UC Davis Graduate School of Management

MGB 252-001: Managing for Operational Excellence – Winter Quarter 2022

Class Meeting Location: UCD GSM San Ramon Campus

Class Dates: Jan 14, Jan 28, Feb 12, Feb 25, Mar 11, Mar 18 (on-line final exam)

Class Times: 2:00 – 5:00 PM and 6:00 - 9:00 PM

Instructor: Ed Arnheiter, Ph.D.

Contact Information: edarnheiter@ucdavis.edu, Phone +1 (860) 466 - 0676 (urgent matters only)

Primary Contact Method: edarnheiter@ucdavis.edu

Live Office Hours: Thursday, 5 – 7 PM PST via Zoom, or by appointment using Zoom.

Required Material

George, M., Rowlands, D., Price, M., and Maxey J. (2005). *Lean six sigma pocket toolbook*. McGraw-Hill. ISBN: 978-0-07-144119-3.

Case Study - Assembling Smart Phones: Takt time ≠ Cycle Time?, Case number 9-611-012, Willy Shih and Ethan Bernstein, Harvard Business School Publishing.

Required software: Latest version of Excel.

Official Course Prerequisite: *203A, Data Analysis for Managers*

Course Description:

Official: Explores operations in manufacturing and service sectors from both inside and outside a company. Quantitative methods and their organizational implications are also examined.

Additional detail: This course is an introduction to some selected topics in the field of production and operations management. It covers process analysis, quality management, quality control, lean operations and Six Sigma, inventory management, and supply chain management.

An emphasis will be placed on quality management and process improvement. The basic principles and tools of lean operations and Six Sigma approaches will be covered, particularly how to apply these process improvement methodologies. The focus will be on the data analysis, decision making, and measurement methods used to establish and manage global value networks in order to improve customer satisfaction, minimize all forms of waste, and strengthen market position.

Course Purpose within a Program of Study:

The purpose of this course within a graduate business program is to provide students with the tools needed to make operational decisions based on data. These tools include data collection methods, analysis procedures,

data formatting, and statistical analysis. Students are taught to consider the limitations and underlying assumptions of each technique.

Expected Learning

Course Objectives (CO) and Associated Student Learning Outcomes (SLO)		
CO1 - Calculate descriptive statistics and create appropriate graphs and charts for process improvement	**Homework**	**Worksheet**
SLO1 - Calculate basic statistics (mean, standard deviation, etc.), using Excel and the normal probability distribution.	1	1
SLO2 - Create and use visual process improvement tools, including; Pareto diagrams, fishbone diagrams, scatter plots, boxplots, run charts, and histograms.	1	2
CO2 - Construct process control charts, identify out-of-control (OOC) signals, and develop corrective action plans		
SLO3 - Construct and interpret statistical process control charts for attribute data (p-charts and c-charts).	1	3
SLO4 - Construct and interpret statistical process control charts for variable data (I-MR charts)	2	4
CO3 - Calculate process capability measures for attribute and variable data		
SLO5 - Calculate and interpret commonly used process capability indices for variable data	2	5
SLO6 - Calculate and interpret commonly used process capability indices for attribute data	3	6
CO4 - Analyze processes using the Define-Measure-Analyze-Improve-Control (DMAIC) improvement methodology		
SLO7 - Use common Six Sigma tools to reduce process variation, and practice the "DMAIC" approach for process improvement. In-class **Catapult Lab.**	-	7
SLO8 - Understand Little's Law (LT = CT x WIP). Compute values for a simple series process without changeover considerations.	3	8
SLO9 - Create and interpret a value stream map (VSM) and calculate takt time, percent correct and accurate, daily capacity, and productive ratio.	4	9
SLO10 - Analyze various process data distribution patterns and suggest underlying root causes.		10
SLO11 - Calculate cycle times for different layout configurations. Interpret takt time. Calculate capacities and cycle times.	4 (Smartphone)	
CO 4 – Practice Supply Chain Management Fundamentals		
SLO 12 - Estimate order sizes using an economic order quantity approach	5	11
SLO 13 - Measure supply chain performance by estimating average aggregate inventory values, weeks of supply, and inventory turnover rates	5	12
SLO 14 - Select a supplier based upon a "total cost approach", as well as using subjective criterion.	5	13

