

## MMI-DL Medical Informatics 405 Section 55 Syllabus

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### HIT Integration, Interoperability, and Standards Summer 2011

**Contact Information:** (815)260-4173, [n-bertram@northwestern.edu](mailto:n-bertram@northwestern.edu), and office hours by appointment

**Course Description:** This course will provide the details of healthcare information technology standards and interoperability. The value proposition of standards will be presented. The course will review health information models and look at the IHE Initiative, HL7, DICOM, CCOW, and other standards, and cover the role of non-medical standards in medical informatics (HTTP, XML, etc.). The course will also cover multi-institutional issues and telemedicine, e-commerce, and Health Insurance Portability and Accountability Act (HIPAA) standards compliance.

**Text:**

- 1) Giannangelo, K. (2010). Healthcare Code Sets, Clinical Terminologies, and Classifications - 2<sup>nd</sup> edition. Chicago, IL: American Health Information Management Association.  
ISBN: 978-1-58426-225-1
- 2) Henderson, M. (2007). HL7 Messaging - 2<sup>nd</sup> edition. Aubrey, TX: OTech Inc.  
ISBN: 978-0-9787646-4-7

**Software:** Standard office software is needed. (i.e. Word, PowerPoint, Acrobat, Internet browser)

**Learning Goals:** The goals of this course are to:

- Describe the benefits of standards-based HIT interoperability
- Identify the resources necessary for an HIT integration project
- Utilize appropriate HIT standards in an integration project
- Navigate through US national interoperability standards
- Explain the policy issues in intra- and inter-institutional health data exchange

**Evaluation:** The following criteria and weightings will be used to determine the final course grade:

Discussion Board Participation - 10%

Full participation:

Contributions reflect thought leadership and are substantiated by personal experiences or research. Student is eager to volunteer, interacts and negotiates well with others.

Partial participation:

Contributions have little persuasive impact and are not based on personal experiences or research. Student waits to be called on and raises few questions for debate.

Quizzes - 30%

- Quiz 1 - 15%
- Quiz 2 - 15%

### Team Project - 30%

- Comprehensive written report - 20%
- Team member ratings of individual participation - 10%

### Final Exam - 30%

**Discussion Board Etiquette:** The purpose of Discussion Boards is to allow students to freely exchange ideas and participation is highly encouraged. It is important that we always remain respectful of one another's viewpoints and positions and, when necessary, agree to disagree, respectfully. 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. Although frequency is not unimportant, content of the message is paramount. Please remember to cite all sources – when relevant – in order to avoid plagiarism.

**Proctored Assessment:** The final exam must be proctored.

### **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	below 70

**Attendance:** Attendance at the one synchronous session and participation on Discussion Boards are required and paramount to your success in this class.

**Late Work:** Any course work submitted after the due date will be penalized by subtracting 25% per day from the assigned grade. Assignments submitted four or more days after the due date will receive zero credit.

**Learning Groups:** The team project will be to design the information architecture for an integration specialty of your choosing. The teams are to be self-formed. Each team can have from 2-4 students. There are several collaboration tools freely available. These include email, Blackboard work groups, Adobe Connect, Skype, and Google (docs, chat). Grading is based on a combination of team work and individual participation.

**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., taking material from readings without citation 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:  
[http://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 the site <http://www.northwestern.edu/uacc/plagiar.html>. Myriad other sources can be found online, as well.

Some assignments in this course may be required to be run through SafeAssign, a plagiarism detection and education tool. You can find an explanation of the tool [here](#). In brief, SafeAssign compares the submitted assignment to millions of documents in very large databases. It then generates a report showing the extent to which text within a paper is very similar or identical to pre-existing sources. The user can then see how or whether the flagged text is cited appropriately, if at all. 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 doesn't take into account how or whether material is cited. (If a paper consisted of just one long quote that was cited appropriately, the score would be 100%. This wouldn't be plagiarism, due to the appropriate citation. However, just submitting one long quote would probably be a pretty bad paper.) Low scores are not necessarily good, nor do they necessarily indicate a lack of plagiarism. (If a 50-page paper had all original material, except for one short quote that was not cited, the score might be around 1%. But, not citing a quotation would still be plagiarism.)

