**GMS 6850: FOUNDATIONS OF BIOMEDICAL INFORMATICS (3 credit hours)**

**Fall 2021**

**LOCATION**: Zoom
( https://ufl.zoom.us/j/93510233236?pwd=UU1lUkJNVlhESmZ5S09CYk9oOHN1dz09 (Links to an external site.))

**CLASS HOURS**: 9:35 am to 12:35 pm

**INSTRUCTOR**:

François (ph: Franswah) Modave, PhD

2004 Mowry Rd, CTRB 3226

Phone: (352) 294-5932

Email: modavefp@ufl.edu

**Office Hours:** By appointment

**Course Communications:** Students may email the instructor with questions but are encouraged to consider whether their questions are of general interest to the entire class. Dedicated class time will be devoted to discussing and answering general questions about either course content or course mechanics that are relevant to all students.

**COURSE OVERVIEW**:

Biomedical informatics is the science of information as studied in or applied to biomedicine. Its scope therefore is information in patient care, public health, biomedical research, and health sciences education. This course will cover foundational issues such as the nature of information, how biomedical information is unique, the purposes for which biomedical information is created and used, the methods of analysis and inference on biomedical information, and the ethical and privacy issues involved. A survey of various kinds of information systems and software in biomedicine and issues in their implementation and use will follow, including but not limited to electronic health records, software for analysis of genomic/genetic data, and public health surveillance systems.

The purpose of this course is to introduce students to the field of biomedical informatics and give them sufficient knowledge and skills in the discipline to (1) improve how they approach issues of information capture, management, and use in their careers, (2) understand and assess the biomedical informatics literature, (3) critically evaluate the reasonableness of proposed information system projects, and (4) pursue an academic degree in biomedical informatics if so desired.

**COURSE OBJECTIVES**:

1. Explain the fundamental nature of information and the implications for information capture and processing
2. Understand the unique issues that pertain to biomedical information vs. other types of information in health care, research, and education
3. Distinguish between ontology vs. epistemology, and data vs. what data are about
4. Read the biomedical informatics literature and understand key terms, descriptions, methods, results, and their implications
5. Engage organizational leadership, information technology professionals, subject matter experts, and other key stakeholders in decision making around and implementation of information systems in their future careers
6. Describe current trends and problems in the field of biomedical informatics
7. Articulate the human, organizational, social, and societal impacts of information and information systems and their significance to give students access to state-of-the-art tools, methods, and approaches for the protection of information security and data privacy.

**TEXTBOOKS/READING MATERIALS**:

- Shortliffe EH, Cimino JJ, eds. Biomedical Informatics – Computer Applications in Health Care and Biomedicine. 4th ed. ISBN 978-1-4471-4474-8. (A 5th edition is available, but we will use the 4th edition for the course)
- Other articles relevant to the course will be made available.

**PREREQUISITES**:

N/A

**GRADE COMPOSITION:**

Attendance and class participation: 10%

Homework assignments and leading class discussion: 30%

Midterm (proposal for the technical report/term paper and presentation): 30%

Final (technical report and presentation): 30%

**Homework assignments**:

Assignments are reading relevant papers (6) in the field and lead in-class discussions.

Students will be asked to read articles in topics related to biomedical informatics and be prepared to lead the discussion in the next course.

**Course project:**

The final product of the course is a technical report/term paper on topics relevant to the course, which consists of 65% of overall the grade. You can collaborate with other students as a team. However, each team can have up to two (2) members. Exception can only be made with written explanation and subject to the instructor's approval. And, please clearly delineate 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 area of the course and write a technical report (or a term paper). You are encouraged to come up 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 do reviews on) and give a presentation during the midterm. Please follow the requirements below for the project proposal and presentation.

Project proposal requirements:

- Cover Page: Include title and list of team members.
- Abstract: Up to 1 page. Explain the motivation for the work to be accomplished.
- Project description: Up to five (10) pages, and please include the following:
  - Specific Aims/Objectives
  - Background and Significance
  - Approach/Research Design (preliminary data and analysis if applicable)
  - Timeline
- Literature cited (no page limit); please follow the JAMIA style.

Proposals must use single column and double spacing; font size no smaller than 11 point; tables and figure labels can be in 10 point; minimum 0.5 inch margins.

Midterm (proposal) presentation:

- Up to fifteen (15) slides and no more than 20 minutes of presentation with 10 minutes Q&A.
- Please send the slides to the instructor at least three (3) days in advance.

Each project team is expected to turn in a final project report, associated code and datasets (or reference to used datasets), and a group presentation.

Project report requirements: the project report can be up to ten (20) pages (excluding references), and please structure the report to include:

- Title (14 point typeface) and names of each team member
- Abstract: no more than 1 page summarizing the project.
- Introduction: background and objective(s) of the study.
- Methods: design, setting, and approaches.
- Results: key findings
- Discussion: key conclusions with direct reference to the implications of the methods and/or results.
- References: please follow the JAMIA style.

Final project presentation:

- Up to fifteen (25) slides and no more than 30 minutes of presentation with 10 minutes Q&A.
- Please send the slides to the instructor at least three (3) days in advance.

