SI 554 / HBHE 654: Consumer Health Informatics

University of Michigan School of Information
Winter 2019 – Mondays, 5:30-8:30 pm
2255 NQ

INSTRUCTOR

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Role</th>
<th>Office Hours</th>
<th>Location</th>
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<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Tiffany</td>
<td>Professor</td>
<td>Tuesdays, 2:30 – 3:30 pm or by appointment</td>
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COURSE OVERVIEW

Consumer health informatics (CHI) is a rapidly-expanding area of informatics practice, with career opportunities emerging in the public, non-profit and private sectors. Broadly, the field aims to give individual health care consumers, as well as their families and communities, the information and tools that they need to help them become more involved in their health and health care. In this course, students will become familiar with a range of CHI applications, including the needs/problems that the applications address, their theoretical bases, and their designs. Building on this prior CHI work, students will acquire an ability to evaluate existing applications, to use design techniques and skills for ideation, and to generate theory-informed design and implementation strategies for CHI applications. Students will also learn to assess the needs and technological practices of potential users, with a particular focus on groups that experience health and information access disparities.

LEARNING OBJECTIVES

1. Compare and evaluate a range of consumer health informatics (CHI) applications.
2. Assess consumers’ health-related needs, resources and technology-oriented practices, and evaluate their implications for CHI applications.
3. Develop guidelines and recommendations for addressing identified needs using consumer technologies.
4. Develop a commitment to CHI practice with diverse user groups.
5. Understand and apply design methods and skills, including brainstorming, sketching techniques, personas and scenarios.

MHI CORE VALUES

This course is designed in part to reflect the following core values of the MHI program. According to these values, graduates of the program will:

- Be committed to meeting diverse needs and reducing disparities.
- Appreciate the difference between what is possible and what is needed.
- Recognize the importance of understanding the communities and organizations where individuals live and work.
Innovate and lead.

MHI COMPETENCIES

This course helps students to achieve the following MHI Program Competencies:

- Assess the needs and resources of individuals, organizations, and communities where individuals live and work to ensure that information technology deployed to improve health will sustainably meet these needs.
- Appropriately utilize theories of individual behavior, social science, health management, and organizational change in the design and implementation of socio-technical interventions.
- Develop socio-technical interventions that fit to context for successful deployment in health settings.

COURSE RESOURCES

There are assigned readings drawn from a range of sources. Course readings and other resources are delivered via the University of Michigan Canvas course management system (or the World Wide Web). The Files folder in Canvas contains copies of the weekly course readings, located in subfolders labelled by week number.

Separate Canvas folders include tools for submitting assignments and other facilities. The most current copy of this document, the Course Syllabus, also resides on the Canvas site.

All course materials are provided in electronic form under the "fair use" copyright exemption. This means that you may not redistribute copies of class readings outside the class. For more information see "Copyright at the University of Michigan: For Students."

OVERVIEW OF ASSIGNMENTS

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Class #</th>
<th>Date</th>
<th>Value (% of final grade)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHI application critique (Individual Assignment)</td>
<td>Class 5</td>
<td>Feb 18</td>
<td>20%</td>
</tr>
<tr>
<td>Designing for Diversity Project (Group Assignment)</td>
<td>Class 7 or 8</td>
<td>Mar 11 or Mar 18</td>
<td>20%</td>
</tr>
<tr>
<td>Needs assessment and gap analysis (Group Assignment – part 1)</td>
<td>Class 10</td>
<td>Apr 1</td>
<td>20%</td>
</tr>
<tr>
<td>Lightning Talk re: a new CHI intervention/application (Group Assignment – part 2a)</td>
<td>Class 13</td>
<td>Apr 22</td>
<td>30%</td>
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<tr>
<td>Proposal for a new CHI intervention/application, including sketches and wireframes (Group Assignment – part 2b)</td>
<td>Class 13</td>
<td>Apr 22</td>
<td></td>
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<tr>
<td>Participation</td>
<td>Class 13</td>
<td>Apr 22</td>
<td>10%</td>
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Assignment Format

Assignments should be written in a 12 point font on letter-sized paper with one inch margins. All papers should be double-spaced – with the exception of the “Design Principles” document developed for the Designing for Diversity assignment – you can use the fonts and spacing that you wish for that assignment. If citations are included, please use American Psychological Association (APA) style guidelines for citing materials used in your assignments. The style guide can be found online at: http://owl.english.purdue.edu/owl/resource/560/01/.

