, data etc.)	Yin/Liu	
2/29	#8	<i>Biomedical data mining II – genomic data</i>	Yin/Liu	
3/7	#9	<i>Use of ontology in clinical NLP, literature mining, and machine learning</i> Assignment 1 release	Liu/Yin	Submit course project proposal
3/14	SPRING BREAK			
3/21	#10	<i>Ontology development</i> <i>Ontology alignment and integration</i>	Guest – Matt Diller Liu/Yin	
3/28	#11	<i>Use of ontology for SDoH standardization</i> <i>Future trends in biomedical ontologies</i> Assignment 2 release	Guest – Dr. Zhe He Liu/Yin	Submit Assignment 1 – mini review
4/4	#12	<i>Group discussion for the course project</i>	All	
4/11	#13	<i>Special topics I:</i> 1. <i>The Language of Protein in Information Modeling</i> 2. <i>Data mining and information modeling for real-world problem solving I</i>	Yin/Liu Guest – Dr. Xiao Fan	Submit Assignment 2 – commentary
4/18	#14	<i>Special topics II:</i> 1. <i>Large Language Model in Biomedicine</i> 2. <i>Data mining and information modeling for real-world problem solving II</i>	Yin/Liu Guest – Dr. Sai Zhang	
4/25	#15	Course project team presentations (15-20 minutes each)	All	Submit course project report

COURSE POLICIES

Attendance Policy

Class attendance is mandatory. Excused absences follow the criteria of the UF Graduate Catalogue (e.g., illness, serious family emergency, military obligations, religious holidays), and should be communicated to the instructor prior to or on the day of absence, not later. Regardless of attendance, students are responsible for all assigned reading material and meeting the scheduled due dates for class assignments. The use of cell phones, pagers, or laptop computers (except for class assignments) is not permitted in class.

Quiz/Exam Policy

Unless otherwise stipulated, all quizzes and exams are individual assignments. Students are forbidden to collaborate or consult with one another on such assignments. Students must follow University Policy on Academic Misconduct.

Assignment Policy

A penalty of 10% per day (maximum of two days) shall be assessed on assignments turned in late.

Make-up Policy

Students are allowed to make up work only as the result of illness or other unanticipated circumstances. In the event of such emergency, documentation will be required in conformance with University policy. Work missed for any other reason will earn a grade of zero.

EVALUATION AND GRADING POLICIES

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Course Project	180	45%
Final report	120	30%
Presentation	60	15%
Project proposal	80	20%
Assignments	140	35%
Two quizzes	30 points each	7.5% each
Two assignments	40 points each	10% each
Total	400	100%

Grading Policy

Percent	Grade	Grade Points
93.0 – 100.0	A	4.00
90.0 – 92.9	A-	3.67
87.0 – 89.9	B+	3.33
83.0 – 86.9	B	3.00
80.0 – 82.9	B-	2.67
77.0 – 79.9	C+	2.33
73.0 – 76.9	C	2.00
70.0 – 72.9	C-	1.67
67.0 – 69.9	D+	1.33
63.0 – 66.9	D	1.00
60.0 – 62.9	D-	0.67
00.0 – 59.9	E	0.00

More information on UF grading policy may be found at:
<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

UF POLICIES

Students Requiring Accommodations

Students requiring accommodations must first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester. The College is committed to providing reasonable accommodations to assist students in their coursework.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Diversity and Inclusion

We consider this classroom to be a place where you will be treated with respect, and we welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

In-Class Recording Policy

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular

subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session. Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

ChatGPT

The use of generative AI tools (e.g., ChatGPT, Dall-e, etc.) is permitted in this course only for the following activities: 1) Searching for literature on a research topic; 2) Drafting an outline for your final presentation; 3) checking grammar and spelling. The use of generative AI tools is not permitted in this course for the following activities: 1) Writing any portion of your assignments and final project proposal and report.

Campus Resources:

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.