

### COURSE GOALS

To introduce students to foundational concepts in Operations, decision analysis, and optimization.

### LEARNING OBJECTIVES

Students will be able to ...

- Appreciate the role of Operations within business
- Understand business processes
- Use Little's Law to analyze flows in processes
- Recognize the sources of variability and use techniques for mitigating it
- Understand the importance of inventory in processes
- Appreciate various techniques to improve processes such as TQM, lean, 6-Sigma, etc
- Compute inventory levels using the Economic Order Quantity formula
- Use techniques for evaluating decisions under uncertainty such as risk analysis, decision trees, Newsvendor models, etc
- Formulate and solve simple optimization models using Excel Solver

### ASSESSMENT SUMMARY

The mark in BASC 550 will come from:

|                     |     |
|---------------------|-----|
| Assignments         | 30% |
| Case memo           | 10% |
| Exam                | 50% |
| Class Participation | 10% |

### PROGRAM GOALS *(Check those that apply)*

| MBA  |
|--|
| <input checked="" type="checkbox"/> Critical & Analytical Thinking |
| <input checked="" type="checkbox"/> Integration                    |
| <input checked="" type="checkbox"/> Communication                  |
| Ethics & Social Responsibility                                     |

**COURSE INFORMATION****Division: Operations and Logistics****Instructor: Tom McCormick**

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Office hours: by appointment

**Section number: 1/2****Course duration:** 21 Oct to 30 Nov**Pre-requisites: (none)****Course website: UBC Connect****Term/period: Period 2 of MBA program****Teaching Assistant: (none)**

Email:

Phone:

Office hours:

**Class meeting times: Tue-Thu 8-10/10-12  
(except Tue 12 Nov?)****Classroom location: HA 132****Tutorials / labs: none**

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**BRIEF COURSE DESCRIPTION**

Every organization either manufactures a product, or provides a service, or both. "Operations" refers to the set of business processes that produce the product or service. "Logistics" refers to the set of business processes that procure inputs and distribute the finished product or service to the customer. A network of operations and logistics functions that spans several companies and many functional areas within those companies, usually referred to as a "supply chain," is needed to convert raw materials into finished goods. This component of the MBA program will introduce students to key concepts and tools needed to understand and effectively manage supply chains, or Supply Chain Management (SCM). A key idea is the concept of a "business process", and managing and improving such processes. Since every functional area of business includes processes, most of the material will be relevant to managers in all functional areas.

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**COURSE MATERIALS & REQUIREMENTS**

Reading Materials:

- There is no textbook, but the readings include relevant excerpts from a few different texts.
- The full lecture notes will hopefully be available on the class website from the beginning of the class. These notes include more material than we will be able to cover in class, but you will be responsible only for the parts covered in class. As the BASC 550 exam approaches, a condensed version of the notes containing only the key points covered in class will be made available.
- Required readings: The required readings for each class are noted in the Course Outline below. Some of them are available through the "Library Course Reserves" area of the Connect webpage, and some are in the course package that you must buy from the UBC Bookstore.

Optional readings: Optional readings (usually from the business press or newspapers) will be made available through on-line access. Links to access these optional readings will be announced in class on the class website as they are posted. These optional readings are not included in the class package.

**Other Learning Resources:** including library resources, websites

**Technology Requirements:** none

**Activity Fees:** none beyond IF requirements

The readings fall into four categories:

1. **Absolutely required** (in bold font on syllabus below), since discussion questions on these will be distributed and then students will be cold-called in class to provide answers:
  - Deep Change article
  - Wriston case
  - Oglethorpe Power Corporation article (*Interfaces* article, available from course Connect website)
  - RRSP Flood article (*Interfaces* article, available from course Connect website)
  - Red Brand Canners case
2. *Semi-required* (in italic font on the syllabus below): there will not be formal discussion questions and cold-calling, but I will refer to this article a lot in classes 1 and 2, and there is some chance I will ask a question about it on a homework or exam.
  - “Interview with Michael Dell” article
3. Good background for understanding the lectures, but can be skipped if you understand the lectures (in normal font on syllabus below):
  - Taxonomy of Process Types
  - Mass customization
  - Inventory Aggregation
  - Waste and its sources
  - Variability, Buffers, and Inventory
4. Totally optional, but enriching. Some material will be posted on the Connect website.

