SI 554 / HBHE 654: Consumer Health Informatics

University of Michigan School of Information
Winter 2014 – Mondays, 5-8 pm
Location TBD
online at: http://ctools.umich.edu
email list: si554-hbhe654-w14@ctools.umich.edu

INSTRUCTOR

Instructor	Role	Office Hours	Location	Email	Phone
Dr. Tiffany Veinot	Professor	Tuesdays, 2-3 pm or by appointment	4429 North Quad	tveinot@umich.edu	734-615-8281

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, their technical architectures, and relevant evaluation results. Building on this prior CHI work, students will acquire an ability to evaluate existing applications, 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, and to select appropriate evaluation approaches based on an application's technological maturity.

LEARNING OBJECTIVES

1. Compare and evaluate a range of consumer health informatics (CHI) applications.
2. Generate CHI design and implementation principles and guidelines that incorporate theories from the behavioral, social and environmental sciences.
3. Assess consumers' health-related needs, resources and technology-oriented practices, and evaluate their implications for CHI applications.
4. Plan the design, implementation and evaluation of a new, theory-informed CHI application to address the health need(s) of a particular audience.
5. Develop a commitment to CHI practice with diverse user groups.

HBHE COMPETENCIES

This course provides training towards the following HBHE competencies:

2f) Understand the merits of using theory to inform interventions and their evaluation in public health.

4c) Understand and appropriately apply the major types of evaluation (e.g. formative, outcome, process).

5a) Identify, explain, and apply the appropriate intervention strategy (e.g. policy advocacy, mass media, community organizing, social marketing, one on one counseling) to specific health problems and conditions.

5b) Identify, explain, and apply the appropriate level of intervention (e.g. individual, family, community, policy).

5c) Apply evidence-based approaches to the development and evaluation of public health programs.

6d) Design, implement, and evaluate culturally appropriate interventions for diverse individuals and communities.

COURSE RESOURCES

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

Separate CTools folders include tools for submitting assignments and other facilities. The most current copy of this document, the Course Syllabus, also resides on the CTools site. CTools maintains an archive of all email messages sent to the entire class.

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

Assignment	**Class #**	**Date**	**Value (% of final grade)**
CHI application critique *(Individual Assignment)*	Class 6	Feb. 24	20%
Designing for Diversity Project *(Paired or Group Assignment)*	Class 5, 6, 7, 8, 9, 10 or 11	Feb. 17 - Apr. 7, 2014	20%
Needs assessment and gap analysis *(Group Assignment – part 1)*	Class 9	Mar. 24, 2014	25%
Proposal for a new CHI intervention/application and Lightning Talk (Group Assignment – part 2)	Class 13		25%
Participation *(Individual Assessment)*	Class 13		10%

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. 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 Adobe pdf format. Please name your pdf 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.pdf).

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:

Letter Grade	Points	Interpretation
A+	90-100	Extraordinary achievement. Rarely given.
A	85-89	Consistently distinguished performance in all course aspects, such qualities as analytical ability, creativity, and originality are exhibited at a very high level.
A-	80-84	Strong, solid achievement in most aspects of the work.
B+	77-79	Good performance. Consistent with performance expected of students in a graduate degree program.
B	73-76	Acceptable.
B-	70-72	Borderline.
C+	67-69	Poor performance. This is a marginal grade which alerts students to their limited performance in a particular course.
C	63-66	Very poor performance.
C-	60-62	Minimal. Performance not at a graduate student level. Student should review his/her progress in the program with the associate dean for academic affairs.

Earning an A+
If you have already earned an A in the course based on coursework, you may apply to receive an A+. This grade may be granted for varied reasons, such as: significant assistance of other students, contributing materials to the class, outstanding effort, or coursework that far exceeds expectations. To apply, please write a one-page justification for your receipt of an A+ in the course, and e-mail it to the instructor by the last day of class.

COURSE POLICIES

Academic Integrity
Unless otherwise specified in an assignment, all submitted work must be your own, original work. Any excerpts 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 Student Handbook) will result in severe penalties, which might range from failing an assignment, to failing a course, to being expelled from the program, at the discretion of the instructor and the Associate Dean for Academic Affairs.

Accommodations for Students with Disabilities
If 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; http://www.umich.edu/sswd/) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. I will treat any information you provide as confidential.

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

COURSE SCHEDULE

Class 1 (Jan.13) – *Course Introduction*

Learning Objectives:

- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Develop a commitment to CHI practice with diverse user groups.

CLASS PREPARATION

Study Question(s):

- What are the major types of consumer health informatics (CHI) applications?
- What impacts have CHI applications had, and for whom?

Theory and Research

Gibbons, M.C. (2011) Consumer health informatics: results of a systematic evidence review and evidence based recommendations. *Translational Behavioral Medicine*, 1(1), 72-82.

Hesse, B. W., Hansen, D., Finholt, T., Munson, S., Kellogg, W., & Thomas, J. C. (2010). Social participation in Health 2.0. *Computer*, 43(11), 45-52.

Cases/Examples

Braunstein ML. (2013). Chapter 6: Empowering the Patient. *Health Informatics in the Cloud.* (pp. 67-79). New York, NY: Springer.

Techniques

Smith, K. (2013). Chapter 1: Who are Digital Outcasts? *Digital Outcasts: Moving Technology Forward Without Leaving People Behind.* (pp. 1-21). San Diego: Morgan Claypool, 2013.

