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MEDICAL INFORMATICS

A Course for Health Professionals



Educational Objectives and Outlines

Day 1 - Monday, May 29, 2000

Session 1: 8:30 - 9:00 AM

What is Medical Informatics?

Faculty

[Daniel Masys, M.D.](#)

[James Cimino, M.D.](#)

Educational Objectives

The class will develop its own definition of Medical Informatics and discuss the personal qualities and skills needed for success.

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Session 1A: 9:00 - 10:00 AM

HPCC, NII, current issues in medical informatics

Faculty

[Donald A.B. Lindberg, M.D.](#)

Educational Objectives

This lecture will summarize the federal interagency High Performance Computing and Communications program accomplishments in non-medical and health related aspects and will enumerate some past, current, and future research funding sources.

At the completion of the session, participants will:

- Understand the "interagency model" and the government-industry-university approach to the HPCC work.
- Understand the initial opportunities in biomedical applications of the NII.
- Have a beginning set of funding contacts.

Session Outline

1. High Performance Computing and Communications federal program
 - Background and Legislation
 - Objectives and Organization
 - Phase 1
 - Accomplishments - Grand Challenges
 - Progress on Grand Challenge Problems
 - Phase 2
 - National Information Infrastructure
 - National Challenge Applications
 - Non-medical
 - Medical
2. NLM Role in the NII
 - Intramural Research
 - UMLS
 - Visible Human

- Extramural Research
 - NII medical testbed
 - Telemedicine
 - Computer-based patient record
- Public Policy Issues
 - Medical Data Privacy
 - National Security
 - Intellectual Property Rights
 - Traditional Copyright Demands
 - Today's Revolution in Electronic Publishing
- Federal Research Funding Sources for Medical Informatics
 - NLM Programs
 - Other HHS Programs
 - Other federal agency support

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Session 2: 10:30 AM - 12:00 N

Principles of database design

Faculty

[Daniel R. Masys, M.D.](#)

Educational Objectives

This lecture and lab session will introduce basic principles of organization of data in computerized systems. At the completion of the session, participants will:

- Understand the historical evolution of computerized data handling methods
- Know the relative strengths and weaknesses of hierarchical, relational, information network, and object-oriented database systems
- Understand the process of development of a set-theory-based relational data model, including entity-relationship definitions, principles of fully normalized relational models, state transitions and data flow diagrams.
- Understand the design principles involved in the transformation of a flat file record structure to a normalized relational structure (lab exercise).

Session Outline

- Database definitions and paradigms
 - What is a Database?
 - Historical Evolution of data management techniques
 - General benefits of Database Management Systems (DBMSs)
 - DBMS types
 - Heirarchical
 - Information Network (linked lists and pointers)
 - Relational
 - Object-oriented
 - Principles of Relational database design
 - Representation of real world objects and their attributes
 - Relationships between objects
 - Table notation formalisms
 - Relationships: one-to-one, one-to-many, many-to-many
 - System design and building methods
 - Entity-relationship diagrams
 - State Transition Models
 - Data Flow Diagram
 - Transforming flat files to tables
 - A sample problem in database design

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Session 3: 1:30 - 3:00 PM

Faculty

[Lawrence C. Kingsland, III, Ph.D.](#)

Educational Objectives

This lecture has two independent segments. The first segment introduces the Unified Medical Language System (UMLS) project initiated by the National Library of Medicine in 1986. The second segment 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 history of the Unified Medical Language System
- Be introduced to the content of the UMLS Knowledge Sources: the Metathesaurus, the Semantic Network and the SPECIALIST lexicon
- Have viewed a demonstration of the UMLS Knowledge Source Server
- Have viewed a demonstration of the UMLS Metathesaurus browser application in the Internet Grateful Med program, including the introduction of related concepts and co-terms
- Have received an introduction to technologies that are shaping the further development of the Internet and the ways we use it.