### ASSESSMENT

Student learning will be assessed through two assignments; a memo on the Wriston case; and a written, in-class, open book, open notes, closed computer final exam.

To repeat, the weights on various categories will be:

|                     |     |
|---------------------|-----|
| Assignments         | 30% |
| Case memo           | 10% |
| Exam                | 50% |
| Class participation | 10% |

**SCHEDULE**

The sessions here are numbered as a continuation of the Operations sessions in the Integrated Foundation. Two homeworks are included.

| WEEK #                         | CLASS TOPICS   | ACTIVITIES / READINGS  | WHAT'S DUE  |
|--------------------------------|--|--|---|
| Fri, 6 Sept<br>integrated case | Westlake case  | Westlake case, CSM panel   | Case memo   |
| Tue, 22 Oct<br>Opns 1          | Introduction to Operations, Logistics and Supply Chain Management.   |  |   |
| Thu, 24 Oct<br>Opns 2          | <b>Introduction to Processes (Part 1; tie to BASC 500)</b> <ul style="list-style-type: none"> <li>• Importance of the process view</li> <li>• Basic Process Types</li> <li>• Product Process Matrix</li> <li>• Basic Little's Law</li> </ul> | Taxonomy of Process Types  | <b>Homework 1 handed out</b>  |
| Fri, 25 Oct<br>Integrated case | Zara case  | Zara case, PSM panel   | Case memo   |
| Tue, 29 Oct<br>Opns 3          | <b>Introduction to Processes (Part 2)</b> <ul style="list-style-type: none"> <li>• Role of variability</li> <li>• Role of inventory</li> </ul>   | <ul style="list-style-type: none"> <li>• <b>Deep Change article</b></li> <li>• Mass customization</li> <li>• Inventory Aggregation</li> <li>• Waste and its sources</li> </ul> | <b>Prepare Deep Change discussion questions</b> (see below)   |
| Thu, 31 Oct<br>Opns 4          | <b>Introduction to Processes (Part 3)</b> <ul style="list-style-type: none"> <li>• Process improvement strategies including quality</li> <li>• Methods: TQM, Lean, JIT, 6-Sigma, etc</li> </ul>  | <b>Wriston case</b><br><i>Interview with Michael Dell</i>  | <b>Wriston case memo due – Oct 31<sup>st</sup> at 8am</b><br><i>Prepare Dell discussion questions</i> (see below) |
| Tue, 5 Nov<br>Opns 5           | <b>Introduction to Inventory (Part 1; tie to BASC 523)</b> <ul style="list-style-type: none"> <li>• Computing long-run inventory levels with low variability using Economic Order Quantity</li> </ul>  | • Variability, Buffers, and Inventory  | Download EOQ.xls from website<br><b>Homework 1 due – Nov 5<sup>th</sup> at 8am</b><br>Homework 2 handed out       |
| Thu, 7 Nov<br>Opns 6           | <b>Introduction to Optimization (Part 1; tie to BAMS 523)</b><br><b>Decision making and risk:</b> <ul style="list-style-type: none"> <li>• Probability and expected value</li> <li>• decision trees and</li> </ul>                           | Lecture notes, and <b>Oglethorpe Power Corporation</b> article   | <b>Prepare Oglethorpe discussion questions</b> (see below)  |

