DRAFT (WILL BE CHANGED)

Course overview: See CANVAS for specific times of classes and assignments:

<table>
<thead>
<tr>
<th>Class</th>
<th>Module and Description</th>
<th>Readings</th>
<th>Cases</th>
<th>Hand-In</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction &amp; Framework for strategic decisions in operations</td>
<td>Chapter 1 of <em>Operations Strategy</em> (2nd ed.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Application</td>
<td>Swiss Watch Industry (Ch1, p. 38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>VALUE: Tying operational metrics to firm value using ROIC tree</td>
<td>Chapter 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Application</td>
<td>Peapod (Ch14)</td>
<td></td>
<td>Peapod (group)</td>
</tr>
<tr>
<td>5</td>
<td>COMPETENCIES: Tradeoff curves and competitive benchmarking</td>
<td>Chapter 3</td>
<td>Sugar &amp; Spice (Canvas)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Application</td>
<td>American Connector Corp (in case pack)</td>
<td>American Connector (individual)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Part I. Concepts &amp; Value &amp; Competencies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Capacity Strategy and sizing under uncertainty</td>
<td>Chapter 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Speaker</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Network capacity and Operational Hedging</td>
<td>Chapter 10</td>
<td>Seagate Technology (Ch13)</td>
<td>Seagate Technology (individual)</td>
</tr>
<tr>
<td>10</td>
<td>Capacity expansion and timing</td>
<td>Chapter 5</td>
<td>Harley-Davidson (Ch12)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Capacity Types and Flexibility</td>
<td>Chapter 6</td>
<td>PharmaFlex (Canvas)</td>
<td>PharmaFlex (group)</td>
</tr>
<tr>
<td>12</td>
<td>Capacity location</td>
<td>Chapter 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Analytics session: Optimization via Simulation and Problem</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Global networks and offshoring</td>
<td>Mini-case 7: “Mexico or China?”</td>
<td>Mexico-China (group)</td>
<td></td>
</tr>
<tr>
<td>Class</td>
<td>Module and Description</td>
<td>Readings</td>
<td>Cases</td>
<td>Hand-In</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------------------</td>
<td>---------------------------------------</td>
<td>------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>15</td>
<td>❑ Global Sourcing over the Product Life Cycle; Strategic Sourcing</td>
<td>Chapter 8 (skip 8.5)</td>
<td>Boeing 787 Dreamliner (Canvas)</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>❑ IntCase1 debrief; ❑ Operational Risk Management</td>
<td></td>
<td>XTX Operational Risk</td>
<td>Integrative Case I (group)</td>
</tr>
<tr>
<td>17</td>
<td>❑ Automation and Artificial Intelligence in Ops</td>
<td></td>
<td></td>
<td>Perhaps operational Risk exercise</td>
</tr>
<tr>
<td>18</td>
<td>❑ Demand, Revenue and Yield management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>❑ Innovation: Social Enterprise operating model</td>
<td></td>
<td>World Bicycle Relief: Buffalo Bicycle Social Enterprise</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Summary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td><em>Course Summary and WrapUp</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TBD</td>
<td>Final Exam (closed book, in-class)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Course Description and Objectives

The goal of this course is to make strategic decisions that are grounded in operational reality. We study how to build and evaluate the “operating system” of the firm to maximize value.

Content: The course provides a framework and multiple analytic tools to analyze, value, and optimize the strategic decisions involved in configuring the firm's operating system. The key evaluation metric is how these decisions impact the net present value and risk exposure of the firm. The strategic decisions studied are

1) designing a dashboard of operational KPIs that quantitatively tie operations to the value of the firm;
2) analyzing trade-offs among operational competencies (cost, quality, time, customization, etc.) and using this for competitive benchmarking;
3) asset decisions (capacity sizing, expansion, flexibility, and location); and
4) process decisions (sourcing; automation; standardization; risk management and operational hedging; improvement, innovation and learning).

Relationship to Other Courses: This operations elective course builds on the core operations class and also assumes you are familiar with the basics of finance, economics, and strategy. The strategic decisions studied in this course require a detailed analysis and understanding of the underlying operations. Thus, this course has a greater amount of concreteness and detail than a competitive strategy class. It complements more specialized electives such as supply chain operations, service operations, or analytic spreadsheet modeling.