Session Outline

- Unified Medical Language System
 - History
 - The UMLS Metathesaurus
 - The UMLS Semantic Network
 - The SPECIALIST lexicon
 - The UMLS Knowledge Source Server
 - The Internet Grateful Med Metathesaurus browser as an example of a UMLS application, with emphasis on related concepts and co-terms
- Internet Futures
 - Context
 - Internet Protocol (IP)
 - IPv6
 - Quality of Service (QOS)
 - Optical switching
 - Virtual Private Networks (VPNs)
 - Digital Spread Spectrum
 - Bluetooth
 - Wireless Access Protocol (WAP)
 - Ubiquity (wearable computing)
 - Dynamic content
 - Standards/open source

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Session 4: 3:30 - 5:00 PM

PubMed and the NLM Gateway

Faculty

[Kathi Canese, MLS](#)

Educational Objectives

This lecture and lab session will discuss the National Library of Medicine's new PubMed search interface, computer physiology, and recent enhancements. There will also be a demonstration of NLM's Gateway system which will provide an interface for searching multiple NLM products. Students will be provided with hands on lab time.

Session Outline

1. PubMed Overview
2. Automatic Term Mapping
 - o Search Formulation and Retrieval
 - o Search Refinement
 - o Feature's Bar (Limits, Preview/Index, History and Clipboard)
3. Related Articles
4. LinkOut
5. Cubby
6. NLM's Gateway
7. Hands on lab time

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Evening Session

Class of 2000 Personal Web pages workshop

Faculty

[Daniel Masys, M.D.](#)

Educational Objectives

This hands on laboratory will introduce participants to WYSIWYG HTML editing, basic digital image editing and compositing, and publishing web pages to a server.

At the completion of the session, participants will:

- Have created a personal web page with one or more images, and hyperlinks using free HTML editor (Netscape Composer)
- Have a basic understanding of digital image editing software (Photoshop).
- Have created a class resource that enables participants to know one another better

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Day 2 - Tuesday, June 2, 1998

Session 1: 8:30 - 10:00 AM

Molecular biology information resources

Faculty

[David Wheeler, Ph.D.](#)

Educational Objectives

In this lecture and the accompanying lab session, Dr. Wheeler will discuss methods developed at the National Center for Biotechnology Information, to extract information about chromosomes, genomes, molecular sequences and structures, and the associated information in the biomedical research literature. Students will get hands on experience of these tools.

Session Outline

1. The Primary Data Available
 - o Sequence data
 - DNA data from GenBank, DDBJ, and EMBL submissions
 - Protein data from GenBank CDS translations and other databases
 - o Structure data derived from the PDB
 - o Supplementary data: literature, mapping, expression, genotypic, phenotypic, sequence alignments
2. Ways to Retrieve Sequence Data

- Entrez: A versatile text-based sequence retrieval system
 - FTP: Brute-force sequence retrieval
 - Retrieval of representative data types
 - DNA sequences
 - Sequences of individual genes
 - Chromosomal sequences
 - Complete Genome sequences
 - Other DNA sequences (ESTs, GSSs, STSs, HTG sequences)
 - Sequence alignments
 - Protein sequences
 - Sequences of individual proteins
 - Proteome sequence sets
3. Higher Level Organizations of Sequence Data
- Links between data records
 - Sequence neighbors
 - Structure neighbors
 - Specialized NCBI resources
 - NCBI Taxonomy: A taxonomy of over 70,000 species represented in GenBank
 - Genome views: Organized presentations of complete genomes
 - Views of Bacterial Genomes
 - Views of Eukaryotic Genomes: The Genome Map Viewer
 - RefSeq: A database of reference sequences
 - LocusLink: A single query interface to curated sequence and descriptive information about genetic loci
 - GeneMap'99: A radiation hybrid gene map of the human genome
 - COGs: Clusters of Orthologous Groups of proteins from 21 model organisms
 - Unigene: Gene anchored clusters of ESTs
 - Homologene: Clusters of clusters
 - dbSNP: A database of Single Nucleotide Polymorphisms and short insertions or deletions
4. Tools for the Analysis of Sequence Data
- BLAST (Basic Local Alignment Search Tool)
 - Basic BLAST
 - PSI-BLAST: A BLAST search using a protein profile
 - PHI-BLAST: A BLAST search using a amino acid pattern as a seed
 - BLAST2Sequences: A BLAST of one sequence against another
 - BLAST against microbial genomes
 - BLAST against human genomic contigs
 - OrfFinder: Locates Open Reading Frames in DNA sequences
 - Genotyping Tools
 - General Genotyping
 - HIV Genotyping
 - Electronic PCR: Locates STSs within nucleic acid sequences
 - VecScreen: Detecting contamination in nucleotide submissions
5. Structure Data: Retrieval and Analysis
- The NCBI Molecular Modeling Database (MMDB)
 - Creation of the MMDB from the PDB (Protein Data Bank)
 - Viewing MMDB structures with Cn3D
 - Superimposing a protein sequence onto a structure using Cn3D
 - The Vector Alignment Search Tool (VAST)
 - Viewing pre-computed VAST structural alignments
 - Submitting a novel structure for a VAST search
6. Data on Gene Expression, Genotypes and Phenotype
- SAGEMap: A resource for the visualization and analysis of SAGE data
 - CGAP: The cancer genome anatomy project
 - OMIM: A catalog of human genes and genetic disorders

