INFO 7380 User Experience for Healthcare Applications

FALL 2024

Course Information

Course Title: User Experience Design for Healthcare Applications
Course Number: INFO 7380
Term and Year: Fall 2024
Credit Hour: 4
Course Format: ONLINE
Class schedule: Wednesdays 12 - 3pm EST

Instructor Information

Full Name: Svetlena Taneva Metzger
Email Address: s.tanevametzger@northeastern.edu

Instructor Biography

I am a Professor at Northeastern University's College of Engineering, and previously I've spent over 15 years immersed in the world of user research, cognitive engineering, human factors-informed design, and usability evaluations. My specialty knowledge areas include user research, application of UXD to Healthcare IT, medical device regulation, and AI in UX Design. My international experience spans Canada, the U.S., France, Germany, and Switzerland. I've also had the privilege of being a frequent public speaker at international symposiums.

Teaching Assistant Information

Full Name: Vidhi Patel
Email Address:patel.vidhi3@northeastern.edu
Office Hours: By appointment

Course Prerequisites

CSYE7280 or a similar general UX/HCI course; good working knowledge of Design Principles, User Experience Research & Design, and User Experience testing concepts.

Course Description

Health IT presents a very complex systems engineering challenge for environments where some technologies are highly regulated (e.g. medical devices), while other technologies are not (e.g. software). User experience for healthcare applications extends beyond satisfaction and efficiency to include safety - ensuring that people will not die as a result of poor UX design. The UX challenge is to inform design of the needs of a variety of stakeholders in clinical and non-clinical settings: across hospitals, homecare environments and on the move

while using mobile healthcare technology. In addition, factors related to regulation, organizational culture and political climate in healthcare, also influence technology implementation and adoption.

This course introduces the unique challenges of UX research, design and evaluation in a complex safety-critical domain, with a systems engineering perspective. Informs of regulations, standards, development processes, implementation and adoption considerations for health technology. This course will prepare students for the challenges UX professionals need to tackle when working on healthcare applications. Offers students an opportunity to build the necessary skill sets to enter the competitive and highly specialized industry of healthcare IT.

Course Learning Outcomes

1. Apply User-Centred design and evaluation methodologies to healthcare UX projects.
2. Differentiate the UX regulatory pathways for various healthcare applications
3. Apply risk-based UX design strategies to engineer use-safety.
4. Identify UX design issues as root causes for use errors.
5. Assess healthcare application environments to inform UX design.
6. Prepare protocols for UX projects in healthcare
7. Develop and display critical thinking and analytical skills through hands-on assignments

Required Tools and Course Textbooks.

The readings associated with each weeks topics are mandatory. Students are expected to read the assigned chapters in articles in advance of each lecture. Students will need access to the full text of the following books:

1. Book 1 - *Fieldwork for Healthcare : Guidance for Investigating Human Factors in Computing Systems*. Morgan & Claypool, 2015, Furniss, Dominic., et al., editors.
2. Book 2 - *Fieldwork for Healthcare : Case Studies Investigating Human Factors in Computing Systems*. Morgan & Claypool, 2014, Furniss, Dominic., et al.
3. Book 3 - *Design for Health : Applications of Human Factors*. Academic Press, 2020, Sethumadhavan, Arathi, and Farzan Sasangohar, editors.
4. Book 4 - *Applied Human Factors in Medical Device Design*. Academic Press, 2019, Privitera, Mary Beth, editor.

Course Schedule/Topics Covered.

This course spans the following UX in Healthcare Applications topics:

- UX Process in healthcare topics:
    - Risk-based UX design
    - The role of UX in Patient safety
    - Human Factors engineering

- Systems engineering and human error
- Medical device usability engineering regulations
- Formative and Validation usability testing
- UX-informed procurement and implementation
- Ethical considerations

- UX Design topics: environmental considerations, persuasive design, software UI design guidelines, anthropometry, design for communication in healthcare; design for critical care, emergencies, collaboration, cognitive support, self-care, older adults, etc.

The Technologies discussed in the context of the above process and design topics include Medical Devices, Computerized Provider Order Entry, Medication Safety technologies, Mobile Health, General Wellness products, etc.

