MET CS781 C1 Advanced Health Informatics
2014 Fall Syllabus

Course Description:

This course presents the details of health care data and information, health care information systems (HCIS), and the management of information technology (IT) challenges. The course is organized into six modules. In each module, a case study demonstrates the application of what is taught in the module. The first part of the course introduces health care data, information, regulations, laws, and standards related to health care information. The second part covers the history of HCISs, the technologies behind it, the details of HCIS acquisition, development, implementation and support, and HCIS standards and security issues. The last part starts with an introduction to the roles, responsibilities, and functions of the IT staff and services in health care environment, followed by topics on organizing IT services and staff, the development of IT strategic plans, and IT budgeting. The course has a term project providing students a hands-on experience in HCIS design and research. Two to three guest lecturers with many years of working experience in health IT will be invited to share their first-hand experience with students.

Course Objectives:

- Understand various types of health care data and information,
- Learn regulations, laws, and standards related to health care information
- Understand the HCIS history and the information technologies behind it
- Understand the process of HCIS acquisition, development, implementation, and support
- Learn HCIS standards and security issues
- Understand the various aspects of managing IT challenges in health care environment

Prerequisites:

CS580 Health Informatics

Textbooks :

Wager, K.A., Lee, F.W., & Glaser, J.P. (2013). Health Care Information Systems: A practical approach for health care management, 3rd edition. Jossey-Bass.

Einbinder L, Ash JS, Einbinder J, Lorenzi NM, Gadd CS. Transforming Health Care Through Information: Case Studies. Springer, 2011. (This book is electronically available at BU library.)

Please note: E-books are not allowed in the final open-book exam.

1. Module One – Introduction to Health Care Data and Information

Module overview:
This module introduces the concepts and uses of data and related information in modern healthcare. Students learn key concepts, types of information, information flow, and data quality and develop understanding of the information processing needs, and information management requirements in health care environments.

Learning objectives:

- Understand various definitions of health care information, learn the major types of health care information (internal and external), and study examples of the major types of health care information.
- Understand the relationship between health care data and health care information and be able to follow acquisition and use of patients' health information throughout a typical encounter or process.
- Define the characteristics of data quality, understand the challenges associated with measuring and ensuring health care data quality, and identify problems associated with the limited quality of health care data.
- Discuss accreditation, licensure, and certification of health care facilities and how these define the information needs. Understand the legal requirements for managing health records. Review privacy regulations, and requirements for patient confidentiality.

Lecture One:
Health care information and data quality

- Definitions and types of health care information
- Internal data and information
- External data and information
- Data, information, and knowledge
- Data quality and related issues

Lecture Two:
Regulations, laws, and standards governing health care information.

- Licensure, certification and accreditation of health care organizations
- Legal aspects of managing health care information

2. Module Two –Health Care Information Systems Part I

Module overview:
This module lays the foundation for students to understand health care information systems (HCIS). The topics include the history and evolution of HCISs, the major advances in information technology (IT), IT applications in health care, federal initiatives that influenced the adoption of HCISs, and the main types of administrative and clinical information systems. Clinical information systems such as Electronic Health Record (EHR) and Electronic Medical Record (EMR) systems, computerized provider order entry (CPOE) systems are introduced. Examples demonstrate how clinical information systems affect patient safety, quality, efficiency, and outcomes. The definitions of Health information exchange (HIE), Regional Health Information Organization (RHIO),

Nationwide Health Information Network (NHIN) and the challenges in sharing information across organizational settings are introduced too.

Learning objectives:

- Learn the history and evolution of HCISs.
- Identify the major advances in IT and federal initiatives that influenced the adoption of HCIS.
- Learn the major types of administrative and clinical information systems used in health care.
- Discuss why health care IT lags and how incentives influence health care IT adoption.
- Learn EHR systems and their key components.
- Understand the major obstacles to EMR and EHR adoption and strategies to overcome them.
- Understand the impact of clinical information systems on patient safety, quality, efficiency, and outcomes through examples.
- Learn definitions of HIE, RHIO, and NHIN.
- Understand the challenges related to sharing information across organizations.

