“Nothing is less productive than to make more efficient what should not be done at all.”

— Peter Drucker, 20th century management guru

“As the economy changes, as competition becomes more global, it’s no longer company vs. company but supply chain vs. supply chain.”

— Harold Sirkin, author and consultant

“The factory of the future will have only two employees, a man and a dog. The man will be there to feed the dog. The dog will be there to keep the man from touching the equipment.”

— Warren Bennis, USC business school professor and presidential advisor

“The Industrial Revolution did not end agriculture because we still have to eat and the Information Revolution will not end industry because we still need a can to hold beer.”

— Industry pundit

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**INSTRUCTOR**

Tim Zak  
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**Office:** (412) 268-5945  
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**CLASS HOURS**

Wednesdays—HBH 1004, 6:00-8:50 p.m.  
Course site accessed through Canvas ([https://cmu.instructure.com/courses/351](https://cmu.instructure.com/courses/351))

**OFFICE HOURS**

By appointment.  
I realize that everyone’s schedule is different so I’ll make every effort to accommodate your needs. The best bet is to call or send me an e-mail to make an appointment or, if you’re feeling lucky, just stop by my office.
Also, I’ll be happy to take questions or comments after class on a first-come, first-served basis. Finally, I welcome conversations not necessarily related to SCM (e.g., career path, course selection) if you think that my time in the “real world” can provide another dimension to your experience at the Heinz College.

**Teaching Assistant**

Mallory Nobles (mnobles@andrew.cmu.edu); TA hours—day/time and location TBD

Mallory has been a TA for this course multiple times so you should make good use of her office hours, particularly for questions about course content, problem sets, and grading.

**About This Course**

In the simplest sense, supply chains are “process umbrellas” under which products are designed, produced, and delivered to customers. A supply chain incorporates procurement, production, storage, distribution, selling, and disposal/recycling activities that are connected by material, information, and financial flows. Despite its name, a supply chain is in fact a *network* of activities and flows that often involves the extensive participation and integration of external trading partners. Therefore, Supply Chain Management (SCM) includes:

- The strategic design of the network and its operational capacities
- The tactical utilization of these capacities (e.g., by managing production, inventory, and logistics activities), and
- The simultaneous control of material, information, and financial flows to achieve an optimal mix of responsiveness and efficiency in the face of changing market conditions and customer demands.

Building on lean/just-in-time (JIT) manufacturing concepts and quality methodologies (e.g., Six Sigma) that were all the rage in the 1980’s and early 1990’s, SCM has gotten significant attention in recent years. What were “theoretical” capabilities ten years ago are now hot competitive weapons. Although recent developments in large-scale optimization software applications have provided industry players with the information visibility needed to synchronize the entire channel, SCM isn’t just about technology. It’s fundamental to business strategy and can be leveraged to create new opportunities to succeed and achieve long-term competitive advantage.

The central objective of this course is to introduce future senior decision makers to the concepts, skills, and perspectives necessary to make good SCM choices. Analytical foundations of SCM related to key concepts such as inventory, capacity, and quality will be introduced. A variety of SCM examples from the private, public, and social sectors, from the simplest to the most complex, will be explored and compared. The emerging challenge of incorporating recycle and reuse strategies into SCM objectives will be investigated. Particular emphasis will be placed on evaluating the appropriateness of mainstream SCM technologies such as enterprise resource planning (ERP) systems as well as emerging enablers like 3D printing, sensors, and do-it-yourself, open-source manufacturing.

With this emphasis on “currency”, the course is a combination of core curriculum combined with readings and numerous examples cited to further illustrate key concepts. Readings are primarily from “hardcore” management publications like *Harvard Management Review*.
and McKinsey Quarterly as well as more “mainstream” sources such as The NY Times and The Wall Street Journal, and selections from “academic” texts and articles. Although no textbook is assigned for the course, I will attempt to draw from among the best SCM books that I’ve come across such as Supply Chain Management by Chopra and Meindl and Designing and Managing the Supply Chain by Simchi-Levi, Kaminsky, and Simchi-Levi, particularly to highlight some of the theoretical underpinnings of SCM in areas such as forecasting and inventory management.

Here’s our challenge for the mini semester: The range of potential SCM-related topics is vast and a rigorous review of just the analytical underpinnings of SCM could extend beyond the scope of a full semester course. Therefore, this course will act as an overview to the key concepts, contemporary issues, and future direction of supply chain management directed at future executives (as opposed to dedicated SCM practitioners) in the private, public, and nonprofit sectors. In short, I hope that this course will arm you with a set of topics, tools, and techniques related to Supply Chain Management that are both relevant and impactful to your future career plans.

