

BMI 510/610 – Introduction to Biomedical & Health Informatics

William Hersh, M.D., Course Director

3 credit hours

Winter Quarter, 2015

Last updated: December 2, 2014

PREREQUISITES

Graduate-level standing.

COURSE DESCRIPTION

This course provides a broad survey introduction to biomedical and health informatics, the field concerned with the acquisition, use, and storage of information in healthcare, biomedical research, and public health. Students focus on the underlying themes of biomedical and health informatics, including the proper use of information technology in health-related settings. The course also covers the main applications of information technology in health and biomedicine, including electronic health records, personal health records, information retrieval, genomics, imaging, and telemedicine. The viewpoints of information technology from medicine, computer science, nursing, public health, patients/consumers are considered. The course provides up-to-date details on current events in the field, including the “meaningful use” of electronic health records specified by the Health Information Technology for Economic and Clinical Health (HITECH) Act of the American Recovery and Reinvestment Act (ARRA, also known as the economic stimulus package).

INSTRUCTOR

The instructor for the course is [William Hersh, MD](#). The best way to reach him is via email (hersh@ohsu.edu). Dr. Hersh does not keep regular office hours but phone calls or meetings can be arranged with him. He also maintains a blog, [Informatics Professor](#).

COURSE COORDINATION

The course is taught via distance learning. Teaching modalities include:

- Access to the entire course via the [OHSU Sakai system](#)
- Voice-over-PowerPoint lectures using the Flash browser plug-in
- Handouts of PowerPoint slides and cited references
- Reading assignments in the form of PDFs
- On-line multiple-choice homework assignments
- On-line discussion in the Sakai forums

COURSE INTERACTION

The course provides a great deal of interaction among the faculty, teaching assistants, and other students. On-line discussion begins with the instructor posing 1-2 questions per unit. Students are also encouraged to post questions or comments about any topic in the course or the field in the general discussion forum at any time.

COURSE PROJECT

The course project is a term paper. The goal of the term paper is for you to explore a topic of interest beyond what we cover in class. Therefore you should pick a topic that interests you, search for information about it in reputable sources, and write it up in a coherent and readable manner. You must not simply re-hash material we cover in class.

One of the big challenges students face with this assignment is an appropriate level of focus. You may need to do some searching to determine what that level of focus is. You want a topic that you can reasonably describe, not necessarily in exhaustive detail, in 10-15 pages. If you have questions about appropriate level of focus, or any other questions, do not hesitate to email the instructor. He and you can even talk by phone if necessary.

Some logistical details about the paper:

- It should be 10-15 pages double-spaced, including tables, figures, and references, with one-inch margins.
- It should be a readable narrative and not a series of lists or bulleted items.
- The text should be your own words and not copied and pasted from other writings. (An on-line plagiarism-checking tool is used.)
- It should be typed into a Microsoft Word document.
- The file name should begin with your last name.
- The references can be in any format you choose (eg, APA, Vancouver) as long as they are consistent and have enough information for them to be located (which the instructor occasionally does, since you may pique his interest!).

WHEN PROBLEMS ARISE

It is critical to contact the appropriate person when problems arise:

- For basic Sakai problems and course issues (e.g., cannot log in, after-hours technical assistance, Course Materials or Forum not available/accessible during regular business hours/days), contact the Sakai Help Desk: Toll-Free - (877) 972-5249; email - sakai@ohsu.edu. The Sakai Help Desk hours are 8 a.m. – 10 p.m. Pacific M-F, and 12-5 p.m. Pacific on weekends and holidays.
- For questions about course content (e.g., do not understand a topic or disagree with homework quiz answer), contact the Teaching Assistant, who will be announced at the beginning of the course: go to the Email Tab after logging into the course and choose “Associate” role to send message to the TA or post a question in the Forums.

When appropriate, all issues will be elevated to Dr. Hersh. While Dr. Hersh does not maintain scheduled office hours, he is readily accessible via email and will respond within 24-48 hours. Appointments to discuss course matters by phone or in person can be arranged via email.

FINAL EXAMINATION

BMI 510/610 requires a final exam. The exam is administered at the end of course. The exam is open-book, so students may access books, notes, lectures, and Internet but may not contact or communicate with other humans.

It is OHSU policy that any exam offered online and worth more than 10% of the final course grade must be virtually proctored. In this course, we will be using ProctorU, a remote proctoring service. You will be required to schedule your final exam time three weeks ahead of time and it will cost \$35. More

information will be provided to you regarding the setup, scheduling and requirements in your course materials.

COURSE OUTLINE

Below is the outline for the course, with the unit name, reading assignment, and date the material is posted. All work in all units is due one week after it is posted (i.e., when the next unit's material is posted).