Graded Assignments and Learning Activities

Item	**Weight**
Five Homework Assignments (10% each)	50%
In-class 75-minute Quiz	15%
Final exam (cumulative)	20%
In-class Worksheet Packet (Submit as a single file at end of term)	15%
Total	**100%**

HW Assignments: Homework, quiz, and exam will be submitted using the "Quizzes" tool in Canvas. Feel free to ask me to explain any of the homework problems in detail.

In-class Worksheet Packet: Submit the entire worksheet packet by March 18, using the "Assignments" drop-box in Canvas. To receive full credit, you must complete and submit all worksheets. In general, a worksheet packet that is submitted late will not be accepted for credit. Each worksheet will be scored as either 0 (did not complete) or 1 (complete). Submitting a worksheet packet on behalf of another student is a violation of the honor code!

Catapult Lab (SLO7)

If we are forced due to COVID-19 to hold the Catapult Lab class on-line, you will watch a short video in which I demonstrate launching a rubber ball using a small wooden catapult. I will provide an Excel file containing the carry distances (in inches) for 60 shots made using the catapult; 30 shots for the 'baseline' setup, and then 30 shots from an 'improved' version of the process. From the video and data supplied, you will complete the worksheet.

Grading Matrix:

Graded assignments will be weighted as noted earlier, and a final grade will be calculated as follows:
(0.10)(HW1) + (0.10)(HW2) + (0.10)(HW3) + (0.10)(HW4) + (0.10)(HW5) + (0.15)(Quiz) + (0.20)(Exam) + (0.15)(worksheets) = Final Grade

Grade Scale **-** Letter grades assigned will be as follows:

Overall Score	Grade
94 – 100	A
90 – 93	A-
85 – 89	B+
80 – 84	B
75 – 79	B-
70 – 74	C+
65 – 69	C
60 - 64	C-
55 - 59	D
< 55	F

Instructor Feedback:

I will score the weekly Worksheets on the basis of 0.0, 0.5, or 1.0 point. If you complete all of the questions on the worksheet, and your work is neat and organized, you will receive 1.0 point for that worksheet. If your work is only partially complete or very messy, you will receive 0.5 points for that worksheet.

Tentative Course Schedule:

Week (Date)	Core Topics Covered	Reading - *LSS Pocket Tool Book*	Work-sheet	HW Due
1 (1/14)	Course expectations & requirements, basic statistics and summary measures, OM trends, productivity, process improvement tools (histograms, boxplots, run charts, cause-and-effect, Pareto charts, etc.)	pp. 104 - 121 pp. 141 - 155	1, 2	
	Statistical process control (SPC). Interpret statistical process control charts for attribute data (p-charts and c-charts).	pp. 122 - 135	3	
2 (1/28)	Construct and interpret statistical process control charts for variable data (limited to I-MR charts).		4	HW 1 Due 1/28.
	Calculate and interpret commonly used process capability indices for variable data (P_{pk}, P_p, σ_{cap}, σ_{level}).		5	
3 (2/12)	**75-minute Quiz – covers Weeks 1 - 2 and HW 1 - 2.** Calculate and interpret commonly used process capability indices for attribute data (dpu, dpo, dpmo, σ_{cap}).	pp. 135 - 140	6	HW 2 Due 2/12.
	Use common Six Sigma tools to reduce process variation, and practice the "DMAIC" approach for process improvement (Catapult Lab).	pp. 4 - 19	7	
4 (2/25)	Understand Little's Law (LT = CT x WIP). Compute values for a simple series process without changeover considerations.	pp. 45 - 54 pp. 197 - 202	8	HW 3 **Due 3/4.**
	Lean management - Philosophy, tools, continuous improvement, Kaizen, process flow diagrams (including functional process flows), Create and interpret value stream maps and calculate takt time, percent correct and accurate, daily capacity, and productive ratios. Impact of machine changeovers. Analyze process distribution patterns and develop possible root causes.	pp. 203 - 212 pp. 228 – 240 Smart phone case	9, 10	
5 (3/11)	Supply chain management. Estimate order sizes using an economic order quantity approach. Measure supply chain performance by estimating average aggregate inventory values, weeks of supply, and inventory turnover rates.		11, 12	HW 4 due 3/11.
	Select a supplier based upon a "total cost approach". Use subjective criterion to select supplier.		13	
6 (3/18)	**On-line final exam via Canvas. 6 – 9 PM.**			HW 5 Due (March 18)

