

**Introduction to Technology and Operations Management (TOM)**  
**IRGN 438 - Fall 2014 - Section ID 813381**  
Professor Roger Bohn

***Administrative information***

Class meets Tuesday and Thursday 12:30 to 1:50 PM, in the Gardner Room.

Faculty: Roger Bohn, Room RBC 1315. (Third floor of the big IRPS building)  
Phone/text message (858) 381-2015.

Until mid-October, I will be in on the top floor in Room 1411.

Office hours: Wednesday 2:15 to 3:15PM in my office;  
Thursday 2:15 to 3:15PM at Peet's coffee (near RIMAC);  
or text to make an appointment.

**Communications:** We will use TED.ucsd.edu. I plan to start with one main Forum where I will post messages. You are encouraged to post news articles and ask questions on it. In addition, frequent very small assignments will be posted in the *Content* section. Use TED to hand in written assignments. Your papers will be returned the same way.

If you run into a problem, need a last-minute extension, or have a question that is urgent, you can try texting (SMS) to (858) 381-2015. Please identify yourself - I won't recognize your phone number. No guarantees on how long it will take to get a respond.

**Textbook:** The main textbook is a custom e-book, in PDF form from McGraw Hill. It is drawn partly from *Operations and Supply Chain Management*, 14/e by F. Robert Jacobs and Richard B. Chase. It also includes almost all of our case studies. You can purchase the book from <http://create.mcgraw-hill.com/shop/> Pay by credit card.

You will also need to purchase three items from the Harvard Business School. Cost is about \$30. Go to <https://cb.hbsp.harvard.edu/cbmp/access/30928484> .

Other material will be assigned during the quarter. To keep the cost down, you can download many of them via the UCSD library.

**On-line course:** A colleague at Wharton is teaching an 8 week operations course on Coursera. It has about 60 percent overlap with our course, and I will assign some of his 7 minute lectures. It is free, but for \$70 you can get a "certificate of completion."  
[www.coursera.org/course/operations](https://www.coursera.org/course/operations). There is no need to do the entire course, but if you choose to do so, it will strengthen your understanding of this material.

**Course rules:** We will follow American business practices, specifically California high tech.

***Introduction***

All organizations have to do something useful - something that customers want, and are willing to pay for in some way. This course is about how to do those things *better* - faster, cheaper, with fewer defects, better meeting customer desires, and so forth. This is the subject of operations and technology management. Marketing is about "selling things," operations is about "producing things," technology is about "new things." A typical set of activities for a new product follows this flow:

Concept (done in the marketing group) --> Design --> Supply chain --> Assembly --> Distribution --> Customer support --> End of life

The course is designed for students in the for-profit and nonprofit management tracks. Recently, many nonprofit donors are driving them to measure and then improve the cost-effectiveness of what they do, forcing them to develop operations skills. The course is also useful for anyone interested in the energy sector.

TOM translates organizations' activities into something that can feed, clothe, or entertain the world. Economists used to point to accumulation of capital goods (machinery) as the source of economic growth, but since about 1800 growth has been driven largely by technological progress. This progress allows making more, using less (physical) input – the heart of TOM. Inferior operating methods waste resources, energy, and workers' time – and money.

The course uses case studies to develop your problem-solving skills. Cases are decision- and “first-person” oriented. Most of them require you to *identify, diagnose* and *solve* a problem in the organization. You must choose a course of action as a protagonist in the case

## ***Organization***

The course is divided into three modules.

- A. **Process Analysis:** You will learn to analyze an operating system, including its costs, speed, and capacity. How can it be improved? Services and manufacturing will be examined together.
- B. **Supply Chains and Uncertainty:** Companies such as IBM used to be vertically integrated, but most now concentrate on a few stages of their supply chain, and outsource the rest. Product variety and unpredictable demand add considerable difficulty to managing these supply chains. In many “fashion” industries, demand forecasts are very inaccurate, but production and capacity decisions must still be made.
- C. **Quality and Improvement:** Organizations that don’t improve eventually get overtaken, and disappear. Customers expect defect-free products and services. The tools that were developed to improve manufacturing quality, often loosely called “six sigma,” are now also used in a variety of situations, such as hospital safety. The tools for improvement and for quality management are closely related.

