COURSE NUMBER: MSCR 598

CREDIT HOURS: 1 CREDIT   **SEMESTER:** Fall 2021

COURSE TITLE: Big Data to Knowledge (BD2K) in CTR Research

CLASS HOURS AND LOCATION: Th 3.10-5.00PM, Online

Join Zoom Meeting

Join Zoom Meeting
https://us02web.zoom.us/j/83445278993?pwd=bFJhcFhlTURsWk5jWk9OT3VlZlFrUT09

Meeting ID: 834 4527 8993
Passcode: 511057

INSTRUCTOR NAME: Turgay Ayer, Ph.D.

INSTRUCTOR EMAIL: tayer@emory.edu

TEACHING ASSISTANT (TA): Andrew ElHabr
TA EMAIL: aelhabr@emory.edu

Required Textbook: Copyrighted material will be available through Harvard Business School Publishing (HBSP). Please click on the following link to access the course package. If you are not already registered, please register and login at HBSP to access the link: https://hbsp.harvard.edu/import/857226

Please note that HBSP tracks who registers with them and compares that to the class roster as every student is expected to purchase their own course pack – copying another's course pack is a copyright violation.

Other notes will be provided by instructor.

Recommended (not required) textbook: Biomedical Informatics: Computer Applications in Health Care and Biomedicine, edited by Edward H. Shortliffe and James J. Cimino. 4th ed.
  o *This text is suitable for students who are technically inclined or are interested in a deeper dive into Biomedical Informatics*

COURSE DESCRIPTION

In 2012, the NIH began the trans-institute Big Data to Knowledge (BD2K) initiative, recognizing the exponential growth of data, its potential tremendous value to human health and the importance of promoting parallel growth of data acquisition, storage and analytic infrastructure and processing capacity within the human health research domain. The BD2K initiative is guided by the following mission statement:

"BD2K is a trans-NIH initiative established to enable biomedical research as a digital research enterprise, to facilitate discovery and support new knowledge, and to maximize community engagement."

 BD2K can derive from several patient care sub-domains including electronic medical records, continuous health monitor signal processing, the self quantized patient (mHealth/social networking) or public health surveillance activities. This course will seek to convey an understanding of the fundamental principles of this multi-faceted BD2K Pipeline derived from patient care.

Link: http://georgiactsa.org/training/ms-in-clinical-research/mscr-courses.html

COURSE COMPETENCIES:

1. Define the data that formulate research hypotheses.
2. Derive translational questions from clinical research data.
3. Describe trends and best practices in informatics for the organization of biomedical and health information.
4. Describe the effects of technology on medical research, education, and patient care.
5. Explain the role that health information technology standards have on the interoperability of clinical systems, including health IT messaging.
6. Discuss the role of bioinformatics in the study design and analyses of high dimensional data.

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LEARNING OBJECTIVES/OUTCOMES:

This course will teach fundamental Big Data principles underlying all fields that incorporate aspects of BD2K and provide more detailed case studies within select clinical, patient care fields. More specific goals are to:

- Define Big Data, Data Science and its components.
- Recognize the importance BD2K in numerous sectors of human endeavor and biomedical science.
- Gain an overall understanding of various analytics techniques in handling big data.
- Learn how the Big Data Pipeline is applied in various areas, such as clinical informatics, public health informatics, and learning healthcare systems.
- Perform descriptive and predictive analysis on real data.

EVALUATION

Grading Policy

Intermountain Case Analysis	20%	-individual assignment[1]
HW (Modeling) Assignments	30%	-individual assignment
Paper Presentation	35%	-group assignment
Class Participation	15%	-individual assignment

More details on each assignment are provided below.

COURSE STRUCTURE AND POLICIES

This a <u>fully online course</u>.

Participation
The learning effectiveness will be maximized if students actively engage in class discussions. A teaching assistant will be online during the lecture times to answer any questions that you can share through Zoom's chat option. Class attendance, by

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[1] Questions you should be answering in your write-ups are listed at the end of the syllabus.

itself, is not sufficient to obtain class participation points. However, inadequate class attendance will surely hinder adequate participation.

Written Case Analysis

You are expected to provide a write-up for a case we will be analyzing. A detailed course outline at the end of this syllabus provides a list of questions to be answered. Concentrate explicitly on these questions for your write-ups, providing detailed analysis and/or discussion. A good write-up will start with summarizing the case, and continue with clear and crisp responses to the write up questions, followed by a succinct representation of the supporting analysis/rationale. The write-up should focus on issues at hand and utilize case facts only.

