BIOINF555, HMP696, SI642 (MSI)/SI742 (PHD)

Concepts in Health Informatics
Syllabus—Fall, 2010

Fridays 2–5 p.m., Boardroom #3 Palmer Commons

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1 Introduction

This course provides students a formal framework in which to discuss contemporary topics in health informatics. Topics include: architecture, interoperability, usability, public policy, outreach and patient-centric care and technology-enhanced computation.

1.1 Prerequisites

Graduate status or employees at the health systems. Please direct registration related questions to Julia Eussen (jneussen@umich.edu, 734-615-8895).

1.2 Basic tenets and intended audience

The current climate for healthcare reform, combined with the explosive advances in information technologies (IT), has created the need for skilled individuals who are able to design, manage, and integrate clinical and administrative information, technologies, and systems in healthcare organizations. This course is accordingly designed for graduate students and healthcare practitioners who wish to develop a comprehensive understanding of the design, use, and evaluation issues and methodologies of health informatics applications.

1.3 Learning objectives and competencies

Students in this course will develop familiarity with major research topics in the domain of biomedical (health) informatics, as well as commonly used research approaches in each of the topic areas. Upon completing this course, students will be able to (based on “HMP Competencies for Achieving Professional Excellence in Health Management and Policy”):

- Measurement and Analysis:
  1. Measure: Identify appropriate sources and gather information, effectively and efficiently.

- Communication
  1. Convey: Speak and write in a clear, logical, and grammatical manner in formal and informal situations, prepare cogent business presentations, and facilitate an effective group process.
  2. Listen: Receive, process, and respond appropriately to information conveyed by others.
• Leadership

4. *Change Leadership*: Energize stakeholders and sustain their commitment to the organization while adapting to changes in approaches, processes, and strategies.

5. *Collaboration*: Work collaboratively with others as part of a team or group, demonstrating commitment to the team's goal and encouraging individuals to put forth their best effort.

7. *Organizational Awareness*: Understand and learn from the formal and informal decision-making structures and power relationships in an organization, industry, or community.

• Professional Development

4. *Self-Development*: Address knowledge, skills, and other developmental gaps through reflective, self-directed learning, and by trying new approaches.

1.4 Definition of medical/health informatics

*[Def. n.]* Medical/Health Informatics (MI, HI) is an evolving scientific discipline that deals with the collection, storage, retrieval, communication and *optimal use* of health-related data, information, and knowledge. The discipline utilizes the methods and technologies of the information, social, and technology sciences for the purposes of problem solving and decision-making thus assuring quality healthcare in all basic and applied areas of medical, biomedical, and health sciences.¹

- HI is concerned primarily with the processing of data, information, and knowledge in all aspects of healthcare;
- HI aims to study the principles and provide solutions;
- HI domains are—research, academia, operations, and commercial;
- HI as a discipline is used by—clinicians, operational health practitioners, managers, academics, researchers, educators, scientists, technologists, and political leaders.

1.5 Instructor

Kai Zheng PhD, Assistant Professor
Information Systems & Health Informatics
School of Public Health, School of Information

¹*What is Medical/Health Informatics?*, Medinfo 2007 Program Brochure.
1.6 Related HIT courses on campus

Students interested in health informatics or topics on general health IT are encouraged to consider:

1. HMP 605—Health Information Technology (a general introductory course to the discipline; this one-credit course is required for all masters students in HMP)

2. HMP 668/BIOINF 668/SI 542—Introduction to Health Informatics (a more in-depth introductory course to the discipline)

3. HMP 669—Database Systems and Internet Applications in Health Care (covering the technical aspect of designing and implementing the database components underlying most modern healthcare information systems)

4. HMP 655—Decision Making Models in Health Care (introduction to decision science and applications of computational models for decision making in healthcare, foundational components underlying many clinical decision-support systems)

5. SI 653—Evidence-Based Health Information Practice (designed for information professionals whose job responsibility involves integrating health sciences research into clinical decision making)

6. IOE 591—Health Care Operations Research (“providing students with an overview of some of the many applications of operations research in healthcare and to motivate students to contribute to this growing field”)

2 Requirements and grades

Requirements of the course, for masters-level students include:

1. Pre-reading and in-class presentation of the seminal research papers selected for each of the sessions;

2. Active participation in class discussion;
3. A five-page\textsuperscript{2} term paper critiquing a research paper discussed in class;
4. A ten-page\textsuperscript{3} final paper proposing a research project extending one of the studies discussed in class.

