

**Supply Chain Management**  
**Course Number: 33:799:460**  
**Course Title: Six Sigma & Lean Manufacturing**

## **COURSE DESCRIPTION**

This course provides fundamentals of six sigma, lean manufacturing, methodology and tools along with change management and other important strategies to improve the performance of business processes. Through case studies and team exercises, students will practice solving business problems and improving processes using these powerful tools and concepts. Topics covered will include: six sigma improvement methodology and tools, lean thinking tools and cultural approach, dashboards, process mapping, applied statistics and other business improvement techniques.

Students will also gain an understanding of: the strategic importance of business improvement, the need for fact based management and how to deploy these tools in different parts of the value chain. The course is structured as a combination of lectures, class discussions, case studies, and team exercises.

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## **COURSE MATERIALS**

### **§ Optional TEXTBOOKS**

**1) Title: Learning to See: Value Stream Mapping to Add Value and Eliminate MUDA. Lean Enterprise Institute, 1999. (Abbreviated as Learning to See)**

Authors: Mike Rother and John Shook  
ISBN-13: 978-0966784305 ISBN-10: 0966784308  
Publisher: Lean Enterprise Institute

**2) Title: A Guide to Six Sigma and Process Improvement for Practitioners and Students (Second Edition)**

Authors: Howard S. Gitlow, Richard J. Melnyck and David M. Levine  
ISBN-13: 978-0-13-392536-4 ISBN-10: 0-13-392536-6  
Publisher: Pearson

**3) Title: Lean six sigma for Engineers and Managers With applied Case studies**

Authors: Donna C. S. Summers  
ISBN-13: 978-1-4822-4353-6  
Publisher: Pearson

### **§ Required Software**

**Minitab 16 (<https://labgateway.rutgers.edu>)**

### **§ SLIDE DECKS & OTHER COURSE MATERIALS**

- Slide decks covering topics in the textbook will be reviewed and discussed in class and will also be provided to students through Canvas.
  - Other course materials will also be provided to students through Canvas.
  - Check **Canvas** (canvas.rutgers.edu) and your **official Rutgers email account** regularly for updates and announcements.
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## LEARNING GOALS AND OBJECTIVES

This course is designed to help students develop skills and knowledge in the following areas:

1. **Knowledge:** Students will have broad understanding of basic business theory and practice and deep understanding of theory and practice within supply chain management. Students who complete this course will demonstrate the following:

a. Knowledge of current advanced concepts within supply chain management and an ability to integrate and apply these concepts to practical business problems.

- Successful students will demonstrate their knowledge of manufacturing and operations planning concepts to ensure efficient and effective operations in business.

b. Proficiency at using current software tools and information systems to manage business data and address practical business problems.

c. Ability to apply appropriate quantitative methods to analyze business data, and to apply quantitative modeling techniques to analyze business plans and decisions.

2. **Effective Communication:** Students will be effective communicators. Students who complete this course will demonstrate the following:

a. Ability to construct clear, concise, and convincing written business communication.

b. Ability to construct and deliver clear, concise, and convincing oral communication.

Students develop these skills and knowledge through the following course activities and assignments:

§ **Lectures.** Lectures provide core knowledge of lean six sigma and how improvement strategies apply in a complex business environment, especially in supply chain operations, manufacturing, and service management. Students will establish an appreciation of operational excellence through linkage between business improvement strategies and business performance. Lean six sigma principles are grounded on data-oriented decision making, and therefore students will learn to use quantitative data analysis tools to quantify characteristics of business problems, derive cause-and-effect relationship, brainstorm and prioritize solutions, and report to stakeholders. The homework assignments and the term project enhance the learning in real-life business scenarios, and the exams test the degree to which students acquire the requisite knowledge.

§ **Class Participation.** Students should be able to communicate their ideas to the class and

create a positive learning environment. For details, please refer section on “Course Requirements and Grading”.

§ **Team Presentation:** Persuasive communication: Having the best idea without an effective means of communication is no solution. In the term project, students will produce a team report and deliver a presentation in a team setting. It is geared to enhance student skills to engage audience and present ideas effectively and efficiently, both in oral and written formats.

§ **Exams.** The course includes three non-cumulative exams to formally assess students’ knowledge and comprehension.

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## PREREQUISITES

*None. However, basic knowledge of statistics is very helpful.*

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## ACADEMIC INTEGRITY

*I do NOT tolerate cheating.* Students are responsible for understanding the RU Academic Integrity Policy <http://academicintegrity.rutgers.edu/>

I will strongly enforce this Policy and pursue *all* violations. On all examinations and assignments, students must sign the RU Honor Pledge, which states, “On my honor, I have neither received nor given any unauthorized assistance on this examination or assignment.” I will screen all written assignments through *SafeAssign* or *Turnitin*, plagiarism detection services that compare the work against a large database of past work. Don’t let cheating destroy your hard-earned opportunity to learn. See [business.rutgers.edu/ai](http://business.rutgers.edu/ai) for more details.