Lecture Three:

History and evolution of health care information system

- History and evolution of HIS from the 1960s to the present
- Major advances in IT and federal initiatives that influence the adoption of HCISs
- Major types of administrative and clinical information systems used in health care
- Why health care IT lags and how incentives influence health care IT adoption

Lecture Four:

Clinical Information System

- The purposes, uses, key attributes, and functions of clinical information systems
- EHR systems and their key components
- Major obstacles to EMR and EHR adoption and strategies to overcome them
- The impact of clinical information systems on patient safety, quality, efficiency, and outcomes
- Definitions of HIE, RHIO, and NHIN
- The challenges related to sharing information across organizations

3. Module Three – Health care Information Systems Part II

Module overview:

This module covers system acquisition - how a health care organization (HCO) selects a HCIS, the project management tools useful in the acquisition process, and possible problems that may occur in the process. Students learn the system implementation process, managing the organizational aspects, and important factors as well as possible problems in system support and evaluation process.

Learning objectives:

- Understand how a HCO selects a HCIS and the various stages during system acquisition.
- Learn the purpose and content of a RFI (request for information) and RFP ((request for proposal) in a system acquisition process.
- Discuss the problems that may occur during system acquisition.
- Learn the system development life cycle (SDLC) and the process that a HCO typically goes through in implementing a HCIS.
- Appreciate the organizational factors that can affect system acceptance and study strategies for managing change.
- Understand the factors important to system support and evaluation, the things that may go wrong during implementation, and the strategies to alleviate problems.

Lecture Five:
Acquisition of HCISs
- Definition of system acquisition
- System acquisition process
- Project management in system acquisition
- Things that can go wrong during system acquisition

Lecture Six:
System implementation and support
- System implementation process
- Managing the organizational aspects
- System support and evaluation

4. Module Four – IT related to health care

Module overview:
This model gives an overview of the emerging trends in IT, the core technologies behind HCISs, and the importance and issues of adopting IT in a HCO. It also reviews the major types of health care information standards and the standard development organizations. Students learn the HCO-wide security programs, the HIPAA security regulations, and other information security related issues.

Learning objectives:
- Learn the emerging IT trends and the core technologies behind HCISs.
- Identify the major issues related to IT adoption in a HCO.
- Understand the importance of adopting overall information system architecture in a HCO.
- Review the major types of health care information standards and the organizations that develop or approve them.
- Understand the relationships among health information exchanges, regional health information networks, and the Nationwide Health Information Network.

- Understand the importance HCO-wide security programs and the major threats to the security of health care information.
- Learn the HIPAA security regulations.
- Discuss the impact and the risks of using wireless networks and allowing remote access to health information, and describe ways to minimize the risks.

Lecture Seven
Technologies and standards related to HCISs
- Core information technologies behind HCISs and emerging IT trends
- Major issues related to IT adoption in HCOs
- The importance of having information system architecture in a HCO
- Major types of health care information standards
- Active standard development organizations

Lecture Eight
Security of HCISs
- HCO security program
- Threats to HCISs
- HIPAA security regulations
- Security in wireless environment

5. Module Five – IT Management of HCISs Part I

Module overview:
This module introduces topics related to IT management in health care environment. The specific topics include the roles, responsibilities, and functions of the IT staff and services, organizing IT services and staff, the development of IT strategic plans, and IT budgeting. In addition, it covers the management of major IT initiatives and IT project value realization. The specific topics include managing the organizational change associated with IT initiatives, managing IT projects, the critical factors that contribute to IT project successes and failures, IT-enabled value and IT investment, IT project proposals, the step to improve IT project value realization, and the challenges in the realization of IT value.

Learning objectives:
- Understand the roles, responsibilities, and functions of the IT department
- Understand the role and responsibility of key IT staff.
- Learn the various ways to organize IT services and the key attributes of highly effective IT organizations.
- Understand the components of an IT strategic plan and the importance of having it.
- Learn the challenges and the processes of developing an IT strategy.
- Understand the scope and importance of IT governance and the success factors in the application of IT.
- Learn the components of an IT budget and the processes for developing the budget.