Advanced Resources (Optional)

Gibbons, M.C., Wilson, R.F., Samal, L., Lehmann, C.U., Dickersin, K., Lehmann, H.P., et al. (2009*) Impact of consumer health informatics applications*. Rockville, MD: Agency for Healthcare Research and Quality. Available: http://www.ahrq.gov/research/findings/evidence-based-reports/er188-abstract.html

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 behavior change techniques, and mode of delivery on efficacy. Journal of Medical Internet Research, 12(1), e4. Available: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2836773/

Jan. 20 – NO CLASS – Martin Luther King Day

Class 2 (Jan. 27) – *Health behavior change, part 1*

- Guest speaker: Victor Strecher, University of Michigan

Learning Objectives:

- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Generate CHI design and implementation principles and guidelines that incorporate theories from the behavioral, social and environmental sciences.

CLASS PREPARATION

Study Question(s):

- How can one apply the Theory of Reasoned Action (TRA)/Theory of Planned Behavior (TPB)/Integrated Behavioral Model (IBM) to the design of consumer health informatics applications? How was this accomplished in the case study?

Theory and Research

Montano, D. E., & Kasprzyk, D. (2008). Chapter 4. Theory of Reasoned Action, Theory of Planned Behavior, and the Integrated Behavioral Model. In K. Glanz, B. K. Rimer & K. Viswanath (Eds.), *Health Behavior and Health Education: Theory, Research and Practice* (4th ed., pp. 67-96). San Francisco, CA: Jossey-Bass.

Cases/Examples

Get Active!

- Hurling, R., Hayet, C.M., De Boni, M., Fairley, B.W., Hurst, T., Murray, P., Richardson, A., Sodhi, J.S. (2007). Using Internet and Mobile Phone Technology to Deliver an Automated Physical Activity Program: Randomized Controlled Trial. *Journal of Medical Internet Research*, 9(2), e7, URL: http://www.jmir.org/2007/2/e7/.
- Hayet, C.M., Hurling, R., Newby, B.P., Patel, S. (2005). Method and apparatus for assisting behavioural change. US Patent 8,150,707. Available: https://docs.google.com/viewer?url=patentimages.storage.googleapis.com/pdfs/US8150707.pdf **(skim)**
- Commercialized version: http://www.imperativehealth.com/

Techniques

Abraham C, Michie S. (2008). A taxonomy of behavior change techniques used in interventions. *Health Psychology*, 27(3), 379-87.

Advanced Resources (Optional)

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211.

Fishbein, M. and Yzer, M. C. (2003). Using Theory to Design Effective Health Behavior Interventions. *Communication Theory,* 13: 164–183.

National Cancer Institute. (2005) *Theory at a glance: A Guide for Health Promotion Practice*. (2nd ed.) Bethsda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute.

Class 3 (Feb. 3) – *Health behavior change, part 2*

Learning Objectives:

- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Generate CHI design and implementation principles and guidelines that incorporate theories from the behavioral, social and environmental sciences.

CLASS PREPARATION

Study Question(s):

- How can one apply Socio-cognitive theory (SCT) to the design of consumer health informatics applications? How was this accomplished in the case study?

Theory and Research

McAlister, A. L., Perry, C. L., & Parcel, G. S. (2008). Chapter 8. How individuals, environments, and health behaviors interact. Social cognitive theory. In K. Glanz, B. K. Rimer & K. Viswanath (Eds.), *Health Behavior and Health Education. Theory, Research and* Practice (4th ed., pp. 169-188). San Francisco, CA: Jossey-Bass.

Cases/Examples

Watch, Discover, Think, and Act

- Design
  - Bartholomew, L.K., et al. (2000). Watch, Discover, Think, and Act: a model for patient education program development. *Patient Education and Counseling,* 39, 253-268.
  - Shegog, R., et al. (2006). Asthma Management Simulation for Children: Translating Theory, Methods, and Strategies to Effect Behavior Change. *Simulation in Healthcare,* 1(3), 151-159.
  - *Watch, Discover, Think, Act* Screens [Slide deck]
- Evaluation
  - Shegog, R., Bartholomew, L. K., Parcel, G. S., Sockrider, M. M., Mâsse, L., & Abramson, S. L. (2001). Impact of a computer-assisted education program on factors related to asthma self-management behavior. *Journal of the American Medical Informatics Association,* 8(1), 49-61 **(skim)**
  - Bartholomew, L.K., et al. (2000). Watch, Discover, Think, and Act: a model for patient education program development. *Patient Education and Counseling,* 39, 253-268. **(skim)**

Techniques

Hekler, E.B., Klasnja, P., Froelich, J.E., Buman, M.P. (2013) Mind the Theoretical Gap: Interpreting, Using, and Developing Behavioral Theory in HCI Research. *Proceedings of the 2013 Conference on Human-Computer Interaction (CHI)*, April 27–May 2, 2013, Paris, 1-10.

Advanced Resources (Optional)

Bandura, A. (2004). Health Promotion by Social Cognitive Means. Health Education & Behavior, 31, 143–164.

Baranowski, T., Buday, R., Thompson, D.I., Baranowski, J. (2008) Playing for Real: Video Games and Stories for Health-Related Behavior Change. *American Journal of Preventive Medicine,* 34(1), 74-82.

Class 4 (Feb.10) – *Health behavior change, part 3*

- Guest speaker: Michael Hess, *Stepping Up to Health*, University of Michigan

Learning Objectives:

- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Generate CHI design and implementation principles and guidelines that incorporate theories from the behavioral, social and environmental sciences.

CLASS PREPARATION

Study Question(s):

- How can one apply Self-Regulation Theory (SRT) and goal setting to the design of consumer health informatics applications? How was this accomplished in the case study?