Approach: I aspire to a data-driven approach where tools and analysis start with realistic data. This will allow you to implement the course content directly in practice. Each topic will be discussed using a combination of models, case-discussions, readings and speakers. The anticipated mix for the course is 50-50 qualitative-quantitative. In a typical
week we will cover one major case in-depth, supplemented by mini-lectures, presentations and qualitative discussions.

PRE-REQUISITES:

- Kellogg core operations course OPNS430
- Comfort with, or desire, for operations analytics
- Time: 10hrs/week in total as smoothed average (don't take this course as your "fifth class").

INTENDED AUDIENCE: Students interested in (1) operations and supply chain management, (2) management consulting, (3) running your own business. It may also be of interest to (4) private equity given that operations typically employs the greatest number of employees and requires the largest investment in assets.

2. Grading and “Rules of the Game”

GRADING: The grade you receive for the course is intended to certify your demonstrated proficiency in the course material and achievement of the course objectives. Proficiency will be estimated by measuring your performance in:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Course contribution:</td>
<td>Individual</td>
<td>10%</td>
</tr>
<tr>
<td>2.</td>
<td>Final exam:</td>
<td>Individual</td>
<td>35%</td>
</tr>
<tr>
<td>3.</td>
<td>Individual submission (2):</td>
<td>Individual</td>
<td>15%</td>
</tr>
<tr>
<td>4.</td>
<td>Group submissions (4):</td>
<td>Group plus Peer Review</td>
<td>40%</td>
</tr>
</tbody>
</table>

1. COURSE CONTRIBUTION & CLASS EXPECTATIONS = Your contributions to create and enhance a positive learning environment for this course. This mostly concerns your positive externality on the learning of others. To create this environment:

- Only paper or "flat tablets" can be used in class, and only for honest class work. (Laptops with vertical screens distract students around you and create a shield between you and others, including the instructor.)
- Attendance and butt-in-seat on-time. While I hope you will find it valuable to attend class and will decide to do so, attendance is not mandatory. There is no penalty for missing classes, except that it will of course reduce your opportunities to contribute in class. When you attend, you will be expected to fully follow the principles of the Kellogg code of classroom etiquette and I expect you to be in your seat before class starts. Closed doors signal that class is in session. Entering late inflicts negative externalities on your colleagues who
came on time. Therefore, if you enter late, you should state your name and reason for lateness before you sit down and this may affect your contribution grade.

- Seating chart: in the second class, please select a seat you will be comfortable with for the remainder of the course.
- Cold calling and name tags: I prefer voluntary in-class contribution but will also cold call to incentive preparation and engagement. Please leave your name-card up for the entire duration of each class.

2. **Final Exam** = in-class, closed-book so it can focus on first-order, qualitative questions. Date and time of final exam will be arranged by student affairs.

3. **Individual Submissions** = these are short submissions in quiz format to be submitted via Canvas.

4. **Group Submissions**
   Groups should have four or five students, each of them bringing different strengths to the table. To increase the learning from the skills and knowledge that each person brings to the group, groups must be balanced. For example, groups must balance 2Ys, 1Ys, Exchange students, JDMBAs and MMMs, as well as geographical origins to benefit from cross-learning and multi-disciplinary experiences. Within those constraints, you can form your own groups on Canvas until the first group submission, which will lock-in groups.

* **Honor Code and Peer Evaluations**

  A. **Submissions** may not be discussed with anyone outside your study group nor may you use other sources without acknowledgment. It is important that everyone has a level playing field so this also means that materials from previous years or websites cannot be used. I’m sure you understand. It also is extremely important and part of the honor code that each member of a group makes a material contribution to each case analysis of the group. *If any individual has not contributed for a particular write-up, s/he should not append his/her name to the case report but can submit a separate report his/her own. It will also be the group’s responsibility to ensure that this happens.* Only one written report will be due per group per assignment.

  B. **Peer Evaluations**: Given the importance of group work in this class, each member should make every effort to contribute and carry his/her part of the load. Your grade will reflect peer evaluations to be done at the end of the course.

  C. Other parts of the honor code:

  - For standard violations of academic integrity, please see [http://www.northwestern.edu/uacc/defines.html](http://www.northwestern.edu/uacc/defines.html)
3. Text and Course Materials

☐ Required:
  o Course-pack I
  o Textbook *Operations Strategy: Principles and Practice* by J.A. Van Mieghem & G. Allon. Publisher: Dynamic Ideas, Charlestown, MA. 2015. As author, I obviously believe that the textbook is a useful companion to the course and I recommend it. It also contains several cases and mini-cases that are covered in the course. Previous students recommended I make the textbook required and I will provide a code (see Canvas Announcement) to buy the book at deep discount directly from the publisher: https://www.dynamic-ideas.com [consider bundling with friends]. The University bookstore also has books (at better price than Amazon).