Case write-ups are limited to 2 pages (strictly enforced). All assignments, including case write-ups, should be double-spaced, 12 pt in Times New Roman, 1 inch margins all around.

All assignments will be submitted through Canvas. The due dates for assignments are available in the course outline at the end of the syllabus, and also under the Assignments tab in Canvas. The Canvas submission system will close by the due date and late submissions will not be accepted.

Article Assignments

In addition to cases, each group of (about six) students will present one research article relevant to this course. Students are expected to identify their own research articles based on their interests. The only minimal expectation is that the selected paper should be relevant to the content covered in this class, such as big data, data science, machine learning, artificial intelligence, real-world evidence etc.

Once you form your group and agree on an article, please indicate your selection at the link below and submit your selected article through Canvas by **September 10**, i.e. third week of the class.

https://tinyurl.com/y9u75q9l

We will have the paper presentations during the last class meeting, and each team will have 20 minutes for their presentation, including Q&As. Every student is expected to read all of the selected articles for presentation/discussion prior to the class and join the class discussion.

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The article presentation should cover:
a) Main research problem

b) Approach

c) Results

d) Discussion

e) Critique (e.g., weak points, how could this article be improved etc.)

Power point presentations should be submitted through Canvas by the deadline (see course outline at the end).

LANEY GRADUATE SCHOOL POLICIES

Accessibility and Accommodations

Accessibility Services works with students who have disabilities to provide reasonable accommodations. In order to receive consideration for reasonable accommodations, you must contact the Office of Accessibility Services (OAS). It is the responsibility of the student to register with OAS. Please note that accommodations are not retroactive and that disability accommodations are not provided until an accommodation letter has been processed.

Students who registered with OAS and have a letter outlining their academic accommodations are strongly encouraged to coordinate a meeting time with me to discuss a protocol to implement the accommodations as needed throughout the semester. This meeting should occur as early in the semester as possible.

As the instructor of this course I endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me and the Office for Equity and Inclusion, 404-727-9877 or accessibility@emory.edu. Additional information is available at the OAS website at http://equityandinclusion.emory.edu/access/students/index.html

HONOR CODE

You are bound by Emory University's Student Honor and Conduct Code. The Georgia CTSA MSCR Program requires that all material submitted by a student fulfilling his or her academic course of study must be the original work of the student. Violations of academic honor include any action by a student indicating dishonesty or a lack of integrity in academic ethics. *Academic dishonesty refers to cheating, plagiarizing, assisting other students without authorization, lying, tampering, or stealing in performing any academic work, and will not be tolerated under any circumstances.*

The Laney Graduate School Honor Code states: "A writer's data, facts, ideas, and phraseology should be regarded as his/her property. Any person who uses a writer's data, facts, ideas, or phraseology without giving due credit is guilty of plagiarism."

Link: http://gs.emory.edu/handbook/honor-conduct-grievance/honor/index.html

TENTATIVE COURSE CALENDAR AND OUTLINE

Week	Topic	Related Reading Materials	Assignment
1 (8/26)	Intro to Big Data and Informatics	"Creating Value In Health Care Through Big Data: Opportunities And Policy Implications"	
2 (9/2)	Algorithms and Models in Big Data Analytics	"The Inevitable Application of Big Data to Health Care" by Murdoch and Detsky	
3 (9/9)	Algorithms and Models in Big Data Analytics		Group/paper selections and submissions are due on 9/10, 11.59PM (submit only the selected paper via Canvas; one submission per group)
4 (9/16)	Algorithms and Models in Big Data Analytics	"Big Data And New Knowledge In Medicine: The Thinking, Training , And Tools Needed For A Learning Health System"	
5 (9/23)	Intermountain Case discussion Algorithms and Models in Big Data Analytics (ctd)	Intermountain Case	Intermountain case write-up is due on 9/22, 11.59PM
6 (9/30)	Algorithms and Models in Big Data Analytics	"Big Data Opportunities for Global Infectious Disease Surveillance"	HW1- Coding Assignment Part I due 9/30 11.59PM
7 (10/7)	Paper Presentations		Presentation slides due 10/6, 11.59PM
10/14	NO CLASS MEETING - HW 2 ASSIGNMENT	Any questions related to this assignment should be sent to TA.	HW2-Coding assignment Part II due 10/14 11.59PM

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Case Discussion and Assignment Questions:

- *Week 5, Case: Intermountain Healthcare* - HBS Case 5-603-066
  Write-up Assignment Questions:
    1. How well is Intermountain Health Care performing?
    2. What is Intermountain's approach to the management of health care delivery?
    3. Why don't all health care delivery organizations do this?