

BioMedical Informatics

A Course For Health Professionals



Marine Biological Laboratory - National Library of Medicine



course overview »

Overview

Schedule

Faculty

Logistics

Application

Archives

Other MBL Courses

Research Issues in Bio-medical Informatics

D. Lindberg

Objectives

This lecture will discuss some research opportunities in Medical Informatics.

At the completion of the session, participants will:

- be able to accept or challenge this list of research opportunities
- be able to operate and understand ClinicalTrials.gov
- be able to access and evaluate examples of new Interactive Publications

Outline

1. Research Areas and Challenges in 2005
2. Electronic Health Record
3. Prospective Population Studies
4. Information for the Public: e.g., ClinicalTrials.gov
5. Interactive Publications

Principles of Database Design

J. Cimino

Objectives

- Define "database"
- Review the history of database architectures
- Teach the principles of database normalization
- Identify the basics for object-oriented database design
- Reinforce principles with a design exercise

At the conclusion of the session, participants should:

- Understand the evolution of modern database architecture
- Understand some of the principles behind choices to be made when designing a database
- Have a basic understanding of database normalization

Outline

1. Definition
2. History of Database Architectures
3. Database Normalization
4. Object-Oriented Table Design
5. Exercise: Database for Medline Records
6. Exercise: Clinical Database

NCBI & PubMed

Kathi Canese

Educational Objectives

This lecture will focus on PubMed, NCBI's free web interface for citation data. In addition, NCBI's homepage, PubMed Central, Bookshelf, and My NCBI will also be discussed. Searching techniques will be presented as well as a review of recent enhancements. Students will be provided with hands-on lab time.

Session Outline

- NCBI's Homepage and Entrez Databases
- PubMed Searching
- Automatic Term Mapping
- Search Sensors and Discovery Ads
- Limits and Advanced Search
- Clipboard, Collections, E-mail, etc.



- RSS Feeds
- Clinical Queries & ClinicalTrials.gov
- NIH Public Access Policy
- My NCBI
- Entrez Programming Utilities
- Hands On Lab Time

Disaster Informatics

Steven J. Phillips, MD & J. Pakiam

Objectives

This lecture will provide an overview of:

- NLM's the Disaster Information Management Research Center (DIMRC) activities
- Resources, tools and research projects
- Discuss the inability of U.S. Hospitals to respond to an emergency bed surge need then describe a Congressionally Funded solution model.
- My Haiti site visit

At the completion of the session, the participant will:

- Learn about DIMRC and disaster research programs
- Be able to access, operate and understand DIMRC tools

Outline

- NLM and DIMRC overview
- Disaster research activities
- Tools
- Evening "hands on" workshop 1: Digital Pen and ReUnite Tools
- Evening workshop 2: MBL student response to a magnitude 8.0 Boston earthquake

Telemedicine

Michael J. Ackerman, Ph.D.

Objectives

This lecture will approach the subject of telemedicine from the perspective of an information process. The lecture will start with historical background. Technical, regulatory and societal impediments to the utilization of telemedicine will be discussed. Modern telemedicine is dependent on digital networking. After a brief Internet history the lecture will summarize current and next generation networking concepts including Internet2 and National LambdaRail. The application of Next Generation Networking technology as well as the application of text messaging to healthcare will be demonstrated through examples funded by the NLM along with a discussion of the lessons learned.

At the completion of the session, the participant will:

- Understand telemedicine as an information process
- Understand the technical, regulatory and societal impediments to the utilization of telemedicine
- Understand the national need for a next generation network and its relevance to healthcare
- Be familiar with next generation networking concepts
- Be familiar with the NLM programs as a demonstration of the relevance of advanced networking technology to telemedicine and healthcare
- Gain an appreciation of current and future networking challenges and opportunities

Outline

- Definition of telemedicine
- History of the telemedicine
- Impediments to telemedicine
- Next generation networking
- Networking concepts
- Quality of Service (QoS) concepts
- NLM's involvement in telemedicine
- NLM's National Telemedicine Initiative

- Next generation network health examples
- Telemedicine lessons learned
- Current events

CPOE

K. Johnson

1. What is CPOE
 - Definitions (CPOE, ACPOE)
 - History of CPOE
2. Specific issues CPOE can address
 - Medical Errors
 - Policy and Procedure
 - Workflow Challenges
 - Data interoperability
3. Components of CPOE
4. Evidence supporting use of CPOE
5. New functionality, new approaches to CPOE
6. Conclusion

Consumer Informatics

Alexa T. McCray, Ph.D.