☐ Additional readings are downloadable from Canvas.

☐ Recommend reading in textbook: by week during the class

<table>
<thead>
<tr>
<th>Week</th>
<th>Recommended Sections in Textbook</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.1 - 1.10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2.1-2.4; 2.6-2.7</td>
<td>2.5</td>
</tr>
<tr>
<td>3</td>
<td>3.1-3.7; 3.10-3.11</td>
<td>3.8-3.9</td>
</tr>
<tr>
<td>4</td>
<td>4.1-4.6; 4.8-4.9</td>
<td>4.7; Appendix 4A</td>
</tr>
<tr>
<td>5</td>
<td>5.1-5.3; 5.5-5.6; 5.9-5.11</td>
<td>5.4; 5.7-5.8; Appendix 5</td>
</tr>
<tr>
<td>6</td>
<td>6.1-6.6; 6.9-6.10</td>
<td>6.7-6.8; Appendix 6</td>
</tr>
<tr>
<td>7</td>
<td>7.1-7.5; 7.11-7.12</td>
<td>7.6-7.10</td>
</tr>
<tr>
<td>8</td>
<td>8.1-8.6; 8.8-8.9</td>
<td>8.7</td>
</tr>
<tr>
<td>9</td>
<td>11.1-11.3</td>
<td>11.4-11.9</td>
</tr>
</tbody>
</table>
4. Guidelines for Case Write-ups

**FORMAT:** A case write-up is not to exceed three pages of typed text plus maximally three supporting exhibits. Hand in a hardcopy before the start of the class when the write-up is due. (Exhibits must be relevant and described in the text.)

**STRUCTURE OF CASE WRITE-UP:** A good paper should clearly and succinctly state:

1. Your recommendation in the first paragraph to provide the reader with a framework (if a lengthy description of the recommendation seems necessary, append it to the report).
2. To stay in line with the objective of the course, the second part of the write-up should always qualitatively analyze and assess the operations strategy of the company (“the big picture”).
3. The remaining part of the write-up should explain your quantitative analysis (in words), what the key sensitivities are, and use it to justify your specific recommendation taking into account both the desirable and undesirable consequences of adopting it. If there are options under consideration in the case that you reject, a clear rationale for your decision should be provided.

Keep in mind that you write to someone who knows all the facts in the case—no need to repeat them. A good report is not a chronology of analysis, but a clearly articulated statement of recommendation and support. Finally, the case write-up should answer the key questions in the case (and not be just an answer to the guiding questions that come with the case).

**MAIN EXPECTATION:** each case write-up must have (1) an analysis and assessment of the big picture of the current operations strategy and (2) a quantitative analysis that must be used to justify your specific operations strategy recommendation as it pertains to the problem of the case. There are many ways to Rome: many analyses may work and choosing an appropriate one is part of the assignment. (In real life, nobody will tell you in advance what to do either.)
5. **Detailed topics and assignments**

- *All* cases must be read before the class they are to be discussed in (*whether a submission is required or not*).
- Lectures will follow the book which aims to give you the theory and practice behind our topic. As such it contains more than we will cover in class. Each assigned chapter is perhaps best scanned before class and read afterwards to reinforce the class discussion.
Part I: Strategy & Operations

Class 1: Introduction & A Framework for Strategic Decisions in Operations

Content: What is the operating system and the strategic decisions to configure it? Introduce a framework to describe a company’s operating system and how to evaluate it. The operating system comprises assets and processes. Its evaluation depends on the value created, delivered and captured.

Read:
- Chapter 1

Class 2

Content: Apply the framework and tailor it to specific business situations. We will use the Swiss Watch Industry mini-case as our main discussion vehicle.

Read:
- Swiss Watch Industry, mini-case 1 in Chapter 1. Be prepared to discuss the accompanying questions.

Class 3: VALUE: Tying operational metrics to firm value using ROIC tree
(Investor/External Assessment: Operations Forensics)

Content: How to value an operating system as an outsider? Use public information together with personal estimates of key assets and processes to assess the attractiveness of firm’s operating system (and business model). During this process, distill key operational metrics that create value, tie them to financial performance, and suggest how to improve profitability over time. We will use ROIC tree decomposition.