Lecture Nine:
Organizing IT services & IT strategic planning
- IT functions and organizing staff,
- Organizing IT services
- Key attributes of highly effective IT organizations

Lecture Ten
Strategy Consideration & IT governance and management
- The components of an IT strategic plan
- The importance of having an IT strategic plan
- The challenges and the processes of developing an IT strategy
- IT governance and the success factors in the application of IT
- The components of an IT budget and the processes for developing the budget

6. Module Six – IT Management of HCISs Part II & Term Project (HCIS design tasks)

Module overview:
Students get familiar with the management of major IT initiatives and IT project value realization. The specific topics include managing the organizational change associated with IT initiatives, managing IT projects, the factors contributing to IT project failures and critical success factors, IT-enabled value and IT investment, IT project proposals, the step to improve IT project value realization, and the challenges in the realization of IT value.

Learning objectives:
- Understand the organizational change associated with IT initiatives.
- Learn the strategies for effective change management.
- Learn the structures and processes used to manage IT projects.
- Review the factors that contribute to IT project failures.
- Understand IT-enabled value.
- Learn the components of the IT project proposal.
- Learn the step involved in IT project value realization.
- Understand why IT investments can fail to deliver returns.
- Review factors that challenge the realization of IT value.
- Demonstrate the ability to practically apply knowledge acquired throughout the course within a research or development project
- Demonstrate the ability to communicate effectively the results of their work to peers and co-workers

Lecture Eleven
Managing major IT initiatives
- Managing the organizational change associated with IT initiatives
- Managing IT projects
- The factors that contribute to IT project failures and critical success factors

Lecture Twelve
Accessing and achieving values in HCISs

- IT-enabled value and IT investment
- IT project proposals
- The steps to improve IT project value realization
- Understand why IT investments could fail to deliver returns
- Challenges in the realization of IT value

Term project
Students perform a series of tasks representing various design aspects of HCISs focusing on individually assigned case studies. They are required to prepare a report detailing their solutions simulating specific processes captured by the case studies.

Instructor Biography

Guanglan Zhang, Ph.D.
Office Location: 808 Commonwealth Avenue, Room 254, Boston, MA 02215
Phone: (617) 358-5164
Email: guanglan@bu.edu
Office hours: Wednesday afternoon 2-5pm

Dr. Guanglan Zhang holds Masters degrees in Biomedical Engineering (M.Eng., Nanyang Technological University, Singapore) and Automatic Control Theory and Application (M.Eng., Northwestern Polytechnic University, China). She received a Ph.D. (Nanyang Technological University, Singapore) for doctoral work in bioinformatics. She is an Assistant Professor in Computer Science at Boston University Metropolitan College, where she teaches Health Informatics subjects and is a member of the Health Informatics Laboratory. She is also holding an adjunct position at Dana-Farber Cancer Institute and Harvard Medical School.

Dr. Zhang has worked in the biomedical informatics field since 1998. The most important aspects of her work include development and implementation of biomedical databases, computational simulations of laboratory experiments, development of diagnostic methods for tissue typing, and computational support for vaccine development. Computational tools that she developed are used in the study of immunology, vaccinology, infectious disease, and cancer. She has authored more than 30 peer-reviewed scientific journal publications and developed dozens of biomedical specialist databases and computational systems.

Course Resources

Boston University Library Link

As Boston University students you have full access to the BU Library—even if you do not live in Boston. From any computer, you can gain access to anything at the library

that is electronically formatted. To connect to the library use the link http://www.bu.edu/library. You may use the library's content whether you are connected through your online course or not, by confirming your status as a BU community member using your Kerberos password.

Once in the library system, you can use the links under “Resources” and “Collections” to find databases, eJournals, and eBooks, as well as search the library by subject. Go to http://www.bu.edu/library/research/collections to access eBooks and eJournals directly. If you have questions about library resources, go to http://www.bu.edu/library/help/ask-a-librarian to email the library or use the live chat feature.

To locate course eReserves, go to http://www.bu.edu/library/services/reserves.

Please note that you are not to post attachments of the required or other readings in the water cooler or other areas of the course, as it is an infringement on copyright laws and department policy. All students have access to the library system and will need to develop research skills that include how to find articles through library systems and databases.

Course Grading Information

Course Structure

This course is presented as a series of weekly modules. The course material is grouped in six modules. Modules 1–5 will have one or two lectures, one discussion topic, one quiz, and one assignment. There is also a term project to assess students' understanding and implementing simple Health Informatics solutions. Module 6 will be a review session covering key points taught in the course and student project presentations.

Reading materials – Introduced in each module.