Theory and Research

Rothman, A.J., et al. (2010). Self Regulation and Behavior Change: Disentangling Behavioral Intention and Behavioral Maintenance. In Vohs, K. D., & Baumeister, R. F. (Eds.) Handbook of self-regulation: Research, theory, and applications. The Guilford Press.

Scheier, M.F., Carver. C.S. (2003). Goals and confidence as self-regulatory elements underlying health and illness behavior. In Cameron, L.D. and Leventhal, H. (Eds.) *The Self-Regulation of Health and Illness Behaviour*, London, UK: Routledge, 17-41.

Cases/Examples

Stepping Up to Health

- Richardson C, Mehari K, McIntyre L, Janney A, Fortlage L, Sen A, et al. (2007). A randomized trial comparing structured and lifestyle goals in an internet-mediated walking program for people with type 2 diabetes. *International Journal of Behavioral Nutrition and Physical Activity*, 4(1), 59-69.
- Log in to be provided to students

Techniques

Stephanidis, C., Akoumianakis, D., Sfyrakis, M., & Paramythis, A. (1998). Universal accessibility in HCI: Process-oriented design guidelines and tool requirements. *Proceedings of the 4th ERCIM Workshop on User Interfaces for all*, Stockholm, Sweden.

Advanced Resources (Optional)

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes,* 50(2), 248-287.

Fishbein, M., Triandis, H. C., Kanfer, F. H., Becker, M., Middlestadt, S. E., & Eichler, A. (2001). Factors influencing behavior and behavior change. *Handbook of health psychology.* (Baum, A., Revenson, T.A., Singer, J.E., eds.). Mahwah, NJ: Lawrence Erlbaum, 3-17.

Class 5 (Feb. 17) – *Tracking, Records and Remote Monitoring, part 1*

- Assignment due (for certain groups): Designing for Diversity project presentation (20%)

Learning Objectives:

- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Generate CHI design and implementation principles and guidelines that incorporate theories from the behavioral, social and environmental sciences.
- 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):

- For consumers and patients, what are the effects of self-monitoring?

Theory and Research

Klasnja, P., & Pratt, W. (2012). Healthcare in the pocket: Mapping the space of mobile-phone health interventions. *Journal of Biomedical Informatics*, 45(1), 184-198.

Webb, T. (2013). Self-Monitoring. In M. Gellman & J. R. Turner (Eds.), *Encyclopedia of Behavioral Medicine* (pp. 1748-1750). New York: Springer.

Wolfe, G. (2009). Know thyself: Tracking every facet of life, from sleep to mood to pain. *Wired,* 17(7), Retrieved from http://www.wired.com/medtech/health/magazine/17-07/lbnp_knowthyself

Cases/Examples

Dietary Intake Monitoring Application (DIMA)

- Connelly, K., Siek, K. A., Chaudry, B., Jones, J., Astroth, K., & Welch, J. L. (2012). An offline mobile nutrition monitoring intervention for varying-literacy patients receiving hemodialysis: a pilot study examining usage and usability. *Journal of the American Medical Informatics Association,* 19(5), 705-712.
- Welch, J. L., Siek, K. A., Connelly, K. H., Astroth, K. S., McManus, M. S., Scott, L., et al. (2010). Merging health literacy with computer technology: self-managing diet and fluid intake among adult hemodialysis patients. *Patient Education & Counseling,* 79(2), 192-198.
- Siek, K. A. DIMA: Designing Assistive Technologies for Dialysis Patients. Available: http://www.cs.colorado.edu/~ksiek/INDEX_PAGE/Publications/Tapia_DoctoralConsortium.pdf

Techniques

Zayas-Caban, T. and Marquard, J.L. (2009). A Holistic and Human Factors Evaluation Framework for the Design of Consumer Health Informatics Interventions. *Proceedings of the 53rd Annual Human Factors and Ergonomics Meeting*, 1003-1007

Advanced Resources (Optional)

McFall, R. M. (1977). Parameters of Self-Monitoring. In R. B. Stuart (Ed.), *Behavioral Self-Management: Strategies, Techniques and Outcomes* (pp. 196-214). New York: Brunner/Mazel.

Class 6 (Feb. 24) – *Tracking, Records and Remote Monitoring, part 2*

- Assignment due: CHI application critique (20%)
- Assignment due (for certain groups): Designing for Diversity project presentation (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.
- Develop a commitment to CHI practice with diverse user groups.

CLASS PREPARATION

Study Question(s):

- Describe how (or how not) Microsoft HealthVault's functionality might meet consumers' needs.

Theory and Research

Kahn, J. S., Aulakh, V., & Bosworth, A. (2009). What It Takes: Characteristics Of The Ideal Personal Health Record*. Health Affairs*, 28(2), 369-376.

Tang, P. C., Ash, J. S., Bates, D. W., Overhage, J. M., & Sands, D. Z. (2006). Personal Health Records: Definitions, Benefits, and Strategies for Overcoming Barriers to Adoption. *Journal of the American Medical Informatics Association,* 13(2), 121-126.

Cases/Examples

Microsoft HealthVault

- HealthVault in Action [YouTube video] - http://www.youtube.com/watch?v=ri123bhhMtg
- HealthVault platform technical overview - http://msdn.microsoft.com/en-us/healthvault/jj127438
- Application: https://www.healthvault.com/us/en
- Sunyaev, A., Chornyi, D., Mauro, C., & Krcmar, H. (2010, 5-8 Jan. 2010). Evaluation Framework for Personal Health Records: Microsoft HealthVault Vs. Google Health. *Paper presented at the 43rd Hawaii International Conference on System Sciences (HICSS).* http://ieeexplore.ieee.org.proxy.lib.umich.edu/stamp/stamp.jsp?tp=&arnumber=5428380

Techniques

MacLean, A., Young, R. M., Bellotti, V. M. E., & Moran, T. P. (1991). Questions, options, and criteria: Elements of design space analysis. *Human-Computer Interaction*, 6(3-4), 201-220.

