

Health Informatics

CS580C1/EL

Course Format (On Campus/Blended)

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Office hours: Wednesday afternoon 2-5pm or by appointment

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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 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 assess students' ability to understand and implement simple Health Informatics solutions. To reinforce the lecture material, one to two guest lecturers with many years of experience in health informatics will be invited to share their first-hand experience with students.

Books

No required textbook for this course.

Recommended reference books

- Wager, K.A., Lee, F.W., and Glaser, J.P. (2013). Health Care Information Systems: A practical approach for health care management, 3rd edition. Jossey-Bass. (This is the required textbook for CS781 Advanced Health Informatics.)
- Einbinder L, Ash JS, Einbinder J, Lorenzi NM, and Gadd CS. (2011) Transforming Health Care Through Information: Case Studies. Springer. (This book is electronically available at BU library.)
- Trotter, F. and Uhlman, D. (2011) Hacking Healthcare: A Guide to Standards, Workflows, and Meaningful Use. O'Reilly Media, 1st edition.

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 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

- Quizzes - This course will have 4 to 5 graded quizzes.
- 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 assignments and the class project.

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

Deliverable Weight

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|-------------|-----|
| Quizzes | 15% |
| Discussions | 15% |
| Assignments | 20% |
| Project | 20% |
| Final Exam | 30% |

Class Meetings, Lectures & Assignments

Lectures, Readings, and Assignments subject to change, and will be announced in class as applicable within a reasonable time frame.

Lecture One – Introduction to Health Informatics

- Introduction to health informatics and its significance
- Definitions and key concepts in health informatics
- Background disciplines, historical overview, and future challenges

Lecture Two – Introduction to Data, Information, and Knowledge

- Introduction to knowledge hierarchy: Data, information, and knowledge
- healthcare terminology, vocabularies, and classification systems
- Types of clinical and health data
- Data representation, databases, and data storage
- Introduction to biomedical research and publicly available resources

Lecture Three – Building Blocks of Health Informatics – Part 1

- Introduction to healthcare processes
- Introduction to algorithms in computer science
- Introduction to medical algorithms

Lecture Four – Building Blocks of Health Informatics – Part 2

- Introduction to decision-making process
- Introduction to medical-decision making process (diagnosis, treatment, monitoring, prognosis)
- Informatics in clinical decision-making

Lecture Five – Building Blocks of Health Informatics – Part 3

- Introduction to modeling and simulation
- Introduction to evidence-based medicine
- Application of modeling and simulation in biomedicine

Lecture Six – Building Blocks of Health Informatics – Part 4

- Introduction to hospital functions
- IT components of representative clinical processes
- Informatics for clinical process modeling

Lecture Seven – Standards in Health Informatics – Part 1

- Introduction to Standardization
- Standardization in health informatics
- Quality management in health informatics
- Terminology standards

Lecture Eight – Standards in Health Informatics – Part 2

- Information and data exchange, and information protection
- Health data interchange standards
- EHR content standards

Lecture Nine – Knowledge Management Systems

- Introduction to knowledge management
- Knowledge discovery, data mining and text mining
- Knowledge management and decision making support in biomedicine

Lecture Ten – Electronic Health Record and Hospital Information System

- Introduction to Electronic Health Record (EHR)
- EHR systems overview and functions
- Data interchange in hospital information system
- Safety and privacy of patient data
- Introduction to Hospital Information System (HIS)
- Types of HIS and their functions

Lecture 11 – Project

- Student presentations and class discussions

Lecture 12 – Guest lecture

Lecture 13 – Final Exam

Instructor Biography

Guanglan Zhang, Ph.D.

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 40 peer-reviewed scientific journal publications and developed dozens of biomedical specialist databases 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.