### Course Objectives (“By the time this course is over, students will…””)

| Understand key concepts and terminology specific to SCM, and gain experience in appropriately applying them in relevant situations. | Problems sets; quiz; comprehensive final exam; class participation |
| Know how to rigorously question and analyze SCM-specific data, along with qualitative evidence, to support executive-level decisions. | Problem sets; quiz; comprehensive final exam; class participation |
| Improve on their ability to defend a position while actively listening to, respecting, and heeding the advice and ideas of others. | Class participation |

### Course Content

The course is organized into 7 modules:

- **Foundations of SCM** provides an introduction to key concepts to be covered throughout the course including a general framework to understand supply chains.

- **Forecasting and Fulfilling Demand** provides basic tools used in demand forecasting, aggregate planning decisions, and responding to predictable variability, as well as an introduction to the basics of process configuration and management.

- **Lean Supply Chain and Quality Management** introduces more “advanced” tools and concepts critical for operational success such as the Toyota Production System and quality control.

- **Planning and Managing Inventories in a Supply Chain** identifies ways that inventory can be use effectively to improve SCM performance, profitability, and customer satisfaction.

- **Supply Chain Networks** considers the importance of transportation modes, storage facilities, and strategic sourcing to desired SCM outcomes.
• *The Role of Technology on Global Supply Chains* examines how access to, and use of, information is increasingly separating SCM “winners” from “losers”, and how technology of various kinds is radically changing SCM strategies and operations.

• *21st Century Supply Chains* examines a variety of emerging innovations with the potential to accelerate the pace of change in global SCMs.

**Pre-Requisites**

None.

**Required Readings**

Available in *Course Packet* and links to articles provided in the syllabus with some supplementary readings (as applicable) made available in advance of the appropriate class session. All readings must be done in advance of the class session when they will be covered (see *Tentative Course Schedule*) and key concepts will be integrated into lectures and discussions. Expect “cold calling” to open class and to provide additional thoroughness and rigor to our review of the materials throughout each class session.

Relevant lecture materials/notes will be made available on Canvas prior to the lecture for that week. In general, Canvas will act as the course repository for submitted and corrected assignments, grade postings, class communications, and other related “assets” from our time together.

**Course Requirements**

Since there are likely a large number of students in the class there will be a mix of assignments to provide some flexibility as well as an opportunity to stand out individually:

- Three *Individual Problem Sets* (30%; **CUMMULATIVE, NOT 10 POINTS / PROBLEM SET**)
- One *Quiz* on Logistics and Strategic Sourcing (5%)
- *Class / Course Participation* (25%—DETERMINED BY THE RUBRIC INCLUDED BELOW)
- *Comprehensive Final Exam* (40%)

All assignments should be submitted to the appropriate section of Blackboard by the start of class on the day they are due.

The grading policy for this course is based on the premise that expectations regarding student performance at the graduate level are high. The mean grade in the class will likely be around 3.5 (between A- and B+) although I am more than willing to depart from those guidelines based on extraordinary performance (in either direction) from the class. Grades in the “A-to-A+” range will be reserved for students who perform exceptionally well in all aspects of the course.

Students occasionally request an extension if they cannot complete their assignments due to unforeseen work commitments, family problems, illness, and so on. Full credit for late assignments will be given only under exceptional circumstances (poor time management is not considered an “exceptional circumstance”!), at my discretion; a late penalty or even a “zero” on the assignment is a more likely outcome.
Finally, you should note that the assigned readings for the course provide only a broad framework for the topics we will discuss. Therefore, in your assignments, you are encouraged to use other research materials, resources, data, and readings.

A BRIEF WORD ON PLAGIARISM AND CHEATING...

Don’t!—no grade is worth sacrificing your personal integrity, particularly at the grad level! You are responsible to know and adhere to all university policies on academic integrity. The Heinz College provides a booklet on plagiarism and cheating, and the university lists all policies on the web at (www.cmu.edu/policies/documents/Cheating.html). Please acquaint yourself with the contents.

Any plagiarism or cheating will result in failure in the course and your case will be reported to the Associate Dean who may decide to take further action.

INDIVIDUAL PROBLEM SETS AND QUIZ

There are three individual problem sets assigned in Weeks #2, #3, and #4. They are due by the start of class for that week—for this mini, on Wednesdays. A brief quiz on logistics and strategic sourcing will be given during the class session of Week #5 (September 27th). Both problem sets and the quiz will contain a combination of multiple choice and short answer questions, including quantitative analysis as appropriate.