Requirements of the course, for students taking this course at the doctoral level, include:

1. Pre-reading and in-class presentation of the seminal research papers selected for each of the sessions;
2. Reading selected supplemental reading assignments and preparing a weekly summary;
3. Active participation in class discussion;
4. A ten-page\textsuperscript{4} term paper critiquing a research paper discussed in class and proposing a study design that would address the issues you raise;
5. A final paper proposing a new research project, either based on the term paper or in other relevant subjects of interest. The final paper should be prepared as an NIH proposal narrative and must contain all required sections including Specific Aims and Research Strategy (Significance, Innovation, and Approach), except for preliminary studies. For more information about the NIH proposal format, refer to NIH Notice \# NOT-OD-09-149.

Final grades will be determined according to the following formula:

1. Class Participation: 50%;
2. Term Paper: 20% (individual effort, due November 15, 2010);
3. Final Paper: 30% (individual effort, due December 15, 2010).

3 Discussion format

All required readings will be discussed in detail in class. In general, each paper will be presented by a \textit{Presenter}—who will be in charge of outlining the basic facts of the paper (e.g., problem, background, methods, results, discussions, and conclusions); and a principal \textit{Discussant}—who will lead the discussions particularly on those ‘take-away’ points. Examples of the ‘take-away’ points may include but

\textsuperscript{2}Single-space, 12-point \textit{Times New Roman} font, 1-inch on all margins.
\textsuperscript{3}Same as above.
\textsuperscript{4}Same as above.
not limited to: how the paper contributes to a better understanding of the more profound psychological or social issues beyond the statistical results presented (when applicable); and how the results can be used to inform practice, for example the HIT endeavors current taking place at the University of Michigan or design of future HIT systems interventions.

Preparing presentation slides is not required but encouraged if it can facilitate the presentation.

4 Schedule

Note: The schedule may be subject to change throughout the term for reasons including potential influenza outbreaks.

WEEK 1 Introduction to the course and the discipline (September 10)

Readings:


Supplemental Readings:


**WEEK 2 Research and practice in health informatics/health IT: Opportunities and challenges** (September 17)

*Readings:*


*Supplemental Readings:*


**WEEK 3** Major applications in the spotlight: Electronic health records (EHR), computerized prescriber order entry (CPOE), and clinical decision support systems (CDSS) (September 24)

**Readings:**


**Supplemental Readings:**


**WEEK 4 Sustainable and interoperable architecture (October 1)**

**Readings:**


**Supplemental Readings:**


WEEK 5  Convergence of namespaces and ontologies (October 8)

Guest Lecturer: Prof. Ulysses Balis

Readings:


WEEK 6  Clinical research informatics and secondary use of clinical data (October 15)

Guest Lecturer: Prof. David Hanauer

Readings:


Supplemental Readings:


Reference Readings:


WEEK 7 Evaluation of healthcare information systems (October 22)

Readings:


**Supplemental Readings:**


**Reference Readings—Evaluation Survey Instruments:**

1. **Readiness Assessment** OITIRS (Organizational Information Technology Innovation Readiness Scale).


4. **Prediction of User Acceptance (variants of TAM or related theories)**

• Park Y, Chen JV. Acceptance and adoption of the innovative use of smartphone. Ind Manag Data Syst. 2007;107(9):1349-65.

• countlessly many more . . .


11. User Interface Satisfaction QUIS (Questionnaire for User Interface Satisfaction).


**Reference Readings—Related Survey Instruments:**


2. **Patient-Centered Medical Home**
   - PPC-PCMH (The National Committee for Quality Assurance: Standards and Guidelines for Physician Practice Connections—Patient-Centered Medical Home)


4. **Quality of Life** CDC HRQOL (Centers for Disease Control and Prevention: Health-Related Quality of Life Measure).

5. **Health Status** SF-36/12/08 (Short-Form Health Survey)
• McHorney CA, Ware JE, Raczek AE. The MOS 36-Item Short-Form Health Survey (SF-36®): II. psychometric and clinical tests of validity in measuring physical and mental health constructs. Med Care 1993; 31(3):247-63.

6. Depression CES-D (Center for Epidemiological Studies Depression Scale)

7. Depression PHQ-9/2 (Personal Health Questionnaire Depression Scale)

8. Chronic Illness Care ACIC (Assessment of Chronic Illness Care), PACIC (Patient Assessment of Chronic Illness Care)

9. Ambulatory Care Experiences ACES (Ambulatory Care Experiences Survey)

10. Health Literacy REALM-R (Rapid Estimate of Adult Literacy in Medicine, Revised)

12. **Perceived Social Support** MSPSS (Multidimensional Scale of Perceived Social Support)