Course Policies:

The course Canvas site will be your sole source for the PowerPoint lecture notes, worksheets, homework, and relevant data sets. The student is responsible for reading and viewing all of this material and is encouraged to ask the instructor questions about any topics that are not clearly understood. All Worksheets, Homework, Quizzes, and Exams will be submitted through Canvas.

University Policies:

1. **Statement on Accommodation**
   UC Davis is committed to educational equity in the academic setting, and in serving a diverse student body. All students who are interested in learning about how disabilities are accommodated can visit the Student Disability Center (SDC). If you are a student who requires academic accommodations, please contact the SDC directly at sdc@ucdavis.edu or 530-752-3184. If you receive an SDC Letter of Accommodation, submit it to your instructor for each course as soon as possible, at least within the first two weeks of a course.

2. **Rights and Responsibilities**
   All participants in the course, instructor and students, are expected to follow the UC Davis Principles of Community, which includes affirmation of the right of freedom of expression, and rejection of discrimination. The right to express points-of-view without fear of retaliation or censorship is a cornerstone of academic freedom. A diversity of opinions with respectful disagreement and informed debate enriches learning. However, in this course, any expression or disagreement should adhere to the obligations we have toward each other to build and maintain a climate of mutual respect and caring.

   You are expected to take UC Davis's Code of Academic Conduct as seriously as we do. You were given this code of conduct with explicit explanations of violations (e.g. plagiarism, cheating, unauthorized collaboration, etc.) and your responsibilities in regard to them during orientation, and you signed a statement affirming that you understand it. Academic conduct violations will not be tolerated, and your instructor will not hesitate to turn violators over to Student Judicial Affairs. If you are uncertain about what constitutes an academic conduct violation, please refer to the code linked above, contact your instructor, or refer to the Office of Student Judicial Affairs.

   All material in the course that is not otherwise subject to copyright is the copyright of the course instructor and should be considered the instructor's intellectual property.

3. Safety and Emergency Preparedness
   UC Davis has many resources to help in case of emergency or crisis. While reviewing campus Emergency Information, you may want to register for UC Davis Warn Me and Aggie Alert, which will give you timely information and instructions about emergencies and situations on campus that affect your safety.
   If there is an emergency in the classroom or in non-Davis locations, follow the instructions of your instructor.

4. Student Wellness
   You deserve respect, and are encouraged to practice self-care so that you can remain focused and engaged; that might mean getting a drink of water, leaving to use the restroom, taking a moment to stretch, or doing something else you need to do to take care of yourself. Please be respectful of others by minimizing distractions when practicing self-care – especially in lab, field or studio settings where safety is imperative.
   College life can be overwhelming at times but know that you are not alone if you're feeling stressed. For many of us, systems of oppression such as racism, sexism, heterosexism or cissexism may cause additional stress. Please remember to practice self-care and reach out for support if and when you need it.

   You can visit Virtual UC Davis to find resources related to health and well-being, academics, basic needs (food and housing) and more.

5. Disclaimer
   Unexpected events might require elements of this syllabus to change. Your instructor will keep you informed of any changes.