

# BMI 510/610 - Introduction to Biomedical Informatics

William Hersh, M.D., Course Director  
3 credit hours  
Fall Quarter, 2009  
Distance Learning  
Last updated: July 10, 2009

## PREREQUISITES

For BMI 510/610, must have graduate-level standing.

## COURSE DESCRIPTION

This course provides a broad survey introduction to biomedical informatics, the field concerned with the acquisition, use, and storage of information in health care, biomedical research, and public health. Students focus on the underlying themes of biomedical informatics, including the proper use of information technology in health and biomedical settings. The course also covers the main applications of information technology in health and biomedicine, including electronic health records, information retrieval, genomics, and telemedicine. The viewpoints of information technology from medicine, computer science, nursing, public health, patients/consumers are considered.

## INSTRUCTOR

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## REQUIRED TEXTBOOK(S)

Edward H. Shortliffe, James J. Cimino, (eds.), *Bioedical Informatics: Computer Applications in Health Care and Biomedicine (3rd edition)*, Springer-Verlag, 2006.

## RELEVANT LITERATURE AND RESOURCES

Provided on-line.

## 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

## COURSE OUTLINE

Here is 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).

<b>Unit</b>	<b>Topic</b>	<b>Reading</b>	<b>Date Posted</b>
1	Overview of Field and Problems Motivating It	1, 2, 23, and Hersh papers	9/30
2	Biomedical Computing	5, 6, and Malan paper	10/7
3	Electronic Health Records	12, 13, 16	10/14
4	Clinical Decision Support; EHR Implementation	20	10/21
5	Standards and Interoperability; Privacy, Confidentiality, and Security	7	10/28
6	Secondary Use of Clinical Data: Personal Health Records, Health Information Exchange, Public Health, Health Care Quality, and Clinical Research	14, 15	11/4
7	Evidence-Based Medicine and Medical Decision Making	3	11/11
8	Information Retrieval and Digital Libraries	19	11/18
9	Imaging Informatics and Telemedicine	9, 14, 18, Hersh paper	11/25
10	Translational Bioinformatics	22	12/2
-	Final Examination Due		12/9

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The term paper is due by 5 pm Pacific time on 12/2, the day that the final exam is distributed. The take-home final exam is due by 5 pm Pacific time on 12/9.

## EVALUATION

Student grading is based on the following:

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

## DETAILED COURSE OUTLINE

### 1. Welcome and Overview of Field

- 1.1 A discipline whose time has come
- 1.2 The discipline of biomedical informatics
- 1.3 Problems in health care motivating biomedical informatics
- 1.4 Seminal documents and reports
- 1.5 Resources of 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 Health Records

- 3.1 Clinical Data
- 3.2 History and Perspective of the Health (Medical) Record
- 3.3 Potential Benefits of the Electronic Health Record
- 3.4 Definitions and Key Attributes of the EHR
- 3.5 EHR Examples
- 3.6 Nursing Informatics

### 4. Clinical Decision Support; EHR Implementation

- 4.1 Historical Perspectives and Approaches
- 4.2 Medical Errors and Patient Safety
- 4.3 Reminders and Alerts
- 4.4 Computerized Provider Order Entry (CPOE)
- 4.5 Implementing the EHR
- 4.6 Use and Outcomes of the EHR
- 4.7 Cost-Benefit of the EHR

### 5. Standards and Interoperability; Privacy, Confidentiality, and Security

- 5.1 Standards: Basic Concepts
- 5.2 Identifier and Transaction Standards
- 5.3 Message Exchange Standards: HL7, DICOM, IEEE 1073 / ISO 11073, NCPDP/SCRIPT, ELINCS, CCR/CCD
- 5.4 Terminology Standards: ICD-9/10, DRG, ICPC, NCDC, LOINC, CPT, SNOMED, UMLS
- 5.5 Privacy, Confidentiality, and Security: Basic Concepts
- 5.6 HIPAA Privacy and Security Regulations

### 6. Secondary Use of Clinical Data: Personal Health Records, Health Information Exchange, Public Health, Health

## Care Quality, Clinical Research

- 6.1 Personal Health Records
- 6.2 Health Information Exchange
- 6.3 Public Health Informatics
- 6.4 Health Care Quality
- 6.5 Clinical Research Informatics

## 7. Evidence-Based Medicine and Medical Decision Making

- 7.1 Definitions and Application of EBM
- 7.2 Interventions
- 7.3 Diagnosis
- 7.4 Harm and Prognosis
- 7.5 Summarizing Evidence
- 7.6 Putting Evidence into Practice
- 7.7 Limitations of EBM

## 8. 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 Evaluation
- 8.7 Digital Libraries

## 9. Imaging Informatics and Telemedicine

- 9.1 Imaging in Health Care
- 9.2 Modalities of Imaging
- 9.3 Digital Imaging
- 9.4 Telemedicine: Definitions and Barriers
- 9.5 Efficacy of Telemedicine

## 10. Translational Bioinformatics

- 10.1 Translational Bioinformatics - The Big Picture
- 10.2 Overview of Basic Molecular Biology
- 10.3 Important Biotechnologies Driving Bioinformatics
- 10.4 Genetics-Related Diseases
- 10.5 Bioinformatics Information Resources
- 10.6 Translational Bioinformatics Challenges and Opportunities

## **ACADEMIC HONESTY**

Course participants are expected to maintain academic honesty in their course work. Participants should refrain from seeking pat published solutions to any assignments. Literature and resources (including Internet resources) employed in fulfilling assignments must be cited. See <http://www.ohsu.edu/dmice/enrolled/plag.shtml> for details.