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Session 2: 10:30 - 12:00 N

Encryption and public policy issues

Faculty

Educational Objectives

This lecture and discussion will present the theoretical and practical bases for recommendations concerning medical data privacy, data encryption technology, and some of the national security considerations.

At the completion of the session, participants will:

- Know the issues facing the US regarding copyright and database protection world-wide
- Know if they support or do not support federal privacy legislation, and its features
- Understand the basis for current data encryption methods.
- Will have tested at least two Security Token Authentication devices.
- Know if they prefer to operate Challenge Response or Time Synchronous security devices.

Session Outline

1. Intellectual Property Rights
 - WIPO Treaty proposals
 - Pub Med Plans
2. Encryption
 - Basic concepts
 - DES Public-Private Key
 - Implementation and Devices
 - a) Data Encryption Technology
 - Private Key Encryption
 - Digital Encryption Standard
 - Kerberos
 - Public-Private Key Encryption
 - b) System Considerations
 - Length of Cipher Keys
 - Security Token Authentication
 - c) Devices
 - Challenge - Response
 - Time Synchronous
3. Medical Data Privacy
 - Requirements
 - Legislation
 - Overview
 - Status of Federal Privacy Legislation
 - Contentious Issues
 - Initial Practical Experience with Medical Data Privacy Assurance

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Session 3: 1:30 - 3:00 PM

Principles of Web page design

Faculty

David Remsen, MBL staff

Educational Objectives

At the completion of this session, participants will have an understanding of Hypertext Markup Language (HTML) and its application in the creation of World Wide Web pages.

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Session 4: 3:30 - 5:00 PM

Faculty

Allen Hightower

Educational Objectives

At the completion of this session, participants will have an understanding of the Geographic Information Systems and their application to life sciences research and healthcare.

Session Outline

I. An Introduction to Geographic Information Systems (GIS)

- (1) Definition
 - (a) Database Model
- (2) Types of Use
 - (a) Operational
 - (b) Research
- (3) Brief History
 - (a) Medical/Public Health Application
 - (b) Software - Mainframe to PC
- (4) Objectives

II. GIS concepts

- (1) Projections, coordinate systems
- (2) Layers
- (3) Address Matching
- (4) Vector vs. Raster GIS
- (5) Thematic Maps
- (6) Buffer Analyses
- (7) Network Analyses
- (8) Creation of Distance variables
- (9) Surface Interpolation

III. Electronic Map Preparation

- (1) Digitizing
- (2) Scanning
- (3) GPS

IV. Introduction to GPS

- (1) Background Information
- (2) Limitations/Error levels
- (3) Differential GPS
 - (A) When is it needed?
 - (B) Equipment/Costs

V. Case Study: GIS at the CDC Field Station in Western Kenya

- (1) Overview of field station
 - (A) Research Activities
 - (B) Computer Center
- (2) Map creation with Differential GPS
- (3) Operational and Research Applications
- (4) Future Plans

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Evening Session

Introduction to Personal Databases

Faculty

David Remsen

Educational Objectives

This hands on workshop will create sample databases and discuss the implications of different data models.

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Day 3 - Wednesday, May 31, 2000

Session 1: 8:30 a.m. - 10:00 a.m.

Principles of Controlled Terminology

Faculty

[James J. Cimino, M.D.](#)

Educational Objectives

This lecture will introduce basic principles of controlled terminologies and how they are used to represent patient data, health information, and medical knowledge. At the completion of the session, participants will:

- Have a basic understanding of issues related to coding medical information with controlled terminologies
- Know what controlled terminologies are available
- Understand how controlled terminologies can be used for supporting health care applications

Session Outline

- What are Controlled Terminologies?
 - Definitions
 - Uses of terminologies
 - Features of controlled terminologies
 - Desiderata for terminology
- State of the Art in Controlled Terminologies in Health Care
 - ICD9-CM and ICD-10
 - SNOMED
 - Read
 - Nursing terminologies
 - MEDCIN
 - LOINC
 - MeSH
 - The Columbia Medical Entities Dictionary
- Case Studies of Using the MED
 - Summary reporting
 - HCFA requirements
 - Clinical research
 - Expert systems
 - Automated decision support
 - Linking to on-line information sources

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Sessions 2, 3 and 4: 10:30 a.m. - 5:00 p.m.