|                                      | <b>decision analysis</b>  |   |  |
|--------------------------------------|---|---|--|
| <b>Fri, 8 Nov</b><br>Integrated case | BC Packers case   | BC Packers case, Finance panel  | Case memo  |
| <b>Tue, 12 Nov</b><br>Opns 7         | <b>Introduction to Optimization (Part 2)</b><br><b>The value of information:</b> <ul style="list-style-type: none"> <li>• Bayes' Theorem</li> <li>• Expected Value of Sample Information</li> </ul> |   | (continue Oglethorpe)  |
| <b>Thu, 14 Nov</b><br>Opns 8         | <b>Introduction to Inventory (Part 2)</b> <ul style="list-style-type: none"> <li>• Computing short-run inventory levels under uncertainty using Newsvendor</li> </ul>                               | Lecture notes   | Will again use EOQ.xls from website  |
| <b>Tue, 19 Nov</b><br>Opns 9         | <b>Introduction to Optimization (Part 3)</b><br><b>Linear Programming</b> <ul style="list-style-type: none"> <li>• Formulation</li> <li>• Excel Solver</li> </ul>                                   | <b>RRSP Flood article</b><br>Lecture notes  | Download GLASSES.xls, BadGIP.xls, RBCData.xls from website<br><br><b>Prepare RRSP discussion questions (see below)</b><br><br><b>Homework 2 due Nov 19<sup>th</sup> at 8am</b> |
| <b>Thu, 21 Nov</b><br>Opns 10        | <b>Introduction to Optimization (Part 4)</b> <ul style="list-style-type: none"> <li>• Shadow prices</li> <li>• Sensitivity analysis</li> </ul>  | <b>Red Brand Canners case</b>   | <b>Prepare RBC discussion questions (see below)</b>  |
| <b>Date TBA</b>                      | <b>Final exam for BASC 550</b>  | Review all notes, readings, and cases: exam will be <b>open book, open notes, closed computer</b> | TBA  |

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### TEACHING & LEARNING ACTIVITIES

The classes will revolve around discussing the material in the notes, in the readings, and one case. Students are expected to have read the readings, the case, and the articles, and come to class prepared to answer questions about them. In addition, students are expected to be able to relate the material presented in class to their prior business experience if called upon to do so.

## Discussion Questions for Readings

### (Optional) Discussion Questions for the Dell article

**Important note: You do *not* have to prepare written answers to the discussion questions for Dell to hand in. The Dell reading is semi-optional, and so I won't cold-call students to ask these questions. But it may help your understanding of course concepts to consider these questions as you read the article.**

Here are the questions, in roughly the order in which they appear in the article:

1. On page 75 Michael Dell says "[t]he rule we follow is to have as few partners as possible." Why is this a good idea?
2. Why does he say (p 76) that "inventory is [a] risk"?
3. Draw a picture of the Sony + Dell supply chain under the old style (Sony sends monitors to Dell) and the new style (Sony sends monitors directly to customers). What is the advantage (if any) of this for customers? For Dell? For Sony?
4. On page 77 he says that Dell's suppliers "don't have to worry about sell-through". What does this mean and why is it an advantage for the suppliers?
5. He says that Dell can "substitute information for inventory" (p 77). What does he mean by this?
6. Dell's supply chain follows "just-in-time" principles, and Michael Dell talks about how Dell's demands to Sony will be "very consistent, predictable" (p 77). But what has happened to demand variability? That is, won't demand to Sony reflect consumer demand and so be in fact very inconsistent and unpredictable? That is, isn't Michael Dell lying here?
7. How does Dell's "virtually integrated" supply chain help its Marketing?
8. Automobile manufacturing is another industry where there is a large infrastructure of suppliers who make components. Ford and General Motors (GM) have both struggled a lot in recent years, whereas Toyota has done quite well even as it has greatly expanded its North American manufacturing. Why do you think this is the case? (Hint: the answer is probably more than just their supply chains.)

**Important note: You do *not* have to prepare written answers to the discussion questions below to hand in. However, I will randomly call on students to give answers to these questions in class, and so you should be prepared to give an answer.**

### Required Discussion Questions for the Deep Change article

Here are the questions, in roughly the order in which they appear in the article:

1. On page 1 the author writes "Operational innovation should not be confused with operational improvement or operational excellence". Did the rest of the article convince you that this is true?
2. On page 2 the author attributes Toyota's success to operational innovation. From what you understand of Toyota's success, is this a fair claim?
3. The left column on page 3 (and p 8) tells about Shell Lubricants' order fulfillment process. How would you describe this sort of process change?
4. The right column of page 3 talks about Progressive reducing its cycle time from 7-10 days to 9 hours. How did this reduce their cost structure?
5. In the right column of page 4 is a story about how some middle managers pushed through a change in fulfilling orders at a semiconductor maker. What tool did they use to make their point? Why do you think that this diagram was so complicated?

