Introduction to Biomedical Informatics and Artificial Intelligence
AMIA-OHSU 10x10 – 2025 – Syllabus
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OBJECTIVES

The goal of this course is to provide a detailed overview of biomedical informatics and artificial intelligence (AI) to those who will work at the interface of healthcare and information technology (IT). The course also aims to provide an entry point for those wishing further study (and/or career development) in the field. It provides a broad understanding of the field from the vantage point of those who implement, lead, and develop IT solutions for improving health, healthcare, public health, and biomedical research. It provides up-to-date details on current events in the field, including electronic health records, data standards and interoperability, clinical decision support, population health, patient engagement, telehealth, clinical research, and public health. It also describes and sets the context for newer technologies, such as SMART on FHIR, generative AI, large language models (LLMs), and wearables. Although the course has a clinical orientation, many non-clinicians working in health IT environments have found the course accessible and the knowledge gained invaluable to their professional development.

The 10x10 course gets its name from its original goal when launched in 2005 of educating 10,000 healthcare and related professionals in biomedical and health informatics by 2010. The goal of 10,000 individuals came from an assertion by former AMIA President Dr. Charles Safran that the US needed at least one physician and one nurse trained in medical informatics in each of the country's 6000 hospitals. The needs are equally strong beyond the US in the rest of the world and for professionals beyond physicians and nurses. The goal of 10x10 was operationalized by [Dr. William Hersh](#) of [Oregon Health & Science University (OHSU)](#). The OHSU offering of 10x10 was the original offering in the program and has had the largest enrollment. The success and continued interest in the course have led us to continue it beyond the original 2010 goal. Since the program was launched in 2005, over 3300 people, mostly from the US but also from a variety of international locations, have completed the course. About 10-15% of those graduating have gone on to further graduate study in the field, mostly at OHSU.

INSTRUCTOR

The instructor for the course is [William Hersh, MD](#). The best way to reach him is via email (hersh@ohsu.edu). Dr. Hersh does not keep regular office hours but phone calls or meetings can be arranged with him. He also maintains a blog, [Informatics Professor](#).

COURSE COORDINATION

The course is offered in two parts:
1. A 10-unit Web-based component starting April 9, 2025. The Web-based portion is provided through on-line lectures, readings, interactive discussion, and self-assessment tests. (Quizzes are required to be completed but grades do not count towards a final grade.)

2. A one-day in-person session held in conjunction with an AMIA meeting (see below). The in-person session brings participants together to integrate the material, allow presentation of course projects, and meet the instructor as well as other students in person.

OHSU 10x10 participants have the option of attending the in-person session associated with any AMIA meeting within one year of their taking the class and not just the session that occurs at the end of the offering in which they are enrolled. (We also allow participants to forego the in-person session if hardship or other reasons prevent them from attending a session, although we strongly encourage attendance to complete their learning experience.) The next available AMIA meetings with in-person sessions will be:

- AMIA 2025 Annual Symposium, Atlanta, GA, November 15-19, 2025
- AMIA 2026 Clinical Informatics Conference, date and location TBD

The course is an adaptation of the on-line *Introduction to Biomedical and Health Informatics* class currently taught in the OHSU [biomedical and health informatics education program](#). This survey course provides a broad overview of the field, highlighting the key issues and challenges for the field. The course is taught in a completely asynchronous manner, i.e., there are no "scheduled" classes. However, students must keep up with the course materials so they can benefit from the interactive discussion with faculty and other students. The course uses the following teaching modalities:
- Voice-over-PowerPoint lectures – Lectures are provided in MP4 format via Sakai, the OHSU learning management system. The content is easily accessed by any type of computer, tablet, or smartphone connected to the Internet.
- Interactive threaded discussion – Students engage in discussion on important issues using the on-line threaded discussion forums. An on-line faculty moderator helps keep the discussion on track.
- Optional reading assignments – The syllabus suggests optional readings from a textbook for students.
- Homework/quizzes – Each of the units is accompanied by a 10-question multiple-choice self-assessment that aims to have the student apply the knowledge from the unit.

The on-line part of the course is accessed via OHSU's Sakai learning management system (LMS). At the onset of the course, each student is provided a login and password by the OHSU distance-learning staff, who also provide technical support for the course. The course has no required textbook; with all assigned readings either freely available on-line or provided by OHSU. Students are expected to keep up with the materials and should anticipate spending 4-8 hours per unit on the course. All on-line activities are asynchronous, so there is no specified time that a student must be on-line.

Students are welcome to download and save all PDF files of slides and references. (Sakai does not allow download of lecture videos.) Please note that this content is for your own personal use and you should not share with others or post to any public or private Web sites.

Students must complete all of the self-assessment tests, the course project, and participate in class discussions to receive the AMIA 10x10 Certificate of Completion. Physicians are eligible for up to 44 hours of AMA PRA Category 1 CME Credit(s)™. Because the course is continuing education, it

does not use academic letter grades (e.g., A, B, etc.). However, those wanting academic credit by taking the optional final exam (see below) will be assigned a letter grade based on their score on the exam.