Advanced Resources (Optional)

Steele, R., Min, K., & Lo, A. (2012). Personal health record architectures: Technology infrastructure implications and dependencies. *Journal of the American Society for Information Science and Technology*, 63(6), 1079-1091.

Wagner, P. J., Dias, J., Howard, S., Kintziger, K. W., Hudson, M. F., Seol, Y.-H., et al. (2012). Personal health records and hypertension control: a randomized trial. *Journal of the American Medical Informatics Association*, 19(4), 626-634.

March 3 – NO CLASS – Spring Break

Class 7 (Mar. 10) – *Tracking, Records and Remote Monitoring, part 3*

- Assignment due (for certain groups): Designing for Diversity project presentation (20%)

Learning Objectives:

- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Generate CHI design and implementation principles and guidelines that incorporate theories from the behavioral, social and environmental sciences.
- Plan the design, implementation and evaluation of a new, theory-informed CHI application to address the health need(s) of a particular audience.
- Develop a commitment to CHI practice with diverse user groups.

CLASS PREPARATION

Study Question(s):

- What possibilities do sensor-based technologies introduce for CHI applications?

Theory and Research

Riley, W., Rivera, D., Atienza, A., Nilsen, W., Allison, S., & Mermelstein, R. (2011). Health behavior models in the age of mobile interventions: are our theories up to the task? *Translational Behavioral Medicine*, 1(1), 53–71

Stanley, K. G., & Osgood, N. D. (2011). The Potential of Sensor-Based Monitoring as a Tool for Health Care, Health Promotion, and Research. *Annals of Family Medicine,* 9(4), 296-298.

Cases/Examples

Open mHealth

- Estrin, D., & Sim, I. (2010). Open mHealth Architecture: An Engine for Health Care Innovation. *Science, 330*(6005), 759-760.
- Deborah Estrin. (2011). Participatory mHealth: Opportunities and Challenges. [Lecture] Available: http://www.youtube.com/watch?v=4_MSZWvxeb0
- Open mHealth. (2013). Key architectural abstractions. Available: http://openmhealth.org/developers/key-architectual-abstractions/. (and skim links)

Techniques

Nielsen, Lene (2013): Personas. In: Soegaard, Mads and Dam, Rikke Friis (eds.). *The Encyclopedia of Human-Computer Interaction*, 2nd Ed. Aarhus, Denmark: The Interaction Design Foundation. Available: http://www.interaction-design.org/encyclopedia/personas.html

Advanced Resources (Optional)

Adlin, T., Pruitt, J. (2006). Putting Personas to Work: Using Data-Driven Personas to Focus Product Planning, Design, and Development. *Human-Computer Interaction: Development Process*. Boca Raton, FL: CRC Press, 95-120.

Kraft, P., Drozd, F., & Olsen, E. (2009). ePsychology: Designing theory-based health promotion interventions. *Communications of the Association for Information Systems*, 24(1), 24.

Class 8 (Mar. 17) – *Social support and informal care, part 1*

- Assignment due (for certain groups): Designing for Diversity project presentation (20%)
- Guest Speaker: Kristi Williams, University of Kansas Medical Center (via Skype)

Learning Objectives:
- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Generate CHI design and implementation principles and guidelines that incorporate theories from the behavioral, social and environmental sciences.
- Plan the design, implementation and evaluation of a new, theory-informed CHI application to address the health need(s) of a particular audience.
- Develop a commitment to CHI practice with diverse user groups.

CLASS PREPARATION

Study Question(s):
- Compare and contrast the three care coordination applications. What are their features? What needs might exist that are not met by existing applications?

Theory and Research

Family Caregiver Alliance. (2013). *Digital Technology for the Family Caregiver*. San Francisco, CA: Family Caregiver Alliance. Available: http://www.caregiver.org/caregiver/jsp/content_node.jsp?nodeid=2587

Raina, P., O'Donnell, M., Schwellnus, H., Rosenbaum, P., King, G., Brehaut, J., et al. (2004). Caregiving process and caregiver burden: Conceptual models to guide research and practice. *BMC Pediatrics*, 4(1), 1-13.

Williams, K., Arthur, A., Niedens, M., Moushey, L., & Hutfles, L. (2013). In-Home Monitoring Support for Dementia Caregivers. *Clinical Nursing Research*, 22(2), 139-150.

Cases/Examples

Care Coordination Applications
- Caring Bridge - http://www.caringbridge.org/
- Lotsa Helping Hands - http://www.lotsahelpinghands.com/
- Alzheimers care team calendar – http://www.alz.org/care/alzheimers-dementia-care-calendar.asp

Techniques

Carroll, J. M. (1999). Five reasons for scenario-based design. In *Proceedings of the 32nd annual Hawaii International Conference System Sciences*, 1-11.

Advanced Resources (Optional)

Fox, S., Brenner, J. (2012). Family Caregivers Online. Washington, DC: Pew Internet & American Life Project. Available: http://www.pewinternet.org/Reports/2012/Caregivers-online.aspx

Rosson, M.B., Carroll, J.M. (2006). Scenario-Based Design. *Human-Computer Interaction: Development Process*. Boca Raton, FL: CRC Press, 95-120.