Unit	Topic	Date Posted
1	Overview of Field and Problems Motivating It	1/7
2	Biomedical Computing	1/14
3	Electronic and Personal Health Records	1/21
4	Standards and Interoperability	1/28
5	Meaningful Use of the EHR	2/4
6	EHR Implementation and Evaluation	2/11
7	Protection and Analytical Use of Data	2/18
8	Information Retrieval and Digital Libraries	2/25
9	Imaging Informatics and Telemedicine	3/4
10	Research Informatics (Term paper due)	3/11
-	Final Examination Due	TBD

The term paper is due by 5 pm Pacific time on 3/11. Details about the final exam will be provided at a later date.

REQUIRED READINGS

The course has no required textbook. Students are provided assigned readings from 1-3 key articles or reports for each unit. Students are also provided comprehensive lists of references for topics covered in the lectures.

In addition, there are two optional textbooks that students may want to consider, for which a table below lists chapters appropriate for each unit in the course:

- Shortliffe, EH and Cimino, JJ, Eds. (2014). *Biomedical Informatics: Computer Applications in Health Care and Biomedicine (Fourth Edition)*. New York, NY, Springer.
- Hoyt, RE, Yoshihashi, A, et al., Eds. (2014). *Health Informatics: Practical Guide for Healthcare and Information Technology Professionals, Sixth Edition*. Pensacola, FL, Lulu.com.

The reading assignments from these books 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	Shortliffe	Hoyt
1	Overview of Field and Problems Motivating It	1	1
2	Biomedical Computing	5, 6	7, 11
3	Electronic and Personal Health Records (EHR, PHR)	2, 12, 17	2, 4
4	Standards and Interoperability	7, 8	6
5	Meaningful Use of the EHR	13, 22	5, 15, 16, 17

6	EHR Implementation and Evaluation	11, 15, 16	10, 21
7	Protection and Analytical Use of Data	3, 10	3, 8, 14
8	Information Retrieval and Digital Libraries	21	12, 13
9	Imaging Informatics and Telemedicine	9, 18, 20	18, 19
10	Research Informatics	24, 25, 26	20, 22

EVALUATION

Student grading is based on the following:

- On-line multiple-choice homework assignments - 30%
- Term paper - 30%
- Final examination - 30%
- Class participation in discussion forums - 10%

(HIP 520 students are graded only on the homework quizzes, final examination, and class participation.)

The course is graded on a curve, but usually adheres to the following distribution:

A	90-100
A-	85-89
B+	80-84
B	75-79
B-	70-74
C+	65-69
C	60-64
D/F	<60

Graduate Studies in the OHSU School of Medicine is committed to providing grades to students in a timely manner. Course instructors will provide students with information in writing at the beginning of each course that describes the grading policies and procedures including but not limited to evaluation criteria, expected time needed to grade individual student examinations and type of feedback they will provide.

Class grades are due to the Registrar by the Friday following the week of finals. However, on those occasions when a grade has not been submitted by the deadline, the following procedure shall be followed:

- 1) The Department¹ /Program Coordinator² will immediately contact the Instructor requesting the missing grade, with a copy to the Program Director and Registrar.
- 2) If the grade is still overdue by the end of next week, the Department¹ /Program Coordinator² will email the Department Chair directly, with a copy to the Instructor and Program Director requesting resolution of the missing grade.
- 3) If, after an additional week the grade is still outstanding, the student or Department¹ /Program Coordinator² may petition the Office of Graduate students for final resolution.

1 For courses that are run by a specific department.

2 For the conjoined courses (course number is preceded by CON_ that are run by Graduate Studies.

DETAILED COURSE OUTLINE

1.0 Overview of Field and Problems Motivating It

1.1 What is Biomedical and Health Informatics?

- 1.2 A Discipline Whose Time Has Come
- 1.3 Problems in Healthcare Motivating Biomedical and Health Informatics
- 1.4 Who Does Biomedical and Health Informatics?
- 1.5 Seminal Documents and Reports
- 1.6 Resources for Field - Organizations, Information, Education

- 2.0 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

- 3.0 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

- 4.0 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 Natural Language Processing of Clinical Text

- 5.0 Meaningful Use of the EHR
 - 5.1 Patient Safety and Medical Errors
 - 5.2 Healthcare Quality
 - 5.3 Clinical Decision Support (CDS)
 - 5.4 Computerized Provider Order Entry (CPOE)
 - 5.5 Health Information Exchange (HIE)
 - 5.6 HITECH, ARRA, and Achieving Meaningful Use

