

**MET CS-581**

**Health Information Systems**

**Fall 2023**

**Syllabus**

**Location:  
CDS 264  
and  
Online**

**Day and Time:** Monday 6:00 pm – 8:45 pm

Michael Levinger (mlevinge@bu.edu)

**Computer Science Department  
Metropolitan College  
Boston University**



## Course Description

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Health Information Systems (HIS) are comprehensive application systems that automate the activities of healthcare delivery including clinical care using electronic health records (EHRs), coordination of care across providers, telehealth, management of the business of healthcare such as revenue cycle management, and population health management. The course covers the functionality of these systems, the underlying information technology they need and their successful operations. This use of HIS has many challenges including complex data, high security requirements, integration to multiple application systems, a distributed user base, and broad impact on how these users work.

This course will focus on real-world use and deployment of HIS and EHRs through readings, hands-on labs, and case studies. Students will: (1) learn the functionality of HIS and EHRs including through hands-on labs; (2) learn the technical infrastructure required for HIS and EHRs including distributed architecture, network, and security design; (3) understand how an HIS changes healthcare delivery workflows and how to manage that change; and (4) learn best-practices for deploying HIS including project management, typical budgets, system selection, and governmental requirements and funding.

## Learning Objectives

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- Learn the functionality of HIS and EHRs through lectures and hands-on labs
- Learn the technical infrastructure needed for HIS including distributed architecture, cloud infrastructure, network design, and security.
- Understand how HIS and EHRs change healthcare delivery workflows and how to manage that change
- Learn best-practices for deploying HIS including project management, typical budgets, system selection, and governmental requirements and funding
- Collect a set of tools to use in HIS and other enterprise system deployment programs
- Present results of class work in a “real-world” fashion including class presentations and written assignments
- Introduce students to the applied, “real-world” deployment of enterprise application systems in general
- Encourage independent, analytical thinking about the challenges of deploying HIS and how to address them

In pursuing these objectives, the course will:

- Use textbooks, current news items, government reports and publications lectures, and cases;
- Use assignments and in-class exercises that apply the class material to case examples including presentation of results; and
- Use in-class team exercises to both learn course topics and teamwork.

MET CS-581  
Health Information Systems  
Syllabus – Fall 2023

## Course Schedule

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Class	Date	Lecture Topics	Attendance Required for Blended
1	11-Sep-23	Course Introduction, Overview of Health Info Systems and EHRs, Healthcare Workflow and Business Process Re-engineering	√ Course Introduction
2	18-Sep-23	Enterprise Architecture, Hospital Information Systems Functionality Overall, EHR Clinical Functionality NOTE: ALL REMOTE	
3	25-Sep-23	Mike not available due to religious holiday Mitch McCauslin will do an IT Review NOTE: ALL REMOTE	
4	2-Oct-23	HIS Revenue Cycle functionality, Population Health	√ In-class Group Exercise
5	10-Oct-23	Federal EHR Regulations, Certification NOTE: TUESDAY DUE TO INDIGINEOUS PEOPLES' DAY	
6	16-Oct-23	HIS/EHR Technical Infrastructure Design	
7	23-Oct-23	HIS/EHR Technical Infrastructure Performance Requirements	√ In-class Group Exercise
8	30-Oct-23	HIS & EHR Security & HIPPA	
9	6-Nov-23	HIS/EHR Interoperability - Health Information Exchanges, HL7, FHIR and more	
10	13-Nov-23	HIS/HER Interoperability - Standards	
11	20-Nov-23	HIS/EHR System Selection	√ Special Speaker
12	27-Nov-23	HIS/EHR Deployment Project Management	
13	4-Dec-23	HIS/EHR Deployment Project Budgets and Value	
14	11-Dec-23	Selected Course Project Presentations, Course Review	√ If Possible for Course Presentation & Course Review
15	18-Dec-23	Final Exam	√ Final Exam

## COVID-19

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- The class will follow the BU policies on COVID-19 as defined at these locations: <https://www.bu.edu/chiefhealthoffice/bu-covid-19-policies/> and <https://www.bu.edu/shs/covid-19/>.
- If you test positive for COVID-19, you must follow the BU policies on isolation detailed here: <https://www.bu.edu/shs/covid-19/quarantine-isolation-guidance/>. In summary, you are required to isolate for at least 5 days from your onset of symptoms or your positive test date (if you do not have symptoms). If you are temporarily unable to attend class, you should inform the professor and plan to attend class remotely on Zoom.