**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 the missed class day when possible. UF rules require attendance during the first two course sessions. Missing more than three scheduled sessions will result in a failure. Regardless of attendance, students are responsible for all material presented in class and meeting the scheduled due dates for class assignments. Finally, students should read the assigned readings prior to the class meetings, and be prepared to discuss the material for each session.

**Grading scale:**

| Letter Grade | Grade Points | Grade Percentage |
|---|---|---|
| A | 4.0 | 95-100 |
| A- | 3.67 | 90-94 |
| B+ | 3.33 | 87-89 |
| B | 3.0 | 83-86 |
| B- | 2.67 | 80-82 |
| C+ | 2.33 | 77-79 |
| C | 2.0 | 73-76 |
| C- | 1.67 | 70-72 |
| D+ | 1.33 | 67-69 |
| D | 1.0 | 63-66 |
| D- | .67 | 60-62 |
| E | 0 | < 59 |

For more detail on letter grades and related University of Florida policies, please see the Grades and Grading Policies at http://gradcatalog.ufl.edu/content.php?catoid=6&navoid=1219#grades (Links to an external site.).

**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.

**UF POLICIES:**

**University policy on accommodation students with disabilities:** Students requesting accommodation for disabilities must first register with the Dean of Students Office (http://www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the

instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

**University policy on academic misconduct:** Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at http://www.dso.ufl.edu/students.php. You are expected and required to comply with the University's academic honesty policy (University of Florida Rules 6C1-4.017 Student Affairs: Academic Honesty Guidelines, available at http://regulations.ufl.edu/chapter4/4017.pdf). Cheating, plagiarism, and other forms of academic dishonesty will not be tolerated. Note that misrepresentation of the truth for academic gain (e.g., misrepresenting your personal circumstances to get special consideration) constitutes cheating under the University of Florida Academic Honesty Guidelines

**Netiquette – communication courtesy:** All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions, and chats. The first instance of clearly rude and/or inappropriate behavior will result in a warning. The second instance will result in a deduction of five percentage points from your overall grade. The third instance will result in a drop of a letter grade (A to B, A- to B-, and so on).

## GETTING HELP:

For issues with technical difficulties for E-learning in Sakai, please contact the UF Help Desk at:

- learning-support@ufl.edu
- (352) 392-HELP - select option 2
- https://lss.at.ufl.edu/help.shtml

## COURSE SCHEDULE (TENTATIVE):

The course schedule is subjected to change according to students' background and interests based on the survey conducted at the beginning of the class.

| Week | Date | Topic | Reading | Notes |
|---|---|---|---|---|
| 1 | 8/23 | Introductions, course mechanics/overview, and definition of biomedical informatics<br><br>Overview of biomedical informatics | Shortliffe, Ch. 1 | |
| 2 | 8/30 | Data, information, knowledge and decisions: moving along the spectrum<br><br>How is biomedical information unique? | Shortliffe, Ch. 1<br><br>Shortliffe, Ch. 2 | **Register for i2b2 access** |
| 3 | 9/6 | LABOR DAY HOLIDAY – NO CLASS | | |
| 4 | 9/13 | Clinical research informatics: data warehousing, cohort discovery, secondary data analysis | Shortliffe, Ch. 26 | |
| 5 | 9/20 | Information processing: AI, machine learning, deep learning, and visualization<br><br>Natural language processing and understanding clinical notes | Shortliffe, Ch. 8 | |

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| 6 | 9/27 | Overview of a common data model and its usage in OneFlorida | https://pcornet.org/wp-content/uploads/2020/12/PCORnet-Common-Data-Model-v60-2020_10_221.pdf (Links to an external site.)<br><br>Shortliffe, Ch. 14 |
| 7 | 10/4 | Overview of clinical information systems<br><br>The electronic health record | Shortliffe, Ch. 12<br><br>Koppel paper |
| 8 | 10/11 | Clinical decision support systems<br><br>Ethics and legal issues of biomedical informatics, including privacy and security of information | Shortliffe, Ch. 22<br><br>Shortliffe, Ch. 10<br><br>Goodman paper |
| **9** | **10/18** | **Project presentations** | |

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| | | Information and the US Healthcare System | |
| 10 | 10/25 | Unintended consequences of information systems, adverse events, patient safety | Bloomrosen paper |
| | | Evaluation in biomedical informatics | Shortliffe, Ch. 11 |
| 11 | 11/1 | | |
| | | Human cognition and information systems | Shortliffe, Ch. 4 |
| | | Consumer health informatics and mHealth | |
| 12 | 11/8 | | |
| | | Overview of bioinformatics | Shortliffe, Ch. 24 |
| 13 | 11/15 | Interoperability and standards 1 & 2 | SW Smith paper<br>B Smith paper |
| | | Public health informatics and information systems | |
| 14 | 11/22 | Clinical research informatics: The role of informatics in translational science | Shortliffe, Ch. 16 |

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| 15 | 11/29 | Final project presentations | Last day of class |
| 16 | 12/6 | Final project presentations (if needed) | |