

Objectives Fall 2013

What is Biomedical Informatics?

As a result of participating in this activity, learners will be able to:

1. Have a basic understanding of the components of medical informatics
2. Be able to characterize these components as technologies, concepts and skills

Major Biomedical Informatics Methods

As a result of participating in this activity, learners will be able to:

1. Understand and reason about several methodologies in common use in biomedical informatics, both from the clinical as well as the biomedical literature perspective.
2. Identify in their practice domain where these technologies are manifest, and be able to pinpoint how their practice might be improved through a more thoughtful application of these technologies.
3. Integrate their understanding of these technologies in the remaining lecture of the course.

Clinical Informatics

As a result of participating in this activity, learners will be able to:

1. Determine where the clinical information systems that they use or see in their work practice fit on the spectrum of HIMSS capability.
2. Consider and analyze the merits of standard EHR modules, especially in the context of HITECH's "meaningful use" standards.
3. Anticipate ways that clinical decision support enhances the utility of the EHR in clinical practice.
4. Gain sufficient expertise in clinical informatics basic theory to engage in a material way with the course's workshop project.

The Unintended Consequences of EHR Adoption

As a result of participating in this activity, learners will be able to:

1. Describe and understand nine types of unintended consequences related to EHRs.
2. Describe at least one strategy for addressing each of the nine types of unintended consequences related to EHRs.
3. Learners will be able to know where to look for additional resources on this topic.

Vocabularies and Terminologies

As a result of participating in this activity, learners will be able to:

1. Understand motivations and issues related to high-quality controlled terminologies
2. Understand the "desiderata" for controlled biomedical terminologies
3. Gain familiarity with currently available standard terminologies
4. Appreciate the complexities and advantages of reuse of clinical data coded with controlled terminologies

Human-Computer Interaction

As a result of participating in this activity, learners will be able to:

1. Identify the key cognitive processes involved in human-computer interaction.
2. Explain why HCI is critical in the development and deployment of Informatics systems, and cite an example of what can happen if HCI is not applied correctly.
3. Describe how HCI techniques could be applied in on project they are currently working on.
4. Describe at least two major emergent trends in HCI related to biomedicine.

Meaningful Use

At the completion of the session, participants will:

1. Define the concept of "meaningful use" and explain how it aligns with improvement in the quality, safety, and efficiency of health care.
2. Explain why adoption, certification, and health information exchange are key components of the national health IT agenda--and describe the programs in place to achieve these goals.
3. Describe the challenges to achieving nationwide health information exchange, and how these challenges are being addressed.

Natural Language Processing Resources at the NLM

At the completion of the session, the participant will be able to:

1. Have a basic understanding of the Unified Medical Language System (UMLS)
 - a. Metathesaurus
 - b. Semantic Network
 - c. Specialist LEXICON
2. Gain exposure to the UMLS Terminology Services interface (UTS)
3. Have a basic understanding and gain exposure to the natural language processing tools and resources developed at NLM
 - a. MetaMap
 - b. SemRep

Semantic MEDLINE

As a result of participating in this activity, learners will be able to:

1. Appreciate the need for an advanced biomedical information management application such as Semantic MEDLINE
2. Have a basic understanding of the components of Semantic MEDLINE
 - a. Information retrieval
 - b. Automatic summarization
 - c. Language processing
 - d. Knowledge visualization
3. Understand (through real scenarios) how Semantic MEDLINE supports enhanced access to the biomedical literature and literature-based discovery

Public and Population Health Informatics

As a result of participating in this activity, learners will be able to:

1. Describe the mission of public health and opportunities for improvement using informatics
2. Describe the features and value proposition for immunization information systems
3. Describe current efforts to improve the exchange of information between public health and clinical systems.
4. Explain the value of providing population-based information to improve clinical decision making.