**WEEK 8** **Human-computer interaction and human factors engineering** (October 29)

**Readings:**


**Supplemental Readings:**


**WEEK 9**  
**Considerations for sociotechnical integration** (November 5)

**Readings:**


**Supplemental Readings:**


**WEEK 10**  
**Societal aspect and social networking tools** (November 12)

**Readings:**


Supplemental Readings:


WEEK 11 Effective presentation of data and visual analytics (November 19)

Readings:


2. Eppler MJ. A comparison between concept maps, mind maps, conceptual diagrams, and visual metaphors as complementary tools for knowledge construction and sharing. Inf Visualization. 2006;5(3):202-10. (III)


**Supplemental Readings:**


**WEEK 12** Thanksgiving break. No class. (November 26)

**WEEK 13** Internet-based patient empowerment and personal health records (December 4)

**Readings:**


Supplemental Readings:


WEEK 14 Current and emerging policies on HIT (December 10)

Guest Lecturer: Prof. Brian Athey

Readings:

1. American Recovery and Reinvestment Act of 2009: Title XIII—Health Information Technology for Economic and Clinical Health (HITECH) Act (pp. 112-44).


4. Class wrapping-up
5 Materials

5.1 Course website
http://ctools.umich.edu/.

5.2 Off campus journal access
1. Use Library Proxy
2. or, through UM/UMHS VPN
   • ITCS: http://www.itcom.itd.umich.edu/vpn/
   • MCIT: https://helpdesk.umms.med.umich.edu/software/vpn.html
   • Snow Leopard users connecting to UM VPN:
     (a) Create a VPN interface using Cisco IPSec
     (b) Server: umvpn.umnet.umich.edu
     (c) Shared secret: WseaTBed!
     (d) Group name: UM-off-campus-access
   • Snow Leopard users connecting to UMHS VPN:
     (a) Create a VPN interface using Cisco IPSec
     (b) Server: 198.111.181.16
     (c) Shared secret: download the VPN profile and decode the shared secret string
     (d) Group name: UMHS1
3. or, RDP to an ITCS virtual site: http://virtualsites.umich.edu/

5.3 Textbook

6 Resources

6.1 Online resources
1. AHRQ National Resource Center for Health IT
   http://healthit.ahrq.gov/
2. The Office of the National Coordinator for Health Information Technology
   http://healthit.hhs.gov/
3. Health IT Stimulus News
   http://www.ihealthbeat.org/

4. OpenClinical
   http://www.openclinical.org/

5. CPOE.org
   http://www.cpoe.org/

6. Certification Commission for Health Information Technology (CCHIT)
   http://www.cchit.org/

6.2 Major professional organizations

1. American Medical Informatics Association (AMIA)
   http://www.amia.org/

2. Health Information and Management System Society (HIMSS)
   http://www.himss.org/

3. International Medical Informatics Association (IMIA)
   http://www.imia.org/

4. Certification Commission for Healthcare Information Technology (CCHIT)
   http://www.cchit.org/

5. Health Level 7 (HL7)
   http://www.hl7.org/

6.3 Major professional conferences

1. AMIA Annual Symposium
   http://www.amia.org/meetings/

2. Triennial World Congress on Health (Medical) Informatics (also known as Medinfo)
   http://www.medinfo2007.org/

3. Annual HIMSS Conference and Exhibition
   http://www.himss.org/ASP/eventsHome.asp

6.4 Major academic journals

1. Journal of the American Medical Informatics Association (JAMIA)
   http://www.jamia.org/
2. Methods of Information in Medicine (MIM)
   https://www.schattauer.de/index.php?id=704

3. Journal of Medical Internet Research (JMIR)
   http://www.jmir.org/

4. International Journal of Medical Informatics (IJMI)
   http://www.intl.elsevierhealth.com/journals/ijmi/

5. Journal of Biomedical Science (JBS)
   http://www.springerlink.com/content/112912/

7 Academic conduct

The faculty of the School of Public Health believes that the conduct of a student registered or taking courses in the School should be consistent with that of a professional person. Courtesy, honesty and respect should be shown by students toward faculty members, guest lecturers, administrative support staff and fellow students. Similarly, students should expect faculty to treat them fairly, showing respect for their ideas and opinions and striving to help them achieve maximum benefits from their experience in the School. Student academic misconduct refers to behavior that may include plagiarism, cheating, fabrication, falsification of records or official documents, intentional misuse of equipment or materials (including library materials), and aiding and abetting the perpetration of such acts. The preparation of reports, papers, and examinations, assigned on an individual basis, must represent each student’s own effort. Reference sources should be indicated clearly. The use of assistance from other students or aids of any kind during a written examination, except when the use of aids such as electronic devices, books or notes has been approved by an instructor, is a violation of the standard of academic conduct.