Class 9 (Mar. 24) – *Social support and informal care, part 2*

- Assignment due (for certain groups): Designing for Diversity project presentation (20%)
- Assignment due: Needs assessment and gap analysis (25%)
- Guest Speaker: Predrag Klasnja, University of Michigan

Learning Objectives:
- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Generate CHI design and implementation principles and guidelines that incorporate theories from the behavioral, social and environmental sciences.
- Plan the design, implementation and evaluation of a new, theory-informed CHI application to address the health need(s) of a particular audience.
- Develop a commitment to CHI practice with diverse user groups.

CLASS PREPARATION

Study Question(s):
- What is the range of technical possibilities for engaging one's social network for support?

Theory and Research

Haney, C & Israel B. (2008). Chapter 9. Social Networks and Social Support. In K. Glanz, B. K. Rimer & K. Viswanath (Eds.), *Health Behavior and Health Education. Theory, Research and Practice* (4th ed., pp. 67-96). San Francisco, CA: Jossey-Bass.

Munson, S. (2011). Beyond the share button: Making social network sites work for health and wellness. *Potentials, IEEE*, 30(5), 42-47.

Cases/Examples

HealthWeaver
- Skeels, M. M., Unruh, K. T., Powell, C., & Pratt, W. (2010). Catalyzing social support for breast cancer patients. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 173-182.
- Hartzler, A., Skeels, M. M., Mukai, M., Powell, C., Klasnja, P., & Pratt, W. (2011). Sharing is caring, but not error free: transparency of granular controls for sharing personal health information in social networks. *AMIA Annu Symp Proc,* 2011, 559-568.
- Pratt, Wanda. Video lecture on HealthWeaver: http://vimeo.com/20480876

Techniques

Buxton, W., Greenberg, S., Carpendale, S., Marquardt, N., & ScienceDirect. (2011). The Narrative Storyboard. *Sketching User Experiences*. San Diego: Morgan Kaufmann, 167-177.

Advanced Resources (Optional)

Bull, S. S., Levine, D. K., Black, S. R., Schmiege, S. J., & Santelli, J. (2012). Social Media–Delivered Sexual Health Intervention: A Cluster Randomized Controlled Trial. *American Journal of Preventive Medicine*, 43(5), 467-474.

Newman, M. W., Lauterbach, D., Munson, S. A., Resnick, P., & Morris, M. E. (2011, March). "It's not that I don't have problems, I'm just not putting them on Facebook": Challenges and opportunities in using online social networks for health. In *Proceedings of the ACM 2011 conference on Computer supported cooperative work* (pp. 341-350).

Class 10 (Mar. 31) – *Social support and informal care, part 3*

- Assignment due (for certain groups): Designing for Diversity project presentation (20%)

Learning Objectives:
- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Generate CHI design and implementation principles that incorporate theories from the behavioral, social and environmental sciences.
- Plan the design, implementation and evaluation of a new, theory-informed CHI application to address the health need(s) of a particular audience.
- Develop a commitment to CHI practice with diverse user groups.

CLASS PREPARATION

Study Question(s):
- How might peer-to-peer communication between patients benefit them? What potentially negative effects might there be, if any?

Theory and Research

Richardson, C. R., Buis, L. R., Janney, A. W., Goodrich, D. E., Sen, A., Hess, M. L., Piette, J. D. (2010). An online community improves adherence in an internet-mediated walking program. Part 1: results of a randomized controlled trial. *Journal of Medical Internet Research*, 12(4).

Ziebland, S., & Wyke, S. (2012). Health and illness in a connected world: how might sharing experiences on the internet affect people's health? *Milbank Quarterly*, 90(2), 219-249.

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).
- Jamie Heywood Keynote Talk at Health Care Experience Design Conference [Video]. (2013). http://healthcareexperiencedesign.com/speakers/speakers-bio-heywood.php
- Application: http://www.patientslikeme.com/

Techniques

Friedman, C. P., Wyatt, J. (2006). Chapter 3: Determining What to Study. *Evaluation methods in biomedical informatics*. (pp. 48-84). New York: Springer.

Advanced Resources (Optional)

Fox, S. (2011). *Peer-to-peer healthcare*. Washington, DC: Pew Internet & American Life Project.

Hartzler, A., & Pratt, W. (2011). Managing the personal side of health: how patient expertise differs from the expertise of clinicians. *Journal of Medical Internet Research,* 13(3).

Veinot, T. C. (2010). "We have a lot of information to share with each other": Understanding the value of peer-based health information exchange. *Information Research,* 15(4), paper 452.

Class 11 (Apr. 7) – *Community and Environmental Health, part 1*

- Assignment due (for certain groups): Designing for Diversity project presentation (20%)

Learning Objectives:

- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Generate CHI design and implementation principles and guidelines that incorporate theories from the behavioral, social and environmental sciences.
- Plan the design, implementation and evaluation of a new, theory-informed CHI application to address the health need(s) of a particular audience.
- Develop a commitment to CHI practice with diverse user groups.

CLASS PREPARATION

Study Question(s):

- What are the possibilities for technology to reduce or increase health disparities?

Theory and Research

Goldman, D.P., Lakdawalla, D. (2005). A Theory of Health Disparities and Medical Technology *Contributions to Economic Analysis & Policy,* 4(1): 1-30. Available: http://works.bepress.com/cgi/viewcontent.cgi?article=1019&context=dana_goldman **(skim)**

Veinot, T. C., Meadowbrooke, C. C., Loveluck, J., Hickok, A., & Bauermeister, J. A. (2013). How "community" matters for how people interact with information: Mixed methods study of young men who have sex with other men. *Journal of Medical Internet Research*, 15(2), e33. Available: http://www.jmir.org/2013/2/e33/

Cases/Examples

- *I-Decide (Heisler and An)*
    - TBD – Articles in press

Techniques

Lancaster, G. A., Dodd, S., & Williamson, P. R. (2004). Design and analysis of pilot studies: recommendations for good practice. *Journal of Evaluation in Clinical Practice*, 10(2), 307-312.