## Professor

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Michael Levinger is an adjunct faculty member of Boston University's MET College. He created CS581 and has been teaching the course for years. Michael is an information technology and healthcare IT senior executive and multi-time entrepreneur specializing in the successful creation, deployment and use of healthcare technologies including Health Information Systems, Electronic Health Records and MedTech devices. Mike is currently working for a systems integration company and a major consumer products company on the successful use of the Internet of Things (IoT), cloud computing, and other advanced technologies such as artificial intelligence and machine learning especially focused on the healthcare/life science market for health information systems and MedTech devices.

Previously Mike was the Chief Operating and Information Officer of a consulting and services company specializing in improving healthcare quality including using healthcare information systems like electronic health records. He was President and CEO of a Massachusetts-based electronic health record consulting and systems integration company. Under Mike's leadership, the company helped numerous physician practices and healthcare delivery organizations implement EHR deployment programs. Mike has been an advisor to the University of Missouri Medical School Healthcare Management and Informatics Department, is an active member of several healthcare industry organizations, and an experienced non-profit volunteer leader.

## Communication

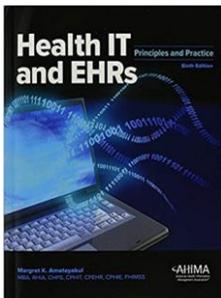
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- Methods
  - Email
  - BU Blackboard course site
- Mike Levinger
  - [mlevinge@bu.edu](mailto:mlevinge@bu.edu)
  - Cell Number: 781-307-7898
  - Skype: mlevinger
- Snow/Weather Cancellation – BU Snow Cancellation Phone Number: 617-353-SNOW

## Course Resources

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**Required Textbook** – Available from Barnes and Noble at Boston University and online sources.



*Health IT and EHRs Principles and Practice* -Sixth Edition 2017

by Margret K. Amatayakul

ISBN 9781584265290

Published by:

American Health Information Management Association

233 No. Michigan Ave., 21<sup>st</sup> Floor

Chicago, IL 60601

[www.ahima.org](http://www.ahima.org)

MET CS-581  
Health Information Systems  
Syllabus – Fall 2023

### **Online Materials**

The course makes extensive use of online reading material and the online BlackBoard course website. The website supplies extensive course material and will be used to submit materials. URLs will be provided for other readings.

### **Personal Computers & PC Software**

The course uses online materials and software. In addition, quizzes will be done online as part of the class homework using the course Blackboard site (see below). To facilitate in-class exercises, you should bring a computer to all classes. If that is a problem, please let me know as soon as possible.

Assignments will need to be completed using Microsoft Office tools - Word, Excel, and PowerPoint. You will also need access to workflow diagramming software such as Microsoft Visio or Microsoft PowerPoint and to a project management software tool such as Microsoft Project. If you do not have Microsoft Project, please use Gantt Project Tool at <http://www.ganttproject.biz>.

### Microsoft Software

BU participates in several programs that make Microsoft Software available at reduced cost or even free. Students should look at the follow locations for further information:

<http://www.bu.edu/tech/services/cccs/desktop/distribution/microsoft/studentoffice/>  
<https://www.bu.edu/cs/resources/laboratories/microsoft-dreamspark/>.

### **Student Support Resources**

The [MET Enrollment & Student Success \(ESS\)](#) office can assist in triaging student support resources that are available at MET, Boston University, and in the Boston area. ESS Student Success Advisors are your best support in navigating BU policy, process, and resources if you are experiencing distress, financial difficulty, interpersonal issues, or academic performance issues. ESS has developed a [Student Resource Flyer](#) which provides more information.

## **Course Structure & Student Expectations**

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The course is organized by classroom sessions. Each class focuses on a particular major course topic and consists of a mix of lectures, discussion, class exercises, assignments, and quizzes. Each of the classes requires includes assigned textbook readings; assigned readings from government and healthcare articles and websites; homework quizzes and/or assignments.

### **What is expected of students?**

#### 1. Overall

- Participate
- Work as part of a team
- Think and create solutions
- Reading
  - Textbook chapters
  - Current articles from healthcare and healthcare IT literature
- Homework projects - critical elements of HIS and EHR system deployment

MET CS-581  
Health Information Systems  
Syllabus – Fall 2023

- Class discussions and projects
- Final course project
- Quizzes
- Final exam

2. Attendance

In person attendance at all classes is expected for in-class students. Attendance will be taken early in the class. In accordance with the department policy, any student missing more than two classes will be considered to have withdrawn. Students arriving late will be considered to have missed the class. If you cannot attend in person, please let the professor know and if possible attend remotely like the blended students.

