



NORTHWESTERN  
UNIVERSITY

SCHOOL OF  
CONTINUING  
STUDIES

MED\_INF 403-DL: Introduction to Medical Informatics

Fall 2011

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Office Phone: 312-775-4244 between 9 a.m. and 3 p.m. Monday through Friday.

Office Hours: By appointment (day and evening available).

### Course Description

The course is an introductory survey of fundamentals of information technology as applied to health care. Topics center on technology's impact on the patient level, individual health care provider, and hospital level. It focuses on clinical data and physician data. The use of data to measure outcomes and performance is explored. Decision support, system integration, and educational applications is also discussed. The course also explores emerging and new uses of technology.

### Text

Shortliffe, E. H., & Cimino, J. J. (2006). *Biomedical informatics: Computer applications in health care and biomedicine* (3rd ed.). New York, NY: Springer.

[ISBN-13: 978-0387289861]

### Software

None.

### Prerequisites

None.

### Learning Goals

The goals of this course are to:

- Identify the multiple consumers of medical informatics and how they interact with medical informatics.
- Analyze the benefits and limitations of medical informatics from the perspective of each of the multiple key stakeholders.
- Evaluate an information system from a specific scenario from the perspective of multiple users.
- Discuss how medical informatics has contributed to improving quality health care.
- Explain future opportunities and challenges in improving quality health care.

### Evaluation

The student's final grade will be determined as follows:

- Course Project—Informatics Profile and Assessment: 250 pts. (5 sections: 50 pts. possible per section)
- Case Study: 40 pts.
- Lexicon Exercise: 40 pts.
- Statistics in Literature: 40 pts.
- Course Participation: 230 pts.

**Total Points: 600 pts.**

### Grading Scale

A = 93%–100%

A- = 90%–92%

B+ = 88%–89%

B = 83%–87%

B- = 80%–82%  
C+ = 78%–79%  
C = 73%–77%  
C- = 70%–72%  
F = 0%–69%

### Discussion Board Etiquette

The purpose of the discussion boards is to allow students to freely exchange ideas. It is imperative to remain respectful of all viewpoints and positions and, when necessary, agree to respectfully disagree. While active and frequent participation is encouraged, cluttering a discussion board with inappropriate, irrelevant, or insignificant material will not earn additional points and may result in receiving less than full credit. Frequency is not unimportant, but content of the message is paramount. Please remember to cite all sources—when relevant—in order to avoid plagiarism.

### Proctored Assessment

None.

### Attendance

This course will not meet at a particular time each week. All course goals, session learning objectives, and assessments are supported through classroom elements that can be accessed at any time. To measure class participation (or attendance), your participation in threaded discussion boards is required, graded, and paramount to your success in this class. Please note that any scheduled synchronous or “live” meetings are considered supplemental and optional. While your attendance is highly encouraged, it is not required and you will not be graded on your attendance or participation.

### Late Work

Late work is accepted with a 50% deduction up to one week after the due date. No work is accepted after the one week period.

### Learning Groups

Learning groups are utilized in this course. More information about learning groups will be provided by the instructor via the Blackboard course site.

### Academic Integrity at Northwestern

Students are required to comply with University regulations regarding academic integrity. If you are in doubt about what constitutes academic dishonesty, speak with your instructor or graduate coordinator before the assignment is due and/or examine the University Web site. Academic dishonesty includes, but is not limited to, cheating on an exam, obtaining an unfair advantage, and plagiarism (e.g., using material from readings without citing or copying another student's paper). Failure to maintain academic integrity will result in a grade sanction, possibly as severe as failing and being required to retake the course, and could lead to a suspension or expulsion from the program. Further penalties may apply. For more information, visit [www.scs.northwestern.edu/student/issues/academic\\_integrity.cfm](http://www.scs.northwestern.edu/student/issues/academic_integrity.cfm).

Plagiarism is one form of academic dishonesty. Students can familiarize themselves with the definition and examples of plagiarism, by visiting [www.northwestern.edu/uacc/plagiar.html](http://www.northwestern.edu/uacc/plagiar.html). A myriad of other sources can be found online.