**Other Processes and Policies:** Please refer to your SCS student handbook at <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:

- Recognize how important system interoperability is for healthcare
- Explain how an interface engine works
- Identify integration issues and the benefits of integration
- Discuss how integration impacts the master patient index and data warehouse

### **Course Content:**

*Reading – For this session please read:*

- 1) Chapter 11: System Integration and Interoperability

Hebda, T., & Czar, P. (2009). Chapter 11: System Integration and Interoperability. In Handbook of Informatics for Nurses & Healthcare Professionals (pp. 273-291). Upper Saddle River, NJ: Pearson Education, Inc.

<http://turing.library.northwestern.edu/login?url=http://www.library.northwestern.edu/ers/530-1361.pdf>

- 2) The Economics of Standardization: Summary of Main Findings 1-10 and 12

Swann, P. G. M. (2000). Summary of Main Findings. In The Economics of Standardization: Final Report for Standards and Technical Regulations Directorate Department of Trade and Industry (pp. iii-vii). University of Manchester. Retrieved from <http://www.berr.gov.uk/files/file11312.pdf>

<http://turing.library.northwestern.edu/login?url=http://www.library.northwestern.edu/ers/510-1629.pdf>

*Multimedia –*

None

### **Discussion Board**

Each Session you are required to participate in all Discussion Board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the Discussion Board in Blackboard.

### **Assignment**

- 1) The Proctor Approval Application is due by Monday, June 27, 2011 at 11:55 PM (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and review the printable assignment directions.

## Sync Session

Tuesday, June 21, 2011, 7:00 – 9:30 PM (central time)

This presentation includes information about the course and the session 1 readings.

## Session 2

**Learning Objectives:** After this session, the student will be able to:

- Specify the different levels of interoperability
- Illustrate the benefits of interoperability
- Identify key factors in the health information exchange movement
- Compare and contrast different health information exchange models
- Identify obstacles to health information exchange development and operations
- Identify the value that the IHE provides

## Course Content:

*Reading – For this session please read:*

- 1) Chapter 13: Regional Health Information Organizations (RHIOs)

Hebda, T., & Czar, P. (2009). Chapter 13: Regional Health Information Organizations (RHIOs). In Handbook of Informatics for Nurses & Healthcare Professionals (pp. 316-327). Upper Saddle River, NJ: Pearson Education, Inc.

<http://turing.library.northwestern.edu/login?url=http://www.library.northwestern.edu/ers/530-1363.pdf>

- 2) The Value of Healthcare Information Exchange and Interoperability:  
Executive summary,  
Chapter 1: Introduction,  
Chapter 2: Approach to Analysis,  
Chapter 12: Conclusions,  
Appendix 1: Methods

Pan, E., Johnston, D., Walker, J., Adler-Milstein, J., Bates, D. W., Middleton, B. (2004). Executive summary, Chapter 1: Introduction, Chapter 2: Approach to Analysis, Chapter 12: Conclusions, Appendix 1: Methods. In The Value of Healthcare Information Exchange and Interoperability (pp. 1-6, 7-11, 13-20, 133-136, 137). Center for Information Technology Leadership. Wellesley, MA: Healthcare Information and Management Systems Society.

*Pursuant to our copyright agreement with CITL's Value of Healthcare Information Exchange and Interoperability, this PDF may only be viewed online and may not be downloaded.*

<http://turing.library.northwestern.edu/login?url=http://www.library.northwestern.edu/ers/508-5578.pdf>

*Multimedia –*

- 1) Why IHE?: The Value Proposition for Implementing IHE Profiles

Davis, D. (2008, June 10). Why IHE?: The Value Proposition for Implementing IHE Profiles. Integrating the Healthcare Enterprise Podcast. Podcast retrieved from <http://www.ihe.net/Events/webinars2008.cfm>

- 2) Pre-recorded presentation available in the Course Content area of the course web site

This presentation includes information related to the team project.

## Discussion Board

Each Session you are required to participate in all Discussion Board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the Discussion Board in Blackboard.