Blended students are encouraged to attend as many classes in person as possible. Attendance for blended students is expected at the following classes (with one class optional):

- 11 September – First class
- 2 October – Group exercise on enterprise architecture for population health
- 23 October – Group exercise on HIS/EHR infrastructure
- 20 November – Guest speaker on HIS/EHR system selection
- 11 December – Optional but encouraged - selected course presentations and course review
- 18 December - Final Exam

If you have a conflict being in the classroom on these days, please contact the professor as soon as possible.

3. Timely Presentation of Materials Due & Requests for Extensions

All homework has due dates and must be completed. Students should organize their time and work to turn in assignments by the due date.

The general position is that extensions or make-up tests are not given. If, for any reason, you are unable to meet any assignment deadline, a student should contact the professor or a facilitator/teaching assistant immediately and preferably in advance. Homework grades will be reduced for late materials as indicated under Grading. Recognizing that most CS581 students have full-time professional roles and unforeseen situations occur, each student will be allowed one “pass” per term for a one-week delay in submitting homework without a grade reduction.

This policy is not to penalize any individual student. The course materials build from week to week so keeping current is important to successfully learning the material. In addition, this policy is an attempt to assure that there is a level playing field and the total class feels confident that no one has a unique advantage.

4. Student Preparation & Class Participation

Minimal preparation is reading the material, and being able to summarize what it is about, what the major issues are, and some recommendations.

MET CS-581  
Health Information Systems  
Syllabus – Fall 2023

Superior preparation involves being able to (i) summarize the situation or problem presented by the material; (ii) recommend solutions; (iii) support your recommendation with data, relevant details, and analyses; and (iv) discuss innovative solutions.

5. Off-Syllabus Work

The course topic is part of a very dynamic industry. As such, there is much material that is not covered in the class. Students are encouraged to read and consider related material and issues that are beyond those defined in the syllabus to include in their work and in class discussions.

## Artificial Intelligence including Generative AI

Artificial Intelligence and machine learning including generative artificial intelligence (GenAI) are increasingly available and accessible. These technologies are having substantial impact on both academics, the use of HIS/EHRs, and in the professional world generally. In recognition of this increased adoption, this course allows the use of GenAI per the following policies. This specific approval is given to help you to become familiar with AI tools, to increase your AI literacy, and to understand how to use AI in appropriate ways within both academic and professional contexts.

You may use one or more GenAI tools for this class for all assignments and quizzes. In all cases, you are required to let the teaching team know that you used GenAI or a similar tool and disclose the prompt(s) you used. If you do not provide attribution and we find out that you used an AI tool, you will receive an automatic zero on that assignment, quiz, or course project. Note that the quizzes have a time limit, and the professor does not believe that using GenAI will be that helpful completing quizzes.

The Final Exam is closed book including not allowing use of the Internet, so you are NOT allowed to use any AI tools for the Final Exam.

ChatGPT and other GenAI and automated content tools are known to return incomplete, incorrect, and/or biased information, along with fake citations or sources. Therefore, they are not considered a completely reliable resource. It is the student's responsibility to ensure that all information is accurate. If you use GenAI tools to complete an assignment or the course project, you are required to do a two to four paragraph summary of how the tool(s) both successfully helped you complete the assignment and how the tool(s) did not do a good job on the assignment. You do not need to provide this summary on quizzes.

Many GenAI tools, such as ChatGPT, require that you provide personal information, such as an email address. Please review the privacy information supplied by the tool so that you are aware of the uses of your information. As your instructors, the facilitators/teaching assistants and I abide by FERPA (Family Educational Rights and Privacy Act) Guidelines and will not create or respond (for example, through feedback or grades) to assignments in any way that will impact the privacy of your student records.

## Grading Policy

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All students are expected to demonstrate an understanding of the class materials. To obtain an exceptional grade you must exceed expectations in your assignments, course project, quizzes, final exam and discussions.

## Grade Weighting

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There are multiple graded items (classroom discussions and exercises, five assignments, five quizzes, the course project, and a final exam). Course letter grades are determined in a three-phase process designed to accurately determine how well each student has demonstrated that they understand and can use the subject matter. The process begins when the professor and any facilitators/teaching assistants compute the weighted scores, using the weighting below. They examine not only the overall weighted score, but also each student's scores in each of the areas, and the trend of scores in each of these areas. The professor in conjunction with the facilitators/teaching assistants then determines a letter grade for each student. The professor and the facilitators/teaching assistants review all graded items for all students and the proposed letter grades. After the professor receives feedback from the facilitators/teaching assistants he completes the grades and uploads them to the University Information System, where students can see their grades via the Student Link.

