Boston University Metropolitan College

Health Informatics

CS580 A1

Guanglan Zhang
Email: guanglan@bu.edu
Class time: Wednesday 6-8:45pm
Classroom Location: CGS 321, 871 Commonwealth Avenue, Boston
Office hours: Wednesday 2:30 – 4:30 PM
Office Location: Zoom Live Classroom

Course Description

The CS580 course presents the fundamental principles, concepts, and technological elements that make up the building blocks of Health Informatics. It introduces fundamental characteristics of data, information, and knowledge in the domain, the common algorithms for health applications, and IT components in representative clinical processes. It also introduces the conceptual framework for handling the collection, storage and the optimal use of biomedical data. It introduces the concepts of population health and precision medicine and the information systems that support them. It covers basic principles of knowledge management systems in biomedicine, various aspects of Health Information Technology standards, and IT aspects of clinical process modeling. There is also a term project to access students' ability to understand and implement simple Health Informatics solutions. A guest speaker, Michael Mukavetz, who has years of experience in health IT, will be invited to share his first-hand experience with students.

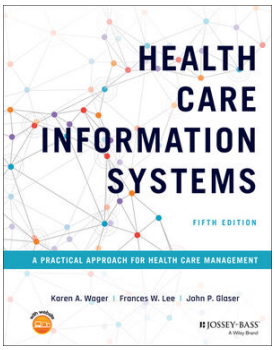
Course Objectives

This course will enable you to:

- Become familiar with the basic definitions, key concepts, terminology, and historical context of Health Informatics
- Understand fundamental characteristics of data, information, and knowledge in the Health Informatics domain
- Become familiar with common algorithms for health applications and IT components in representative clinical processes
- Develop understanding of population health and precision medicine
- Understand basic principles of knowledge management systems in biomedicine
- Develop understanding of various aspects of Health Information Technology standards
- Become familiar with IT aspects of clinical process modeling and health information systems

Boston University Metropolitan College

Required Book

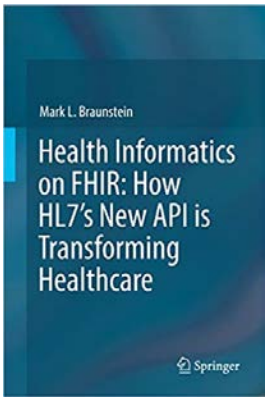


Wager, K. A., Lee, F. W., & Glaser, J. P. (2022). ***Health care information systems: A practical approach for health care management*** **-5th Edition.**

Jossey-Bass. ISBN: 978-1-119-85387-9.

Note: This is also the required textbook for CS781.

Recommended Books



Braunstein, M. L. (2018). Health Informatics on FHIR: How HL7's New API is Transforming Healthcare.

Springer International Publishing. ISBN: 9783319934136.

The e-book is available for free through the BU library.

Spring 2022 COVID-19 Policies

Compliance: All students returning to campus will be required, through a digital agreement, to commit to a set of Health Commitments and Expectations including face coverings, testing, contact tracing, quarantine, and isolation. The agreement makes clear that compliance is a condition of being a member of our on-campus community.

Class Policies

1) **Attendance & Absences** – Full attendance and participation is expected. If there is a reason to miss a session, advanced notice through email should be sent to the lecturer.
2) **Assignment Completion & Late Work** – All assignments should be completed individually and submitted on time. If there is a delay, the student must be in touch with the instructor. Late submissions without reasons will result in grade deduction.
3) **Academic Conduct Code –Cheating and plagiarism will not be tolerated in any Metropolitan College course. They will result in no credit for the assignment or examination and may lead to disciplinary actions. Please take the time to review the**

Student Academic Conduct Code:
http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/code.html.

NOTE: [This should not be understood as a discouragement for discussing the material or your particular approach to a problem with other students in the class. On the contrary – you should share your thoughts, questions and solutions. Naturally, if you choose to work in a group, you will be expected to come up with more than one and highly original solutions rather than the same mistakes.]

Grading Criteria

This course is presented as a series of weekly modules. The course material is grouped in six modules. Each module consists of one or two lectures.

Reading materials—Introduced in each module.

Assignments—This course will have four graded assignments.

Discussions—There are 4 graded discussions that involve posting and reviewing the answers to the discussion topics.

Term Project—The term 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 term project.