Advanced Resources (Optional)

Jimison, H., Gorman, P. N., Nygren, P., Walker, M., Norris, S., & Hersh, W. (2009). *Barriers and drivers of health information technology use for the elderly, chronically ill and underserved*. Rockville, MD: Agency for Healthcare Research and Quality. Available: http://www.ncbi.nlm.nih.gov/books/NBK38653/

Parker, A. G. (2013). Designing for health activism. *interactions*, 20(2), 22-25.

Smith, A. (2013). *Technology Adoption by Lower Income Populations*. Washington, DC: Pew Internet & American Life Project. Available: http://pewinternet.org/Presentations/2013/Oct/Technology-Adoption-by-Lower-Income-Populations.aspx

Class 12 (Apr. 14) – *Community and Environmental Health, part 2*

Learning Objectives:

- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Generate CHI design and implementation principles and guidelines that incorporate theories from the behavioral, social and environmental sciences.
- Plan the design, implementation and evaluation of a new, theory-informed CHI application to address the health need(s) of a particular audience.
- Develop a commitment to CHI practice with diverse user groups.

CLASS PREPARATION

Study Question(s):

- What can geospatial data add to consumer health informatics applications?

Theory and Research

Friedman, D. J., & Parrish, R. G. (2010). The population health record: concepts, definition, design, and implementation. *Journal of the American Medical Informatics Association*, 17(4), 359-366.

Kamel Boulos, M. N., Roudsari, A. V., & Carson, E. R. (2001). Health Geomatics: An Enabling Suite of Technologies in Health and Healthcare. *Journal of Biomedical Informatics*, 34(3), 195-219.

Morello-Frosch, R., Zuk, M., Jerrett, M., Shamasunder, B., & Kyle, A. D. (2011). Understanding The Cumulative Impacts Of Inequalities In Environmental Health: Implications For Policy. *Health Affairs*, 30(5), 879-887.

Cases/Examples

Cromley, E. K., & McLafferty, S. (2012). Chapter 3: Spatial databases for public health. *GIS and public health*. (pp. 75-112) New York: Guilford Press.

Techniques

Cromley, E. K., & McLafferty, S. (2012). Chapter 1: Geographic Information Systems. *GIS and public health*. (pp. 15-42) New York: Guilford Press.

Advanced Resources (Optional)

Cromley, E. K., & McLafferty, S. (2012). Chapter 4: Mapping health information. *GIS and public health*. (pp. 113-149) New York: Guilford Press.

Cromley, E. K., & McLafferty, S. (2012). Chapter 5: Analyzing spatial clustering of health events. GIS and public health. (pp. 150-182) New York: Guilford Press.

Class 13 (Apr. 21) – *Community and Environmental Health, part 3*

Assignment due: Lightning Talk presentations and Proposal for a new CHI intervention/application (25%)
Assignment due: Participation self-assessment (10%)

Learning Objectives:

- Compare and evaluate a range of consumer health informatics (CHI) applications.
- Generate CHI design and implementation principles and guidelines that incorporate theories from the behavioral, social and environmental sciences.
- Plan the design, implementation and evaluation of a new, theory-informed CHI application to address the health need(s) of a particular audience.
- Develop a commitment to CHI practice with diverse user groups.

CLASS PREPARATION

Study Question(s):

- What potential do you see for consumer-facing applications regarding exposure to environmental hazards?

Theory and Research

Birnbaum, L. S., & Jung, P. (2011). From Endocrine Disruptors To Nanomaterials: Advancing Our Understanding Of Environmental Health To Protect Public Health. *Health Affairs,* 30(5), 814-822.

Nikzad, N., Verma, N., Ziftci, C., Bales, E., Quick, N., Zappi, P., et al. (2012). CitiSense: improving geospatial environmental assessment of air quality using a wireless personal exposure monitoring system. *Proceedings of the Conference on Wireless Health.*

Cases/Examples

Community-Focused Exposure and Risk Screening Tool (C-FERST)

- C-FERST online: http://www.epa.gov/heasd/c-ferst/
- Barzyk, T.M., et al. (2010) Tools available to communities for conducting cumulative exposure and risk assessments. *Journal of Exposure Science and Environmental Epidemiology*, 20(4), 371-84.
- Zartarian, V.G., Schultz, B.D. (2010) The EPA's human exposure research program for assessing cumulative risk in communities. *Journal of Exposure Science and Environmental Epidemiology*, 20(4), 351-8.
- Zartarian, V.G., et al. (2011) The Environmental Protection Agency's Community-Focused Exposure and Risk Screening Tool (C-FERST) and its potential use for environmental justice efforts. *American Journal of Public Health*, 101(S1), S286-94.

Techniques

Williams, P., Dotson, G. S., & Maier, A. (2012). Cumulative Risk Assessment (CRA): Transforming the Way We Assess Health Risks*. Environmental Science & Technology*, 46(20), 10868-10874.

Advanced Resources (Optional)

Cromley, E. K., & McLafferty, S. (2012). Chapter 6: Analyzing environmental hazards. *GIS and public health*. (pp. 183-233) New York: Guilford Press.