Some assignments in this course may be required to be submitted through SafeAssign, a plagiarism detection and education tool. You can find an explanation of the tool at <http://wiki.safeassign.com/display/SAFE/How+Does+SafeAssign+Work>. In brief, SafeAssign compares the submitted assignment to millions of documents in large databases. It then generates a report showing the extent to which text within a paper is similar to pre-existing sources. The user can see how or whether the flagged text is appropriately cited. SafeAssign also returns a percentage score, indicating the percentage of the submitted paper that is similar or identical to pre-existing sources. High scores are not necessarily bad, nor do they necessarily indicate plagiarism, since the score does not take into account how or whether material is cited. If a paper consisted of one long quote that was cited appropriately, it would score 100%. This would not be plagiarism, due to the appropriate citation. However, submitting one long quote would probably be a poor paper. Low scores are not necessarily good, nor do they necessarily indicate a lack of plagiarism. If a 50-page paper contained all

original material, except for one short quote that was not cited, it might score around 1%. But, not citing a quotation is still plagiarism.

SafeAssign includes an option in which the student can submit a paper and see the resultant report before submitting a final copy to the instructor. This ideally will help students better understand and avoid plagiarism.

**Other Processes and Policies**

Please refer to your SCS student handbook at < [www.scs.northwestern.edu/grad/information/handbook.cfm](http://www.scs.northwestern.edu/grad/information/handbook.cfm)> for additional course and program processes and policies.

## Course Schedule

**Important Note:** Changes may occur to the syllabus at the instructor's discretion. When changes are made, students will be notified via an announcement in Blackboard.

### Session 1

#### Learning Objectives

After this session, the student will be able to:

- Identify the recurring issues that have constrained the building of effective patient records.
- Discuss a model of integrated disease surveillance that addresses barriers.
- Define the term *medical informatics*.
- Explain the different types of medical data.
- Explain how different types of medical data are currently recorded.
- Analyze the advantages and disadvantages of paper health records.
- Outline the types of online health care content available to providers and consumers.
- Analyze the quality of online medical content.

#### Course Content

##### Textbook Reading

Shortliffe, Chapters 1, 2, and 19

##### Online Reading

Finding My Way to Electronic Health Records

Benjamin, R. (2010). Finding my way to electronic health records. *New England Journal of Medicine*, 363: 505–506. Retrieved from <http://www.nejm.org/doi/full/10.1056/NEJMp1007785>

#### Discussion Board

Each session you are required to participate in the session-specific discussion board forum. Your participation in both posting and responding to other students' comments is graded. For this session's discussion topic(s), visit the discussion board in Blackboard.

#### Assignments

None.

#### Sync Session

Tuesday, September 27, 2011, 7:00pm – 9:30pm (central time)

## **Session 2**

### **Learning Objectives**

After this session, the student will be able to:

- Analyze the advantages and challenges of converting charting from a written format to an electronic record.
- Explain the basic functions that may be provided by medical computer systems.
- Explain how to perform a system's analysis given a scenario.
- Develop a proposal to a hospital administrator to buy an off-the-shelf product or a home-developed system.
- Outline components that are part of a hospital information system.
- Analyze barriers to technology transfer among health care institutions.
- Explain challenges for natural language processing in the clinical and biological domains.
- Create a lexicon consistent with standards.

### **Course Content**

#### **Textbook Reading**

Shortliffe, Chapters 6 and 8

#### **Online Reading**

Logical Observation Identifiers Names and Codes

McDonald, C., Huff, S., Mercer, K., Hernandez, J., & Vreeman, D. (Eds.) (2010). *Logical observation identifiers names and codes (LOINC) users guide*. Retrieved from [www.loinc.org](http://www.loinc.org)

Logical Observation Identifiers FAQ

*LOINC FAQ*. (n.d.). Retrieved from the Logical Observation Identifiers Names and Codes Web site: [www.loinc.org](http://www.loinc.org)

### **Discussion Board**

Each session you are required to participate in the session-specific discussion board forum. Your participation in both posting and responding to other students' comments is graded. For this session's discussion topic(s), visit the discussion board in Blackboard.

### **Assignments**

Case Study: Paper to Electronic is due Sunday, October 9, 2011 at 11:55 p.m. (central time). For more information, click Assignments on the left navigation bar in Blackboard, and scroll to this assignment's item.