The material will be taught using lectures, readings, case studies, and exercises. Daily assignments will be posted on TED/Blackboard. Many assignments will require you to briefly answer some questions about the case or readings. These are due the night before class.

## **Schedule**

Item numbers like #THIS refer to chapters in the McGraw-Hill reader. Individual assignments, posted on TED one week in advance, are the final reference for each day.

#	Date	Topic	Reading	Case study or exercise
1	Oct 2	Introduction	Text #1, <i>Introduction</i>	
<b>Module A Process analysis: Meeting customer needs quickly and cheaply</b>				
2	Oct. 7	Process flows, speed, and capacity	Operations Management Reading: Process Analysis (Harvard)	#2 <b>Kristen's Cookie Company (A)</b>
3	Oct. 9	Ops Strategy and Investment	#3, <i>Process View of Organization</i> . Coursera video.	#4, <b>Shouldice Hospital (Abridged)</b>
4	Oct. 14	Continuous flows; bottlenecks; waiting lines	Study the readings, especially chapter #3.	#5, <b>National Cranberry Cooperative 1996</b> . Using Excel for a simple process simulation.
5	Oct 16	Economics of operations	#6 Link Between Operations and Finance; video	<b>Exercises - see Ted assignment</b>
6	Oct. 21	Services; directly measuring performance	#7, Service Processes;	#8 <b>Pharmacy Service Improvement at CVS</b>
<b>Module B – Supply Chains, Inventory, and Coping with Uncertainty</b>				
7	Oct. 23	Dealing with uncertainty	#9 Newsvendor model	<b>Le Club Francais</b> (available via Ted)
8	Oct. 28	Forecasting and retail performance	Assigned articles	#10 <b>Supply Chain Management at World Co.; Project proposals due</b>
9	Oct. 30	Supply Chain Simulation	Assigned articles	<b>Supply Chain Simulation</b> (purchased from HBS)
10	Nov. 4	Simulation Day 2	<i>Local residents: vote!</i>	<b>Simulation conclusion and write-up</b>
11	Nov. 6	Sourcing and supply chain strategy	Operations Management Reading: Supply Chain Mgmt. (Harvard)	#11- <b>Crocs</b>
+	Nov. 11	Holiday -No class		Work on term papers
12	Nov. 13	Midterm exam		<b>Exam</b>
<b>Module C – Quality and Learning -- subject to revision</b>				
13	Nov. 18	Costs of quality; quality strategy	Bohn (not in course reader)	
14	Nov. 20	Six Sigma	#12 Six Sigma quality; other readings	Assigned exercises. <b>Draft term paper due</b>
15	Nov. 25	Problem solving methods	TBA	TBA
+	Nov. 27	Holiday - no class		Work on term paper.
16	Dec. 2			
17	Dec. 4			
18	Dec. 9			Team project presentations
19	Dec. 11	Last class		Team project presentations
<b>Exam</b>	TBA	Optional final exam		<b>Final Exam; term papers due.</b>

## **Course responsibilities and grading**

**Class participation, quizzes, and homework approximately 30% of grade.** Especially on days when we discuss cases, participating in the discussions is important. Your understanding of the readings and cases will also be tested by a few brief questions, usually due the night before class. Everyone must turn in an individual answer. *You are permitted to discuss the questions with a few classmates, provided you list the names of everyone you talked to.* Also, be aware that you may be cold called in class to justify your answers.

**Case write-ups: 10%** Analyze one case in writing. Teams of two are permitted and encouraged. Write-ups should be in the form of a memorandum to someone in the case, explaining what you will do, and supporting it with analysis of the situation. More advice on write-ups appears later in the syllabus. You may rewrite the case after you get my comments back.