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

Deliverable	Weight
Active class participation	5%
Quizzes	15%
Assignments	20%
Discussions	15%
Final Project	15%
Final Exam	30%

Study Guide

Module 1

Readings: **Required Readings:** (Wager, et al, 2022)

Chapter 11: Data Governance and Analytics

Recommended readings:

Haux R. Medical informatics: past, present, future. Int J Med Inform. 2010, 79(9):599-610.

Fridsma DB. The scope of health informatics and the Advanced Health Informatics Certification. J Am Med Inform Assoc. 2016, 23(4):855-6.

Gadd CS, Steen EB, et al. Domains, tasks, and knowledge for health informatics practice: results of a practice analysis. Journal of the American Medical Informatics Association. 2020 Jun;27(6):845-52

Module 2

Readings: **Required readings:** (Wager, et al, 2022)

Chapter 1: Evolution of Health Care Information Systems in the United States

Chapter 2: Electronic Health Record Systems

Appendix A: Overview of the Healthcare IT industry

Recommended readings:

Braunstein (2018)

Chapter 1: A brief history and overview of health informatics

Chapter 3: Health Informatics in the real world.

Module 3

Readings: **Recommended readings:**

Braunstein (2018)

Chapter 13: Analytics and Visualization.

Djulbegovic, B., & Guyatt, G. H. (2017). Progress in evidence-based medicine: a quarter century on. The Lancet.

Sheridan, D. J., & Julian, D. G. (2016). Achievements and limitations of evidence-based medicine. Journal of the American College of Cardiology, 68(2), 204-213.

Module 4

Readings: **Required readings:** (Wager, et al, 2022)

Chapter 3: Role of HCIS in Improving Healthcare Delivery

Chapter 4: Realizing the Digital Health Promise with Electronic Health Records

Recommended readings:

Braunstein (2018)

Chapter 12: Public and Population Health

Kindig, D., & Stoddart, G. (2003). What is population health?. American journal of public health, 93(3), 380-383.

König, I. R., Fuchs, O., Hansen, G., von Mutius, E., & Kopp, M. V. (2017). What is precision medicine? European Respiratory Journal, 50(4), 1700391.

Module 5

Readings: **Recommended readings:**

Braunstein (2018)

Chapter 7: Data and Interoperability Standards

Chapter 8: Pre-FHIR interoperability and clinical decision support Standards

Chapter 9: FHIR

Module 6

Readings: **TBD**

Instructor Biography

Guanglan Zhang, Ph.D.

Dr. Guanglan Zhang received her Ph.D. from School of Computer Engineering, Nanyang Technological University, Singapore for doctoral work in bioinformatics. She is an Associate Professor in Computer Science at Boston University Metropolitan College. She is also holding an adjunct position at Dana-Farber Cancer Institute and Harvard Medical School.

Dr. Zhang has worked in the data mining and data analytics field since 1998. The most important aspects of her work include biomedical data analysis, 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 50 peer-reviewed scientific journal publications and developed dozens of biomedical and computational systems.

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.

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.*

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.**

Disability Services

Boston University makes every effort to accommodate the unique needs of its students. In keeping with university policy, students are expected to contact the Office of Disability Services (ODS) (www.bu.edu/disability/) each time they register for a course to request accommodations for that course.

Any student who feels he or she may need an accommodation for a documented disability should contact the Office for Disability Services at (617) 353-3658 or at access@bu.edu for review and approval of accommodation requests.

Technical Support

Experiencing issues with BU websites or Blackboard?

It may be a system-wide problem. Check the BU Information Services & Technology (IS&T) news page for announcements.

Boston University technical support via email (ithelp@bu.edu), the support form (http://www.bu.edu/help/tech/), and phone (888-243-4596) is available from 8 AM to midnight eastern time. For other times, you may still submit a support request via email, phone, or the support form, but your question won't receive a response until the following day. If you aren't calling, it is highly recommended that you submit your support request via the technical-support form at http://www.bu.edu/help/tech/learn as this provides the IS&T Help Center with the best information in order to resolve your issue as quickly as possible.

Examples of issues you might want to request support for include the following:

- Problems viewing or listening to sound or video files
- Problems accessing internal messages

- Problems viewing or posting comments
- Problems attaching or uploading files for assignments or discussions
- Problems accessing or submitting an assessment

To ensure the fastest possible response, please fill out the online form using the link below:

IT Help Center Support	
Web	http://www.bu.edu/help/tech/learn
Phone	888-243-4596 or local 617-353-4357
Check your open tickets using BU's ticketing system.	