Analyzing Medical Results: Lexicon Exercise is due Sunday, October 9, 2011 at 11:55 p.m. (central time). For more information, click Assignments on the left navigation bar in Blackboard, and scroll to this assignment's item.

### **Sync Session**

None.

## **Session 3**

### **Learning Objectives**

After this session, the student will be able to:

- Outline what to consider when deciding to keep data in active versus archival storage.
- Discuss advantages and disadvantages of individual workstations linked in a LAN versus shared access to mainframe computers.
- Explain how access to electronic health records is secured.
- Examine the issues caused by the limitations on how health records are secured.
- Discuss an electronic health record, its functional elements, and how it differs from a paper record.
- Examine barriers to the development and use of an electronic health record.
- Debate the benefits and challenges of provider order entry.
- Provide an example of a clinical order that serves the needs of the hospital with the least burden to the provider.
- Debate the benefits and challenges of clinical decision support.

### **Course Content**

#### **Textbook Reading**

Shortliffe, Chapters 5 and 12

#### **Online Reading**

Health IT Journeys: Stories from the Road

*Health IT journeys: Stories from the road.* (n.d.). Retrieved from the Office of the National Coordinator for Health Information Technology Web site:

<http://healthit.hhs.gov/portal/server.pt?open=512&objID=1958&mode=2>

### **Discussion Board**

Each session you are required to participate in the session-specific discussion board forum. Your participation in both posting and responding to other students' comments is graded. For this session's discussion topic(s), visit the discussion board in Blackboard.

### **Assignments**

Part 1: Informatics Profile and Assessment—Hospital Profile and Questionnaire is due Sunday, October 16, 2011 at 11:55 p.m. (central time). For more information, click Assignments on the left navigation bar in Blackboard, and scroll to this assignment's item.

### **Sync Session**

Date and time to be announced.

## **Session 4**

### **Learning Objectives**

After this session, the student will be able to:

- Discuss commonly used classification systems for diagnostic tests, billing, and procedures.
- Analyze the benefits and limitations of the current classification system.
- Provide examples of how standards have enhanced information exchange.
- Illustrate areas where there are gaps in information exchange.
- Argue the role of government in addressing gaps in information exchange.
- Discuss the challenges informatics poses for patient and provider confidentiality.
- Explain the ways providers and systems address the balance of information exchange and confidentiality.
- Provide an analysis of the balance of information exchange and confidentiality.
- Explain how access to medical information has altered the provider-to-patient relationship.

### **Course Content**

#### **Textbook Reading**

Shortliffe, Chapters 7 and 10

#### **Online Reading**

State Health Information Exchange Program

*State health information exchange program.* (2010). Retrieved from the Office of the National Coordinator for Health Information Technology Web site:

[http://healthit.hhs.gov/portal/server.pt/community/healthit\\_hhs\\_gov\\_\\_state\\_health\\_information\\_exchange\\_program/1488](http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__state_health_information_exchange_program/1488)

HHS Launches Health Information Exchange Pilots

Lewis, N. (2011, February 3). HHS launches health information exchange pilots. *InformationWeek*. Retrieved from <http://www.informationweek.com>

Maybe This is the Solution to the Electronic Medical Records Logjam

Terry, K. (2011, February 4). Maybe this is the solution to the electronic medical records logjam. *BNET*. Retrieved from [www.bnet.com](http://www.bnet.com)

Understanding Health Information Privacy

*Understanding health information privacy.* (n.d.). Retrieved from the U.S. Department of Health and Human Services Web site: <http://www.hhs.gov/ocr/privacy/hipaa/understanding/index.html>

### **Discussion Board**

Each session you are required to participate in the session-specific discussion board forum. Your participation in both posting and responding to other students' comments is graded. For this session's discussion topic(s), visit the discussion board in Blackboard.

### **Assignments**

Part 2: Informatics Profile and Assessment—Identify Key Stakeholders, Answer Questionnaire is due Sunday, October 23, 2011 at 11:55 p.m. (central time). For more information, click Assignments on the left navigation bar in Blackboard, and scroll to this assignment's item.

### **Sync Session**

None.