Please submit your assignments in Microsoft Word format. Please name your Word file beginning with your surname. For group assignments, please use surname(s) in alphabetical order, followed by the assignment title (e.g., Williams_CHI_Application_Critique.docx).

Late assignments
Assignments that are submitted late will lose 2/3 of a letter grade on the first day that an assignment is late. After that, 1/3 of a letter grade will be deducted for each day the assignment is late, up to two whole letter grades. Students may request an extension but they must contact me 24 hours in advance and give a valid reason why they are late.

Grade reconsideration
I make every effort to apply grading criteria objectively and fairly. However, if you believe the grade you received on an assignment is inappropriate, you may ask to have your grade reconsidered. To do so, you must explain in an email to your instructor why you feel your work deserves re-grading. You should provide details and point to specifics in the assignment that you feel merit a higher grade. Requesting a grade reconsideration does not ensure that your grade will change, but your arguments will be carefully considered. Note: one of three outcomes is possible: your grade may be raised, it may remain the same, or it may be lowered.

GRADING

Drawing from the Master’s Student Handbook, all assignments will be graded as follows:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Points</th>
<th>Interpretation</th>
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<tbody>
<tr>
<td>A+</td>
<td>90-100</td>
<td>Extraordinary achievement. Rarely given.</td>
</tr>
<tr>
<td>A</td>
<td>85-89</td>
<td>Consistently distinguished performance in all course aspects, such qualities as analytical ability, creativity, and originality are exhibited at a very high level.</td>
</tr>
<tr>
<td>A-</td>
<td>80-84</td>
<td>Strong, solid achievement in most aspects of the work.</td>
</tr>
<tr>
<td>B+</td>
<td>77-79</td>
<td>Good performance. Consistent with performance expected of students in a graduate degree program.</td>
</tr>
<tr>
<td>B</td>
<td>73-76</td>
<td>Acceptable.</td>
</tr>
<tr>
<td>B-</td>
<td>70-72</td>
<td>Borderline.</td>
</tr>
<tr>
<td>C+</td>
<td>67-69</td>
<td>Poor performance. This is a marginal grade which alerts students to their limited performance in a particular course.</td>
</tr>
<tr>
<td>C</td>
<td>63-66</td>
<td>Very poor performance.</td>
</tr>
</tbody>
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COURSE POLICIES

Academic Integrity
Unless otherwise specified in an assignment all submitted work must be your own, original work. Any excerpts, statements, or phrases from the work of others must be clearly identified as a quotation, and a proper citation provided. Any violation of the School's policy on Academic and Professional Integrity (stated in the Master’s and Doctoral Student Handbooks) will result in serious penalties, which might range from failing an assignment, to failing a course, to being expelled from the program. Violations of academic and professional integrity will be reported to UMSI Student Affairs. Consequences impacting assignment or course grades are determined by the faculty instructor; additional sanctions may be imposed by the Associate Dean for Academic and Student Affairs.

Accommodations for Students with Disabilities
If you think you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course, the assignments, the in-class activities, and the way we teach may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Office of Services for Students with Disabilities (SSD) to help us determine appropriate accommodations. SSD (734-763-3000; ssd.umich.edu/) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. I will treat any information that you provide in as confidential a manner as possible.

Student Mental Health and Wellbeing
The University of Michigan is committed to advancing the mental health and wellbeing of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact Counseling and Psychological Services (CAPS) at (734) 764-8312 and https://caps.umich.edu/ during and after hours, on weekends and holidays, or through its counselors physically located in schools on both North and Central Campus. You may also consult University Health Service (UHS) at (734) 764-8320 and https://www.uhs.umich.edu/mentalhealthsvcs, or for alcohol or drug concerns, see www.uhs.umich.edu/aodresources.

For a listing of other mental health resources available on and off campus, visit: http://umich.edu/~mhealth/

Definition of Consumer Health Informatics used in this course

This course uses the following definition of “consumer health informatics”:

“Any electronic tool, technology or system that is:

1. primarily designed to interact with health information users or consumers (anyone who seeks or uses healthcare information for nonprofessional work),
(2) interacts directly with the consumer who provides personal health information to the CHI system and receives personalized health information from the tool, application or system, and

(3) is one in which the data, information, recommendations, or other benefits the consumer, may be used in coordination with a healthcare professional but is not dependent on a healthcare professional.”

