GMS 6806: Security and Privacy in Clinical Research (3 credit hours)

Spring 2020

LOCATION: HPNP G-108

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

INSTRUCTORS:
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COURSE OVERVIEW:
GMS 6806 provides students with an introduction to a wide range of concepts, policies, and techniques in security and privacy (S&P) as they apply to biomedical and clinical research. Information security and data privacy are essential components of biomedical and clinical research. It is imperative for students to understand S&P rules and guidelines (e.g., the Health Insurance Portability and Accountability Act (HIPAA) but also gain practical experience with technologies, tools, and approaches in dealing S&P issues thought out the life cycle of a research project, from experimental design and data collection to data analysis to the dissemination and archiving of valuable results. In this course, students are introduced to the broad landscape of information security and data privacy for biomedical and clinical research: S&P related regulations and guidelines in clinical research; basic concepts of computer security; security analysis of a study's security plan; best practices in secure data management (e.g., de-identification and encryption); and state-of-the-art tools, methods, and approaches for the protection of information security and data privacy.

COURSE OBJECTIVES:
Teaching methods include lecture, discussion, and hands-on data assessment, analysis, and presentation. The goals of the course are:

- To provide basic understanding of role of information security and data privacy in biomedical and clinical research.
- To familiarize students with basic principles of computer security (e.g., confidentiality, integrity, and availability).
- To deepen students' understanding of security principles in research data management.
- To help students understand ethical and legal issues with dealing with biomedical and clinical data.
- To introduce the concepts of the Institutional Review Board (IRB) and its function in protecting human subjects.
- 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:

The following are suggested reading materials, however they are not required. The instructors will distribute lecture handouts when necessary.

References:

- Department of Health and Human Services Summary of the Privacy Rule of the Health Information Portability and Accountability Act (HIPAA)
- D. McGraw, J. Dempsey, L. Haris, and J. Goldman. Privacy as an enabler, not an impediment: building trust into health information exchange. Health Affairs. 2009; 28(2): 416-427
- Samuel Warren and Louis Brandeis. The right to privacy. Harvard Law Review. 1890; V. IV, No. 5.
- L. Sweeney. Simple demographics often identify people. Working Paper 3, Data Privacy Laboratory, Carnegie Mellon University. 2000.
- P. Golle. Revisiting the uniqueness of simple demographics in the US population. Proceedings of the 5th ACM Workshop on Privacy in Electronic Society. 2006: 77-80.
- K. Benitez & B. Malin. Evaluating re-identification risks with respect to the HIPAA Privacy Rule. Journal of the American Medical Informatics Association. 2010; 17(2): 169-177.
- Martin Kuhlmann, Dalia Shohat, and Gerhard Schimpf. Role mining – revealing business roles for security administration using data mining technology. Proceedings of the 8th ACM Symposium on Access Control Models and Technologies. 2003: 179-186.
- L. Røstad and Ø. Nytrø. Access control and integration of health care systems: an experience report and future challenges. Proceedings of the 2nd International Conference on Availability, Reliability and Security (ARES). 2007: 871-878.
- A. Boxwala, J. Kim, J. Grillo, and L. Ohno-Machado. Using statistical and machine learning to help institutions detect suspicious access to electronic health records. Journal of the American Medical Informatics Association. 2011; 18: 498-505.
- Michael Goodrich, Roberto Tamassia. Introduction to Computer Security. Pearson. 2010.
- Jiang Bian, Alexander Loiacono, Andrei Sura, Tonatiuh Mendoza Viramontes, Gloria Lipori, Yi Guo, Elizabeth Shenkman, William Hogan. Implementing a hash-based privacy-preserving record linkage tool in the OneFlorida clinical research network. Journal of the American Medical Informatics Association Open. 2019.
- Kho AN, Hynes DM, Goel S, et al. . CAPriCORN: Chicago area patient-centered outcomes research network. J Am Med Inform Assoc 2014; 21 (4): 607–11.

