UNIVERSITY OF NORTH TEXAS
School of Library and Information Sciences

SLIS 5960.080 Herman Oosterwijk
Medical Digital Imaging

Contact Information

Professor Herman Oosterwijk, M.S., M.B.A.
Adjunct Faculty, Health Informatics Program
Associate Fellow, Texas Center for Digital Knowledge
President of OTech Inc.

On the Fridays prior to class meetings, I will be staying at the University Hilton Hotel. You may leave a message with the front desk of the hotel at 713.741.2447. You may contact Professor Oosterwijk anytime via WebCT. This will be the preferred mode of communication in the course. In urgent cases, you may contact me via e-mail: herman@otechimg.com or office: 940.440.9530.

Class Location

The class meets at the University of Texas, M.D. Anderson Cancer Center Research Medical Library, Room Y2.6005 and/or the computer classroom, Room Y2. 5727, just before the library on the left side on September 14, September 28, and November 9. On September 14, there will be a Webcast from Dallas to the computer classroom at M.D. Anderson Cancer Center Research Medical Library, and on October 26, we will go on a field trip to two Houston-area hospitals.

Course Description

This course will focus on two critical medical informatics standards used for exchanging relevant information such as patient demographics, orders, laboratory tests, and diagnostic images. These two standards, DICOM and HL7, will be explored in detail. Students will practice actual transactions using software that can simulate patient registrations, image exchange, etc. The role of health information professionals in the management of digital medical images will be explored. Also, the students will participate in a site visit in order to witness the functionality of these standards in real world situations. Various guest speakers from the healthcare industry will give their perspective as well.
Course Prerequisites: The students should have a basic familiarity with computers and information systems.

Course Objectives

1. To develop an understanding of the image and information standards used to exchange data between medical computers and devices such as hospital information systems and radiology acquisition devices such as CT scanners, MRI systems, ultrasound units, etc.

2. To acquire sufficient knowledge so that students can determine the compatibility and effectiveness of medical image and information systems in their future or current careers.

3. To understand the work and information flow in a healthcare environment, in this case the radiology department.

4. To acquire an appreciation of the actual environment and analyze the workflow through an on-site visit.

5. To familiarize students with various types of diagnostic imaging by utilizing public domain viewers and readily available sample images from major modality manufacturers.

6. To perform actual transactions, such as sending images which simulate a real time imaging environment using software that is made available (limited licenses will be made available through OTech).

7. To utilize knowledge resources that involve medical imaging.

8. To appreciate the importance of medical imaging for future efforts involving electronic master patient records and gain an understanding of the complexity involved.

9. To understand the role of health information professionals in the management of digital medical images.

Course Outline

Introduction to Medical Imaging and Informatics (3 hours total)

- Principles of acquisition techniques and resulting image characteristics: ultrasound, CT, MR, nuclear medicine, and new technologies such as computerized radiography, direct digital radiography and computer aided diagnosis.
• Major components of a digital system, i.e. picture archiving and communication systems.
• Major components of information systems in a healthcare environment, including hospital and departmental information systems.

**Security** (1 hour)

• Pending security regulations (HIPAA): What are they and how do they affect a healthcare enterprise? Encryption, Biometrics, and demonstration.

**Introduction to Healthcare Standards** (3 hours)

• DICOM vs. HL7, applications.
• The IHE initiative: Integrating the health care enterprise.

**DICOM Introduction** (2 hours)

• Introduction to DICOM.
• Issues with connectivity.

**DICOM Details, Part I**-Web instruction (1.5 hours)

**DICOM Details, Part II** (3 hours)

• Negotiations, connectivity set up, and DICOM objects: How is a diagnostic image encoded and exchanged?
• DICOM services: exchanging information, database exchanges, printing.
• Enhanced services: Modality work lists, integration with an information system.
• Advanced subjects: Structured reporting.

**Hands-on Lab** (4 hours)

• Display various images using provided software.
• Exchange images.

**Special Topics, Part I**-Web instruction (1.5 hours)

**Site Visits** (7 hours)

• Visit clinical sites and observe workflow as well as image and information exchange.

