USC Viterbi School of Engineering

8/18/2019
Syllabus
Draft

PPD/ISE 508 Health Care Operations Improvement

Units: 3 31508D 048
Fall 2019 6:40 to 9:20 PM Wed.
Location: OHE 100 D

Instructor: David Belson, PhD
Office: GER 242
Office Hours: Wednesday 5 PM
Contact Info: belson@usc.edu

Teaching Assistant: to be defined
Office:
Office Hours:
Contact Info:

Course Description

Systems engineering, data analysis and new technology is changing hospitals dramatically and quickly. The world's largest industry and largest employeer seeks people to solve its unique problems. This course offers a student the opportunity to learn the latest tools from experts, developers and researchers in the field.

Topics such as quality improvement, data analysis, simulation, scheduling, Lean thinking, staffing, modeling, optimization and many other methods are covered. Health care settings beyond the hospital, such as outpatient clinics and private doctor's offices are included as well as international issues. Implementing information systems and new medical technology are addressed.

The highly rated course covers topics in systems improvement such as reducing wait time, lowering costs, improving quality and implementing change. Issues such as workflow, scheduling and data analysis will be examined. Students will become familiar with methods and resources for identifying problems and implementing change in a healthcare setting.

In addition to lectures, we will have guest speakers providing insights. Past speakers have included hospital CEO's, IT providers, software developers, systems engineers, technology developers, physicans and government representatives. Organizations such as Kaiser, Cedars Sinai Hospital, the Veteran's Administration, Keck Hospitals and Epic software will speak at the class. Optional interning opportunities at local hospitals will be provided students and many employment opportunities have resulted directly from this course.

This course is appropriate for graduate students or upper division undergraduates from engineering, the Price School, business, biomechanical engineering, global health, clinical fields and others.

Learning Objectives

The objective of this course is to give students an understanding of how to meaningfully improve the functioning of a service, the health care system in particular. Technology, personal communications, analysis and

leadership are all involved. I try to give both an understanding of methods as well as a perspective from the standpoint having done over 100 improvement projects in hospitals. Since I work in the healthcare industry, I'll be sure to relate the material to its practical use.

I've given this class for several years and will update it this year. There will be an opportunity to apply your learning at local hospitals. I will make arrangements for such experiences off campus, and have in the past, for students taking the course. This experience has directly resulted in permanent jobs for many of its past students. The projects, done as a small team, will be optional in terms of the class grade. As an alternative to a real-world project, students can do a case study which will require a similar level of work.

Prerequisite(s): none **Co-Requisite(s):** none **Concurrent Enrollment:** none
Recommended Preparation: Familiarity with the use of spreadsheets will be helpful
Technological Proficiency and Hardware/Software Required: none
Assignments will be posted online on D2L (or whatever USC online system is made available) as well as announced and explained in class.

Required Readings and Supplementary Materials

The primary source may be Analytics and Decision Support in Health Care Operations Management (Jossey-Bass Public Health) 3rd Edition by Yasar A. Ozcan as well as additional readings. Relevant readings may include:

- Womack, James P., Arthur P. Byrne, Orest J. Fiume, Gary S. Kaplan, and John Toussaint. "Going lean in health care." Cambridge, MA: Institute for Healthcare Improvement (2005).
- Benneyan, James C. "An introduction to using computer simulation in healthcare: patient wait case study." Journal of the Society for Health Systems 5.3 (1997): 1-15.
- DeRosier, Joseph, et al. "Using health care failure mode and effect analysis™: the VA National Center for Patient Safety's prospective risk analysis system." The Joint Commission journal on quality improvement 28.5 (2002): 248-267.
- Stanton, Mark W., and Mark W. Stanton. Hospital nurse staffing and quality of care. Rockville, MD: Agency for Healthcare Research and Quality, 2004.
- Gawande, Atul. "Why doctors hate their computers." The New Yorker (2018).