Social Media and Consumer Health Informatics

At the completion of the session, the participant will be able to:

1. Have an understanding of topics in consumer health informatics
2. Have an appreciation for the potential of social media in health care and education
3. Have a basic understanding and gain exposure to the natural language processing
4. Have gained insight into the concepts of patient empowerment and shared decision making
5. Have gained insight into challenges desiging and evaluating social media applications for health

Knowledge Management and Infobuttons

As a result of participating in this activity, learners will be able to:

1. Understand the motivation for clinical knowledge management
2. Describe the importance of knowledge management for clinical decision support
3. Describe clinical knowledge management processes and associated tools
4. Understand clinicians' knowledge needs

5. Understand how information resources can be integrated into clinical information systems
6. Interact with an Infobutton Manager

Disaster Informatics

As a result of participating in this activity, learners will be able to:

1. Understand the NLM's Disaster Information Management Research Center (DIMRC) activities and disaster research programs
2. Be able to access, operate and understand web based and downloadable tools to guide first responders and first receivers
3. Understand how disparate information sources can be applied as solutions for specific problems
4. Learn and understand how hospital partnerships and informatics tools can be created to successfully respond to a large scale disaster
5. Understand how a network of Disaster Information Specialists can supply and support information and communication needs for disaster preparedness and response
6. Understand how to apply informatics to "boots on the ground" activities.

Telehealth and Mobile Devices

At the completion of the session, the participant will:

1. have an understanding of the field of telemedicine and telehealth over the years and the breadth of applications
2. Have an appreciation for the design and evaluation of telehealth applications
3. Have gained insight into application domains of tele health
4. Have an appreciation for the potential of mobile devices in health monitoring
5. Have an understanding of the current field of mobile health

Genetics and Genomics

As a result of participating in this activity, learners will be able to:

1. Have a basic understanding of the issues involved in genetics and genomics data
2. Have a basic understanding of the roles of Bioinformatics in the field of Biomedical Informatics
3. Relate genomics issues to the Informatics issues of providing healthcare via EMRs
4. Consider the relationships of consumer health informatics issues and genomics issues

Mathematical Modeling

As a result of participating in this activity, learners will be able to:

1. Appreciate the uses of mathematical modeling in biology and medicine
2. State the law of large numbers and appreciate how probability makes predictions about random processes
3. Have a basic understanding of Markov models, specifically the concepts of transition matrices and stationary distributions
4. Explain what is a Hidden Markov Model and what they are used for
5. Understand the methods section of a paper applying Markov models to epidemiology, clinical decisions, and bioinformatics

Mathematical Modeling of Epidemiology

As a result of participating in this activity, learners will be able to:

1. Understand parameters in epidemiology such as the basic reproductive ratio
2. Investigate the effects of changing parameters on an epidemic using an agent-based model
3. Investigate the behavior of a compartment-based Markov of an epidemic
4. Investigate the influence of contact networks on the dynamics of an epidemic
5. Compare the predictions of the models to data from real epidemics

Biomedical Visualization

At the completion of the session, the participant will be able to:

1. Understand the objectives of and differences between scientific and information visualization.
2. Describe multiple important visualization techniques.
3. Describe how visual analysis techniques could be used on a project they are currently working on.
4. Describe multiple examples of cutting-edge biomedical visualization applications.

CDS, CPOE and Quality

As a result of participating in this activity, learners will be able to:

1. Define CDS and CPOE
2. Explain the rationale for implementing CDS and CPOE
3. Describe common functionality of CDS and CPOE
4. Describe current adoption of CDS and CPOE in U.S.
5. Describe best practices for CDS and CPOE implementation
6. Discuss challenges and potential solutions to improving care through CDS and CPOE
7. Practically apply the knowledge gained to support care improvement initiatives

Evaluation Issues In BMI

At the completion of the session, participants will:

1. Identify the four major evaluation questions.
2. Describe three evaluation models..
3. Discriminate evaluation from research and quality improvement
4. Describe the four stages of evaluation
5. Apply appropriate methodological approaches to prototypical evaluation questions.

Responsible Conduct of Informatics Research

As a result of participating in this activity, learners will be able to:

1. Discuss several examples of past ethical lapses in research ethics that led to significant participant harm.
2. Describe several practical limitations on research and practice imposed by the HIPAA and HITECH acts.
3. Apply basic principles of the responsible conduct of research to a case study.

Clinical Research Informatics

As a result of participating in this activity, learners will be able to:

1. Understand the regulatory context, information security and privacy applied to research data
2. Be aware of specialized information technologies, such as the Clinical Trials Management Systems (CTMS), REDCap, and i2b2, that are useful for clinical research
3. Understand systems integration needed to improve clinical research workflows and data flows
4. Understand the role of research data repositories (data warehouses)
5. Have access to curriculum materials for teaching this topic to healthcare professionals
6. Be aware of the overall informatics context of assistance by the research community