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## COURSE REQUIREMENTS AND GRADES

### Grading Scheme

The weights given to different activities in determining the final course grade follow:

**Class participation:** 5%

**Homework** 20%

**Quizzes:** 5%

**Exam 1:** 20%

**Exam 2:** 25%

**Case Presentation:** 25%

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**A** 100 % to 90.0%

**B+** < 90.0 % to 85.0%

**B** < 85.0 % to 76.0%

**C+** < 76.0 % to 70.0%

**C** < 70.0 % to 60.0%

**D** < 60.0 % to 50.0%

**F** < 50.0 % to 0.0%

### Class participation

Class starts and ends promptly at the assigned periods. Students are expected to be in their seats or present online and ready to begin class on time:

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## **Homework**

Homework problems will be assigned regularly, relating to the material covered in the class. Since these homework assignments will depend heavily on the class lecture videos, not watching the videos will put you at a disadvantage in doing your homework assignments accurately. Therefore, you are strongly encouraged to follow the weekly schedule for watching the assigned videos. Homework assignments will be posted on Canvas in the assignments section. The submissions will have to be made via the assignment section of Canvas by the specified due date.

## **Exams**

There will be two cumulative exams. Please refer to the exam schedule in the course outline. In case you have a **conflict** with that timing, please **let the instructor know** as soon as possible. The exam will test your ability to analyze and model to make decisions. The exams can serve as a tool for self-evaluation, provide feedback, and deepen the learning.

## **Quizzes**

There will be some quizzes during the class. All of them will be multiple choice or true/false questions and each of them takes a few minutes. The purpose of a quiz is to review the basic concept of lectures to make sure you are studying them before a new chapter begins.

## **Case Presentation**

- Each student has been assigned to a team. Check the Canvas>People>Team Project.
- Each team has been assigned a unique case presentation. Your project number is your case study. For instance, if you are assigned to team project 1, Case study 1 is yours.
- The case presentation (worth 25% of the grade) will deal with case studies from this book<sup>1</sup>.

You will have to present the case overview, the issues, analyses, and Takeaways. The presentation time is about **20 minutes**. Your presentation should be organized as follows:

1. Clear and Accurate Background/Synopsis of the Case. You do not need to follow the case style of narration. The case background may include information through reading the case or searching on the web.
2. Define each phase of the lean DMAIC process clearly and relate them to the materials you have learned during the course. For instance, which tools they used, what deliverables were provided at the end of each phase, etc.
3. Use multimedia tools, animations, slide transitions, and video clips to capture the attention of the audience.
4. Takeaways and conclusions at the end of presentation based on your knowledge and learning.

Here are the steps every team will follow for their presentation –

1. Every team is required to have a mandatory WebEx meeting with the instructor per schedule.
2. You must send by email a draft of your presentation by 12noon on the week of your presentation. This draft should be close to a final version, which includes all the materials outlined above. This draft presentation needs to be emailed to the instructor.
3. I will provide you detailed feedback on your presentation by Monday on the week of your presentation. Please note, that while the deadline for sending the draft presentation is 12noon on Saturday, you are encouraged to submit it sooner as it will allow me to send you the feedback earlier as well.
4. You must incorporate this feedback into your presentation before presenting to the class.
5. A detailed schedule for each team is provided in the case/team presentation document.

**Note:** You should *not* cut-and-paste verbatim material from the case studies or copy verbatim material from any other sources unless you use that material as exact quotes. In that case, be sure to enclose any pasted text material in double-quotes and to provide an exact reference for it. All pasted graphs and charts should also be properly referenced. If you are unsure about referencing materials, please see the Academic Integrity information available here

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<sup>1</sup> Franchetti, M.J., 2015. Lean six sigma for engineers and managers: with applied case studies. CRC Press. Vancouver

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## TENTATIVE COURSE SCHEDULE

<b>Week</b>	<b>Topic</b>	<b>Recommended Reading</b>
1	Course Overview Lean Six Sigma Introduction	
2	Lean Concepts Value Stream Mapping (I)	<i>Learning to See</i>
3	Value Stream Mapping (I) Value Stream Mapping (II)	<i>Learning to See</i>

4	Value Stream Mapping (II)Lean Culture and Tools	<i>Learning to See</i>
5	Lean Culture and Tools Toyota Production System	
6	Six Sigma Overview and Minitab Introduction Six Sigma: Define (I)	<i>Six Sigma</i> (Ch. 9)
7	Six Sigma: Define (II)  Six Sigma: Measure (I)	<i>Six Sigma</i> (Ch. 10)
8	Six Sigma: Measure (II)Review the exam	<i>Six Sigma</i> (Ch. 11)
9	Midterm (Covered on weeks 1 – 8)  Statistical Methods in Six Sigma (I)	
10	Six Sigma: Analyze (I) Statistical Methods in Six Sigma (II)	Six Sigma (Ch. 12)
11	Six Sigma: Analyze (II) Statistical Methods in Six Sigma (III)	Six Sigma (Ch. 12)