Read:
- Chapter 2

Class 4

Content: Apply the operations forensics concept. We will use the Peapod case as our main discussion vehicle.
Prepare: Peapod, *Chapter 14 in textbook*. (Guiding questions come with the case.)

Prepare the Peapod Case (Chapter 14 in the textbook or). Upload your recommendation and supporting argument to the questions [2 - 3 pages text + a couple figures, including your tree, all in 1 PDF]:

1. What was Peapod’s actual (as-is) cost to fulfill one order in 2001, Q1? [simply use information of Peapod’s income statement and operating data Table 14.3]
2. Decompose two “buckets” in the standard ROIC tree down to measurable operating metrics (such as SPH and others): quarterly revenue and quarterly fulfillment cost using number of orders per quarter as the flow unit. Use case data if available and supplement with your own estimates where needed.

2. Using your decomposition, estimate best "could be" operating metrics and “roll-up” to arrive at a “could be” fulfillment cost per order. Use a clean sheet approach where you are not constrained by any assets. Instead, assume a variable cost model (e.g., Instacard) and estimate the cost to pick, pack, and deliver one order by one person (“unit economics”). Use sensitivity analysis to determine the key performance drivers of the variable fulfillment cost to serve a customer.

3. How attractive is Peapod’s operation from an external investment perspective? Under which conditions is Peapod a desirable investment?

**Class** will feature a speaker. *Note special time: directly following class 4 from noon-1:15pm.*

**Class 5: COMPETENCIES: Tradeoff curves and competitive benchmarking**

Content: How to quantify tradeoffs using internal data and competitive intelligence? Discuss how the concepts of operational trade-offs and competency focus relate to strategic positioning and operational efficiency and how they can be used—qualitatively and quantitatively—to evaluate a firm’s operations strategy in a competitive setting.

Read:
- Chapter 3
- Sugar & Spice (Canvas)

**Class 6**

Content: Apply the content of classes 1-5: describe and contrast two firms’ operations strategy. Use competitive cost analysis and trade-off curves
to guide the design of a defensive strategic response based on process and resource capabilities.

Prepare: • American Connector Company (A), Case (No. 9-963-035)

Submit INDIVIDUALLY your answer to the questions using the GoogleForm. You can edit and revise your answers over time, just make sure to finish your final “Submit” click by midnight (11:59 pm) before class.

The case situation is similar to Sugar and Spice’s and to the interior aircraft manufacturer example in the textbook. This case asks you to push the quantitative analysis of DC. This requires some detective work and estimation, given that not all data is available. The idea is to do your best in estimating financial performance, using case data where possible and supplement it with justified estimates where needed. Use the ACC Kellogg Addendum from Canvas.

Part II: Asset Decisions

Class 7: Capacity Strategy and Sizing under Uncertainty

Content: How to design and value a capacity strategy? A major part of operations strategy is deciding on a capacity strategy. This includes deciding on the sizing, timing, type, and location of each asset change. Use decision trees to value capacity sizing under uncertainty.

Read:
• Chapter 4

Class 8: Speakers (actors in our case studies)

Class 9: Network Capacity and operational hedging

Read:
• Chapter 10

Prepare: • Seagate Technology: Operational Hedging, Chapter 12 in textbook. Guiding questions come with the case. The objective of this case is to analyze and optimize the impact of each asset’s (location) capacity on the overall value and risk of the processing network.
Seagate Technology: Operational Hedging, Chapter 13. Guiding questions come with the case. The objective of this case is to analyze and optimize the impact of each asset’s (location) capacity on the overall value and risk of the processing network.

Submit INDIVIDUALLY your answer to the questions using the GoogleForm. You can edit and revise your answers over time, just make sure to finish your final “Submit” click by midnight (11:59pm) before class.

Class 10: Capacity expansion and timing

Content: When and how should we change capacity? Which strategies can a company use to decide when to expand or contract capacity? What are the key drivers influencing that decision?

Read:
- Chapter 5

Prepare:
- Harley-Davidson Motor Company, Case in textbook. (Guiding questions come with the case.)

Class will feature a speaker. Note special time: directly following class 10 from noon-1:15pm.

Class 11: Capacity Types and Flexibility

Content: Should we invest in specialized or flexible capacity? Once a company decides it needs to build new capacity, it must decide on what type of capacity. This involves deciding on the type of technology and facility. This class will discuss when and why product-dedicated or product-flexible technology is more appropriate. We also will explore what flexibility means and the various approaches to achieve it and be better positioned to respond to changes in demand, supply or processing.