Week	Topics	Readings
WEEK1 Sept. 4	Meet and greet the students and professor; overview of course and policies Topics: UX vs. Healthcare UX, Types of Health IT	--------
WEEK 2 Sept. 11	Topics: UX methods refresher, Human Factors, Systems thinking, Case study *In-class exercise*	Book 3: Chapter-3 Reading articles (TBA)
WEEK 3 Sept. 18	Topics: Patient Safety, EHRs, FMEA *In-class exercise* *Assignment 1 given out*	Book 3: Chapter-1 Book 4: Chapter-12 FMEA Guidance
WEEK 4 Sept. 25	Topics: Overview of health IT classification, Software UI design guidelines *In-class exercise*	Reading articles (TBA)
WEEK 5 Oct. 2	Topics: UX Regulations for Medical Devices, Environmental design factors, Formative evaluations *In-class exercise* *Assignment 2 given out*	Book 4: Chapter-5 and Chapter-10 Reading articles (TBA)
WEEK 6 Oct. 2	Exam 1	---------

WEEK 7 Oct. 9	Topics: Computerized Provider Order Entry, Medication safety, Mobile health, Persuasive design *In-class exercise*	Book 3: Chapter-2 and Chapter-5 Book 4: Chapter-11
WEEK 8 Oct. 16	Topics: Use errors and Root Cause Analysis; Practical challenges of doing UX engineering in healthcare – Ethics considerations *In-class exercise* *Assignment 3 given out*	Book 1: Chapter 1 Book 2: Chapter 4 Book 4: Chapter-13
WEEK 9 Oct. 23	Topics: Validation testing, Communication in healthcare and implications for UX design; Case study *In-class exercise* *Presentation topics and Team formation*	Book 3 – Chapter 6 and Chapter 10 Book 4: Chapter 15
WEEK 10 Oct. 30	Topics: Reporting, Health IT Procurement and Implementation; Case studies	Reading articles (TBA) Book 3: Chapter 13 Book 4: Chapter 17
WEEK 11 Nov. 6	Exam 2 Overview of work for the rest of the semester	Book 4: Chapter 14
STUDENT PRESENTATIONS		
WEEK 12-14 Nov. 13, 20 Dec. 4 (Nov. 27 no class)	Topics: 1. various topics researched and presented in teams 2. Other topics/Guest speaker	Book 2 – various chapters Book 3 – various chapters Book 4 – various chapter HE75 – various topics HF Healthcare journal - various topics
Week 15 Dec 11	Exam 3 Topics: Beyond healthcare: Case study from aviation	

Grading

In-class participation and exercises	35%
Three exams	30%
Assignments	20%
In-class Presentation	15 %

Grading Scale

	87-89.9% B+	77-79.9% C+	
95-100% A	84-86.9% B	74-76.9% C	
90-94.9% A-	80-83.9%B-	70-73.9% C-	69.9% or below F

Plagiarism Policy

When there is evidence that a student has committed plagiarism, copied the work of others, allowed others to copy their work, cheated on an exam, altered class material or scores, or has inappropriate possession of exams, or sensitive material, the incident will be investigated. The consequences for academic dishonesty are severe and that will include a straight F in the course with the potential for dismissal.

The following rules apply to anything you hand in for a grade:

- You may not copy anyone else's work under any circumstances - this includes online and AI sources.
- You may not use any automated or AI tools to generate your assignments or any other material that you're turning for a grade, in whole or in part, unless an assignment specifically allows you to use these tools.
- You may not permit any other student to see any part of your individual assignments.
- You may not permit yourself to see any part of another student's individual assignment.
- You make use online resources as part of your coursework but you may not copy from online sources. If you get an idea of how to solve a problem from an online source, include a short citation in your submission.
- Use of AI resources and posting on forums is not permitted.
- The only exception to the above rules is that you may collaborate with students in your group for assignments classed as group assignment – almost all labs for example will be completed in groups.