12	Six Sigma: Analyze (III) Statistical Methods in Six Sigma (IV)	Six Sigma (Ch. 12)
13	Six Sigma: Improve (No class)	Six Sigma (Ch. 13)
14	Six Sigma: Control	Six Sigma (Ch. 14)
15	Change Management Team Project Presentation	Six Sigma (Ch. 16)
16	Team Project Presentation  Final Exam	

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## SUPPORT SERVICES

If you need accommodation for a *disability*, obtain a Letter of Accommodation from the Office of Disability Services. The Office of Disability Services at Rutgers, The State University of New Jersey, provides student-centered and student-inclusive programming in compliance with the Americans with Disabilities Act of 1990, the Americans with Disabilities Act Amendments of 2008, Section 504 of the Rehabilitation Act of 1973, Section 508 of the Rehabilitation Act of 1998, and the New Jersey Law Against Discrimination. More information can be found at [ods.rutgers.edu](http://ods.rutgers.edu).

[Rutgers University-New Brunswick ODS phone (848)445-6800 or email [dsoffice@echo.rutgers.edu](mailto:dsoffice@echo.rutgers.edu)]

[Rutgers University-Newark ODS phone (973)353-5375 or email [ods@newark.rutgers.edu](mailto:ods@newark.rutgers.edu)]

If you are *pregnant*, the Office of Title IX and ADA Compliance is available to assist with any concerns or potential accommodations related to pregnancy.

[Rutgers University-New Brunswick Title IX Coordinator phone (848)932-8200 or email [jackie.moran@rutgers.edu](mailto:jackie.moran@rutgers.edu)]

[Rutgers University-Newark Office of Title IX and ADA Compliance phone (973)353-1906 or email [TitleIX@newark.rutgers.edu](mailto:TitleIX@newark.rutgers.edu)]

If you seek *religious accommodations*, the Office of the Dean of Students is available to verify absences for religious observance, as needed.

[Rutgers University-New Brunswick Dean of Students phone (848)932-2300 or email [deanofstudents@echo.rutgers.edu](mailto:deanofstudents@echo.rutgers.edu)]

[Rutgers University-Newark Dean of Students phone (973)353-5063 or email [DeanofStudents@newark.rutgers.edu](mailto:DeanofStudents@newark.rutgers.edu)]

If you have experienced any form of *gender or sex-based discrimination or harassment*, including sexual assault, sexual harassment, relationship violence, or stalking, the Office for Violence Prevention and Victim Assistance provides help and support. More information can be found at <http://vpva.rutgers.edu/>.

[Rutgers University-New Brunswick incident report link: <http://studentconduct.rutgers.edu/concern/>. You may contact the Office for Violence Prevention and Victim Assistance at (848)932-1181]

[Rutgers University-Newark incident report link: [https://cm.maxient.com/reportingform.php?RutgersUniv&layout\\_id=7](https://cm.maxient.com/reportingform.php?RutgersUniv&layout_id=7) . You may also contact the Office of Title IX and ADA Compliance at (973)353-1906 or email at [TitleIX@newark.rutgers.edu](mailto:TitleIX@newark.rutgers.edu). If you wish to speak with a staff member who is confidential and does **not** have a reporting responsibility, you may contact the Office for Violence Prevention and Victim Assistance at (973)353-1918 or email [run.vpva@rutgers.edu](mailto:run.vpva@rutgers.edu)]

If students who have experienced a temporary condition or injury that is adversely affecting their ability to fully participate, you should submit a request via <https://temporaryconditions.rutgers.edu>.

If you are a military *veteran* or are on active military duty, you can obtain support through the Office of Veteran and Military Programs and Services. <http://veterans.rutgers.edu/>

If you are in need of *mental health* services, please use our readily available services.

[Rutgers University-Newark Counseling Center: <http://counseling.newark.rutgers.edu/>]

[Rutgers Counseling and Psychological Services–New Brunswick: <http://rhscaps.rutgers.edu/>]

If you are in need of *physical health* services, please use our readily available services.

[Rutgers Health Services – Newark: <http://health.newark.rutgers.edu/>]

[Rutgers Health Services – New Brunswick: <http://health.rutgers.edu/>]

If you are in need of *legal* services, please use our readily available services: <http://rusls.rutgers.edu/>

Students experiencing difficulty in courses due to *English as a second language (ESL)* should contact the Program in American Language Studies for supports.

[Rutgers–Newark: [PALS@newark.rutgers.edu](mailto:PALS@newark.rutgers.edu)]

[Rutgers–New Brunswick: [eslpals@english.rutgers.edu](mailto:eslpals@english.rutgers.edu)]

If you are in need of additional *academic assistance*, please use our readily available services.

[Rutgers University-Newark Learning Center: <http://www.ncas.rutgers.edu/rlc>]

[Rutgers University-Newark Writing Center: <http://www.ncas.rutgers.edu/writingcenter>]

[Rutgers University-New Brunswick Learning Center: <https://rlc.rutgers.edu/>]

[Optional items that many faculty include:

- Students must sign, date, and return a statement declaring that they understand the RU Academic Integrity Policy.
- Students must sign, date, and return a statement declaring that they understand this syllabus.]