(Gibbons et al, 2011)

All technologies evaluated or proposed as a part of assignments in the course should conform to this definition.

Acknowledgements. Thank you to Johmarx Patton, MD, MHI for his assistance in preparing this syllabus.
Course Schedule

Class 1 (Jan. 14) – Course Introduction

Learning Objectives:
- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Develop guidelines and recommendations for addressing identified needs using consumer technologies.
- Define and conceptualize interaction design.

Class Preparation

Study Question(s):
- What impacts have CHI applications had, and for whom?
- What needs are not met, and what can we do about it?
- What is interaction design?

Theory and Research


Techniques


Technology Background (Optional)
- Inside your computer (4:11) - https://www.youtube.com/watch?v=AkFi90lZmXA&index=16&list=PL45DD1CA57AA3122A
- How Does the Internet Work? (5:37) - https://www.youtube.com/watch?v=i5oe63pOhLI
- How Does Wi-Fi Work? (3:59) - https://www.youtube.com/watch?v=xmabFJUKMdq

Advanced Resources (Optional)


Webb, T.L., Joseph, J., Yardley, L., Michie, S. (2010). Using the internet to promote health behavior change: a systematic review and meta-analysis of the impact of theoretical basis, use of

Jan. 21 – NO CLASS – MARTIN LUTHER KING DAY
Class 2 (Jan. 28) – *Health behavior change, part 1 (Theory of Planned Behavior/Integrated Behavioral Model)*

**Learning Objectives:**

- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Develop guidelines and recommendations for addressing identified needs using consumer technologies.
- Evaluate consumer health applications using the basic principles of interaction design.

**CLASS PREPARATION**

**Study Question(s):**

- What TRA/TPB/IBM-related behavior change techniques are used in each of the two case study systems?
- Are any behavior change techniques shared between the two systems? Which behavior change techniques are not shared?
- How are any shared behavior change techniques implemented in each system?

**Theory and Research**


**Techniques**


**Technology Background (Optional)**

- Cell phone design (4:01): [https://www.youtube.com/watch?v=z7r8sKzt7HM](https://www.youtube.com/watch?v=z7r8sKzt7HM)

**Cases/Examples**

**Get Active!**

- Imperative Health application [Slide deck]

**Computerized Simulation in Promoting Walking in Individuals with Diabetes**

  - To see the Simulation, see Multimedia Appendix 1 and Multimedia Appendix 2.
Class 3 (Feb. 4) – Health behavior change, part 2 (Socio-cognitive theory)

Learning Objectives:
- Develop guidelines and recommendations for addressing identified needs using consumer technologies.
- Evaluate consumer health technologies using cognitive walkthrough methods.

CLASS PREPARATION

Study Question(s):
- What SCT-related behavior change techniques are used in each of the two case study systems?
- Are any behavior change techniques shared between the two systems? Which behavior change techniques techniques are not shared?
- How are any shared behavior change techniques implemented in each system?

Theory and Research

Techniques

Technology Background (Optional)

Cases/Examples
Watch, Discover, Think, and Act
- Watch, Discover, Think, Act Screens [Slide deck]

Text2Quit
- Text2Quit application: http://www.text2quit.com

Advanced Resources (Optional)
Class 4 (Feb. 11) – Health behavior change, part 3 (Self-regulation and Goal Setting)

Learning Objectives:

- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Develop guidelines and recommendations for addressing identified needs using consumer technologies.
- Understand and apply design methods and skills.

CLASS PREPARATION

Study Question(s):

- What does the van der Weegen et al. case study, “It’s LiFe!” suggest about the ways in which user requirements for feedback can vary? Given this, what decisions do we need to make when designing feedback as an intervention component in a CHI application?
- What does the ManUp case study tell us about the design of goals for user engagement?

Theory and Research


Techniques


Technology Background (optional)

Graphical User Interfaces: Crash Course: https://www.youtube.com/watch?v=XIGSJshYb90

Cases/Examples

“It’s LiFe!”