CLASS / COURSE PARTICIPATION

Participation does not entail simply answering when spoken to. Informed discussions are critical to the learning process and will make this class much more interesting and fun for all of us. Each student is expected to volunteer substantive comments freely. Quality (versus quantity) is important. Your score will be determined by my assessment of your contributions. The "system" that I'll use is, at the beginning of the course, everyone starts with a score of “100”. Each time you participate in class or interact with me, I'll update your participation score upwards or downwards by an appropriate amount based on the interaction:

- Absent from class = -10; after missing two classes, your grade drops by a letter grade for each additional class missed
- In attendance, but makes no contribution = +5
- In attendance and participates in the class discussion = +7
- In attendance and makes substantial contributions to the class discussion = +10

Participation does not have to be limited to class sessions only. If, for example, you bring a relevant current newspaper or magazine article to my attention, I'll count this as part of the participation grade as well. I will make every attempt to involve every student in this process, but it is possible that I may consistently overlook a potential contributor. Please bring this to my attention. This process may be considered somewhat subjective but, through our collective efforts, we can ensure that it is fair. Some criteria for effective class participation are:
1. Is there a **willingness to participate** and is the participant also a **good listener**?

2. Are the points made **relevant** to the discussion and linked to the comments of others? Are comments **well thought out** or just “thrown out”?

3. Do the comments show **evidence of rigorous analysis**?

4. Is there a willingness to **test new ideas**, or are all comments "safe"? For example, repetition of case facts without analysis and inference is "safe", but a somewhat off-the-mark comment that leads to creative discussion will be considered valuable.

5. Do the comments **clarify, highlight, and synthesize** important aspects of earlier comments and lead to a clearer statement of the concepts being covered or to new knowledge/insights?

6. Do the comments identify **overlooked points** and points that turn out to be influential in further discussion?

**COMPREHENSIVE FINAL EXAM**
The final exam will be comprised of questions drawn from assigned readings and lecture notes. Questions will be in the form of multiple choice, short answer, and quantitative analysis, and are intended to ensure that you’ve understood and retained key terms and concepts from the course, and that you know how to apply them in “real-world” situations.

**CLASSROOM ETIQUETTE**
Cell phones should be turned off. If there is a situation where you need to be able to receive a call during class, you should use the “silent” mode on your phone and quietly leave the room when a call comes in.

Laptop computers are permitted to be open during class but note that it’s relatively easy to identify when students are using devices for non-class-related activities. I reserve the right to ask that laptops be closed at any time and to call on any student using a laptop in class.

I greatly appreciate students arriving on time for class and getting back from breaks. Please let me know beforehand if you must leave class early.

Be respectful of others and generally treat your conduct in this class the same way you would in any other professional situation.

Thanks in advance for your efforts to create a class environment that works for everyone!

**ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES**
If you have a disability and have an accommodations letter from the Disability Resources office, I encourage you to discuss your accommodations and needs with me as early in the mini-semester as possible. I will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, I encourage you to contact them at [access@andrew.cmu.edu](mailto:access@andrew.cmu.edu)
STATEMENT OF SUPPORT FOR STUDENTS’ HEALTH AND WELL-BEING

Take care of yourself. Why? Not only will it help you cope with stress but also it’s directly correlated to higher performance, academically and in the rest of your life. So make an effort to maintain a healthy lifestyle this academic year by eating well, exercising, avoiding drugs and alcohol, getting enough sleep, and taking some time to relax.

All of us benefit from support during times of struggle. There are many helpful resources available on campus and an important part of life is learning how to ask for help. Asking for support sooner rather than later just makes good sense.

If you or anyone you know experiences any excessive academic stress, difficult life events, or feelings like anxiety or depression, I strongly encourage you to seek support. Counseling and Psychological Services (CaPS) is available on campus to help: call 412-268-2922 or visit their website at http://www.cmu.edu/counseling/. Consider reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help.
TENTATIVE COURSE SCHEDULE (OUR ACTUAL MILEAGE MAY VARY)

First, a caveat:
I customarily make substantial modifications to the course after each time it’s taught to incorporate student feedback and reflect the “state-of-the-art” in supply chain management. As a result, there are bound to be some “bumps” along this “journey of discovery” that we’re taking together. Suggestions and constructive criticism on what works and what doesn’t and generally how to make this course great are very much appreciated; direct your comments to me directly or to the Associate Dean.

In addition, I’m always introducing new things into the course and I’ll likely try to inject other materials as I come across them during the mini-semester. It is possible that, as we “get into” the material, I’ll want to make some modifications to the course schedule due to timing and/or content issues. My commitment is to give you enough advanced notice on modifications to sufficiently prepare.