## Assignment

None

## Sync Session

None

## Session 3

**Learning Objectives:** After this session, the student will be able to:

- Explain which factors influence the development of an information systems architecture
- Illustrate two frames of reference used to approach the topic of architecture
- Define what a service is in a service oriented architecture
- Discuss what the greatest opportunities are when applying a service oriented architecture
- Identify the main usage models that healthcare information networks support
- Explain the guidelines for implementing a service oriented architecture
- Examine four levels of enterprise business integration
- Identify data integration techniques
- Illustrate data integration technologies
- Identify data integration applications

## Course Content:

*Reading – For this session please read:*

- 1) Chapter 8 subsection: Information Systems Architecture

Wager, K. A., Lee, F. W., Glaser, J. P., Burns, L. R. (2009) Health Care Information Systems: A Practical Approach for Health Care Management - 2<sup>nd</sup> edition. San Francisco, CA: Jossey-Bass - John Wiley & Sons, Inc.

<http://turing.library.northwestern.edu/login?url=http://www.library.northwestern.edu/ers/2225.pdf>

- 2) Chapter 7: SOA in Healthcare

Juneja, G., Dournaee, B., Natoli, J., Birkel, S. (2007) Service Oriented Architecture Demystified: A Pragmatic Approach to SOA for the IT Executive. Hillsboro, OR: Intel Press, Intel Corporation.

<http://turing.library.northwestern.edu/login?url=http://www.library.northwestern.edu/ers/2226.pdf>

## Multimedia –

- 1) Pre-recorded presentation available in the Course Content area of the course web site

This presentation includes information related data integration approaches.

## Discussion Board

Each Session you are required to participate in all Discussion Board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the Discussion Board in Blackboard.

## Assignment

- 1) Team Project Formation is due by Monday, July 11, 2011 at 11:55 PM (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and review the printable assignment directions.

## Sync Session

None

## Session 4

**Learning Objectives:** After this session, the student will be able to:

- Identify the association between data, technical, functional, and semantic integration
- Define semantic interoperability
- Identify the goal, vision, and challenges with semantic interoperability
- Explain the roadmap and recommendation to achieve semantic interoperability
- Explain how a service oriented architecture can be used to achieve semantic interoperability in healthcare

## Course Content:

*Reading – For this session please read:*

- 1) Semantic Integration in Healthcare Networks

Lenz, R., Beyer, M., & Kuhn, K. (2005). Semantic Integration in Healthcare Networks. In R. Engelbrecht (Ed.) et al., Connecting Medical Informatics and Bio-Informatics: Proceedings of MIE2005. Amsterdam, The Netherlands: The XIXth International Congress of the European Federation for Medical Informatics, 116, 385-390.

<http://turing.library.northwestern.edu/login?url=http://www.library.northwestern.edu/ers/510-1775.pdf>

## 2) Semantic Interoperability for Better Health and Safer Healthcare

European Communities. (2009). Semantic Interoperability for Better Health and Safer Healthcare." Luxembourg: Stroetmann, V. N. (Ed.), Kalra, D., Lewalle, P., Rector, A., Rodrigues, J. M., Stroetmann, K. A., Surjan, G., Ustun, B., Virtanen, M., Zanstra, P. E.

<http://turing.library.northwestern.edu/login?url=http://www.library.northwestern.edu/ers/538-4534.pdf>

### *Multimedia –*

- 1) See the Course Content area of the course web site for more information.

This is an exercise to investigate how a service oriented architecture can be used to achieve semantic interoperability in healthcare. In terms of grading, this exercise falls under the discussion board participation portion of the overall course grade.

### **Discussion Board**

Each Session you are required to participate in all Discussion Board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the Discussion Board in Blackboard.

### **Assignment**

- 1) Quiz 1 is due by Monday, July 18, 2011 at 11:55 PM (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and review the printable assignment directions.