- 6.0 EHR Implementation and Evaluation
 - 6.1 Clinical Workflow Analysis and Redesign
 - 6.2 System Selection and Implementation
 - 6.3 Evaluation of Usage, Outcomes, and Cost
 - 6.4 Nursing Informatics
 - 6.5 Public Health Informatics
 - 6.6 Patient Engagement

- 7.0 Protection and Analytical Use of Data
 - 7.1 Privacy, Confidentiality, and Security
 - 7.2 HIPAA Privacy and Security Regulations
 - 7.3 Evidence-Based Medicine
 - 7.4 Clinical Practice Guidelines
 - 7.5 Healthcare Data Analytics

8.0 Information Retrieval and Digital Libraries

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

8.7 Digital Libraries

9.0 Imaging Informatics and Telemedicine

9.1 Imaging in Health Care

9.2 Modalities of Imaging

9.3 Digital Imaging

9.4 Telemedicine: Definitions, Uses, and Barriers

9.5 Efficacy of Telemedicine

10.0 Research Informatics

10.1 Clinical Research Informatics

10.2 Translational Bioinformatics

10.3 Overview of Basic Molecular Biology

10.4 Personalized/Precision Medicine

ACADEMIC HONESTY

Course participants are expected to maintain academic honesty in their course work. Participants should refrain from seeking past published solutions to any assignments. Literature and resources (including Internet resources) employed in fulfilling assignments must be cited. See http://www.ohsu.edu/xd/education/library/research-assistance/plagiarism.cfm?WT_rank=1# for information on code of conduct for OHSU and <http://www.ohsu.edu/xd/education/teaching-and-learning-center/for-students/index.cfm> for more information on citing sources and recognizing plagiarism.

In an effort to uphold the principles and practice of academic honesty, faculty members at OHSU may use originality checking systems such as Turnitin to compare a student's submitted work against multiple sources. To protect student privacy in this process, it will be necessary to remove all personal information, i.e. student name, email address, student u-number, or any other personal information, from documents BEFORE submission.

STUDENT ACCESS

OHSU is committed to providing equal access to qualified students with disabilities. Student Access determines and facilitates reasonable accommodations, including academic adjustments and auxiliary aids, for students with documented disabilities. A qualified student with a disability is a person who meets the academic and technical standards requisite to admission or participation in a particular program of study. As defined by the Americans with Disability Act (ADA), a person with a disability has a physical or mental impairment that substantially limits one or more major life activities of the individual. This may include, but is not limited to, physical conditions, chronic health issues, sensory impairments, mental health conditions, learning disabilities and ADHD.

Student Access works with students with disabilities from all of OHSU's educational programs and at each campus.

Each school has an assigned Program Accommodation Liaison (PAL), who acts as an "in-house" resource for students and faculty concerning access issues for students with disabilities. The PAL works in collaboration with Student Access to implement recommended accommodations for students with disabilities.

It is recommended that you contact Student Access to consult about possible accommodations if you a) received disability accommodations in the past, b) begin experiencing academic difficulties, and/or c) are given a new diagnosis from your healthcare provider.

Learn more about Student Access:

Phone: 503 494-0082

Email: studentaccess@ohsu.edu

Website: www.ohsu.edu/student-access

COURSE ACCESS

Every reasonable effort has been made to protect the copyright requirements of materials used in this course. Class participants are warned not to copy, audio, or videotape in violation of copyright laws. Journal articles will be kept on reserve at the library or online for student access. Copyright law does allow for making one personal copy of each article from the original article. This limit also applies to electronic sources.

To comply with the fair use doctrine of the US copyright law, Sakai course sites close three weeks after grades are posted with the Registrar. Please be sure to download all course material you wish to keep before this time as you will have no further access to your courses.

DMICE COMMUNICATION POLICY

1. If the syllabus directs the student to contact the TA before contacting the instructor, the student should do so. Otherwise, the student should contact the instructor and allow 2 business days (not including weekends) for a response.
2. If the student does not receive a response from the instructor within 2 business days, s/he should contact the TA (if there is one). When contacting the TA s/he should cc the instructor and Diane Doctor at doctord@ohsu.edu.
3. If a student does not receive a response from the TA within 1 business day (not including weekends), s/he should contact Diane Doctor at doctord@ohsu.edu and cc the instructor and the TA.
4. If Diane does not reply within 1 business day (not including weekends), the student should contact Andrea Ilg at ilgan@ohsu.edu.
5. Students having difficulties with Sakai should contact the Sakai Help Desk at sakai@ohsu.edu or at (877) 972-5249. Sakai help is available M-F from 8am to 10-pm and weekends from Noon to 5pm. Do not contact the instructor.