Assignments

1) CHI application critique - 20%

Learning objectives:

- Compare and evaluate a range of consumer health informatics (CHI) applications.

Procedure:

- This is an individual assignment.

Select a CHI application

- You may choose any application that does **not** have an explicit theoretical basis as described in published literature or marketing materials regarding the application.

Describe the application

- Describe the intervention strategy used in the application.
- Describe the intended user(s) of the applications, and the need(s) that the application attempts to meet.
- Describe the technological platform (e.g., web, iPhone) that the application uses, and platform features employed by the application (e.g., sensing, texting, cameras, Internet access).
- Summarize the features of the application and its content.

Evaluate the application

- Consider the effectiveness of the current intervention strategy. What are its strengths and weaknesses?

Generate alternative design possibilities

- Consider alternative intervention strategies. How could behavior change theories inform these alternative design choices?
    - You may rely upon course readings or a literature review to select a suitable theory.
- Describe the behavior change theory that you propose incorporating into an alternative design for the CHI application (with appropriate citations).
- Develop a proposal regarding how behavior change theories could be used to improve the application's intervention strategy, features and content.

Final document

- Your final assignment should be 5-7 double-spaced pages in length, and should include the following components:
    - Name of the application, and how the instructor can access it.
    - Description of the application (see above).
    - Evaluation of the application (see above).
    - Description of the behavior change theory that you propose incorporating into an alternative design.
    - Your proposal how behavior change theories could be used to improve the scope and structure of the application's strategy, features and content.

- Justification of your proposal, including how and why you think this would improve the application.
- Appendices (as needed, not included in page total).
- References (not included in page total).

Due Date

- Feb. 24, 2014 (Class 6)

Evaluation

- See attached grading rubric.

2) Designing for Diversity Project - 20%

Learning objectives:

- Assess consumers' health-related needs, resources and technology-oriented practices, and evaluate their implications for CHI applications.
- Develop a commitment to CHI practice with diverse user groups.

Procedure:

- This is a paired or group assignment. The size of groups will depend on the class size.

Select an underserved population

- Sign up on CTools to select an underserved population that will form the focus of your assignment. Your options include: 1) seniors/older adults; 2) children; 3) youth and young adults; 4) people who are blind/have low vision; 5) lesbian, gay, bisexual and transgendered (LGBT) people; 6) people with low literacy/health literacy; 7) deaf/hard of hearing people; 8) people with cognitive impairments; 9) African Americans; 10) Latino/as in the United States; or 11) community health workers (CHWs) in developing countries.

Conduct a literature review

- Beginning with several citations provided by the instructor, conduct a literature search for additional materials on: 1) the health-related needs, resources and technology-oriented practices of your population; and 2) if applicable, published principles/guidelines for designing CHI applications for this population.
    - This literature review should encompass relevant published literature in books, journals and relevant conferences.
- Search for existing CHI applications that specifically address your population. You may locate these in the published literature, on the Internet, or in Application stores for iOS, Google Play, Blackberry, Windows or Windows Phone, Amazon or other.

Develop design principles and guidelines

- Summarize what is known about the needs, resources and technology-oriented practices of this group.
    - Ensure that you cite relevant documents that you consulted in your literature review.
- Develop at least five recommended design principles and/or guidelines for CHI applications for your user group.
    - For a background on writing principles and guidelines, consult this course reading:
        - Stephanidis, C., Akoumianakis, D., Sfyrakis, M., & Paramythis, A. (1998). *Universal accessibility in HCI: Process-oriented design guidelines and tool requirements.* Paper presented at the Proceedings of the 4th ERCIM Workshop on User Interfaces for all, Stockholm, Sweden.
        - Additional examples will be provided by the Instructor.
- Develop a 1-2 paragraph rationale for each design principle.
    - Ensure that you cite relevant documents that you consulted in your literature review.
- If applicable, provide examples of these design principles "in action" within CHI applications you found during your literature review.

Presentation

- Prepare a 20-25 minute presentation, and provide it for the class on Class 5, 6, 7, 8, 9, 10 or 11 (depending on sign-up dates). The presentation should cover:
    - Major health issues facing this population.
    - What is known about the needs, resources and technology-oriented practices of this population.
    - Principles for designing CHI applications for this group.
    - Current examples of technologies designed with this group in mind. Show how they do, or do not, embody your design principles.

Design principles/guidelines document

- Create a two-page guide (plus references) for designers of CHI applications for this group. This guide should include:
    - Background on the health needs, resources and technology-oriented practices of this group.
    - Your recommended design principles and guidelines.
    - Your rationale for each design principle.
- Publish your guide on a course wiki, online here: TBD.

Due Date

- Class 5, 6, 7, 8, 9, 10 or 11 (Feb. 17 - Apr. 7, 2014)

Evaluation

- See attached grading rubric.

3) Needs assessment and gap analysis - 25%

Learning objectives:

- Assess consumers' health-related needs, resources and technology-oriented practices, and evaluate their implications for CHI applications.

Procedure:

- This is a group assignment. The size of groups will depend on the class size.
- This assignment is part one of a two-part assignment. You should work with the same group for both parts.

Select a need/problem space and user group

- Choose a need/problem space that you will address with your CHI application. This may be a need/problem space that we have discussed in class (e.g., health behavior change, record keeping, remote monitoring, caregiver coordination, environmental hazard identification), or another of your choice.
    - If you want to select your own need/problem space, please discuss your idea with the instructor. This is necessary to ensure that there is enough prior work to make this a viable topic.
- Choose a user group for whom your CHI application will be designed. Describe their relevant characteristics, including (as applicable) gender, age, race/ethnicity, ability/disability, literacy, education, language, place of residence, health status, sexual orientation, and income.