Read:
- Chapter 6 (other sections will be covered later in the course)

Prepare:
- PharmaFlex.
Hand in a write-up of **PharmaFlex**. The objective of this case is to value flexibility and investigate when and why dedicated or flexible capacity is more appropriate and to connect the technology & facility strategy with new product introduction plans.

**Class 12: Capacity location**

Content: Where should we locate assets? Offshore-Onshore? Centralized-Distributed? Introduce the location decision and global networks. Which factors should be considered when designing a global operational network? How can the concept of *total landed cost* help making such decisions?

Read: • Chapter 7

**Class 13: Analytics Lab Session**

Content: We will focus on the analytics behind our models, including multi-stage decisions and optimization via simulation. Implementations in Excel (and perhaps R).

**Class 14: Global Networks and offshoring**

Content: We will play an in-class simulation of the global dual sourcing problem described in Mini-Case 7. The objective is that each group identifies how to best manage a global network and the key challenges faced in such setting.

Background Reading: • Mini-case 7: “Mexico or China? Managing a Global Network” p. 230. The simulation is inspired on this mini-case, but the assignment does not use any data from mini-case 7.

Prepare: • The Mexico-China Dual Sourcing Game: download “Mexico_China_Student Assignment and Planning Tool.xlsx” from Blackboard.
All information for the sourcing game is contained in that spreadsheet (i.e., the minicase in the textbook is NOT needed). Submit, using two slides, your recommendation and supporting argument to:

Slide 1 = Specify:
- the sourcing and inventory replenishment policy you will use for the simulation;
- your strategic allocation to Mexico and China (The strategic allocation is key in setting up the sourcing relationship and includes the total number of units you expect to order over the product life cycle and how the aggregate order would be allocated to each source (the % allocated to each source captures supplier shares.)
- the E(NPV) or simulated (expected) performance for your policy.

Slide 2 = Provide a rationale for your policy.

Come to class with one laptop for your group with FireFox or Google Chrome installed and ready to start the simulation game.

Grading policy:

The grade for the case MexicoChina will consider both your Part I and Part II (next assignment) performance — the total grade will be reflected in Part II grading later on.

---

**Part III: Process Decisions**

**Class 15: Global Sourcing over the Product Life Cycle; Strategic Sourcing**

**Content:** After our focus on Value, Competencies, and Assets, we turn our attention for the remainder of the course to PROCESSES.

We start with a debrief of the Mexico-China simulation and discuss:

- Strategic global sourcing allocation over the product life cycle
- Connection to offshoring
- Process for Forecasting PLC before launch

**Read:** Boeing 787 Dreamliner, *MIT Case* (download from Canvas).

**Guiding questions:**
1. What are the key factors in determining whether to outsource or vertically integrate?
2. To sustain its competitive advantage, Boeing will need to support its existing core knowledge base while carefully selecting new opportunities for innovation and new competencies. Effective vertical integration decision-making and global sourcing may be
among the most important factors in the ultimate success or failure of Boeing in the future market. If you were a supply chain manager at Boeing and you were asked to define a sourcing strategy for Boeing’s next airplane what would you recommend?

3. Given the supply chain challenges experienced on the 787 program, there was a general sense among some company leaders that Boeing may have accepted too much supply risk. Furthermore, recent volatility in fuel costs and the U.S. dollar had led many U.S. companies to rethink the previous notion that offshore outsourcing is always likely to be cheaper than local production. What should Boeing decide to source internally versus outsource? Produce domestically versus offshore?

**Class 16: Integrative Case I Debrief & Operational Risk Management**

**Content:** Debrief integrative case

*How to value and manage operational risk?*

**Read:** • Chapter 8 (skip 8.5)

**Prepare:** • Integrative case

• Operational Risk Management at XTX (high frequency trading)

| Submit your one-pager for the Integrative Case on Canvas for grading. |

**Class 17: The Automation and AI decision**

Content: Automation decisions included in Industry 4.0; including application of AI in operations

**Class 18: Demand, Revenue and Yield Management processes**

**Read:** • Chapter 9

**Class 19: Innovation: Social Enterprise operating model**

**Content:** Operating Business Model innovation: the synergy between philanthropic and for-profit social enterprise

**Prepare:** World Bicycle Relief and Buffalo Bicycle Social Enterprise

**Class 20: Course Summary and Wrap-up**