Course: _Overview of Medical Informatics, Hosted by OHSU__   **Course Number _____**

Department:	Gen/OME
Faculty Coordinator:	Sendelbach
Asst. Fac. Coordinators:	

Periods Offered:	11
Length:	4 weeks
Max # of Students:	15
First Day Contact:	N/a
First Contact Time:	N/a
First Day Location:	REMOTE Elective--asynchronous
Prerequisites:	*none*

I.   Course Description: This remote elective is hosted by Dr. William Hersh, Department of Medical Informatics & Clinical Epidemiology at Oregon Health and Science University. A detailed course description is attached. The course is a broad survey on the field of informatics and originally derives from the introductory course in their Biomedical Informatics Graduate Program. 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.

Educational Program Objectives	Related Course Objectives	Assessment methods *(examples below)*
Patient Care: Students will demonstrate the ability to provide patient-centered care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health as part of the interprofessional team.		
Knowledge for Practice: Students will demonstrate knowledge of established and evolving biomedical, clinical, epidemiological and social-behavioral sciences, as well as the application of this knowledge to patient care.	1. Students will be able to describe how the Electronic Health Record can be used to improve patient care. 2. Students will be able to explain the role of biomedical and health informatics in advancing health care at the level of the population. 3. Students will develop an overview of biomedical computing.	Performance on quizzes

Interpersonal and communication skills: Students will demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, families and health professionals.	1. Students will communicate effectively via chat, online meetings, written assignments, email.	Successful course completion.
Personal and professional development: Students will adhere to professional standards and demonstrate the qualities required to sustain lifelong personal and professional growth.	1. Students will adhere to the professional guidelines for online sessions. (separate document)	Successful course completion.
Critical thinking and Discovery: Students will be able to critically appraise literature, apply knowledge and engage in scholarly activity	1. Students will be able to discuss research in the field of informatics.	Performance on quizzes
Health Care systems and society: Students will demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care.	1. Students will be able to describe the role of the electronic medical record, how an EMR is implemented, and security of the EMR. 2. Students will describe the critical role of bioinformatics in development of Clinical decision support and Quality improvement	Performance on quizzes

III.   Methods of Instruction: Voice over Power point lectures; online discussion forums, assigned readings, homework and quizzes.

IV.   Overview of student responsibilities: Complete assigned readings, view lectures and pass required quizzes.

IV.   Method of evaluation of students and requirements: Evaluation based on assessment methods listed above, grade is Pass/Fail

MINF 705A Medical Informatics

Medical Student Elective

(4 weeks)

William Hersh, M.D.
Department of Medical Informatics & Clinical
Epidemiology School of Medicine
Oregon Health & Science
University Course Director
Last updated: April 2, 2020

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.

IMPORTANT: We would like to have each medical school handle student enrollment and credit themselves. In other words, we will make the course available through our learning management system (LMS) at OHSU, but we will ask each school to provide us a list of students to enroll and each will get a login to the course. After the course is done, we will report back to the schools on whether each student completed the course or not. We would like for medical schools that participate to handle giving students credit (probably through some sort of self-study elective).

We are implementing the course as a 4-week medical student elective, which is awarded 2 credits at OHSU. 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.

We will start one new 4-week course each week beginning Monday, April 6. We will enroll all students in a single section, and make all of the content available to them for the duration of the 4 weeks. We will make use of the discussion forums built into our LMS to answer questions they have, and raise a few questions for them to discuss. At the end of 4 weeks, the course will end, and those who have completed all of the work will receive a passing grade, which we will report back to the contact from each school.

IMPORTANT: We prefer that there be a single point of contact for each school with which we communicate. To capture this information, we have created an online survey that asks for the point of contact (please use a university email address), estimated number of students (initially up to 20 per school - we may be able to accommodate more later), and preferred dates (which we may need to change to balance load). After the survey is completed, someone from our staff will contact the schools to work out the details. The survey is at

the following URL: https://www.surveymonkey.com/r/ohsu-informatics

Also please note, for those interested in less than a full course on informatics, we have an open Web site that provides a sampling of some of the materials and is being used by some schools: http://informatics.health

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