## **Session 5**

### **Learning Objectives**

After this session, the student will be able to:

- Interpret sensitivity, specificity, disease prevalence, positive predictive value, negative predictive value, and pretest probability.
- Create decision trees.
- Calculate the expected outcomes of a decision tree.
- Provide an analysis for a patient to help guide decision making.
- Explain important characteristics in clinical decision support tools.
- Illustrate challenges in designing the perfect decision support tool.
- Analyze a decision support tool for usability and reliability of results.

### **Course Content**

#### **Textbook Reading**

Shortliffe, Chapters 3 and 20

#### **Online Reading**

Hospital Compare

*Hospital Compare*. (n.d.). Retrieved from the U.S. Department of Health and Human Services Web site:  
<http://www.hospitalcompare.hhs.gov>

#### **Multimedia**

Introduction to Decision Analysis

Decision Analysis with Imperfect Information; Tree-Flipping

### **Discussion Board**

Each session you are required to participate in the session-specific discussion board forum. Your participation in both posting and responding to other students' comments is graded. For this session's discussion topic(s), visit the discussion board in Blackboard.

### **Assignments**

Understanding Statistics in the Literatures is due Sunday, October 30, 2011 at 11:55 p.m. (central time). For more information, click Assignments on the left navigation bar in Blackboard, and scroll to this assignment's item.

### **Sync Session**

None.



## **Session 6**

### **Learning Objectives**

After this session, the student will be able to:

- Explain the clinical, financial, and administrative functions provided by a hospital information system.
- Examine the benefits and challenges of integrating a hospital system.
- Develop, from a chief informatics officer's perspective, what must be considered when implementing a new system.
- Identify how one would enlist stakeholder support.
- Identify how societal forces have influenced the design and implementation of patient care systems.
- Discuss the advantages and disadvantages of free text versus structured data for recording observations.
- Analyze a patient care system.
- Debate the advantages and disadvantages of collecting data automatically versus manually.
- Explain the challenges in using data from bedside monitoring devices.

### **Course Content**

#### **Textbook Reading**

Shortliffe, Chapters 13, 16, and 17

#### **Online Reading**

A Buyer's Guide to Medical Software: Electronic Health Records Software

*A buyer's guide to medical software: Electronic health records software* (n.d.). Retrieved from the Software Advice Web site: [www.softwareadvice.com](http://www.softwareadvice.com)

Electronic Health Records in Ambulatory Care—A National Survey of Physicians

DesRoches, C., et al. (2008). Electronic health records in ambulatory care—A national survey of physicians. *New England Journal of Medicine*, 359: 50–60. Retrieved from <http://www.nejm.org/doi/full/10.1056/NEJMsa0802005>

Patient Alarms Often Unheard, Unheeded

Kowalczyk, L. (2011, February 13). Patient alarms often unheard, unheeded. *Boston Globe*. Retrieved from [http://www.boston.com/lifestyle/health/articles/2011/02/13/patient\\_alarms\\_often\\_unheard\\_unheeded/?page=1](http://www.boston.com/lifestyle/health/articles/2011/02/13/patient_alarms_often_unheard_unheeded/?page=1)

#### **Multimedia**

Simulated Stakeholder Interview

### **Discussion Board**

Each session you are required to participate in the session-specific discussion board forum. Your participation in both posting and responding to other students' comments is graded. For this session's discussion topic(s), visit the discussion board in Blackboard.

### **Assignments**

Part 3: Informatics Profile and Assessment—Develop Proposals with Options is due Sunday, November 6, 2011 at 11:55 p.m. (central time). For more information, click Assignments on the left navigation bar in Blackboard, and scroll to this assignment's item.

### **Sync Session**

None.

## **Session 7**

### **Learning Objectives**

After this session, the student will be able to:

- Provide an analysis on system usability, detailing considerations on overall performance.
- Examine the benefits and disadvantages of using available consumer health tools.
- Explain the impact of telehealth.
- Compare and contrast information needs for public health registries and clinical care.
- Examine the challenges in meeting public health and clinical needs.
- Explain how regulatory agencies use medical informatics.
- Debate the utility in making regulatory measurements public.

