BMI 720
Introduction to Clinical Informatics
Spring 2015

This course provides a detailed overview of clinical informatics for professionals who will work at the interface of clinical care, information technology, and the healthcare system. Students will learn how to analyze, design, implement, and evaluate information and communication technologies found in hospitals, physician offices, and other healthcare settings including the home. Emphasis will be placed on the evolution of the electronic health record and its use to promote patient care that is safe, efficient, effective, timely, patient-centered and equitable. Students will also study implementation failures and unintended consequences of systems. The course will cover the fundamental concepts in clinical informatics such as evidence-based care and clinical workflow analysis. Students will not only study health information systems but have assignments to evaluate some real-life systems at local hospitals. Through case-based analysis, students analyze the life-cycle management of complex clinical computing systems. This course is geared towards physicians seeking postgraduate training.

Course Meetings
Weekly on Thursday afternoons, starting at 2pm.
Seminar/Didactics occur from 2-4pm, with time for either group projects or student-led seminars from 4-5pm.

Location
Countway Library, Room 424, within the Department of Biomedical Informatics at Harvard Medical School.

Directors
Charles Safran     Bradley Crotty
csafran@bidmc.harvard.edu   bcrotty@mail.harvard.edu
### Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>2pm</th>
<th>3pm</th>
<th>4pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29-Jan-15</td>
<td>Course Introduction - Crotty</td>
<td>Clinical Informatics as a subspecialty - Safran</td>
<td>Midterm Project assignments</td>
</tr>
<tr>
<td>2</td>
<td>5-Feb-15</td>
<td>Emergency Room Systems Larry Nathanson</td>
<td>Anesthesia Information Systems - David Feinstein</td>
<td>Case Study</td>
</tr>
<tr>
<td>3</td>
<td>12-Feb-15</td>
<td>Pathology Informatics and Information Systems - Ramy Aranout</td>
<td>Hospital Information Systems - Safran</td>
<td>HL7</td>
</tr>
<tr>
<td>4</td>
<td>19-Feb-15</td>
<td>Electronic health records - Henry Feldman</td>
<td>Patient Portals Crotty</td>
<td>HIMSS tools for analysing EHRs</td>
</tr>
<tr>
<td>5</td>
<td>26-Feb-15</td>
<td>Regulation and Certification Meghan Dierks</td>
<td>Quality and Safety Ken Sands</td>
<td>Meaningful Use</td>
</tr>
<tr>
<td>6</td>
<td>5-Mar-15</td>
<td>CIO perspective</td>
<td>Privacy and Regulatory Environment - Norma Chitvanni</td>
<td>HIPAA/IRB</td>
</tr>
<tr>
<td>7</td>
<td>12-Mar-15</td>
<td>Order Entry Systems - Jonathan Teich</td>
<td>Decision Support - Jonathan Teich</td>
<td>Midterm Project Presentations</td>
</tr>
<tr>
<td>8</td>
<td>19-Mar-15</td>
<td>Spring Recess</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>26-Mar-15</td>
<td>Cybermedicine - Warner Slack</td>
<td>eHealth and eLearning - Yuri Quintana</td>
<td>Case Study</td>
</tr>
<tr>
<td>10</td>
<td>2-Apr-15</td>
<td>Data Warehousing - Shawn Murphy</td>
<td>Unintended consequences Adam Wright</td>
<td>FHIR</td>
</tr>
<tr>
<td>11</td>
<td>9-Apr-15</td>
<td>Governance - Crotty</td>
<td>Reuse of Clinical Data - Safran</td>
<td>SMART</td>
</tr>
<tr>
<td>13</td>
<td>23-Apr-15</td>
<td>Telemedicine - Joe Kevadar</td>
<td>Strategic use of HIT - Kevin Tabb</td>
<td>Group Time End of Term Project</td>
</tr>
<tr>
<td>14</td>
<td>30-Apr-15</td>
<td><strong>Industry perspective &amp; Careers in informatics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>7-May-15</td>
<td><strong>End of Term presentations</strong></td>
<td><strong>Wrap up</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Course Website

Schedules, announcements, readings, and assignments are to be found on the course website: [http://mycourses.med.harvard.edu](http://mycourses.med.harvard.edu)  (direct URL: [https://v2mycourses.med.harvard.edu/Course/Overview/BMI720.0/86840](https://v2mycourses.med.harvard.edu/Course/Overview/BMI720.0/86840))
Weekly Themes and Learning Content

1. Introduction 1/29/2015
   1.1. Definitions of informatics
   1.2. History of Informatics
   1.3. Key concepts, models, and theories