6. The next paragraph says that “operational performance is the driver of financial results”. Since financial results are the thing that ultimately matters to most companies, why should companies pay any attention to “operational performance” at all?
7. The left column on page 6 talks about operational innovation in “procurement, order fulfillment, new product development, post-sales customer support, and even budgeting”. None of these areas is traditional “operations”, so how can improvements in these areas be called “operational innovation”?
8. Pp 6-7 says that “only when a concept is actually tried does one learn what it should really have been in the first place”. What does this have to do with Design Thinking?
9. P 8 right column argues that operational innovation seems easy to copy, but rarely is copied. Why is this?

### Required Memo Question for the Wriston case

Write a memo in the style of the IPD cases. You should consider the following four alternatives for what Wriston Manufacturing Corp. (WMC) should do with its troubled Detroit plant:

1. Close the Detroit plant right now and move its production to other plants.
2. Invest more heavily in Detroit so that it will last for another 5-10 years.
3. Invest very heavily in a new plant to replace Detroit.
4. Some significantly different plan that you prefer to the previous four.

Note that these are the three possibilities for Detroit mentioned in the middle of page 1 of the case, with choice four added for completeness. If you choose alternative 4 you must give compelling reasons why you chose it.

Your memo should recommend one of these four alternatives, and should justify in some detail why you prefer this choice. You might also want to recommend what WMC should do with its Saginaw and Lima plants. A diagram of WMC’s 10 plants, the products they produce, their ROA’s and their capacity utilization, is posted on the course Connect webpage to help you navigate the case.

There are (as usual) several valid ways to look at this decision: How does the Detroit plant fit into WMC’s corporate strategy and its industry? What would the financial consequences of your decision be? (We have entered the data from Exhibits 2A, 3 and 7 into the spreadsheet WMCData.xls on the course’s Connect webpage to help you with this; note that there are some typos in these tables that show up when entered into Excel, so the spreadsheet data does not exactly match the Exhibits.) In class (and perhaps in your memo) you should be ready to discuss this decision not only from the viewpoint of WMC’s Operations, but also its Strategy, Marketing, HR, Accounting, etc.

### Required Discussion Questions for the RRSP Flood article

1. Draw a process flow diagram for the flow of RRSP applications through IFS.
2. What are the sources and costs of variability for IFS in handling RRSP applications?
3. What is the tradeoff between temporary workers hired by the CSG personnel office, versus clerks hired from Manpower Temporary Workers (p. 29)?
4. Why was it ok to round the “15 percent of the ... variables [that] were nonintegers” (p. 30)?
5. The “linear programming solution suggested a very substantial buildup of backlog in the data preparation department towards the end of February”, which “was unexpected” (p. 30). Doesn’t this violate our idea that we should minimize work-in-process inventory?
6. What are the HR implications of this model and its implementation?

### Required Discussion Questions for the Oglethorpe article

1. P. 30 says that “[t]he tree has nearly 8,000 paths”, but the tree in Figure 4 has only 15 paths. Why this difference?
2. P. 30 says “we conducted probability assessments quickly with the expectation that extensive probabilistic sensitivity analysis later would reveal where refinement was necessary. For each chance event, the appropriate experts joined the analytic team to discuss the formulation and provide the needed inputs.” How trustworthy do you find this approach?
3. Explain how Figure 6 shows that the “ITS” and “No Line” decisions are less risky than the “No ITS” decision. What is the tradeoff being shown here?
4. How does the “value of information” analysis on pp. 32-33 and in Figure 8 compare to our analysis in class?
5. Why does the bulk of the analysis talked about in the article happen *after* the “optimal” decision is computed?

### Required Discussion Questions for the Red Brand Canners case

1. Why does Tucker state that the whole tomato production is limited to 800,000 pounds? (i.e., where does the number 800,000 come from?)
2. What is wrong with Cooper's suggestion to use the entire crop for whole tomatoes?
3. How does Myers compute his tomato costs in Exhibit 3? How does he reach his conclusion that the company should use 2,000,000 pounds of B tomatoes for paste, the remaining 400,000 pounds of B tomatoes and all the A in juice? What is wrong with Myers' reasoning?
4. In order to decide on an optimal production schedule, what are the correct numbers to use for the worth of producing one case of whole tomatoes, tomato juice, and tomato paste? That is, should we use the “Net Profit” suggested by Exhibit 2, the “Marginal Profit” suggested by Exhibit 3, or some other numbers?