### **Sync Session**

None

## **Session 5**

**Learning Objectives:** After this session, the student will be able to:

- Identify which types of transactions, code sets, and identifiers are covered under the HIPAA legislations
- Describe the principles used to guide the choices involved in deciding which standards become designated as HIPAA standards
- Describe the technical details of X12 transactions
- Identify the concepts, costs, and benefits of associated with implementing HIPAA compliant transactions, code sets, and identifiers
- Explain the general purpose of healthcare data interchange standards
- Identify the relationship between data interchange standards and vocabularies, terminologies, and classification systems
- Recognize the names and purpose of the major healthcare data interchange standards
- Explain how vocabularies, terminologies, and classification systems work together in an electronic healthcare environment



- Identify the implementation issues surrounding the use of vocabulary, terminology, and classification systems
- Explain the terminology connection to semantic interoperability
- Analyze an interface engine data flow scenario

## Course Content:

*Reading – For this session please read:*

1) Chapter 2: Transactions and Codes

Rada, R. (2002) HIPAA @ IT Reference, 2003 Edition: Health Information Transactions, Privacy, and Security. Baltimore, MD: Hypermedia Solutions Limited.

<http://turing.library.northwestern.edu/login?url=http://www.library.northwestern.edu/ers/2227.pdf>

2) Chapter 16: Data Interchange Standards

Giannangelo, K. (2010). Healthcare Code Sets, Clinical Terminologies, and Classifications - 2<sup>nd</sup> edition. Chicago, IL: American Health Information Management Association.

3) Chapter 18: Use of Vocabulary, Terminology, and Classification Systems

Giannangelo, K. (2010). Healthcare Code Sets, Clinical Terminologies, and Classifications - 2<sup>nd</sup> edition. Chicago, IL: American Health Information Management Association.

*Multimedia –*

1) Healthcare IT Talk: Healthcare Interfacing Revisited-Community General Hospital

Elia, S. (2008, Jan. 23). Healthcare IT Talk: Healthcare Interfacing Revisited-Community General Hospital. Corepoint Health Podcast. Podcast retrieved from <http://www.corepointhealth.com/resource-center/videos-and-podcasts?type=customer-insights&vid=115>

## Discussion Board

Each Session you are required to participate in all Discussion Board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the Discussion Board in Blackboard.

## Assignment

None

## Sync Session

None

## Session 6

**Learning Objectives:** After this session, the student will be able to:

- Identify the development and purpose of CPT
- Identify and describe the types of CPT
- Explain the purpose and function of LOINC
- Define LOINC's relationship to other terminologies and code sets
- Explain the general purpose of healthcare data sets
- Recognize the relationship between healthcare data sets and vocabularies, terminologies, and classification systems
- Examine the coexistence of similar standards
- Describe and identify potential problems with technical documentation of healthcare information technology standards

## Course Content:

*Reading – For this session please read:*

1) Chapter 3: Current Procedural Terminology (CPT)

Giannangelo, K. (2010). Healthcare Code Sets, Clinical Terminologies, and Classifications - 2<sup>nd</sup> edition. Chicago, IL: American Health Information Management Association.

2) Chapter 10: Logical Observation Identifiers, Names, and Codes (LOINC)

Giannangelo, K. (2010). Healthcare Code Sets, Clinical Terminologies, and Classifications - 2<sup>nd</sup> edition. Chicago, IL: American Health Information Management Association.

3) Chapter 15: Data Set Standards

Giannangelo, K. (2010). Healthcare Code Sets, Clinical Terminologies, and Classifications - 2<sup>nd</sup> edition. Chicago, IL: American Health Information Management Association.

4) The Clinical Document Architecture and the Continuity of Care Record: A Critical Analysis

Ferranti, J. M., Musser, R. C., Kawamoto, K., & Hammond, W. E. (2006). The Clinical Document Architecture and the Continuity of Care Record: A Critical Analysis. Journal of the American Medical Informatics Association, 13 (3), 245-252.

<http://turing.library.northwestern.edu/login?url=http://www.library.northwestern.edu/ers/510-5824.pdf>

*Multimedia –*

1) See the Course Content area of the course web site for more information.

This is an exercise to investigate technical documentation related to healthcare information technology standards which has been prepared by HITSP. In terms of grading, this exercise falls under the discussion board participation portion of the overall course grade.

## Discussion Board

Each Session you are required to participate in all Discussion Board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the Discussion Board in Blackboard.

