MINF 705A Medical Informatics

Medical Student Elective

(4 weeks)

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Text
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A virtual course from Oregon Health & Science University (OHSU) is being made available as an elective for medical students. The course is a broad survey on the field of informatics and originally derives from the introductory course in our Biomedical Informatics Graduate Program. This course is also used in OHSU's offering as part of the American Medical Informatics Association 10x10 ("ten by ten") program.

The course has about 40 hours of lecture, and we anticipate another 40 hours spent on discussion forums, multiple-choice self-assessments for each unit, and optional readings. The course is graded as pass-fail, and passing requires completion of all of 10 units and their self-assessments over the 4 weeks of the course.

Information for University of Utah medical students:

Local Course Director: Damian Borbolla, MD, MS. Assistant Professor, Department of Biomedical Informatics

Start/End Dates: 4/27/2020 - 5/22/2020

Format: The duration of the course is 4 week, OHSU will define passing or falling based on self assessments. Dr. Borbolla will offer weekly Zoom sessions (1 hour long, optional) to discuss informatics topics and Q&A related to the course. Day and Time TBD

Overview of Course

The goal of this course is to provide a detailed overview of biomedical and health informatics for medical students. It is a virtual course with about 40 hours of asynchronous lecture and a comparable amount of time spent on self-assessment quizzes, online forum discussion, and optional readings. The course provides up-to-date details on the informatics field, including electronic health records, data standards and interoperability, clinical decision support, healthcare data analytics, population health, patient engagement, and telemedicine. It also describes and sets the context for new technologies, such as SMART on FHIR, machine learning and artificial intelligence, wearables, and blockchain. The course will also discuss issues specific to the Covid-19 pandemic.

Course Logistics

This course is an adaptation of the on-line *Introduction to Biomedical and Health Informatics* class currently taught in the OHSU biomedical informatics education program. It is being offered in a 4-week block for medical students. The course is taught in a completely asynchronous manner, but students must keep up with the course materials so they can benefit from the interactive discussion with faculty and other students. The course uses the following teaching modalities:

- Voice-over-Powerpoint lectures - These are delivered using HTML5. (As such, it is available on just about any platform.) The content is easily accessed by any type of connection to the Internet.
- Interactive discussion - Students can engage in interactive discussion on important issues using on-line discussion forums.
- Reading assignments - The course suggests optional reading assignments (although students are only responsible for the content in the lectures).
- Homework/quizzes - Each unit is accompanied by a 10-question multiple-choice self-assessment that aims to have the student apply the knowledge from the unit.

The course is accessed via OHSU's Sakai learning management system (LMS). At the onset of the course, each student is provided a login and password by the OHSU distance-learning staff, who also provide technical support for the course. All on-line activities are asynchronous, so there is no specified time that a student must be on-line. Students must complete all of the self-assessment tests and participate in class discussions.

Instructor

The instructor for the course is William Hersh, MD. The best way to reach him is via email (hersh@ohsu.edu). You may also find interesting reading in his blog.

Syllabus

The following table outlines the curriculum with unit number and topic, with the full course outline provided below.

Unit	Topic
1	Overview of Field and Problems Motivating It
2	Biomedical Computing
3	Electronic and Personal Health Records (EHR, PHR)

4	Standards and Interoperability
5	Advancing Care With the EHR
6	Data Science and Analytics
7	EHR Implementation, Security, and Evaluation
8	Information Retrieval (Search)
9	Research Informatics
10	Other Areas of Informatics

Readings

The course has no required textbook. There is an optional textbook (co-edited by the course instructor) that students may want to consider: Hoyt RE, Hersh WR, Eds. (2018). *Health Informatics: Practical Guide, Seventh Edition*, available from Lulu.com in paper and eBook format. The reading assignments from the book are optional, and no material will appear on the homework quizzes or final exam that is not also covered in the class. But some students prefer to also read a textbook when learning. The appropriate chapter readings for each unit in the course are as follows:

Unit	**Topic**	**Textbook Chapter(s)**
1	Overview of Field and Problems Motivating It	1
2	Biomedical Computing	3
3	Electronic and Personal Health Records (EHR, PHR)	2, 4
4	Standards and Interoperability	5
5	Advancing Care With the EHR	6, 8, 9
6	Data Science and Analytics	7, 14
7	EHR Implementation, Security and Evaluation	4, 10
8	Information Retrieval (Search)	15
9	Research Informatics	18, 20
10	Other Areas of Informatics	12, 13, 16, 17, 19

Detailed Course Outline

1. Overview of Field and Problems Motivating It
1.1 What is Biomedical and Health Informatics?
1.2 A Short History of Biomedical and Health Informatics
1.3 Problems in Healthcare Motivating Biomedical and Health Informatics
1.4 Who Does Biomedical and Health Informatics?
1.5 Resources for Field – Organizations, Information, Education

2. Biomedical Computing
2.1 Types of Computers
2.2 Data Storage in Computers
2.3 Computer Hardware and Software
2.4 Computer Networks
2.5 Software Engineering

3. Electronic and Personal Health Records (EHR, PHR)
3.1 Clinical Data
3.2 History and Perspective of the Health (Medical) Record
3.3 Definitions and Key Attributes of the EHR
3.4 Benefits and Challenges of the EHR
3.5 EHR Examples
3.6 Personal Health Records

4. Standards and Interoperability
4.1 Standards and Interoperability: Basic Concepts
4.2 Identifier and Transaction Standards
4.3 Message Exchange Standards
4.4 Terminology Standards
4.5 SMART on FHIR

5. Advancing Care With the EHR
5.1 Patient Safety and Medical Errors
5.2 Clinical Decision Support (CDS)
5.3 Healthcare Quality Measurement and Improvement
5.4 Health Information Exchange (HIE)
5.5 From Meaningful Use to Promoting Interoperability

6. Data Science and Analytics
6.1 Data Science and Data Analytics
6.2 Machine Learning and Artificial Intelligence
6.3 Natural Language Processing
6.4 Evidence-Based Medicine
6.5 Clinical Practice Guidelines

7. EHR Implementation, Security, and Evaluation
7.1 Clinical Workflow Analysis and Redesign
7.2 EHR System Selection and Implementation
7.3 Telemedicine and Telehealth
7.4 Privacy and Security
7.5 Evaluation of the EHR

8. Information Retrieval (Search)
8.1 Information Retrieval
8.2 Knowledge-based Information
8.3 Content
8.4 Indexing
8.5 Retrieval
8.6 Research: Evaluation and Future Directions

9. Research Informatics
9.1 Clinical Research Informatics
9.2 Overview of Basic Molecular Biology
9.3 Translational Bioinformatics
9.4 From Clinical Genetics and Genomics to Precision Medicine
9.5 Genomics Data in the EHR and Other Information Systems

10. Other Areas of Informatics
10.1 Imaging Informatics

10.2 Nursing Informatics
10.3 Public Health Informatics
10.4 Consumer Health Informatics
10.5 Population Health