Evaluation Methods in Medical Informatics

Faculty

[Charles P. Friedman, Ph.D.](#)

Session Outline

This section of the course examines medical informatics as an empirical science. As such, the section will focus on formal studies of applications of information technology in medicine. We refer to these applications generically as information resources. Studies can be conducted while information resources are under development as well as after they are in routine

service. Studies typically address questions such as: Is the resource functioning as anticipated? How can it be improved? Does it make a difference? Are the differences it makes beneficial?

Within medical informatics, there is increasing interest in evaluation and empirical studies. From an administrative perspective, as institutions invest in new technology, it is critical for them to know how these systems can contribute to health care, education, and research so they can set development plans and set priorities. From a more academic perspective, research projects in informatics, including doctoral dissertations and masters theses, now often include an evaluation or empirical study component. Much of the funded research in informatics is required to have such a component.

This day-long session on evaluation will provide participants with an understanding of the range of evaluation methods that are used in informatics and will address how studies are designed as well as how data for these studies are collected, analyzed, and reported. We will address during the day many of the challenges that make evaluation difficult, emphasizing those challenges that are particular to medical informatics, and we will discuss methods that have been developed for addressing many of these challenges.

Educational Objectives:

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

1. Describe the purposes of evaluation in medical informatics.
2. List several factors that can make it difficult to do evaluation in medical informatics effectively, as well as strategies that can be employed to address these difficulties.
3. Distinguish objectivist (quantitative) and subjectivist (qualitative) approaches, describe the assumptions that underlie them, and explain why both methods are used.
4. Identify the major steps in the process of conducting objectivist and subjectivist studies.
5. Identify the individuals or groups comprising the “audience” for an evaluation study.
6. Describe how the methods and purposes of a study can be matched the level of maturity of an information resource.
7. Frame many of the recurring difficulties of evaluation in medical informatics as problems of measurement.
8. Distinguish between measurement errors that are issues of reliability from those that are issues of validity. Distinguish between different types of validity.
9. Explain how “measurement studies” can be conducted to identify the sources of error in any measurement process, and to estimate the magnitude of these errors.
10. Explain what is meant by a “gold standard” in the framework of a measurement study.

Identify measurement methods and features of measurement instruments that can be employed to reduce measurement errors.

11. Identify some specific evaluation questions or issues that lend themselves particularly well to subjectivist approaches.
12. Explain how the questions and key issues of a study arise through the process of immersion.
13. Describe the major data collection strategies in subjectivist research, how these are used in a complementary way within a study, and how the data generated by each are analyzed.
14. Explain the steps a researcher can take to ensure the veracity of the findings of a subjectivist study.
15. Describe some of the barriers to combining objectivist and subjectivist methods within a single study.

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Day 4- Thursday, June 1, 2000

Session 1: 8:30 AM - 10:00 AM

Clinical Information Systems: Organizational Success Factors

Faculty

[William W. Stead, M.D.](#)

Educational Objectives:

This lecture will discuss how to align the enterprise and IT strategies, together with how to align strategies to “scale up” the IT function to meet the resulting challenges. At completion of the session, participants will:

1. Understand what the purpose of IT/Informatics should be in the organization.
2. Know what IT/Informatics support strategies are scalable.
3. Know what it means to manage data as a corporate asset
4. Know the core of planning functions needed by the enterprise.
5. Understand where IT/Informatics should be positioned in an organization.