**Special Topics, Part II**-Guest Speakers (4 hours)

• Emerging technologies and/or practical hints.
• Suggestions: speech recognition, experiences with PACS, etc.
Workflow Analysis Assignment (6 hours)

- Students will document workflow in a true healthcare environment and also observe modalities such as CT etc. (assuming we can do a site visit). 2 pages double spaced (not including bibliography) and a workflow diagram. Teams should consist of 3 people.

Special (Final) Project (8 hours)

- Students will form teams and work on special projects that are related to the medical imaging field.

The course will consist of: 45 hours, including 10 hours of lecture; 7 hours of site visits and evaluation; 4 hours of guest lectures and presentations; 3 hours of student presentations; 3 hours of Web instruction; 4 hours of hands-on; 6 hours of workflow analysis; and 8 hours of the special (final) project.

Description of Course Assignments

- Literature Search

The students will search the literature to find articles related to topics covered in class. Each week, the students will submit an abstract of one article, consisting of two paragraphs as well as an electronic copy of the article. The abstract of the article and the copy of the article are due on the Saturdays indicated in the calendar by 12:00 p.m. A complete (hardcopy) compilation of all the articles will be submitted at the end of the semester.

- Workflow Analysis Assignment

The students will divide into teams of three people, and each team will document the workflow in a true healthcare environment. Each team will also have the opportunity to observe modalities, such as CT, etc. Each team will prepare a two-page double-spaced paper, a PowerPoint presentation, and a flowchart.

- Special (Final) Project

Each team of students will prepare a research paper with a maximum of fifteen (15) pages double-spaced. Be sure to include a bibliography of the resources used to prepare the paper. Example topics for the research paper include: HIPAA, IHE, HL7 3.0, related healthcare standards, etc.

- Class Participation

Discussion questions will be posted for the students to answer throughout the semester, and the answers should be submitted on the dates due as indicated in the course calendar.
The students will be graded as follows:

- Literature Search: 15%
- Workflow Analysis Assignment: 30%
- Special (Final) Project: 30%
- Attendance and Class Participation: 15%

100%

Readings

Required Textbooks


Required Reading


Recommended Resource


Course Calendar

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Activities</th>
<th>Reading</th>
<th>Deliverables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept. 14</td>
<td>9:00 a.m.-5:00 p.m. Webcast</td>
<td>Lecture via Webcast: Intro. to Medical Imaging; Security (HIPPA); Intro. to DICOM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sept. 21</td>
<td></td>
<td></td>
<td></td>
<td>-Literature Search #1</td>
</tr>
<tr>
<td>Sept. 28</td>
<td>9:00 a.m.-5:00 p.m.</td>
<td>Lecture on Workflow and DICOM Details; Hand-on-Shortliffe, Ch. 14:</td>
<td>-Literature Search #2</td>
<td>-Discussion Questions</td>
</tr>
<tr>
<td>Date</td>
<td>Library Activity</td>
<td>Reading Material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------------------------</td>
<td>-------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 5</td>
<td>Literature Search #3</td>
<td>-DICOM, pp. 81-92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 12</td>
<td>-DICOM, pp. 27-60</td>
<td>-Discussion Questions #2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Proposed Special (Final) Projects and Team Name</td>
<td>-Project Proposal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 19</td>
<td>Literature Search #5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 26</td>
<td>9:00 a.m.-5:00 p.m. Meet at University of Houston Hilton Lobby</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Field Trip to two Houston-area Hospitals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reading:</td>
<td>-Literature Search #6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-HL7, pp. 1-26</td>
<td>-Discussion Questions #3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Project Outline and Abstract</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov. 2</td>
<td>Suggested Team Meeting to Discuss Workflow Analysis Project</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov. 9</td>
<td>9:00 a.m.-5:00 p.m. Library</td>
<td>-Literature Search #7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Guest Lectures and Workflow Project Presentations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reading:</td>
<td>-Discussion Questions #8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-HL7, pp. 27-44</td>
<td>-Workflow PowerPoint Presentation and Paper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov. 16</td>
<td>Suggested Team Meeting to Discuss Special (Final) Project</td>
<td>-Literature Search #9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Updated Workflow Presentation Based on Feedback</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov. 23</td>
<td></td>
<td>-Literature Search #10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov. 30</td>
<td>Submit Special (Final) Project</td>
<td>-Special (Final) Project</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Final Compilation of Literature Search Articles</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>