GMS 6850 Fundamentals of Biomedical Informatics

Course Instructors:
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Semester/Year: Fall 2025
Class Meetings: Thursdays 9:35am – 12:35pm
Classroom: DSIT (Malachowsky Hall) 7126
Credit Hours: 3 hours
Course Format: In-person
Office Hours: By appointment
Canvas URL: http://elearning.ufl.edu/
Department Website: https://hobi.med.ufl.edu/

Prerequisites: None

Course Description

Biomedical informatics is the interdisciplinary science that applies the principles of information science – including the transformation of data into meaningful information – to problems in biomedicine and healthcare. As an evolving and expansive field, biomedical informatics encompasses the development and use of computational tools and methods to collect, manage, analyze and apply biomedical data, information, and knowledge to improve human health.

This course introduces students to the foundational concepts and methods of biomedical informatics. It explores the unique nature of biomedical information, its uses across different healthcare and research settings, how it is structured and managed, and the ethical, legal, and privacy considerations involved in its use. The course is organized around four core subfields; each covered in a dedicated three-week module led by subject matter experts:

- ***Clinical Informatics (Dr. Gregory)*** – Focuses on the integration of informatics into healthcare delivery, including electronic health records (EHRs), clinical decision support, and health IT solutions to enhance care quality and efficiency.
- ***Clinical Research Informatics (Dr. Rahman)*** – Addresses informatics tools and methods used to generate and manage new clinical knowledge related to health and disease, particularly in the context of secondary analyses of clinical data.
- ***Translational Bioinformatics (Dr. Song & Dr. Yin)*** – Bridges molecular and genomic research with clinical practice, translating scientific discoveries from bench to bedside.
- ***Biomedical Imaging Informatics (Dr. Valdes Hernandez)*** – Introduces the fundamentals of biomedical imaging informatics, focusing on methods that enhance the efficiency, accuracy, and reliability of medical imaging analysis

Course Objectives & Goals

The goal of this course is to equip students with foundational knowledge in the discipline that will (1) enhance their ability to address challenges related to biomedical information capture, management, and use in their respective domains, (2) enable them to critically evaluate biomedical informatics methodologies, (3) support informed decision-making regarding biomedical information system and projects, and (4) prepare them for

advanced study or a professional career in biomedical informatics. By the end of the course, students will be able to:

- Explain key concepts, subfields, and the development of biomedical informatics
- Describe major types of health data, relevant data standards, and the infrastructure required for effective data integration and management
- Identify and apply appropriate informatics methods across clinical, translational bioinformatics, and imaging informatics domains
- Demonstrate an understanding of ethical, legal, and practical considerations in biomedical data handling and use
- Describe current trends, innovations, and ongoing challenges in the field of biomedical informatics

Textbooks/Reading Materials

- Shortliffe EH, Cimino JJ, eds. Biomedical Informatics – Computer Applications in Health Care and Biomedicine. 5th ed. Springer. ISBN 978-3-030-58720-8 or e-Book ISBN 978-3-030-58721-5. (Required)
- Additional readings relevant to the course may be assigned each week and will be made available on Canvas.