**Simulation: 10%** There will be a simulation exercise, done in teams. The simulation results and your write-up of what happened will both be graded.

**Midterm: 25%** The exams are in-class, open notes, no computer. In other words, you can print out a few pages of notes and bring them, and your textbook, to class.

**Final paper or final exam: 25%** You have a choice of taking a final exam, or doing a final research paper. The most interesting papers work with a real organization to analyze their operations issues. You may also do a more research-based paper, which should include original information such as from telephone interviews.

**Interpreting grades on Ted:** The Ted system forces me to state a “point value” for each assignment. The actual grades are then integers from 0 up to that value. For example, brief daily assignments are normally graded on a 3 point scale: 1 point for making an effort; 2 points for a correct answer; 3 points for exceptional insight, diligence, or interest. Another assignment could have a completely different total, such as 100 points for the midterm.

You should keep track of your grades on assignments. However, Ted simply adds up the points, while I use more elaborate calculations for grades. For example, if you rewrite a case study, your final grade is not the sum of the two grades. The midterm is not worth 33.3 times as much as a daily homework. So the “total points” reported by Ted is oversimplified. When I hand back the midterm, I will show the distribution of point scores so you can see how you are doing.

**Collaboration and outside assistance on assignments:** I encourage collaboration and conversation outside of class, and via the course conference. Cross-cultural and cross-discipline collaborations are the most valuable, especially for anything requiring creativity. This is the “diversity effect.”

There are specific limits on what you can do for different kinds of assignments:

- For *daily short assignments*, see above. You are permitted to discuss the questions with a few classmates, provided you list the names of everyone you talked to, and hand in your own answers. Using answers copied from people not in the class is not allowed.
- For *case studies*, you can talk with classmates, but once you start the final

writeup, *including exhibits and spreadsheets*, it should be done only by you and your teammate. *Provide a list at the end of anyone you talked with about the case.* This list provides you with a “safe harbor.” All the case facts you need should be in the case itself (plus general knowledge); don’t go off and research the company. Textbooks and research papers discussing the principles at work are fair game, but footnote them following the usual academic rules. Using answers copied from people not in the class is forbidden.

- For term papers, *you may talk with absolutely anyone about absolutely anything*, provided that outside sources are properly footnoted.

If in doubt about rules for a particular assignment, ask my permission in advance and include an explicit note about how you collaborated.

**Maintaining Academic Integrity:** Students agree that by taking this course and using Turnitin.com all submitted papers will be subject to textual similarity review by Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the terms of use agreement posted on the Turnitin.com site.

## Turning in material

Follow a standard procedure when you turn in case writeups and similar material:

- For short question assignments, you can just type the answers into the provided section on Ted.
- File format: You can use PDF (preferred), Word, or RTF format. Text, exhibits, and attachments should be included in a single file, *including spreadsheet printouts*. Creating a concise and legible spreadsheet is an important part of conducting an analysis.
- Include your name(s) in the text of *all* documents you submit, but *put them at the end of the last page*. This allows me to grade anonymously. Remember to use memo format for case write-ups, so use fictitious “from” names. (Exception: final reports should have a normal title page.) Also include your email addresses and the date.
- File name: Include your name and the date in the file name. Files with names like “assignment.doc” will get lost!
- Document management: TED is the preferred gateway. I will return comments the same way. If two people worked on a paper jointly, both should turn it in, and mention your partner in the comments so that I don’t grade the paper twice.
- Diagrams may be done by hand and photographed or scanned into your document, as long as they are clear and legible. (Exception: final reports should be done using computer tools.)
- For things like team paper proposals, you may submit the file as an email message to me, *with a cc to all team members* so that I can use “Reply All” to send comments.

## **Final Papers**

We will discuss this in more detail in class. If you wish to do a final paper, you must submit a proposal by October 21. If you intend to do a field project, describe the organization, the general area you will work on, and who in it has agreed to assist you.