All graded items are graded as a percentage of the maximum anticipated score; this traditional American grading system is sometimes termed "out of 100." Rarely a student may so exceed our expectations that they earn more than 100.

## Grading Structure and Distribution

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The following table summarizes the four kinds of graded items and the default percentage of grades determined by each of these kinds of graded items. Each of these graded items is explained below.

Overall Grading Percentages	
Assignments	25%
Course Term Project	15%
Class Discussions & Exercises	20%
Quizzes	20%
Final Exam	20%

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## Assignments & Course Project

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The course has five homework assignments plus a course project. Each homework assignment is an exercise doing an important part of deploying an HIS or EHR system. The course project is to develop and present an integrated EHR deployment plan. It builds on the earlier homework assignments. Students will do the homework assignments and then integrate their work and develop and present the final plan. The professor will supply more details in class.

Assignments are due on the class date shown. The professor and facilitators/teaching assistants endeavor to return graded materials the weekend following the due date.

If you worked with other students on an assignment you should disclose that fact. While some amount of collaboration is fine and good preparation for professional collaboration, copying or using another student's work – from this or a previous term – is unacceptable. If you do not disclose your work with other students or the teaching team judges that you used another student's work, we will invoke the Boston University Metropolitan College Graduate Student Academic Conduct Code.

If for any reason you are unable to meet an assignment deadline, contact the professor or a facilitator/teaching assistant as soon as possible and preferably in advance. As stated earlier, recognizing that most CS581 students have full-time professional roles and that unforeseen situations occur, each student will be allowed one "pass" per term for a one-week delay in submitting homework without a grade reduction. Any other extensions must have mitigating circumstances. Scores for assignments submitted late without extenuating circumstances will be penalized ten percent. Assignments submitted late near the end of the term may not be graded, because facilitators/teaching assistants and the professor are very busy grading final exams, resulting in zero scores for those assignments

If you are stuck, and just can't complete part of an assignment, then submit what you can complete, asking for help. The professor or facilitator/teaching assistant may then choose to provide you with guidance in the areas where you are stuck and return the partial assignment to you for further work and resubmission. We will deduct from your score on the resubmission for any part of the solution that was provided to help you. We may re-grade based on resubmissions. Whether a particular resubmission should be re-graded is up to the judgment of the professor or facilitator/teaching assistant. Resubmissions may not be graded near the end of the term. Resubmissions are intended to help struggling students who are stuck, and resubmissions are not intended for routine use.

## Class Discussions and Class Contributions

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Twenty percent of your grade is based on your class contributions. This grade is derived from your participation in classroom discussions, exercises, group projects and your presentation of both homework materials and other topics. This is an important part of the learning process. Your classroom participation grade is based on your involvement and mastery of the material and how well you work as a member of a team and contribute to your classmates' learning experience and understanding of the material.

MET CS-581  
Health Information Systems  
Syllabus – Fall 2023

To facilitate class discussions, all students participating remotely are required to have a headset so they can participate verbally. Students participating remotely are encouraged to also have a camera so they can participate visually as well. This is especially valuable when taking part in group work.

## Quizzes

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There are five graded quizzes. Quizzes consist of a combination of choose multiple, multiple choice, true/false, matching, and short written answer questions. Quizzes are taken online on your own time using the course Blackboard site. They will be available for approximately one week up to the due date to complete the quiz. Students will have one opportunity to take the quiz at a time of their choosing during that week. The professor and facilitators/teaching assistants endeavor to complete and release the results for your quiz the weekend following the due date. When the quiz results are released, you will be able to see the questions and your answers. Since students have a week to take quizzes, they should be completed by the due date. Quizzes may be taken after the results have been released, with the professor's or a facilitator/teaching assistant's permission. Grade deductions for late quizzes are at the discretion of the professor depending on the reason for a delay.