Attendance/Late Work Policy

Attendance Policy

Students registered in MGEN courses (INFO, CSYE, and DAMG) are allowed **a maximum of 2 absences per course, with 3 or more absences resulting in an automatic 'F' for that course.** Students are expected to inform their instructors of any absences in advance of the class; if a student is sick long-term or experiences a medical issue that prevents class attendance, it is strongly encouraged that they speak

with their Academic Advisor (coe-mgen-gradadvising@northeastern.edu) to learn more about the Medical Leave of Absence. Should a student anticipate being unable to attend 3 or more classes, they should discuss their situation with their Academic Advisor to explore other types of leave in accordance with the University's academic and global entry expectations. International students should review the Office of Global Services webpage to understand their visa compliance requirements.

Teaching Assistants (TAs) or Instructional Assistants (IAs) will be present at each class to collect student attendance.

Late Work Policy

Students must submit assignments by the deadline in the time zone noted in the syllabus. Students must communicate with the faculty prior to the deadline if they anticipate work will be submitted late. Work submitted late without prior communication with faculty will not be graded.

End-of-Course Evaluation Surveys
Your feedback regarding your educational experience in this class is particularly important to the College of Engineering. Your comments will make a difference in the future planning and presentation of our curriculum.

At the end of this course, please take the time to complete the evaluation survey at **https://neu.evaluationkit.com**. Your survey responses are **completely anonymous and confidential**. For courses 6 weeks in length or shorter, surveys will be open one week prior to the end of the courses; for courses greater than 6 weeks in length, surveys will be open for two weeks. An email will be sent to your Northeastern University Mail account notifying you when surveys are available.

Academic Integrity
A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.

As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. Northeastern University expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this Code or by the direction of instructors.

Go to http://www.northeastern.edu/osccr/academic-integrity-policy/ to access the full academic integrity policy.

MGEN Student Feedback
Students who would like to provide the MGEN unit with anonymous feedback on this particular course, Teaching Assistants, Instructional Assistants, professors, or to provide general feedback regarding their program, may do so using this survey: https://neu.co1.qualtrics.com/jfe/form/SV_cTIAbH7ZRaaw0Ki

University Health and Counseling Services
As a student enrolled in this course, you are fully responsible for assignments, work, and course materials as outlined in this syllabus and in the classroom. Over the course of the semester if you experience any health issues, please contact UHCS.

For more information, visit https://www.northeastern.edu/uhcs.

Student Accommodations
Northeastern University and the Disability Resource Center (DRC) are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations through the DRC, students must provide appropriate documentation that demonstrates a current substantially limiting disability.

For more information, visit https://drc.sites.northeastern.edu.

Library Services
The Northeastern University Library is at the hub of campus intellectual life. Resources include over 900,000 print volumes, 206,500 e-books, and 70,225 electronic journals.

For more information and for education specific resources, visit https://library.northeastern.edu
Network Campus Library Services: Northeastern University Library Global Campus Portals

24/7 Canvas Technical Help
For immediate technical support for Canvas, call 617-373-4357 or email help@northeastern.edu

Canvas Student Resources: https://canvas.northeastern.edu/student-resources/

For assistance with my Northeastern e-mail, and basic technical support:
Visit ITS at https://its.northeastern.edu
Email: help@northeastern.edu
ITS Customer Service Desk: 617-373-4357

Diversity and Inclusion
Northeastern University is committed to equal opportunity, affirmative action, diversity, and social justice while building a climate of inclusion on and beyond campus. In the classroom, members of the University community work to cultivate an inclusive environment that denounces discrimination through innovation, collaboration, and an awareness of global perspectives on social justice.

Please visit http://www.northeastern.edu/oidi/ for complete information on Diversity and Inclusion

Title IX

Title IX of the Education Amendments of 1972 protects individuals from sex or gender-based discrimination, including discrimination based on gender-identity, in educational programs and activities that receive federal financial assistance.

Northeastern's Title IX Policy prohibits Prohibited Offenses, which are defined as sexual harassment, sexual assault, relationship or domestic violence, and stalking. The Title IX Policy applies to the entire community, including male, female, transgender students, faculty, and staff.

In case of an emergency, please call 911.

*Please visit **https://www.northeastern.edu/ouec** for a complete list of reporting options and resources both on- and off-campus*.