

## **IE/MFG/SE 5390 Special Topics: Healthcare Process Improvement Fall 2023**

**Catalog description.** This course trains the student in the principles and methods of process modeling and improvement in healthcare. Students will learn how to identify, analyze, and improve processes in healthcare settings to improve quality, safety, efficiency, and patient outcomes. The course will cover topics such as, Lean Six Sigma, Quality Improvement, Systems Thinking and Modeling of Healthcare Systems, Process Mapping, Data Modeling and Analysis in Healthcare Settings, and Project Management in Healthcare Settings. The course will include lectures, case studies, discussions, and a team project.

**Course administrative details.** Course meets Thursdays from 6 PM to 8:50 PM in Physical Sciences Building 222A. Course material is posted on Blackboard. Course assignments will be due via Blackboard.

**Instructor and office hours.** Dr. Arunkumar Pennathur, [apennathur@utep.edu](mailto:apennathur@utep.edu). Email is the fastest way to reach me. I check my email at least twice daily and will respond within a day if I am not traveling, and within 2 to 3 days if I am on the road. I usually do not check emails Saturdays and Sundays, so all emails sent to me after Friday 5 PM will be queued for responses beginning Monday. My office is located in Engineering Building A240. My office hours are Mondays 3 to 4:30 PM.

**Course objectives and topics.** The goal is to introduce the student to the design, operation, and modeling of healthcare systems using the principles, tools, and methods from industrial engineering and management sciences that allow for a structured and detailed representation of healthcare services and systems. The course includes the following topics:

- Healthcare services and delivery systems operations – definitions and framework, modeling and design cycles.
- Healthcare as service – modeling definitions, terminology including alternative ways of grouping clients, service and operation definitions, resources and units, processes and chains, networks, and planning and coordination for healthcare operations.
- Healthcare data modeling – model types, principles of model building, data collection and analyses.
- Managing individual healthcare units – resource and capacity management considerations, performance management, balancing capacity and demand.
- Managing healthcare process chains – identifying and classifying process chains, process flowcharting and service blueprinting, value stream mapping, process chain performance modeling, planning, and improving process chains.
- Healthcare quality improvement – Deming’s PDSA approach and Institute for Healthcare Improvement (IHI) model, Quality Improvement tools including Cause and Effect diagram, Checksheets, Pareto Charts, Scatterplots, Process Control Charts, Business Process Reengineering, Theory of Constraints, Lean Management, Six Sigma principles.
- Structured approach for design-oriented study and improvement of an individual healthcare unit.

- Structured approach for design-oriented study and improvement of a healthcare process chains.
- Modeling logistics in healthcare networks.

**Suggested books and resources.** My lectures will be centered around the content in the book *Operations Management for Healthcare, 2<sup>nd</sup> Edition published in 2023, by Jan Vissers, Sylvia Elkhuisen and Nathan Proudlove, published by Routledge, New York, NY.* You can rent or buy this low cost book from the following link: : <https://www.routledge.com/Operations-Management-for-Healthcare/Vissers-Elkhuisen-Proudlove/p/book/9781003020011>. This is an excellent book that you will find useful in your practice.

For in-class discussions, please see the reading list of published research papers that we will discuss in teams during class.

**I will also have guests lecture on various topics in healthcare process improvement throughout the semester.** Our first guest lecture on **September 21, 2023**, will be from Mr. Ricardo Castillo (he is a UTEP alum, Go Miners!), Senior Process Engineering Performance Program Director at Banner Health. He has also been Process Excellence Engineering Manager at Northern Arizona Healthcare, and Lean Manager at Norchem Drug Testing in Arizona.

**Course activities.** The first half of class sessions will typically consist of a lecture/guest lecture. The second half of class sessions will typically consist of discussions from assigned readings – class teams will lead the discussions based on a set of discussion questions posted on Blackboard and assigned to teams.

**Course grading.** The course will include the following grading components:

Case analysis and discussion:	35% (spread over ~3 cases per team)
In class reading discussions:	15%
Written reflections [any 3 readings]:	30%
Final take home paper:	20%

Letter grades for the course will be assigned based on the following scale:

- A: 90 and above
- B: 80-89
- C: 70-79
- D: 60-69
- F: Below 60.

**Case analyses:** There will be 12 case assignments on various aspects of healthcare process improvement. These cases include case studies from the text in section 2, and from published case studies available from Harvard Business Publishing Education platform. Teams will analyze, present, and facilitate discussion for a case [teams will be formed on the first day of class]. Each team will work on 3 cases during the semester. For the cases assigned from the textbook, you can download the data from the case, PPT slide placeholders for building the case,

and any other information needed for the case from the text page here:

<https://www.routledge.com/Operations-Management-for-Healthcare/Vissers-Elkhuizen-Proudlove/p/book/9781003020011> by following links to the appropriate case chapters 11 through 17. Your task will be to present the case to the class and we will discuss the case and the analysis in the case. For case studies that are from the Harvard Business Publishing Education Platform, I will post guiding questions for the case for every case and every team on Blackboard. You can add additional questions that emerge during your reading and analysis of the case during the discussion. For cases from Harvard Business Publishing Platform, each team must buy their assigned cases.