ManUp

- Duncan M., et al.(2014). Effectiveness of a Web- and Mobile Phone-Based Intervention to Promote Physical Activity and Healthy Eating in Middle-Aged Males: Randomized Controlled Trial of the ManUp Study. J Med Internet Res. 16(6):e136. URL:
- Video tour of ManUp Intervention: http://www.youtube.com/watch?v=m14DamHndl8
Class 5 (Feb. 18) – *Health behavior change, part 4 (Games for Health)*

- **Assignment due:** CHI Application Critique (20%)

**Learning Objectives:**
- Understand and apply design methods and skills, including sketching techniques.
- Compare and evaluate a range of consumer health informatics (CHI) applications.

**CLASS PREPARATION**

**Study Question(s):**
- What did the two case studies tell us about the effective design of games for health?
- How can one apply gamification principles to the design of consumer health informatics applications? How was this accomplished in the case studies?

**Theory and Research**


**Techniques**


**Technology Background (optional)**

How it’s Made: Video Games (5:40) - https://www.youtube.com/watch?v=PYNftj1DNKc

**Cases/Examples**


**Advanced Resources**

Class 6 (Feb. 25) – Awareness and Feedback, part 1 (Self-monitoring)

Learning Objectives:
- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Assess consumers’ health-related needs, resources and technology-oriented practices, and evaluate their implications for CHI applications.
- Develop guidelines and recommendations for addressing identified needs using consumer technologies.

CLASS PREPARATION

Study Question(s):
- For consumers and patients, what are the effects of self-monitoring?
- What methods are there for measuring neuropsychiatric illnesses via sensors?

Theory and Research


Techniques

Technology Background (Optional)
Introduction to Sensors - Macro and Micro-size (13:33): https://www.youtube.com/watch?v=kvy-a5nDgJQ

Cases/Examples
MONARCA

Advanced Resources (Optional)


March 4 – NO CLASS – SPRING BREAK

Class 7 (Mar. 11) – Designing CHI for Diverse Populations, part 1

- Assignment due (for some groups): Designing for Diversity presentations (20%)

Learning Objectives:
- Develop guidelines and recommendations for addressing identified needs using consumer technologies.
- Develop a commitment to CHI practice with diverse user groups.
- Assess consumers’ health-related needs, resources and technology-oriented practices, and evaluate their implications for CHI applications.

CLASS PREPARATION

Study Question(s):
- In the DIMA case, what did the designers do to address the fact that their intended users had low literacy? How might those decisions have been different if literacy were not a concern?

Theory and Research

Technology Background (Optional)
How do Digital Cameras Work? (5:40) - https://www.youtube.com/watch?v=Ic0czeUJrGE
How Barcodes Work (4:12) - https://www.youtube.com/watch?v=e6aR1k-ympo

Techniques

Cases/Examples
Dietary Intake Monitoring Application (DIMA)

IN-CLASS ACTIVITY

Discussion questions to think as you listen to the student presentations:
- Which populations have similar design principles? Why are they similar?
- What aspects of design of CHI applications varied depending on the audience?
Class 8 (Mar. 18) – *Designing CHI for Diverse Populations, part 2*

- **Assignment due (for some groups):** Designing for Diversity presentations (20%)

**Learning Objectives:**
- Develop guidelines and recommendations for addressing identified needs using consumer technologies.
- Develop a commitment to CHI practice with diverse user groups.
- Understand and apply design methods and skills, including personas.

**CLASS PREPARATION**

**Study Question(s):**
- What are personas, and how are they used in the design of technologies?

**Theory and Research**


Techniques


**Technology Background (Optional)**


**Advanced Resources (Optional)**


**IN-CLASS ACTIVITY**

Discussion questions to think as you listen to the student presentations:
- Which populations have similar design principles? Why are they similar?
- What aspects of design of CHI applications varied depending on the audience?
Class 9 (Mar. 25) – Awareness and Feedback, part 2 (Remote monitoring)

Learning Objectives:
- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Assess consumers’ health-related needs, resources and technology-oriented practices, and evaluate their implications for CHI applications.
- Develop guidelines and recommendations for addressing identified needs using consumer technologies.
- Understand and apply design methods and skills, including sketching techniques, personas and scenarios.

CLASS PREPARATION

Study Question(s):
- According to the Speedie reading, what are the assumptions behind our current healthcare delivery model that can be challenged by telehealth?
- What was being measured in the two case studies from this week’s readings?
- What was patient adherence and experience like, and why?
- What decision rules were used to identify a need for clinician action?
- When were alarms sent, to whom were they sent, and what messages were provided?