## Assignment

None

## Sync Session

None

## Session 7

**Learning Objectives:** After this session, the student will be able to:

- Define the concepts related to the Health Level Seven (HL7), version 2.x standard
- Identify the kinds of messages and data types associated with the HL7 2.x standard
- Discuss how HL7 2.x messages are utilized during a typical patient care episode
- Illustrate the technical default encoding of a HL7 2.x message
- Demonstrate how to interpret the HL7 2.x standard specifications
- Explain the difference between standards compliance and conformance

## Course Content:

*Reading – For this session please read:*

- 1) Chapters 1-27

Henderson, M. (2007). HL7 Messaging - 2<sup>nd</sup> edition. Aubrey, TX: OTech Inc.

*Multimedia –*

- 1) What Does HL7 Compliance Really Mean?

Stockemer, M. (2007, Oct. 2). What Does HL7 Compliance Really Mean? Corepoint Health Podcast. Podcast retrieved from <http://www.corepointhealth.com/resource-center/videos-and-podcasts?type=hl7&vid=108>

## Discussion Board

Each Session you are required to participate in all Discussion Board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the Discussion Board in Blackboard.

## Assignment

None

## Sync Session

None

## Session 8

**Learning Objectives:** After this session, the student will be able to:

- Examine the components of data integration
- Identify data dimensions
- Explain how to align data quality with business practices
- Describe the sources of data errors in healthcare information systems

## Course Content:

*Reading – For this session please read:*

### 1) Anatomy of Data Integration

Brazhnik, O., Jones, J. F. (2007). Anatomy of Data Integration. *Journal of Biomedical Informatics*, 40 (1), 252-269.

<http://turing.library.northwestern.edu/login?url=http://www.library.northwestern.edu/ers/513-3559.pdf>

*Multimedia –*

### 1) See the Course Content area of the course web site for more information

This is an exercise to investigate the sources of data errors in healthcare information systems. In terms of grading, this exercise falls under the discussion board participation portion of the overall course grade.

## Discussion Board

Each Session you are required to participate in all Discussion Board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the Discussion Board in Blackboard.

## Assignment

- 1) Quiz 2 is due by Monday, August 15, 2011 at 11:55 PM (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and review the printable assignment directions.

## Sync Session

None

## Session 9

**Learning Objectives:** After this session, the student will be able to:

- Identify the purpose and function of the International Classification of Diseases
- Explain the issues that healthcare organizations should consider as they assess their ICD-10 preparedness
- Explain what HIPAA 5010 is, the reasons for it, and the impact it has
- Explain what ICD-10 is, the reasons for it, and the impact it has

## Course Content:

*Reading – For this session please read:*

- 1) Chapter 2: International Classification of Diseases (ICD) and the U.S. Modifications  
Giannangelo, K. (2010). Healthcare Code Sets, Clinical Terminologies, and Classifications - 2<sup>nd</sup> edition. Chicago, IL: American Health Information Management Association.
- 2) Preparing for ICD-10: Evaluating Approaches and Potential Pitfalls  
Ingenix Consulting. (2009) Preparing for ICD-10: Evaluating Approaches and Potential Pitfalls. Eden Prairie, MN. Retrieved from [http://www.ingenixconsulting.com/content/File/ICD\\_EvaluationsAndPitfalls\\_Final.pdf](http://www.ingenixconsulting.com/content/File/ICD_EvaluationsAndPitfalls_Final.pdf)

*Multimedia –*

- 1) The Race to 5010: the Costs, the Risks, the Rewards  
Watkins, L. (2009, Oct. 7). The Race to 5010: the Costs, the Risks, the Rewards. Podcast retrieved from <http://www.ingenixconsulting.com/NewsandEvents/Webinar/20/>
- 2) Strategizing for ICD-10: An Executive View  
Darr, T. G. (2010, Feb. 24). Strategizing for ICD-10. Podcast retrieved from <http://www.ingenixconsulting.com/NewsandEvents/Webinar/27/>

## Discussion Board

Each Session you are required to participate in all Discussion Board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the Discussion Board in Blackboard.

## Assignment

- 1) Team Project Final Report is due by Sunday, August 21, 2011 at 11:55 PM (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and review the printable assignment directions.
- 2) Team Project Member Participation is due by Sunday, August 21, 2011 at 11:55 PM (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and review the printable assignment directions.
- 3) The Final Exam can be taken from 12:05 AM August 16 to 11:55 PM August 22 central time. For more information, click *Assignments* on the left navigation bar in Blackboard, and review the printable assignment directions.

## Sync Session

None