Conduct a literature review

- Conduct a literature search for research on the need/problem space that your CHI application will address, including:
    - the nature and scope of the need/problem;
    - the characteristics of individuals or groups that are affected by this need/problem, including their existing resources and technology-oriented practices and any related design principles/guidelines or constraints; and
    - potential strategies for addressing this need/problem (including any theoretical frameworks that might underpin prior or future CHI applications).

Conduct a scan of existing CHI applications addressing this need/problem

- Search for existing CHI applications that address your need/problem space of interest. You may locate these on the Internet, or in Application stores for iOS, Google Play, Blackberry, Windows or Windows Phone, Amazon or other.
    - To complete the next step of this assignment, you must find at least **two** applications that address your chosen need/problem space.

Analyze the design space of 2-3 existing applications addressing your chosen need/problem

- Describe the intervention strategy used in the application and its theoretical basis.
- Describe the intended user(s) of the applications, and the need(s) that the application attempts to meet.
- Describe the technological platform (e.g., web, iPhone) that the application uses, and platform features employed by the application (e.g., sensing, texting, cameras, Internet access).
- Summarize the features of the application and its content.

- Based on this review, enumerate any gaps in existing CHI applications in terms of the intervention strategy, user group(s), technological platform, features and/or content.
    - This stated gap should then inform part two of this group assignment.

Final document

- Prepare a 12-15 page document that includes the following sections:
    - 4-6 page description of the need/problem space and user group(s) that your CHI application will address.
        - Results of your literature review, including citations, should be incorporated into this description.
    - 6-8 page design space analysis of 2-3 existing CHI applications.
    - 1-2 page description of the proposed gap(s) that your new application might address.

Due Date

- Mar. 24, 2014 (Class 9)

Evaluation

- See attached grading rubric.

4) Proposal for a new CHI intervention/application - 25%

Learning objectives:

- Plan the design, implementation and evaluation of a new, theory-informed CHI application to address the health need(s) of a particular audience.

Procedure:

- This is a group assignment. The size of groups will depend on the class size.
- This assignment is part two of a two-part assignment. You should work with the same group for both parts.

Develop design process documents

- Develop one persona that outlines the needs, resources and technology-oriented practices of your for your user group.
    - For guidelines on persona development, see the following course readings:
        - Adlin, T., Pruitt, J. (2006). Putting Personas to Work: Using Data-Driven Personas to Focus Product Planning, Design, and Development. *Human-Computer Interaction: Development Process*. Boca Raton, FL: CRC Press, 95-120.
        - Nielsen, Lene (2013): Personas. In: Soegaard, Mads and Dam, Rikke Friis (eds.). *The Encyclopedia of Human-Computer Interaction*, 2nd Ed. Aarhus, Denmark: The Interaction Design Foundation. Available: http://www.interaction-design.org/encyclopedia/personas.html
- Develop 1-2 scenarios that outline in detail when and how your CHI application will work
    - For guidelines on scenario-based design, see the following course readings:
        - Carroll, J. M. (1999). Five reasons for scenario-based design. In *Proceedings of the 32nd annual Hawaii International Conference System Sciences*, 1-11.
        - Rosson, M.B., Carroll, J.M. (2006). Scenario-Based Design. *Human-Computer Interaction: Development Process*. Boca Raton, FL: CRC Press, 95-120.
- Specify any constraints associated with when, how, and by whom the application will be used. These may be presented as principles, guidelines or simple lists of constraints.

Develop your CHI application design concept (5-7 pages)

- Describe the intended user(s) of the applications, and the need(s) that the application attempts to meet.
- Specify the intervention strategy used in the application and its theoretical basis (if applicable)
- Describe the application's technological platform (e.g., web, iPhone), and any platform features employed by the application (e.g., sensing, texting, cameras, Internet access).
- Describe the content and features of the application.
- Drawing from your scenarios and persona, describe in detail when, how and by whom the application will be used.

Implementation issues analysis (2-3 pages)

- Describe 3-4 adoption barriers that your CHI application might encounter, and how you will address these barriers in your design, and/or in implementation plans.

Evaluation (~1 page)

- Describe an evaluation plan for your CHI application, including an evaluation research question and a type of evaluation based on those outlined in the following course reading:
    - Friedman, C. P., Wyatt, J. (2006). Chapter 3: Determining What to Study. *Evaluation methods in biomedical informatics*. (pp. 48-84). New York: Springer.
- Briefly justify why your evaluation plan is suited to the technological maturity of your proposed application.

Presentation

- Present a 3-5 minute "lighting talk" regarding your proposed application in Class 13.
    - Lightning talks are described here: http://en.wikipedia.org/wiki/Lightning_talk

Final document

- Prepare a 8-12 page paper (plus Appendices) that includes the following components:
    - CHI application design concept description (see above)
    - Implementation issues analysis (see above)
    - Evaluation (see above)
    - Appendix A: Persona
    - Appendix B: Scenario(s)
    - Appendix C: Design constraints
    - Other Appendices as desired

Due Date

- Apr. 21, 2014 (Class 13)

Evaluation

- See attached grading rubric.

5) Participation - 10%

Participation grades will be determined based on a combination of your self-assessment and the instructor's observations. Participation grades will be assigned for the complete course.

For the self-assessment component, please submit the letter grade you think you deserve for participation, along with a one paragraph justification of your self-assigned grade.

Your self-assessments should be submitted via CTools at the end of the course: Apr. 21, 2014 (Class 14).