The case list is as follows:

From the text:

1. Use and misuse of queueing theory for hospital capacity decisions.
2. Surgical admission planning and patient mix optimization.
3. Using pathways to model care processes and analyze performance.
4. Analyzing process and unit operations management performance for general surgery.

From Harvard Business Publishing Education:

1. Warehouse consolidation project at Manipal Hospital Bangalore (A), written by A. Tripathy, R. Pai and V. Jain. **Case Number IMB657-PDF-ENG.**
2. Lean Process Improvements at Cleveland Clinic, I. Duenyas, **Case Number W87C95-PDF-ENG.**
3. Fair Park Covid-19 Mass Vaccination Site (A) by W. Shih, **Case Number 622003-PDF-ENG.**
4. Standard Work in Developing Leaders: Rebecca Banquette, Coach, by E.N. Weiss and R. Goldberg, **Case Number UV8119-PDF-ENG.**
5. Kaiser Permanente: Creating a No-Wait Emergency Department, by E.D. Arnheiter, **Case Number W167724-PDF-ENG.**
6. Northwestern Memorial Hospital: Smoothing Material Flow through the Receiving Area, by J.P. McNicholas, H. Bachour, P. Suett, **Case Number W19168-PDF-ENG.**
7. Temple Health System: Real-time Feedback and People Analytics (A), by T. Petrucci and M. Rivera, **Case Number W20203-PDF-ENG.**
8. Learning about Reducing Hospital Mortality at Kaiser Permanente, by A. Tucker, **Case Number 612093-PDF-ENG.**

Case analyses should include the following: (1) a brief presentation [you can use any medium that facilitates discussion, including PPT, MS Word, Text Files etc.] outlining the case and any background information for setting the stage for discussion; (2) key questions and topics addressed in the case; (3) a brief analysis of case information [can be qualitative or quantitative or a combination of the two]; (4) key insights and takeaways from the case. Please upload your case presentation and notes on Blackboard for the respective case assignment before the discussion.

Your contribution to the case discussion will be evaluated based on the following criteria: 1. Preparation [5 points]; 2. Facilitation of case discussion [5 points]; 3. Clarification/bringing out central ideas in case [5 points], and 4. Key takeaways relating to healthcare process improvement and/or new insights, new questions raised [5 points].

***Reading class discussion activity and written reflections:*** A major portion of class time will be spent in discussing peer-reviewed publications on healthcare process improvement. Class discussions will help bring out varied perspectives on the elements of healthcare process improvement, as well as provide a forum for critically and thoughtfully thinking about healthcare process improvement. Class discussions will be team-based activities. I will post a reading list on Blackboard and assign questions to each team from the readings.

There will be 2 components to the article reading and discussions:

1. Leading and participating in discussions for the articles posted.
2. Every student will complete individual written reflections for any 3 readings of their choice from all the readings in the class. You can also pick other articles on healthcare process improvement to write about.

I will post discussion questions for every article on Blackboard at least a week prior to the assigned date for discussion.

The discussions will typically summarize the article and discuss key questions. Teams are expected to be ready with well thought-out responses for the discussion questions, any additional sources about the topic and facilitate peers to discuss the questions. Written responses to the questions are not required. You are encouraged to consult other external sources/readings as relevant to help steer the discussions. Your contribution to the discussion will be evaluated based on the following criteria: 1. Preparation [5 points]; 2. Facilitation of discussion [5 points]; 3. Clarification/bringing out central ideas in article [5 points], and 4. Identification and summarizing of key takeaways relating to innovation and/or new insights, new questions raised [5 points].

In addition to participating in class discussions, each student should complete a written individual reading summary for up to 3 readings total in the semester. The reading reflection should contain your understanding of the key issues in the reading, and should reflect your considered analysis and thoughts, rather than be just a straight summary of what is contained in the paper.

***Final take-home research (review) paper:*** There will be a final take home paper due last day of class. The take home paper will be an individual assignment you will write on any aspect of healthcare process improvement we considered in class or other aspects that you may have interest in. I would suggest a short one-page proposal for your paper idea that you can submit to me in October – this way, we can scope your paper out and refine the idea. I will post general guidelines on what the paper should contain and formatting requirements in mid-September, but this would be a very typical research paper you would write in your area of study. The only requirement is that it relate to the healthcare domain and contain a process perspective.