**Syllabus:** CS126G Computers in Health Care

**Term:** Spring 2017  
**Instructor:** Professor Nikos Chrisochoides  
**OFFICE HOURS:** 4:30 To 6:30

**Course Description:** We will study the role of computers as a disruptive technology in medicine and health care and their direct or indirect impact in health care costs. We will use case studies from computer assisted surgery and specifically image guided therapy.

**Class Meetings:** Tuesday and Thursday 4:20PM - 5:35PM  
**Class Location:** ECS Building, Seminar Room in the 3rd Floor.

**Textbook:** The Innovator's Prescription: A Disruptive Solution for Health Care, by Clayton M. Christensen, Jerome H. Grossman, and J. Hwang. Publisher: McGraw Hill. **Book Reviews**

**Other Books and Resources:**  
1. How to Solve it, by G. Polya. Publisher: Princeton.  
3. Help with Technical and Scientific Writing  
4. Writing Resources Center at W&M

**Prerequisites:** Critical Thinking, Reading and Writing.

**Course Requirements:**  
1. **Regular attendance in class:** Quizzes will be given nearly every time we meet and will be made from one or more questions from your weekly assignment. **Quizzes count for 10% of the final grade.** The quizzes will be short and they are intended to make sure that you work and keep-up with the reading and writing assignments. **There will be no makeup quizzes. Instead the lowest two grades will be dropped.** In certain special circumstances like academic or athletic events you have to submit a schedule at least two weeks in advance. Three unexcused absences will lower your course grade by one letter grade.

2. **Class Participation:** This seminar is designed to motivate students to explore academic area(s) of interest through intensive reading, writing and discussion. Most of the class periods we will be filled with discussion on the reading
assignments -- students are expected to bring a written list of points to raise and questions to ask; the lists will be collected at the beginning of the class. The discussions will be productive if all students are well informed and feel comfortable to participate. This means we have to respect each others opinion and arguments, complete reading assignment and spend time studying and analyzing reputable news sources and scientific articles relevant to the subject of this seminar and assigned topic. Reputable news sources include NewsHour, Frontline, Nova, BBC, NPR, New York Times, Washington Post, Kaiser Health News etc.. and scientific journals include Science, Nature, e! Science News, etc.. We will discuss the news related to our seminar, for the first ten to fifteen minutes of each class session. **Over the course of the semester, each student will be required to present and be a moderator for at least three times a chapter of the book. This will account for 10% of the final grade.** The presenter(s) and/or moderator(s) are required to post their news sources or articles in this Wiki.

3. **Prompt completion of all assignments**

1. All writing homework and quizzes (40% of the final grade). Homework will be submitted to this Wiki. Each homework will be submitted for a review by your peers and the final revision will be re-submitted. The first draft counts for 40% of the HW grade and the final revision for 60% of the HW grade.
2. Participating with the 5-point review pertinent to the class and the topics from the text – 15%
3. Formal midterm PowerPoint presentation (15% of the final grade).

4. Final 5-page paper and presentation (20% of the grade). There is no Final Exam.
5. Peer Review (10% of the final grade). Each student will review at least one homework, the midterm presentation, and the final paper from other students.
6. **Discipline Credits[Extra Credit]:** Choose a pertinent topic from your discipline and argue about (report and presentation) its impact to health care industry: 10% of the final grade.

**Final Grade:** A 92.00, A- 90.00 B+ 87.00, B 83.00, B- 80.00 C+ 77.00, C 73.00, C- 70.00 D+ 67.00, D 63.00, D- 60.00
Objectives: By the end of the class the students will:

1. be exposed to challenging research problems in computer science, bioinformatics and bio-medicine.
2. get a very good idea how basic topics from math (eg. calculus), computer science (eg. algorithms), computational sciences (eg. numerical software) and medical image computing (eg. image registration) can be used to develop disruptive technologies in health care and specifically in computer aided surgery.
3. comfortable to be active participants in a seminar, separate facts from opinions, and argue about the intellectual challenges and broader impact of an approach for the solution a given problem within the topic of the seminar.
4. capable to find/read/study pertinent literature to their research
5. able to formulate problems and workout their solutions, i.e., synthesize solutions from solving simpler problems/parts.
6. motivated and excited to study math and computer/applied science

Schedule: (In this course we will focus on the following list of topics, the order is subject to change)

Part I: Disruptive Solutions for Health Care

1. Week: Introduction: Logistics, Identify Problems In Health Care that can benefit from computer-centric disruptive technologies.

2. Week: The Role of Disruptive Technologies and Innovations for More Affordable and Accessible Health Care.

3. Week: Technological Enablers of Disruption


   5. Week: Computers in Disrupting the Physician's Practice Case Study of enabling technology: Non-Rigid Registration of pre-operative and intra-operative MRI

   6. Week: Disruptive Solutions for the Care of Chronic Disease Math and
7. Week: Is it Possible to Disrupt the Reimbursement System? Case Study: IGNS in robotic surgery of the prostate as well as minimally invasive cancer surgery


11. Week: Future Directions in Medical Devices and Diagnostic Equipment A case study: Medical and Radiation Imaging


Part II: Basic Computational Science Foundations for Image Guided Neurosurgery Case Study
13. Week: More on Numerical Approximation: Case Study on one dimensional brain images (Based on Student’s Interest and Availability of Time)

14. Week: Putting All Together and Final Papers Due.