B.H

GESM 161g Seminar in Quantitative Reasoning
Wireless Computing Technologies for Medicine with Legal and Ethical Implications

Spring 2017

Time: MWF 11am – KAP 167

COURSE CATALOGUE DESCRIPTION:

Introduction to Wireless Computing in Medicine; Overview of Ethical and Legal issues in Wireless Health; Interdisciplinary Analysis of State-of-the-art Medical Nanoscale Devices and Pervasive Networks.

COURSE INSTRUCTOR:

Dr. Mary Mehrnoosh Eshaghian-Wilner
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Tel: (213) 740 – 6257
Office Hours: TBA

COURSE SUMMARY:

This course presents a basic introduction to some of the latest results in the disciplines of Computing, Medicine, and Law, in the field of Wireless Health. After the presentation of introductory material, the rest of the course is organized into three main sections. The first section discusses the use of distributed computing in medicine. It concentrates on methods for treating chronic diseases and cognitive disabilities like Alzheimer's, Autism, etc. It also discusses how to improve portability and accuracy of monitoring instruments and reduce the redundancy of data. It emphasizes the privacy and security of using such devices. The second section covers nanomedicine and discusses how the drug delivery strategies for chronic diseases can be efficiently improved by Nanotechnology enabled materials and devices such as MENs and Nanorobots. The third section will focus on the legal and privacy issues in the domain of nanomedicine, and how to implement this technology in a way that is a safe and ethical for a subset of problems introduced in the first two parts of the course.

GRADING:

Homework:	10%
Presentation:	20%
Four Short Tests:	30%
Final Exam Project:	40%

PREREQUISITE: None

TEXTBOOKS:

"Wireless Computing in Medicine: From Nano to Cloud with Ethical and Legal Implications," Mary Mehrnoosh Eshaghian-Wilner, ISBN: 978-1-118-99359-0,August 2016 (Required Textbook)

"Computer Organization and Embedded Systems," Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, ISBN 978-007-108900-2, 2009 (Recommended Textbook)

COURSE OBJECTIVES:

1. Define the technologies of distributed wireless health, from software that runs cloud computing data centers, to the technologies that allow new sensors to work.
2. Recognize how computing methods are used to treat chronic diseases and cognitive disabilities, such as Alzheimer's and Autism.
3. Determine the ways to improve the portability and accuracy of monitoring instruments.
4. Employ strategies to reduce the redundancy of data in the field of wireless health.
5. Identify the importance of data security and privacy when using such devices.
6. Identify the role of nanotechnologies in the treatment of chronic diseases.
7. Recognize how to implement wireless computing technologies in ways that are safe and ethical.
8. Apply legal and ethical principles to the domain of nano medicine with an emphasis on a subset of problems presented earlier in the course.

COURSE OUTLINE:

	Discussion Topics Activities	**Reading Assignments** about 26 pages/week	**Deliverable/ Due Dates**
Week 1 Dates	**History and Evolution of Computers**	**Chapter 1 of the recommended textbook**	**HW 1 - Due week 2** Chapter 1 of the Recommended Book - Basic Structure of Computers
Week 2 Dates	**Application of Computers in Medicine**	**Introductory chapters of the required textbook**	**HW 2 - Due week 3** Chapter 1 of the Required Book - Introduction to Wireless Computing in Medicine
Week 3 Dates	**Computers, Society and Law**	**Introductory Chapters of the required textbook**	**HW 3 - Due week 4** Chapter 2 of the Required Book- Nanocomputing and Cloud Computing
Week 4 Dates	**Test #1**	**End of Introductory Material**	**HW 4- Due week 5** Chapter 3 of the Required Book - Pervasive Computing in Hospitals
Week 5 Dates	**Pervasive Computing in Medicine**	**Part 1 of the required textbook**	**HW 5 - Due week 6** Chapter 4 of the Required Book- Diagnostic Improvements: Treatment and Care
Week 6 Dates	**Body Sensor Networks**	***Part 1 of the required textbook***	**HW 6 - Due week 7** Chapter 5 of the Required Book- Collaborative Opportunistic Sensing of Human Behavior with Mobile Phone
Week 7 Dates	**Electronic Health Records**	**Part 1 of the required textbook**	**HW 7 - Due week 8** Chapter 6 of the Required Book- Pervasive Computing to Support Individuals with Cognitive Disabilities

Week 8 Dates	**Test #2**	**End of Part 1 of the required textbook**	**HW 8- Due week 9** Chapter 10 of the Required Book- An Introduction to Nanomedicine
Week 9 Dates	**Nanocomputing in Medicine**	**Part 2 of the required textbook**	**HW 9 - Due week 10** Chapter 15 of the Required Book- Linking Medical Nanorobots to Pervasive Computing
Week 10 Dates	**Imaging and Diagnosis of Cancer**	**Part 2 of the required textbook**	**HW 10 - Due week 11** Chapter 16 of the Required Book- Nanomedicine's Transversality: Some Implications of the Nanomedical Paradigm
Week 11 Dates	**Targeted Drug Delivery**	**Part 2 of the required textbook**	**HW 11 - Due week 12** Chapter 17 of the Required Book- Ethical Challenges of Ubiquitous Health Care
Week 12 Dates	**Test #3**	**End of Part 2 of the required textbook**	**HW 12- Due week 13** Chapter 18 of the Required Book- The Ethics of Ubiquitous Computing in Health Care
Week 13 Dates	**Privacy Issues**	**Part 3 of the required textbook**	**HW 13 - Due week 14** Chapter 19 of the Required Book- Privacy Protection of Electronic Healthcare Records in e-Healthcare System
Week 14 Dates	**Ethical Issues**	**Part 3 of the required textbook**	**HW 14- Due week 15** Chapter 20 of the Required Book- Ethical, Privacy, and Intellectual Property Issues in Nanomedicine
Week 15 Dates	**Test #4**	**End of Part 3 of the required textbook**	**Course Review**
FINAL EXAM Week	**Final Project**	**End of the course**	**See USC's official Schedule of Classes for the time of the Final Exam**

STATEMENT ON ACADEMIC INTEGRITY

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, (www.usc.edu/scampus or http://scampus.usc.edu) contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A.

ACADEMIC CONDUCT

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standardshttps://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct/.

Discrimination, sexual assault, and harassment are not tolerated by the University. You are encouraged to report any incidents to the Office of Equity and Diversity http://equity.usc.edu/ or to the Department of Public Safety http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us. This is important for the safety whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage sarc@usc.edu describes reporting options and other resources.

STATEMENT FOR STUDENTS WITH DISABILITIES

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. Website and contact information for DSP: http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html, (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) ability@usc.edu.

SUPPORT SYSTEMS

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information http://emergency.usc.edu/* will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

EMERGENCY PREPAREDNESS/COURSE CONTINUITY IN A CRISIS

In case of a declared emergency if travel to campus is not feasible, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of Blackboard, teleconferencing, and other technologies.