Theory and Research

Techniques

Cases/Examples
Scherr, et. al. (2009). Effect of home-based telemonitoring using mobile phone technology on the outcome of heart failure patients after an episode of acute decompensation: Randomized controlled trial. Journal of Medical Internet Research, 11(3), e34. doi:10.2196/jmir.1252


Advanced Resources (Optional)
Class 10 (Apr. 1) – Awareness and Feedback, part 3 (Personal Health Records)

- Assignment due: Needs assessment and gap analysis (20%)

Learning Objectives:
- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Assess consumers’ health-related needs, resources and technology-oriented practices, and evaluate their implications for CHI applications.
- Understand and apply design methods and skills, including wireframing.

CLASS PREPARATION

Study Question(s):
- Evaluate HealthVault for comprehensiveness of coverage, connectivity to clinical systems, usability, ability to support patients' self-management activities, and privacy/security.

Theory and Research


Techniques


Technology Background (Optional)
An Introduction to XML: The Basics Part 1 (8:01) - [https://www.youtube.com/watch?v=Q0k5ySZGPBc&list=FL_7oT1q4GCN-q1EOaxolqzw&index=6](https://www.youtube.com/watch?v=Q0k5ySZGPBc&list=FL_7oT1q4GCN-q1EOaxolqzw&index=6)

Cases/Examples
Microsoft HealthVault
- HealthVault in Action [YouTube video] (5:56) - [http://www.youtube.com/watch?v=ri123bhhMtq](http://www.youtube.com/watch?v=ri123bhhMtq)

Advanced Resources (Optional)
Overview of the Continuity of Care Record (CCR) XML Schema (9:49) - https://www.youtube.com/watch?v=w4Yb9zpZBCo

Learning Objectives:
• Compare and evaluate a range of consumer health informatics (CHI) applications.
• Assess consumers’ health-related needs, resources and technology-oriented practices, and evaluate their implications for CHI applications.

CLASS PREPARATION

Study Question(s):
• How might peer-to-peer communication between patients benefit them? What potentially negative effects might there be, if any?
• What does PatientsLikeMe do to encourage commitment amongst its members?
• What does PatientsLikeMe do to encourage contributions by its members?


Techniques

Cases/Examples
PatientsLikeMe
• Frost, J. H., & Massagli, M. P. (2008). Social uses of personal health information within PatientsLikeMe, an online patient community: what can happen when patients have access to one another’s data. Journal of Medical Internet Research, 10(3). URL: http://www.jmir.org/2008/3/e15/
• Application: http://www.patientslikeme.com/

Advanced Resources (Optional)


Class 12 (Apr. 15) – Online social networks and community informatics, part 2
(Social networks and social support)

- Assignment due: Lightning talks and Proposal for a new CHI intervention/application (30%)
- Assignment due: Submit your participation self-assessment (10%)

Learning Objectives:
- Assess consumers’ health-related needs, resources and technology-oriented practices, and evaluate their implications for CHI applications.
- Develop guidelines and recommendations for addressing identified needs using consumer technologies.

CLASS PREPARATION

Study Question(s):
- What specific features did the creators of HealthWeaver include in their system so as to increase the amount of social support that cancer patients receive (“enacted support”)? How might those features help to increase enacted social support?
- Do you think any of the features of the system might help to increase perceptions of available support? If so, what are they and how do they work?
- How can designers of social networking technologies make it easier for patients to understand what information they are sharing, and with whom?

Theory and Research


Techniques

Cases/Examples
HealthWeaver
- Pratt, Wanda. Video lecture on HealthWeaver: http://vimeo.com/20480876

Technology Background (Optional)
The History of Social Media (9:31) - https://www.youtube.com/watch?v= cw0jRD7mn1k
Class 13 (Apr. 22) – Lightning Talks and Course Conclusion

SUPPLEMENTARY READINGS (Optional)

The Future of Consumer Health Informatics

Novel approaches to home and health sensors - [https://www.youtube.com/watch?v=BH0qm_67LJA](https://www.youtube.com/watch?v=BH0qm_67LJA)


Rock Health - Meet the 2019 Top 50 in Digital Health Honorees - [http://www.top50indigitalhealth.com/](http://www.top50indigitalhealth.com/)