CLASS SCHEDULE

Date	Week	Topic(s)	Instructor	Assignments
08/21	#1	***Course Overview*** • *History of Biomedical Informatics* • *Heath Data Acquisition and Management*	Liu	
08/28	#2	***Clinical Research Informatics*** • Data Science Pipeline • Medical AI and Machine Learning • Clinical Natural Language Processing	Rahman	
09/04	#3			
09/11	#4			Assignment #1
09/18	#5	***Translational Bioinformatics*** • Introduction to Translational Bioinformatics • Advancing Bioinformatics with Language Models • Real-world Translational Bioinformatics Applications	Song/Yin	
09/25	#6			
10/02	#7			Assignment #2
10/09	#8	***Biomedical Imaging Informatics*** • Biomedical Image Processing techniques to improve the quality, efficiency, and reproducibility of medical images • Biomedical Image Analysis and Neuroinformatics • Real-world applications of biomedical imaging informatics, emphasizing clinical translation challenges and solutions	Valdes Hernandez	
10/16	#9			
10/23	#10			Assignment #3
10/30	#11	***Clinical Informatics*** • The Landscape of Clinical Information Systems and Health IT – the EHR, telehealth, mHealth, and beyond • Human-computer interaction, user-centered design, usability, and workflow • Clinical Decision Support, Patient Safety and Quality	Gregory	
11/06	#12			
11/13	#13			Assignment #4
11/20	#14	***Course project presentations (15-20 minutes each)***	Liu	
11/27	#15	***Thanksgiving Holiday***		
12/04	#16	***Reading Day***		

Homework Assignments:

Homework assignments will be assigned for each of the four core subfields of biomedical informatics covered in this course, due at the end of each three-week module. Details of individual homework assignment will be posted in the assignments section of Canvas and written components will be submitted through Canvas.

Course project:

The final product of the course is a review paper on topics relevant to this course, which consists of 45% of the overall grade (proposal 10% + final report 25% + presentation 10%). You may collaborate with other students as a team. However, each team can only have up to two members. Exceptions can only be made with written explanation and subject to the instructor's approval. Please clearly delineate the roles and responsibilities of each team member. Your final grade of the course project will be adjusted based on your contribution (e.g., merely presenting the project in the final presentation is NOT a contribution).

Students will be asked to conduct a review of literature relevant to specific areas of the course and write a review paper. You are encouraged to come up with novel ideas related to the course. You will conduct extensive background research (e.g., literature review), and you are expected to write a project proposal (the topic you want to review). Please follow the requirements below for the project proposal, final report, and presentation.

Project Proposal Requirements: (Due October 5, 2025)

- **Cover Page**: Title and names of each team member
- **Abstract**: Up to 350 words. Summary of motivation and work to be accomplished.
- **Project description**: 2-3 pages, and please include the following:
  - ***Background and Significance***
  - ***Review Objective and Questions*** – clearly articulate the purpose of the review and formulate specific, answerable questions
  - ***Study Protocol*** – document the planned approach to searching, selecting, extracting, and presenting data. Define inclusion and exclusion criteria. Specify
  - ***Timeline***
- **Literature cited**: no page limit; please follow the JAMIA style.
- Proposals must use a single column and single spacing; 11-point Arial font; tables and figure labels can be in 10-point; 0.5-inch margins.

Project Report Requirements: (Due December 5, 2025)

The project report can be up to 10 pages (excluding references), and please structure the report to include:

- **Cover Page**: Title and names of each team member
- **Abstract**: Up to 350 words summarizing the project using structured format of Background, Objective, Method, Results, Discussion/Conclusion
- **Introduction**: background and objective of the study.
- **Methods**: search strategy, inclusion/exclusion criteria (minimum 15 references, excluding review articles), document screening process using flow diagram.
- **Results**: key findings using tables, charts, and narrative summaries.
- **Discussion**: key conclusions with direct reference to the implications of the review and limitations.
- **References**: please follow the JAMIA style.
- The final report must use a single column and single spacing; 11-point Arial font; tables and figure labels can be in 10-point; 0.5-inch margins.

Final project presentation: (Due November 20, 2025)

- Up to 20 slides and no more than 25 minutes of presentation with 5 minutes Q&A.
- Please upload slides to CANVAS by **midnight November 18, 2025**.

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 activities and 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 penalized 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	Percentage of Final Grade
Attendance	5%
Course Project	45%
• Proposal	10%
• Final report	25%
• Presentation	10%
Assignment #1	12.5%
Assignment #2	12.5%
Assignment #3	12.5%
Assignment #4	12.5%
Total	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

Academic Policies & Resources

https://go.ufl.edu/syllabuspolicies

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.