For those unfamiliar with US-based health system operations


2. Departmental Information Systems 2/5/2015
   2.1. Health Information Systems and Applications
   2.2. Needs Analysis
   2.3. System Implementation, Maintenance, and Evaluation


3. The Hospital Information System 2/12/2015
   3.1. Principles of Information Technology Systems
   3.2. Architecture of Systems
   3.3. Clinical Data standards
   3.4. Flow of data, information, and knowledge within the health system
   3.5. Lifecycle management


HBS Case Study: BIDMC Information Systems (on MyCourses)
4. Electronic Health Records for Clinicians and Patients 2/19/2015
   4.1. EHR as foundational tools
   4.2. Human factors engineering, interface design, and usability
   4.3. Effective communication for teams

   Reading:


   Optional:

5. Safety and Quality Assurance 2/26/2015
   5.1. Regulations governing Health IT
   5.2. IOM Quality Components
   5.3. Evidence-based patient care
   5.4. Clinical workflow evaluation, process redesign, and quality improvement

   Reading:
6. **Leadership 3/5/2015**  
6.1. Leading and managing change  
6.2. leadership models, processes, and practices  
6.3. Strategic planning for Clinical Information Systems  
6.4. Policy and regulatory framework  
6.5. Privacy regulations


7. **Computerized Order Entry and Decision Support 3/12/2015**  
7.1. Evidence based medicine  
7.2. Process engineering  
7.3. Knowledge Lifecycles  
7.4. Decision science

Reading:  


8. **No Class 3/19/2015 - Spring Recess**

9. **e for Engagement 3/26/2015**  
9.1. Determinants of individual and population health  
9.2. Forces shaping healthcare delivery  
9.3. Effective teams and communication


10. Data Management 4/2/2015
10.1. Data integrity, mapping, and manipulation
10.2. Data warehousing
10.3. Data mining and knowledge discovery


11.1. Leadership Models, Processes, and Practices
11.2. Decision-Making
11.3. Interdisciplinary teams


12. Health Information Exchange and Networking 4/16/2015
12.1. Networks
12.2. Technical approaches to enable sharing
12.3. Clinical data standards, and interoperability standards


13. Telemedicine and Strategic Use of Health Information Technology 4/23/2015
13.1. Principles of telemedicine
13.2. Health economics and financing


14.1. Career opportunities in clinical informatics

Reading:


End of term presentations take place on 5/7/2015
Assignments

Seminars

Students are to take one of seven informatics topics and lead a teaching session during the 4pm hour for your peers. Sign up by the end of the first class. Topics are:

• HL7, including principles of standards, structure, and usage
• HIMSS tool for analyzing EHRs
• HIPAA/IRB, including what protections, policies, and procedures must be undertaken to protect patient data
• Meaningful Use, including goals, components, criteria, certification, attestation, and outcomes of the program
• CDA/CCDA/CCR - principles of clinical document architecture for transmitting data
• FHIR - describe draft standard put forth by HL7 group, including structure, use, and problems
• SMART - substitutable apps in healthcare.

Midterm Project

Your assignment is to divide into teams of 2-3 each and choose a hospital information system (not your own) to do an evaluation of strengths and weaknesses of one component. Examples would be to choose an evaluation of order entry, e-prescribing, or results management (among other possibilities). Teams are encouraged to be formal in their assessment, and use available tools and metrics.

Final Project

Design a healthcare innovation or intervention that:

1. Addresses a significant problem
2. Improves cost/quality/access
3. Is sustainable after a period of time

The class should divide into 3-4 teams.

You will have 30 min to present your project on May 7th. You will also have 10 min to answer questions. Your peers will score your project as well as the course faculty.

Your team must also produce a 15-20 page report of your project and submit it with your slide set May 11th. This report should be in the form of a business plan.
An example of an innovation could be a mobile app to improve care coordination for frail elders or medication adherence for children with asthma.

Your work should draw upon the themes in the course and reading material provided by faculty. You may choose to use other sources (e.g., interviews) if helpful. A working prototype or demonstration environment is encouraged.

The team idea for a project should be discussed with either Dr. Crotty or Dr. Safran by the class of March 12th.

**Grading**

Evaluation is pass/fail, and based upon class discussions and participation, group work, and seminars.

**Academic Honesty**

Work submitted by students must be original, and students are expected to follow the standards of academic honesty as found in section 4.09 of the Student Handbook (http://hms.harvard.edu/content/409-academic-dishonesty-and-plagiarism).