### **Course Content**

#### **Textbook Reading**

Shortliffe, Chapters 4, 14, and 15

#### **Online Reading**

Electronic Medical health records and Meaningful Use

*Electronic medical health records and meaningful use.* (n.d.). Retrieved from the Office of the National Coordinator for Health Information Technology Web site:

<http://healthit.hhs.gov/portal/server.pt?open=512&objID=2996&mode=2>

Medicare and Medical EHR Incentive Program Webinar for Eligible Professionals

*Medicare and medical EHR incentive program webinar for eligible professionals.* (n.d.). Retrieved from the U.S. Department of Health and Human Services Web site:

[https://www.cms.gov/EHRIncentivePrograms/20\\_RegistrationandAttestation.asp](https://www.cms.gov/EHRIncentivePrograms/20_RegistrationandAttestation.asp)

The Meaningful Use Regulation for Electronic Health Records

Blumenthal, D. (2010). The meaningful use regulation for electronic health records. *New England Journal of Medicine*, 363: 501–504. Retrieved from <http://www.nejm.org/doi/full/10.1056/NEJMp1006114>

The CIO's Guide to Implementing EHR's in the HITECH Era

*The CIO's guide to implementing EHR's in the HITECH era.* (2010). College of Healthcare Information Management Executives. Retrieved from [www.cio-chime.org](http://www.cio-chime.org)

ONC Will Assess HER Adoption, Clinical Exchange By Region

#### **Online Video**

Final Rules to Support Meaningful Use of EHR

### **Discussion Board**

Each session you are required to participate in the session-specific discussion board forum. Your participation in both posting and responding to other students' comments is graded. For this session's discussion topic(s), visit the discussion board in Blackboard.

### **Assignments**

Part 4: Informatics Profile and Assessment—Regulatory Compliance is due Sunday, November 13, 2011 at 11:55 p.m. (central time). For more information, click Assignments on the left navigation bar in Blackboard, and scroll to this assignment's item.

### **Sync Session**

None.

## **Session 8**

### **Learning Objectives**

After this session, the student will be able to:

- Outline the three stages of technology assessment.
- Analyze the different types of studies that could be utilized in evaluating a technology.
- Illustrate how one should approach evaluating an information system.
- Analyze a mock system for a health care organization.
- Compare and contrast cost-effectiveness and cost-benefit studies.

### **Course Content**

#### **Textbook Reading**

Shortliffe, Chapter 11

### **Discussion Board**

Each session you are required to participate in the session-specific discussion board forum. Your participation in both posting and responding to other students' comments is graded. For this session's discussion topic(s), visit the discussion board in Blackboard.

### **Assignments**

Part 5: Informatics Profile and Assessment—Training Plan and Final Revisions is due Sunday, November 20, 2011 at 11:55 p.m. (central time). For more information, click Assignments on the left navigation bar in Blackboard, and scroll to this assignment's item.

### **Sync Session**

None.

## **Session 9**

### **Learning Objectives**

After this session, the student will be able to:

- Compare the advantages of computer-aided instruction over traditional lecture-style instruction in medical education.
- Compare the advantages and limitations of computer based simulation versus hands-on training.
- Discuss how continuing medical education has changed with technology.
- Explain how health care financing has influenced information systems.
- Debate the uses and possible misuses of value-based purchasing.
- Outline some of the forces that will drive the changes of medical informatics in the future.

### **Course Content**

#### **Textbook Reading**

Shortliffe, Chapters 21, 23, and 24

#### **Online Reading**

Federal Register Value-Based Purchasing

*Federal register.* (2011). Retrieved from the Department of Health and Human Services Web site:  
<http://edocket.access.gpo.gov/2011/pdf/2011-454.pdf>

### **Discussion Board**

Each session you are required to participate in the session-specific discussion board forum. Your participation in both posting and responding to other students' comments is graded. For this session's discussion topic(s), visit the discussion board in Blackboard.

### **Assignments**

None.

### **Sync Session**

None.

**Session 10****Learning Objectives**

No new learning objectives will be introduced.

**Course Content**

None.

**Discussion Board**

Each session you are required to participate in the session-specific discussion board forum. Your participation in both posting and responding to other students' comments is graded. For this session's discussion topic(s), visit the discussion board in Blackboard.

**Assignments**

None.

**Sync Session**

None.