

# **GMS 6857 Clinical Decision Support Systems**

Spring 2021

**LOCATION:** Communicore C1-09

**CLASS HOURS:** Tuesdays, 3-5<sup>th</sup> period, 9:35 am – 12:35 pm

**INSTRUCTOR:**

François Modave, PhD, MS  
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**COURSE OVERVIEW:**

GMS 6857 provides students with the fundamentals of decision-making systems, and state-of-the-art knowledge of clinical decision support systems and software. In particular, students learn about the underlying mathematics of decision theory and decision-making, managing risk and uncertainty, pattern recognition and machine learning in decision-making. Students also learn about the usability of clinical decision support systems, patient-centered approaches, implementation science, and how such systems are used in practice, and integrate with the electronic health record systems, and clinical workflows. Finally, students learn about the impact of clinical decision support systems on care access and quality of care.

**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 clinical decision support system components and architecture
- To prepare students to apply and analyze decision-theoretic concepts to clinical decision-making, and analyze the tradeoffs between accuracy and complexity in real-world decision-making systems
- To prepare students to evaluate current clinical decision support systems and their impact on care delivery
- To prepare students to create new strategies to improve clinical decision support systems within the context of implementation science

**TEXTBOOKS/READING MATERIALS:**

The following are required and suggested reading materials. The instructor will distribute lecture handouts when necessary.

**Required text:**

- Berner ES, Clinical Decision Support Systems: Theory and Practice, 3<sup>rd</sup> Edition. Springer. ISBN-13: 978-3319319117

**Optional texts:**

- Mushlin SB, Greene HL, Decision Making in Medicine: An Algorithmic Approach, 3<sup>rd</sup> Edition. Mosby-Elsevier. ISBN-13: 978-0323041072
- Luce RD, Raiffa H, Games and Decisions: Introduction and Critical Survey. Revised Edition. Dover. ISBN-13: 978-0486659437

**OFFICE HOURS:** By Appointment only

**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 writing critiques for relevant papers (6) in the field.

Students will be asked to read articles in topics related to security and privacy in clinical research and to write a critique of the paper. Please do not copy and rearrange the sentences in the original paper, which will result in low a grade.

**Assignment rules:** You are required to compliant with these rules.

- Your assignment must be turned in no later than 11:59 pm on the day that it is due.
- Late homework assignments will NOT be accepted, unless you have a formal proof of the exception (e.g., a written doctor note, a police ticket, etc.).
- No handwritten assignment. All assignments need to be submitted electronically either by email or the online system (will be clarified at the beginning of the course).
- DO NOT COPY OTHERS' HOMEWORK. There is zero-tolerance. The one who copy the homework will receive 0 point; and the one who is copied will get only 50% of the points that he/she should have received.
- You can work with others (e.g., discuss, consult, etc.) on a homework assignment. And, if you work on a homework assignment with other students in the course, you are required to list their names when you turn in the assignment. Plagiarism will receive 0 point.
- Searching for a solution on the web—and then submitting it as your answer for a homework assignment—will be considered a violation.

**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 systematical review of papers relevant to specific area of the course (e.g., machine learning for CDSS), and write a technical report (a review paper). You are encouraged to come up novel ideas related to the course (e.g., novel technologies for clinical decision-making). 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 following requirements 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.

Any requests for make-up work due to technical issues must be accompanied by the ticket number received from LSS when the problem was reported to them. The ticket number will document the time and date of the problem. You must e-mail the course director within 24 hours of the technical difficulty if you wish to request a make-up or extension.

#### **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).

**Online Faculty Course Evaluation Process:** Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals.

Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

**GETTING HELP:**

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

- [learning-support@ufl.edu](mailto: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.

<b>Week</b>	<b>Topic</b>	<b>Reading / Assignments</b>
1	Introduction to Clinical Decision Support Systems Class Structure Project Description	Chapter 1 Berner
2	Mathematical Foundations of Decisions	Chapter 2 Berner
3	Data Mining and CDSS	Chapter 3 Berner
4	Usability and CDSS	Chapter 4 Berner
5	Architecture and Best Practices for Implementation of CDSS	Chapter 5-6 Berner
6	Ethical and Legal Issues related to Decision Support Systems	Chapter 8 Berner
7	Assessing CDSS	Chapter 9 Berner
8	Introduction to Informed and Shared Decision-Making	Selected readings TBD
9	Midterm presentation	
10	Novel Modeling Techniques for Decision Making	Selected readings Modave
11	Diagnostic Decision Support Systems	Chapter 11 Berner
12	CDSS and Tailored Drug Therapy	Chapter 12 Berner
13	Case Study 1: Brigham and Women’s Hospital	
14	Case Study 2: Intermountain Healthcare	
15	Case Study 3: Vanderbilt	
16	Course project presentations	