OFFICE HOURS:

Office hour is by request. Please email the instructors for an appointment in advance. It is likely that we can address the questions over email. However if this is not possible please make an appointment.

PREREQUISITES:

N/A

GRADE COMPOSITION:

Attendance: 5%
Homework assignments: 30%
Midterm (proposal for the technical report and presentation): 25%
Final (technical report and presentation): 40%

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 security and privacy in clinical research and be prepared to lead the discussion in the next course.

Course project:

The final product of the course is a technical report on topics relevant to the course, which consists of 65% of overall the grade. Each student is required to complete a technical report. 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 systematic review of papers relevant to specific area of the course (e.g., data privacy with big data in healthcare applications), and write a technical report (or a review paper). You are encouraged to come up novel ideas related to the course (e.g., design a security protocol for secure data management). You will conduct extensive background research (e.g., literature review), and you are expected to write a project proposal 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 (5) 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 Vancouver style.

Proposals must use single column and single spacing; Arial or Times New Roman font; 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 15 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 (10) pages (including references), and please structure the report to include:

- Title (14 point typeface) and names of each team member
- Abstract: no more than 250 words summarizing the project.
- Introduction: a short background and objective(s) of the study.
- Methods: design, setting, dataset, approaches, and main outcome measurements.
- Results: key findings
- Discussion: key conclusions with direct reference to the implications of the methods and/or results.
- References: please follow the Vancouver style.

Final project presentation:

- Up to fifteen (25) slides and no more than 25 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.

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	Topic	Instructor	Date
1	Introduction and course overview: information security and data privacy articulated, history and context, examples, technology landscape	BIAN/MODAVE	1/9/2020
2	Intro to Computer Security - Confidentiality, integrity and availability (CIA) - Access Control Models (Role-engineering)	MODAVE	1/16/2020
3	S&P Rules, Policies, Regulations and Guidelines in Clinical Research - Ideology, Law, & Regulation	BIAN	1/23/2020
4	Data at UF: IDR and OneFlorida	MODAVE/BIAN	1/30/2020
5	Guest lecture: Privacy and Information Security for Research - UF Health IT	BIAN	2/6/2020
6	S&P Rules, Policies, Regulations and Guidelines in Clinical Research - Ethics & Dual Use	BIAN	2/13/2020
7	Secure Data Management - Data availability - Formal privacy models (short)	BIAN	2/20/2020
8	Midterm presentation	BIAN/MODAVE	2/27/2020
9	SPRING BREAK		3/5/2020
10	Technologies, tools, and approaches in protecting information security and data privacy – Part 1 (Lecture)	MODAVE	3/12/2020

11	Security Analysis, Threat Modeling, Risk Assessment (Lecture)	MODAVE	3/19/2020
12	Security Analysis, Threat Modeling, Risk Assessment (Interactive Discussions)	MODAVE	3/26/2020
13	~~De-identification, Re-identification~~ ~~- De-id (structured data)~~ ~~- Re-id~~ ~~Technologies, tools, and approaches in protecting information security and data privacy – Part 2 (Lecture)~~ ~~- De-identification of clinical notes~~ ~~- Record linkage and privacy-preserving record linkage~~ ~~- DNA~~ BECAUSE OF COVID 19 OUTBREAK, THIS IS CHANGED TO OFFICE HOUR FOR FINAL PROJECTS Lecture on de-identification will be moved to 4/23.	BIAN/MODAVE	4/2/2020
14	PROJECT DISCUSSION/OFFICE HOURS	MODAVE/BIAN	4/9/2020
15	PROJECT DISCUSSION/OFFICE HOURS	MODAVE/BIAN	4/16/2020
16	• De-identification of clinical notes • Course project presentations	MODAVE/BIAN	4/23/2020
17	Course project presentations (if necessary)	MODAVE/BIAN	4/30/2020