Objectives

This session will consider issues in consumer health informatics with a special focus on health literacy. The role of information technology in addressing the needs of consumers will be discussed. Students will develop a working list of potential informatics interventions in their own institutional settings. At the conclusion of the session, participants should:

- Have an understanding of issues in consumer health informatics
- Have gained insight into the problems of health literacy
- Have an understanding of the role of information technology in consumer health

Outline

1. What is consumer health informatics
2. Online health information
3. Health literacy
4. Role of information technology
5. Exercise and discussion

Principles of Controlled Terminology

J. Cimino

Objectives

- Describe terminology concepts and characteristics
- Provide examples of coding clinical data
- Examine the state of the art with respect to current standards
- Examine case studies of use and reuse of coded data

At the conclusion of the session, participants should:

- Understand the motivation for coding clinical data
- Understand the desiderata for high-quality controlled terminologies
- Be familiar with currently available terminologies

Outline

This pair of lectures is organized into six threads that will be woven together concurrently:

- I. Clinical case
- II. Use and reuse of data
- III. Coding clinical data
- IV. Available terminologies
- V. Terminology concepts and desiderata
- VI. Practical considerations

Evaluation

Joan Ash, Ph.D.

Objectives

In this session, we will review basic evaluation research concepts as they apply to medical informatics. By the end of the session, participants will be able to:

- Appreciate the need for evaluation
- Recognize why evaluation in medical informatics can be difficult
- Understand how evaluation research questions can guide selection of methods
- Describe the relationship between quantitative and qualitative approaches
- Outline methods for evaluation of the sociotechnical issues related to informatics interventions

Outline

- Why evaluation is important
- Quantitative and qualitative methods
- Using appropriate methods
- Evaluating sociotechnical issues

Imaging Informatics

Michael J. Ackerman, Ph.D.

Objectives

This lecture will provide a prospective on use of images as a means of information capture and transfer. The student should gain an understanding of the fundamentals of digital imaging, medical image formats, multi-dimensional informatics and image processing.

At the completion of the session, the participant will:

- Understand the dimensionality of a digital image
- Recognize the size of a digital image and understand the consequences of that size
- Become familiar with matching image visualization method to image use
- Discover the consequences of image compression
- Learn about NLM's Insight Tool Kit (ITK) for image segmentation and registration
- Understand the relationship of PACS to the EMR

Outline

- Technical background
- Dimensionality of images
- Consequences of image size
- Image visualization methods
- Image metadata
- Image compression
- Interesting examples
- Image segmentation and registration
- Images and the EMR

Personal Health Records

R. Rocha

Objectives

- Outline the motivation for Personal Health Records (PHRs)
- Describe the different models for PHRs
- Describe the main components of PHRs
- Explain the interoperability requirements for PHRs
- Illustrate benefits of PHRs through utilization scenarios
- Outline existing incentives that promote PHR adoption
- Outline privacy issues related to PHRs
- Summarize available PHR products and their business models
- Outline challenges and opportunities related to PHRs

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

- Explain uses and benefits of Personal Health Records (PHRs)
- Describe the main components of a PHR

- Describe the different models of PHRs
- Explain existing incentives to adopt PHRs
- Outline important challenges and opportunities related to PHRs

Outline

1. Background
 - Motivation for Personal Health Records (PHRs)
 - Main implementation models for PHRs
 - Incentives promoting PHR adoption
2. PHRs from a consumer perspective
 - Uses and benefits of PHRs
 - Typical and advanced features
 - Privacy issues related to PHRs
3. PHRs from an informatics perspective
 - Components of a PHR system
 - Interoperability requirements for PHRs
 - Examples of PHR design concepts
4. Challenges and opportunities

Clinical Decision Support and Knowledge Management

R. Rocha

Objectives

- Outline the main factors that justify the need for computerized Clinical Decision Support (CDS) and Clinical Knowledge Management (CKM)
- Describe the history and benefits of CDS systems
- Describe the main components of a CDS system
- Describe the different modalities of CDS and their associated requirements
- Provide examples of CDS modalities integrated with EHRs
- Describe the CKM processes required to create, deploy, disseminate, and maintain CDS interventions
- Describe the main components of a CKM system
- Provide examples of CKM tools
- Outline challenges and opportunities related to CDS & CKM

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

- Explain uses and benefits of Clinical Decision Support (CDS) and Clinical Knowledge Management (CKM)
- Describe the main components of a CDS system
- Describe the different modalities of CDS
- Describe CKM processes and associated tools
- Outline important challenges and opportunities related to CDS and CKM

Outline

1. Background
 - Motivation
 - History & Benefits
2. Clinical Decision Support (CDS)
 - CDS modalities (examples) and standards
 - Components of a CDS system
3. Clinical Knowledge Management (CKM)
 - Motivation for CKM
 - CKM Program: processes, people, and infrastructure
4. Challenges and opportunities

The Internet: Reflections on What's Coming

Lawrence C. Kingsland, III, Ph.D.

Educational Objectives

This lecture discusses several aspects of upcoming technologies that are having and will have an impact on the way we view and use the Internet. At the completion of the session, participants will:

- Have received an introduction to the elements that underpin the Internet
- Be introduced to protocols present and emerging
- Receive a quick tour of the 802.xx wireless stew

- Be aware of some truly fascinating new technologies on the way
- Receive links to useful sites tracking developments in these fields

Session Outline

- The Internet is ...
- Protocols, addresses, names, oh my
- Routing
- Virtual Private Networks (VPNs)
- Quality of Service (QoS)
- Unlimited bandwidth
- Digital spread spectrum
- Bluetooth
- 802.11
- New tech
- Ubiquity
- Dissemination

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