The course has a [policy about the use of generative artificial intelligence in course activities](#).

WHEN PROBLEMS ARISE

It is critical to contact the appropriate person when problems arise:
- For basic Sakai problems (cannot log in, something not apparently working) and course issues (e.g., unit or discussion forum not posted when it should be), contact the Sakai Help Desk at 877-972-5249 or sakai@ohsu.edu. The Sakai Help Desk hours are 8 a.m. – 10 p.m. Pacific Mon-Fri and 12-5 p.m. Pacific on weekends. The Sakai Help Desk is closed on all OHSU-observed holidays.
- For questions about course content (e.g., do not understand a topic or disagree with homework quiz answer), contact the Teaching Assistant (TA), who will be announced at the beginning of the course.

When appropriate, all issues will be elevated to Dr. Hersh. While Dr. Hersh does not maintain scheduled office hours, he is readily accessible via email and will respond within 24-48 hours. Appointments to discuss course matters by phone or in person can be arranged via email.

COURSE INTERACTION

The course aims to provide a great deal of interaction among the faculty, students, and teaching assistants. On-line discussion begins for each unit with the instructor posing 2-3 questions per unit. Students are also encouraged to post questions or comments about any topic in the course or the field in the general discussion forum at any time. The instructor aims to guide and fill in details of the discussion but not dominate it.

COURSE PROJECT

Students must complete a course project to obtain the AMIA 10x10 Certificate of Completion. The goal of the project is to identify an informatics problem in your local setting (e.g., where you practice or work, or otherwise have access) and propose a solution based on what is known from informatics research and best practice. The project write-up is due by July 23, 2025. (If you do not have access to a health care setting, you can do the project in another setting, such as a company or organization. The instructor can help if you have a challenge with this.) The problem and solution should be written into a succinct 2-3 page (please no longer!) document that should include references that justify the framing of the problem and the proposed solutions. This is submitted in a Word document uploaded to Sakai.

Students will present their project to their colleagues at the in-person session that they attend. The room at the in-person session has round tables, and students will break into small groups around the tables. Each group selects one individual to present an overview of the group's discussion. The remaining people in the group serve as discussants in a short (10-15 minute) panel presentation at the session.

OPTIONAL FINAL EXAM AND EARNING OHSU CREDIT

The 10x10 course has no final exam, and those who complete all of the online coursework will receive the AMIA 10x10 Certificate of Completion. At the end of the course, an optional final exam is given for those who are eligible for and desire graduate-level academic credit for the course from OHSU. The exam is completed during a one-week window at the end of the course. Credit is typically sought by those desiring further study in biomedical and health informatics or for those requiring an academic transcript for tuition reimbursement. More information about the final exam and how to enroll at OHSU to receive academic credit is provided once the course has started.

Those seeking tuition reimbursement from employers or others should check regarding conditions and timelines for reimbursement. Some employers require an official transcript from OHSU showing the final grade before reimbursing class fees. The transcript and course credit are not available *until the end of the academic term that follows completion of the 10x10 course*.

CURRICULUM AND DATES

The following table outlines the curriculum with unit number, topic, date posted, and date due. The course in general runs with two weeks in a row of posted materials and then a third week to finish the work. The due date for each unit is when the next cycle of material is posted. We are lenient about giving extensions but participants are strongly encouraged not to fall behind, since it is difficult to catch up once one is too far behind.

Unit	Topic	Date Posted	Date Due
1	Overview of Fields and Problems Motivating Them	4/9/25	4/30/25
2	Computing Concepts for Biomedical Informatics	4/16/25	4/30/25
3	Electronic and Personal Health Records (EHR, PHR)	4/30/25	5/21/25
4	Standards and Interoperability	5/7/25	5/21/25
5	Artificial Intelligence	5/21/25	6/11/25
6	Advanced Use of the EHR	5/28/25	6/11/25
7	EHR Implementation, Security, and Evaluation	6/11/25	7/2/25
8	Information Retrieval (Search)	6/18/25	7/2/25
9	Research Informatics	7/2/25	7/23/25
10	Other Areas of Informatics	7/9/25	7/23/25

READINGS

The course has no required textbook. There is an optional textbook, which is edited by the course instructor and that students may want to consider: Hersh WR, Ed. (2022). *Health Informatics: Practical Guide, 8th Edition*. The book has a [Web site](#) and is available from Lulu.com in [eBook](#) and [paper](#) versions. The reading assignments from the book are optional, and no material will appear on the homework quizzes or final exam that is not also covered in the class. But some students prefer to also read a textbook when learning. The appropriate chapter readings for each unit in the course are as follows:

Unit	Topic	Textbook Chapter(s)
1	Overview of Fields and Problems Motivating Them	1, 2
2	Computing Concepts for Biomedical Informatics	3, 23
3	Electronic and Personal Health Records (EHR, PHR)	4, 7
4	Standards and Interoperability	5
5	Artificial Intelligence	6
6	Advanced Use of the EHR	8, 9, 10
7	EHR Implementation, Security, and Evaluation	11, 12, 13, 22
8	Information Retrieval (Search)	14
9	Research Informatics	15, 16
10	Other Areas of Informatics	17, 18, 19, 20, 21

DETAILED COURSE OUTLINE

1. Overview of Fields and Problems Motivating Them
1.1 Definitions and Historical Perspectives of Biomedical and Health Informatics (BMHI)
1.2 Definitions and Historical Perspectives of Artificial Intelligence (AI)
1.3 Problems in Healthcare Motivating Biomedical Informatics and AI
1.4 Who Does Biomedical Informatics and AI?
1.5 Resources for Fields: Organizations, Information, Education

2. Computing Concepts for Biomedical Informatics and Artificial Intelligence
2.1 Types of Computers
2.2 Data Storage in Computers
2.3 Computer Hardware and Software
2.4 Computer Networks
2.5 Software Engineering

3. Electronic and Personal Health Records (EHR, PHR)
3.1 Clinical Data
3.2 History and Perspective of the Health (Medical) Record
3.3 Examples of the EHR
3.4 EHR Data Entry
3.5 Clinical Decision Support
3.6 Personal Health Records

4. Standards and Interoperability
4.1 Standards and Interoperability: Basic Concepts
4.2 Identifier and Transaction Standards
4.3 Message Exchange Standards
4.4 Terminology Standards
4.5 SMART on FHIR

5. Artificial Intelligence (AI)
5.1 Machine Learning
5.2 Data Science

ACADEMIC HONESTY

Course participants are expected to maintain academic honesty in their course work. Participants should refrain from seeking past published solutions to any assignments. Literature and resources (including Internet resources) employed in fulfilling assignments must be cited. The

course also has a [policy concerning the use of generative AI](). Please also consult relevant sections in the [OHSU Code of Conduct]() and the [School of Medicine Graduate Studies Handbook]().

BEYOND 10x10

The goal of the AMIA 10x10 program is to train clinicians and others in informatics so they can be knowledgeable participants in IT implementations in their local settings. The 10x10 program alone will not make one a full-time professional in informatics (any more than a semester of medicine or nursing will make one a physician or nurse!). The program is being structured, however, to allow those who complete the course to carry the credits forward into other graduate programs in informatics. The details need to be arranged with each individual program.

Since the course is an adaptation of the introductory course in the OHSU Health & Clinical Informatics Graduate Program, those who complete the 10x10 course will be able to obtain credit for the course in the OHSU program. This credit is taken by passing the optional final examination at the end of the 10x10 course. Upon enrolling in the OHSU Graduate Certificate or Master of Science program, students passing the final examination will be awarded three credits in the OHSU graduate program. (OHSU is on an academic quarter system, with each quarter consisting of 11 weeks of instruction. A three-credit course is comparable to a course with three contact hours per week plus additional work for reading assignments, homework, and projects.) Most of OHSU's informatics courses are taught on-campus and on-line, and each course is considered equivalent whether it is taught live or via distance.

More details about the individual certificate and degree programs are available on the [OHSU Department of Medical Informatics & Clinical Epidemiology Web site](), but the following table provides an overview of the programs.

Program Name	Description	Admission Requirements	Graduation Requirements
Graduate Certificate	Core courses in informatics	Bachelor's degree in any field	21 credits (generally 8 3-credit courses)
Master of Science Nonthesis	"Professional" master's degree with capstone project	Bachelor's degree in any field plus introductory courses in Computer Science and Anatomy & Physiology	49 credits (43 credits of instruction plus 6 credits of capstone project)
Master of Science with Thesis	"Research" master's degree with master's thesis	Bachelor's degree in any field plus introductory courses in Computer Science and Anatomy & Physiology	55 credits (43 credits of instruction plus 12 credits of master's thesis)
Doctor of Philosophy (PhD) in Biomedical Informatics	PhD program for advanced leaders and research in the field	Bachelor's degree in any field plus introductory courses in Computer Science and Anatomy & Physiology	135 credits, including dissertation

The Web site also has information about OHSU's various fellowship programs, funded by the US National Library of Medicine and others.

STUDENT ACCESS

OHSU is committed to providing equal access to qualified students who experience a disability in compliance with Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act (ADA) of 1990, and the ADA Amendments Act (ADA-AA) of 2008. If you have a disability or think you may have a disability (physical, sensory, chronic health, psychological or learning) please contact the Office for Student Access at (503)494-0082 or studentaccess@ohsu.edu to discuss eligibility for academic accommodations. Information is also available at www.ohsu.edu/student-access. Because accommodations may take time to implement and cannot be applied retroactively, it is important to have this discussion as soon as possible. All information regarding a student's disability is kept in accordance with relevant state and federal laws.