Quizzes - This course will have 5 graded quizzes consisting of multiple choice, multiple answers, True/false, and type matching questions.

Assignments - This course will have 4 to 5 graded assignments.

Discussions – There are 5 graded discussion forums that involve posting and reviewing the answers to the discussion topics.

Class Project – The class project will test students' overall understanding and grasp of the course content.

Final Examination – The final exam will be comprehensive and will cover material from the entire course. It will be an **open-book** proctored exam consisting of questions similar to the ones in the quizzes, assignments, and the class project. Electronic devices such as Kindles and iPads are not allowed during the exam.

Grade Weighting

The final grade for this course will be based on the following:

Deliverable	Weight
Quizzes	15%
Discussions	15%
Assignments	20%
Project	20%
Final Exam	30%

Letter Grade

The final letter grade in the course will correspond approximately with the following numeric grade range:

A ≥ 94
A− ≥ 90 < 94
B+ ≥ 86 < 90
B ≥ 81 < 86
B− ≥ 76 < 81
C+ ≥ 71 < 76
C ≥ 66 < 71
C− ≥ 61 < 66
D ≥ 56 < 61
F < 56

Course Policies

Assignment completion & late work

1. All quizzes and assignments have to be submitted by the due dates. Each 24 hours of delay will result in 10% penalty.
2. Class projects need to be completed and presented by the due date

Academic Conduct Code: http://www.bu.edu/met/for-students/met-policies-procedures-resources/academic-conduct-code/

Discussion Grading Rubric

The discussion grading rubric below is the guide we use to evaluate your discussion contributions.

Criteria	65–69	70–79	80–89	90–94	95–100
Participation	Very limited participation	Participation generally lacks frequency or relevance	Reasonably useful relevant participation during the discussion period	Frequently relevant and consistent participation throughout the discussion period	Continually relevant and consistent participation throughout the discussion period
Community	Mostly indifferent to discussion	Little effort to keep discussions going or provide help	Reasonable effort to respond thoughtfully, provide help, and/or keep discussions going	Often responds thoughtfully in a way that frequently keeps discussions going and provides help	Continually responds thoughtfully in a way that consistently keeps discussions going and provides help
Content	No useful, on-topic, or interesting information, ideas, or analysis	Hardly any useful, on-topic, or interesting information, ideas, or analysis	Reasonably useful, on-topic, and interesting information, ideas, and/or analysis	Frequently useful, on-topic, and interesting information, ideas, and analysis	Exceptionally useful, on-topic, and interesting information, ideas, and analysis
Reflection and Synthesis	No significant effort to clarify, summarize, or synthesize topics raised in discussions			Contributes to group's effort to clarify, summarize, or synthesize topics raised in discussions	Leads group's effort to clarify, summarize, or synthesize topics raised in discussions

Academic Conduct Policy

For the full text of the academic conduct code, please go to http://www.bu.edu/met/for-students/met-policies-procedures-resources/academic-conduct-code/.

A Definition of Plagiarism

“The academic counterpart of the bank embezzler and of the manufacturer who mislabels products is the plagiarist: the student or scholar who leads readers to believe that what they are reading is the original work of the writer when it is not. If it could be assumed that the distinction between plagiarism and honest use of sources is perfectly clear in everyone’s mind, there would be no need for the explanation that follows; merely the warning with which this definition concludes would be enough. But it is apparent that sometimes people of goodwill draw the suspicion of guilt upon themselves (and, indeed, are guilty) simply because they are not aware of the illegitimacy of certain kinds of “borrowing” and of the procedures for correct identification of materials other than those gained through independent research and reflection.”

“The spectrum is a wide one. At one end there is a word-for-word copying of another’s writing without enclosing the copied passage in quotation marks and identifying it in a footnote, both of which are necessary. (This includes, of course, the copying of all or any part of another student’s paper.) It hardly seems possible that anyone of college age or more could do that without clear intent to deceive. At the other end there is the almost casual slipping in of a particularly apt term which one has come across in reading and which so aptly expresses one’s opinion that one is tempted to make it personal property.”