Session Outline

1. Alignment of enterprise and IT strategies

- IT Value Proposition
- Future Trends
- Informatics at the Epicenter of Strategies for the Networked Health Enterprise
- Information Scenario
- Filtering
- Credentialing
- On-Demand Access

2. Organizing IT/Informatics for success

- The Challenge of Scale
- Achieving Scale
- Strategies that Scale
- Technology that Scales
- Data as a Corporate Asset
- Core Planning Functions
- Relationship of Academics to Operations
- Relationship of Bioinformatics to Clinical Informatics
- Relationship of Informatics Research to Informatics Support of Research

3. Vanderbilt as a Case Study

- VU/VUMC Organizational Structure
- Center Plus Division
- Informatics Center Organizational Structure
- Faculty Backgrounds
- Evolution of IAIMS Focus at Vanderbilt
- Build by Putting Pieces Together
- Success Factors

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Session 2: 10:30 - 12:00 N

Reducing Medical Errors and Improving the Quality of Practice:
WizOrder, PC-POETS**, and the Clinical Informatics Service at Vanderbilt

Faculty

[Randolph A. Miler, M.D.](#)

(and Antoine Geissbuhler, MD, William W. Stead, MD, Douglas A. Talbert MS, Jonathan Grande BS)

Educational Objectives:

- To understand the rationale for developing clinical decision-support systems
- To understand social and technical factors required for successful clinician order entry
- To understand the potential for improving quality of care and reducing medical errors through integrating decision support at the point of care
- To learn about Vanderbilt's WizOrder as an example of a clinician order entry system

Session Outline:

- What is WizOrder ?
 - Early Rationale for Clinical Decision Support Systems
 - WizOrder components and functions
1. "Intelligent, Heads-up Display" Approach to Patient Care: What clinicians need to know when they need to know it
 2. Electronic record sensitive to patients' specific information
 3. Medication prescription with safeguards
 4. Flexible tools to present & activate guidelines; Implementation of "Best of Care" clinical pathways

5. Respect for individual physicians' preferences
 6. Hooks to web-based 'just-in-time' educational resources
 7. Linkage of patient cases to literature-based evidence
 8. Ability to implement cost-savings precisely & humanely
- System implementation represents a profound workflow change for users
 - Design Philosophy & Implementation History
 - Future Plans

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Session 3: 1:30 PM - 3:00 PM

Enterprise Information Architecture and Standards

Faculty

[William W. Stead, M.D.](#)

Educational Objectives:

This lecture will introduce the concept of an enterprise information architecture and describe the role of applicable standards and integration strategies. At completion of the session, participants will:

1. Know why we need to manage data independently of systems that automate tasks.
2. Understand the tradeoffs between integrating and relating data.
3. Know when data should be captured in structured form as opposed to when text would suffice.

Session Outline

1. Getting access to the data needed for decision and role support
 - Paradigm Shifts
 - Applications Datatypes
 - Add a Task for Each Problem
 - Integrated Tasks and Data
2. Informatics strategies for integrating and relating data from diverse sources
 - Three Generations of Integration
 - Create de Novo
 - Integrate
 - Relate Separate Sources
 - Three Dimensions
 - When to Use Structure
3. Vanderbilt as a Case
 - Architecture
 - Architecture Phases
 - Wiz Order as an Example
 - Stars as an Example
 - Stages of IAIMS Penetration

Ref: Hripcsak G. IAIMS architecture. J Am Med Inform Assoc 1997 Mar-Apr;4(2 Suppl):S20-30 [\[PubMed\]](#).

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Session 4: 3:30 - 5:00 PM

Computer-Based Expert Systems: a review of computer-assisted medical diagnosis

Faculty

[Randolph A. Miler, M.D.](#)

Educational Objectives

- Be able to describe the rationale behind clinical decision support systems
- Understand the challenges related to developing and maintaining clinical expert systems' knowledge bases
- Be able to discuss the history, issues, and approaches to Medical Diagnostic Decision Support Systems (MDDSS) over the past several decades

Session Outline

- Definition of Medical Decision Support System
 - Areas of active clinical informatics research
 - Rationale for Clinical Decision Support
 - Medical Diagnostic Decision Support Systems
1. Current Understanding of Humans' Diagnostic Reasoning
 2. Early MDDSS system development: 1954-1985
 3. Newer Approaches to MDDSS: 1985-present
 4. Evaluation Issues for Clinical Decision Support Systems
 5. Integrated Clinical Decision Support: Informatics' Holy Grail

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Evening Workshop: 7:00 - 9:00 PM

Information resources to support practice

Faculty

[Nunzia B. Giuse, M.D., M.L.S.](#)

Educational Objectives

This workshop will help participants:

1. Gain an awareness of electronic resources to support clinical practice.
2. Develop an understanding of effective search techniques, including:
 - analyzing the components of a clinical question
 - understanding the importance of context in tailoring search results
 - selecting and combining relevant search terms
 - recognizing strengths and weaknesses of various resources for a specific question.