(Harvard Course Packet cases, core curriculum, and articles are in italics; extra credit readings are identified by a “**”)

Week 1: Foundations of Supply Chain Management

In The News*: Stress Test For the Global Supply Chain (NY Times, March 19, 2011); www.nytimes.com/2011/03/20/business/20supply.html?pagewanted=all&_r=0

Core Curriculum: Supply Chain Management (Gaur, Harvard Business School); sections 2.1-2.4, 2.5 (SKIM), 2.7 (try interactive illustrations)

Case: The Dabbawallah System: On-Time Delivery, Every Time (Thomke and Sinha; Harvard Business School)

Video: Follow That Dabbawalla: Home Cooked Meals, the Mumbai Way (Economist Magazine Videos, May 17, 2009); www.youtube.com/watch?v=zKmp1sZPMUk

Week 2: Forecasting and Fulfilling Demand


Core Curriculum: Forecasting (Wheelwright and Winslow, BYU-Hawaii); sections 2.1-2.2

Core Curriculum: Designing, Managing, and Improving Operations (Shapiro, HBS); sections 2.1-2.2

Core Curriculum: Process Analysis (Shapiro, HBS); all sections

Article*: How Ikea Designs Its Sexy Price Tags (Business 2.0, October 2002); POSTED TO CANVAS

PROBLEM SET #1—Forecasting and Fulfilling Demand, DUE SEPTEMBER 6th
Week 3: Lean Supply Chain and Quality Management

In The News*:  
Factory Efficiency Comes to the Hospital (NY Times, July 9, 2010);  
Starbucks’ Productivity Secrets: More To It Than Caffeine (Knote, October 28, 2014);  
http://knote.com/2014/10/28/starbucks-productivity-secrets/  

Article: Decoding the DNA of the Toyota Production System (Spear and Bowen, Harvard Business Review, January 2006)  
Core Curriculum: Managing Quality (Bohn, UC-San Diego)  
Core Curriculum: Managing Quality With Process Control (Shapiro, HBS)  
Article*: How to Compare Six Sigma, Lean, and the Theory of Constraints (Nave, Quality Progress (www.asq.org), March 2002);  
www.lean.org/Admin/KM%5Cdocuments/76dc2bfb-33cd-4ef2-bcc8-792c5b4ef6a6-ASQStoryonQualitySigmaAndLean.pdf

Video:  
Boeing 737 Lean Manufacturing (February 2011);  
www.youtube.com/watch?v=-y0U1Qux9EA  
Watch Robots Put Together a Telsa (July 2013);  
www.fastcoexist.com/1682635/watch-robots-put-together-a-tesla

PROBLEM SET #2—Lean Supply Chain and Quality, DUE SEPTEMBER 13th

Week 4: Planning and Managing Inventories in a Supply Chain

In The News*: The Trouble Lurking on Wal-Mart’s Empty Shelves (Time, April 9, 2013);  

Core Curriculum: Managing Inventory (Hammond, Harvard Business School)  
Article*: Building a Flexible Supply Chain for Uncertain Times (McKinsey Quarterly, March 2009);  
http://www.mckinsey.com/insights/operations/building_a_flexible_supply_chain_for_uncertain_times  
Article*: Ten Ways to Improve Inventory Management (Bain and Company, July 6, 2011);  

PROBLEM SET #3—Inventory, DUE SEPTEMBER 20th
Week 5: Supply Chain Networks


Core Curriculum: Strategic Sourcing (Pierson and Shih, Dartmouth & HBS); pages 3-22


Videos:
March of the Machines (60 Minutes, January 11, 2013); [www.youtube.com/watch?v=IYvhOg4kwe0](http://www.youtube.com/watch?v=IYvhOg4kwe0)

Amazon’s Jeff Bezos Looks To The Future (60 Minutes, December 2, 2013); [https://www.youtube.com/watch?v=AMqHD2F5Xec](https://www.youtube.com/watch?v=AMqHD2F5Xec)

Quiz—Supply Chain Networks, SEPTEMBER 27th

Week 6: The Role of Technology and the Web on Global Supply Chains


Week 7: 21st Century Supply Chains: Challenges and Opportunities for Executives


Article: The Industrial IoT: 125+ Startups Transforming Factory Floors, Oil Fields, and Supply Chains (CBI Insights, May 5, 2017); https://www.cbinsights.com/research/top-startups-iiot/


Final Exam—October 18th, starting at 6:00 p.m, HBH 1004

Case Questions to Consider

The Dabbawala System: On-Time Delivery, Every Time (Thomke and Simha, Harvard Business School, 2013)

1. What are some of the factors/“secrets” that have allowed this supply chain to be so successful (e.g., high service performance) for so long?

2. Why do world-class companies like FedEx study the dabbawala system? What do they expect to learn?

3. How could “technology” and other proposed improvements potentially hinder the system rather than help?