“Between these poles there are degrees and degrees, but they may be roughly placed in two groups. Close to outright and blatant deceit-but more the result, perhaps, of laziness than of bad intent-is the patching together of random jottings made in the course of reading, generally without careful identification of their source, and then woven into the text, so that the result is a mosaic of other people’s ideas and words, the writer’s sole contribution being the cement to hold the pieces together. Indicative of more effort and, for that reason, somewhat closer to honest, though still dishonest, is the paraphrase, and abbreviated (and often skillfully prepared) restatement of someone else’s analysis or conclusion, without acknowledgment that another person’s text has been the basis for the recapitulation.”

The paragraphs above are from H. Martin and R. Ohmann, The Logic and Rhetoric of Exposition, Revised Edition. Copyright 1963, Holt, Rinehart and Winston.

Academic Conduct Code

I. Philosophy of Discipline

The objective of Boston University in enforcing academic rules is to promote a community atmosphere in which learning can best take place. Such an atmosphere can be maintained only so long as every student believes that his or her academic competence is being judged fairly and that he or she will not be put at a disadvantage because of someone else’s dishonesty. Penalties should be carefully determined so as to be no more and no less than required to maintain the desired atmosphere. In defining violations of this code, the intent is to protect the integrity of the educational process.

II. Academic Misconduct

Academic misconduct is conduct by which a student misrepresents his or her academic accomplishments, or impedes other students' opportunities of being judged fairly for their academic work. Knowingly allowing others to represent your work as their own is as serious an offense as submitting another's work as your own.

III. Violations of this Code

Violations of this code comprise attempts to be dishonest or deceptive in the performance of academic work in or out of the classroom, alterations of academic records, alterations of official data on paper or electronic resumes, or unauthorized collaboration with another student or students. Violations include, but are not limited to:

A. Cheating on examination. Any attempt by a student to alter his or her performance on an examination in violation of that examination's stated or commonly understood ground rules.
B. Plagiarism. Representing the work of another as one's own. Plagiarism includes but is not limited to the following: copying the answers of another student on an examination, copying or restating the work or ideas of another person or persons in any oral or written work (printed or electronic) without citing the appropriate source, and collaborating with someone else in an academic endeavor without acknowledging his or her contribution. Plagiarism can consist of acts of commission-appropriating the words or ideas of another-or omission failing to acknowledge/document/credit the source or creator of words or ideas (see below for a detailed definition of plagiarism). It also includes colluding with someone else in an academic endeavor without acknowledging his or her contribution, using audio or video footage that comes from another source (including work done by another student) without permission and acknowledgement of that source.
C. Misrepresentation or falsification of data presented for surveys, experiments, reports, etc., which includes but is not limited to: citing authors that do not exist; citing interviews that never took place, or field work that was not completed.
D. Theft of an examination. Stealing or otherwise discovering and/or making known to others the contents of an examination that has not yet been administered.
E. Unauthorized communication during examinations. Any unauthorized communication may be considered prima facie evidence of cheating.
F. Knowingly allowing another student to represent your work as his or her own. This includes providing a copy of your paper or laboratory report to another student without the explicit permission of the instructor(s).
G. Forgery, alteration, or knowing misuse of graded examinations, quizzes, grade lists, or official records of documents, including but not limited to

transcripts from any institution, letters of recommendation, degree certificates, examinations, quizzes, or other work after submission.

H. Theft or destruction of examinations or papers after submission.

I. Submitting the same work in more than one course without the consent of instructors.

J. Altering or destroying another student's work or records, altering records of any kind, removing materials from libraries or offices without consent, or in any way interfering with the work of others so as to impede their academic performance.

K. Violation of the rules governing teamwork. Unless the instructor of a course otherwise specifically provides instructions to the contrary, the following rules apply to teamwork: 1. No team member shall intentionally restrict or inhibit another team member's access to team meetings, team work-in-progress, or other team activities without the express authorization of the instructor. 2. All team members shall be held responsible for the content of all teamwork submitted for evaluation as if each team member had individually submitted the entire work product of their team as their own work.

L. Failure to sit in a specifically assigned seat during examinations.

M. Conduct in a professional field assignment that violates the policies and regulations of the host school or agency.

N. Conduct in violation of public law occurring outside the University that directly affects the academic and professional status of the student, after civil authorities have imposed sanctions.

O. Attempting improperly to influence the award of any credit, grade, or honor.

P. Intentionally making false statements to the Academic Conduct Committee or intentionally presenting false information to the Committee.

Q. Failure to comply with the sanctions imposed under the authority of this code.