## Final Exam

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The final exam consists of a combination of choose multiple, multiple choice, true/false, matching, and written answer questions. The format of the questions is the same as those in the quizzes except that the required written answers might be of greater length. You will have three (3) hours to complete the final exam which has shown to be plenty of time. Per BU MET policy for classroom and blended courses, the final exam must be taken in person at the scheduled time unless there are extenuating circumstances. If you have extenuating circumstances, please contact the professor as soon as possible

## Grading Structure

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- Homework Assignments
  - Each homework assignment and the final project have a set of “learning topics” with a weighting for each topic. Each topic will be scored on a zero to 100% basis and a grade for the homework will be determined based on the weighted average.
  - Homework should be turned on time
  - 10% reduction for each week that homework is late
  - One “pass” for no deduction for a one-week delay
- Quizzes
  - Choose multiple, multiple choice, true/false, and matching questions will be graded based on getting the correct answer. Deductions will be taken for wrong answers but you cannot receive a negative score on a quiz question.
  - Each question requiring a written answer will have a set of “learning topics” being tested for with a weighting for each topic. Each topic will be scored on a zero to 100% basis and a grade for the written answer will be determined based on the weighted average.

MET CS-581  
Health Information Systems  
Syllabus – Fall 2023

- Quizzes should be completed during the week they are available online up to the quiz deadline.
- Final Exam
  - Choose multiple, multiple choice, true/false, and matching questions will be graded based on getting the correct answer. Deductions will be taken for wrong answers but you cannot receive a negative score on a final exam question.
  - Each question requiring a written answer will have a set of “learning topics” being tested for with a weighting for each topic. Each topic will be scored on a zero to 100% basis and a grade for the written answer will be determined based on the weighted average.
  - Final exam questions will also have a weighting factor since some written questions are longer and more in-depth than others.
- Class exercises, group projects and discussion
  - Will be graded qualitatively

Your assignments, discussions, quizzes, and final exam will be graded on a percentage basis. The following table summarizes typical correspondence of percentage and letter grades for individual graded items. The process and criteria for determining course letter grades is more complex than computing the weighted average grade and looking up the letter grade in the table below.

Letter Grade	Approximate Percentage Grade Range	Criteria
A	95–100	The student’s work is excellent and nearly without defect. The work demonstrates mastery of the material.
A-	90 < 95	The student’s work is excellent with some minor defects. The work demonstrates a solid grasp of the material.
B+	85 < 90	The student’s work is good with a few defects. The work demonstrates a solid grasp of most but not all of the material.
B	80 < 85	The student’s work is above average with some defects. The work demonstrates a solid grasp of some aspects of the material.
B-	75 < 80	The student’s work is approaching average. The work demonstrates a grasp and understanding of some aspects of the material.
C+	70 < 75	The student’s work is average and has some moderate defects. The work demonstrates a minimal grasp and understanding of the material.
C	65 < 70	The student’s work is average and has some major defects. The work demonstrates a basic understanding of the material but nothing more.
C-	60 < 65	The student’s work is below average and has some major defects. The work demonstrates a barebones understanding of the material but nothing more.
D	55 < 60	The student’s work is poor. Sections may be missing from the work. The work does not demonstrate an understanding of the material at even a basic level.
F	< 55	The student’s work is unacceptable. Sections may be missing from the work. The work does not demonstrate an understanding of the material in any fashion.

Per the [MET Computer Science Academic Policies Online Manual](#) “A degree candidate must earn a cumulative grade point average of at least 3.0 (B) to be in good academic standing. When a student has taken more courses

MET CS-581  
Health Information Systems  
Syllabus – Fall 2023

than required to meet the graduation requirements, a subset of those courses may be selected for the purposes of graduation, provided that the subset meets all degree requirements and the GPA computed over that subset is at least 3.0.”

The percentage ranges above are approximate. Your letter grade is determined by your professor in conjunction with the facilitators/teaching assistants as the best overall measure of how well you have demonstrated that you understand the material, taking into consideration your performance in the quizzes, assignments, course project, classroom discussions, classroom exercises, and final exam. The actual grade ranges will be adjusted to reflect the difficulty of graded items. While there is no fixed absolute number of grades in any one level it is important to note that high grades reflect an excellence in the understanding of class material and organization of thought. In addition, an important aspect of any class is the shared thoughts and insights of the class members. Grades will also reflect an individual’s contributions to the class.

## **Academic Conduct Code**

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This course follows the Boston University Metropolitan College Graduate Student Academic Conduct Code and students are expected to comply with the code. The Academic Conduct Code can be found here:  
[https://onlinecampus.bu.edu/bbcswebdav/courses/00cwr\\_odeelements/metad/bu-met-graduate-student-academic-conduct-code.pdf](https://onlinecampus.bu.edu/bbcswebdav/courses/00cwr_odeelements/metad/bu-met-graduate-student-academic-conduct-code.pdf).