The course provides skills to analyze current operations and to identify the appropriate tools to improve various systems such as surgery, emergency department and clinics which are useful for managers, consultants, clinical providers and others. Performance excellence ideas such as flowcharting, optimization, data gathering, data analysis, simulation and others tools will be covered. Predictive simulation models and realtime location tracking are new technologies covered. Health care settings beyond the hospital, such as outpatient clinics, will be included as well as the role of IT and the impact of the Electronic Medical Record on performance.

Instructor: David Belson, PhD, in addition to teaching healthcare related classes in the Epstein Department of Industrial and Systems engineering he works on research projects for the California Hospital Association, Keck Hospital, UCLA and others. Recent projects have been for the Veterans Administration and the California Healthcare Foundation. He previously was employed in management at IBM, Ernst & Young (EY) and Universal Studios.

Description of Course Assignments

There will be a practical project available for students to work on at a local hospital if they wish. As an alternative, a case study will be available requiring a similar amount of work and grade credit as the real-world project.

Grading Breakdown

Homework Assignments	20%
Quizzes	21%
Final Examination	25%
Case study or project	26%
Class Participation *	8%
Total	100%

There will be multiple brief homework assignments & students will be able to exclude the grade on one homework assignment if they wish. There will be three relatively brief midterm quizzes. Please do not request changes to exam dates as they are fixed. Class participation includes interaction with the instructor, TA and other students (e.g. team work) as well as the classroom discussion forum. * DEN students will not be measured on class performance but proportionately on the total of other activities. If DEN students wish to be considered for evaluation based on class participation, they should so notify the instructor.

Assignment Submission Policy

Assignments are due at the beginning of class. Homework assignments will be announced in class. Off-campus students must submit their assignments in time to be received by DEN on the day they are due. Off campus assignments must be submitted as specified in the DEN guidelines. Assignments should be turned in on time – by the starting time of the class for which it was due. All work is expected to have an easily readable and professional appearance. All examinations are open notes and open book.

Materials, if submitted digitally, should include a filename with the student's name and identification of the item. Such as: "ISE508 HW #2 R Smith" Homework should be clear and show how answers were determined.

Course Schedule: A Weekly Breakdown

(May be revised as the semester progresses)

Week	Topic *	Text covered this week *	Assignment due
1 8/28	**Introduction**, overview, general terminology, history of performance improvement, course plan, projects & cases		
2 9/4	**Process flow,** diagrams for health care operations, **Data**, using data sources, benchmarking. **Forecasting** methods.	Ch. 2, Reading	
3 9/11	**Lean or so-called Toyota methods** (intro), **Six Sigma, Decision** tools.	Ch. 3, Reading	
4 9/18	**Project management, Systems Engineering,** managing change	Reading	HW #1 due
5 9/25	**Productivity, Work Measurement,** Reengineering of healthcare work, real time location tracking	Reading	
6 10/2	**Facility**, **layout & location**. Impact of layout on functions such as surgery and ER. **Quiz 1.**		
7 10/9	**Queuing. Quality Improvement**, becoming a high reliability organization, FMEA and Root Cause Analysis	Reading	
8 10/16	**Staffing,** tools for nursing and other areas. Review content to date. **Patient Safety**		HW #2 due

9 10/23	**Scheduling** and **staffing**, human factors, Lean methods (more) **Quiz 2**	Reading	
10 10/30	**Simulation modeling,** IT use, Electronia Medical Records	Reading	HW #3 due
11 11/6	**Materials management**. Inventory systems. Supply Chain management, automation		
12 11/13	**Resource allocation** optimization models capital budgeting and performance improvement		
13 11/20	Resource allocation (more), more on Lean, data analysis methods in healthcare **Quiz 3**	Reading	HW #4 due
11/27	Holiday, no class		
14 12/4	Presentations, **Review.**		
12/11	Final Exam location TBD 7 to 9 PM		**Final exam**

* Read text assignment prior to class, chapters are from the books or otherwise assigned. Additional readings will be assigned and provided. Guest lecturers will be used as an additional speaker at selected sessions.

Statement on Academic Conduct and Support Systems

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 Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. 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.

Support Systems:
Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center
For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086
Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support
Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs
Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710
Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC
Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information
Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.
Provides overall safety to USC community. dps.usc.edu