## **Preparing Cases**

In case studies, as in real life, you never have all the information you might want. There is also uncertainty: if you pursue a particular course of action, you can't be sure what will happen. Cases also present information that is ambiguous, and sometimes even contradictory or erroneous. Mr. Jones may say that everything worked well when he was in charge, but others may view the situation differently. Does other evidence in the case agree with his statement? If not, how can you reconcile the differences?

Theory provides us with some expectations, but is necessarily stylized and ignores real-world complexities. You must learn how to make reasonable decisions in the face of incomplete information, uncertainty, ambiguity and even deception. Be explicit about your underlying assumptions, so that you can defend them, or change them.

Every case study is different, but here are general guidelines for how to analyze them. Most good case analyses follow a sequence of steps. Although they are listed in logical order, you will usually jump back and forth among them when you are preparing.

### **1. Understand the situation and the setting**

Read the case through once, including a quick look at the exhibits. (30 minutes)

What is the problem to be solved? What decisions need to be made? What critical problems is the organization having? Sometimes this is obvious, but often it requires subtlety to figure out the underlying forces behind the visible situations. (10 minutes)

Analyze the organization's environment. What business are they in; what do they have to do well to succeed? (Key success factors: KSF) What are alternative solutions? Some alternatives are usually spelled out in the case, but creativity may help to modify them and uncover others. (5 minutes)

### **2. Analyze the operating system.**

If the problem is capacity, analyze bottlenecks and anything else that affects capacity. If there is a quality problem, do some root cause analysis. This is detective work, and will take roughly half of your preparation time. (30 minutes and up, depending on case complexity)

### **3. Analyze the alternatives, and select one or more**

Show how actions will lead to consequences. Usually this is a matter of describing possible changes, then quantifying their effects and translating into dollars. Depending on the nature of the issues and information available, the analysis may be more or less quantitative, but it must always be rigorous. *Prepare some kind of comparison table* summarizing the effects, costs, and benefits of different courses of action – one of which may be the status quo. (30 minutes and up)

### **4. Implementation plan**

Think through the next steps. You've said what should be done, but how do you actually make it happen? What obstacles and contingencies do you need to plan for? This

sometimes reveals gaps in earlier steps. (15 minutes)

## 5. Discuss your ideas with a study group

Peer feedback on your ideas is very valuable. You are learning a very new set of skills, together. This will add confidence when you speak in class.

### Case Write-ups

Translating from analysis into an effective write-up is an art in itself. Write-ups should be in the form of a memorandum explaining what you will do, and why. Assume that the reader is familiar with the case facts, and do not waste space on the obvious. Some suggestions:

- Write as a coherent document. Study questions suggest useful issues to investigate, but *are not intended as an outline for a memo*.
- Be clear about your final conclusion – what to DO. It is acceptable to include some tests as part of your implementation plan as long as you are specific about how to do them – “Try this approach for three months and see whether production rises by more than 15 percent.”
- Quantify, and usually end up with dollar estimates. Many times you will have to estimate numbers. For example, the case may not specify how much workers are paid, but you are proposing to add more workers. Use other information in the case, or your “general knowledge”, to make a reasonable guess about wages, and from that to calculate how much your proposal will cost. Usually your final solution won’t depend on the precision of your estimates.
- Use lots of diagrams and tables. Of course if you are crunching a tableau of numbers (e.g. daily numbers for a month) you will want to use a spreadsheet, but annotate it carefully to make clear what you are doing.
- When you calculate numbers, give a sense of their importance. “My plan will reduce cost by \$150,000 per year,” is a good start, but is this a large or small amount of money, in the context of the case?
- More generally, whenever you do a chunk of analysis explain what conclusions to draw from it. Be sure you have explained, “So what?” This is especially useful for exhibits –what does it show, why is that important? In a good case write-up it is often possible to understand your core analysis just by reading through the exhibits.

## Assignments for Second Class

**See Ted.**