Session Outline

1. Introduction to resource selection and search techniques.
2. Case-based examination of electronic resources:
 - PubMed MEDLINE
 - MDConsult
 - UpToDate
 - Cochrane Database of Systematic Reviews
 - CANCERLIT
 - PDQ
 - CDC
 - web search engines

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Day 5 - Friday, June 2, 2000

Session 1 - 8:30 AM - 10:00 AM

Applications of Controlled Vocabulary

Faculty

[Judy Ozbolt, R.N., Ph.D.](#)

Educational Objectives

Session Outline

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Session 2: 10:30 - 12:00 N

Knowledge Acquisition and Filtering

Faculty

[Nunzia B. Giuse, M.D., M.L.S.](#)

Educational Objectives

After a brief introduction to information needs, this lecture will address trends in the use of biomedical knowledge, its different sources, and their usefulness and validity. Basic concepts of extracting information for the purposes of knowledge acquisition and filtering will also be discussed.

Session Outline

1. Information needs (for humans and computer programs).
2. Sources of knowledge, their usefulness, and validity.
3. Extracting information:
 - Filtering
 - Knowledge acquisition.
4. Trends in the use of biomedical knowledge.
5. The changing role of the health sciences library.

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Session 3: 1:30 PM - 3:00 PM

Legal & Ethical Issues for Clinical Decision Support Systems

Faculty

Randolph A. Miller, William W. Stead, et al

Educational Objectives

- Be able to recognize ethical and legal issues related to clinical informatics systems
- Understand basic concepts underlying legal and ethical concerns
- Be able to promote responsible use of software in your own clinical environment

Session Outline

- Ethical Issues regarding Medical Decision Support Systems
 1. Use of software systems in care-providing institutions poses potential risks to patients, care providers, and institutions
 2. By what practices, oversight, and/or regulatory strategies can quality management for clinical software systems be achieved on local and national levels, in order to maximize patient safety?
 3. When should one use an MDSS?
 4. Privacy and Confidentiality
- Legal Issues regarding Medical Decision Support Systems
 - Status of Legal Concerns regarding MDSSs
 - Tort Law: Negligence and Strict Liability
 - Institutional or Federal software regulation

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Evening Workshop: 7:00 - 9:00 PM

Building Web interfaces to databases

Faculty

David Remsen, MBL staff

Educational Objectives

This workshop will give participants hands-on experience in serving databases to the web. In this session they will learn the different necessary components of a database web server. They will create their own interface to a database and learn how to conditionally format the results in HTML. They will get an understanding how HTML form elements translate to database calls, how an HTML form translates to a database query, and how a query is processed and the results are returned.

Session Outline

- Present an overview of a generic database web serving system. This overview will consist of identifying and defining the function of the the different elements that compose a database server.
- A brief introduction to a few of the different database solutions to show how different vendors address the model described in 1.
- Create an interactive web database using Filemaker Pro 4.0 with a sample database which will address the following: Querying the database using FORM and embedded URLS
- Editing a Record via the web
- Adding/Deleting Records
- Processing results with format files.
- Understanding how HTML and database meta tags can interact by:
 - a. Listing multiple records
 - b. Formatting a single record
 - c. Using conditionals to selectively format records
 - d. Using color and graphics with numeric content

Creating embedded links to Entrez, PubMed, others

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Day 6 - Saturday, June 3, 2000

Sessions 1-2: 8:30 - 10:00 AM

Telemedicine Systems

Faculty

[Clement J. McDonald, M.D.](#)

Educational Objectives

This lecture will review current telemedicine applications. Specific emphasis will be placed upon how these systems have been evaluated, what are the associated costs, what are the benefits, and what factors are associated with successful applications.

Session Outline

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Session 3: 1:30 - 3:00 PM

Designing a medical informatics curriculum

Faculty

Faculty Panel

Educational Objectives

At the completion of this session, participants should have an understanding of issues attendant to the development and implementation of a medical informatics curriculum at the fellows' home institutions.

Session Outline

This session will be an interactive discussion among faculty and fellows. It will review the topics covered at the MBL course and promote discussion regarding future changes.

3:00 PM

Course Wrap-Up and Farewell

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Last Updated: 1 June 2000