PURDUE UNIVERSITY | College of Engineering

Engineering Faculty Document No.: 72-26
October 6, 2026

**TO**: The Engineering Faculty

**FROM**: The Faculty of the Edwardson School of Industrial Engineering

**RE**: New undergraduate course – IE 47900 – Supply Chain Engineering and Strategy

The Faculty of the Edwardson School of Industrial Engineering has approved the following new undergraduate course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

**FROM (IF ALREADY OFFERED WITH TEMPORARY NUMBER):**

IE 49000 – Supply Chain Engineering (pre-Fall 2025)
IE 49000 – Supply Chain Engineering and Strategy (Fall 2025)

Fall; Spring

3 total credits; Lecture

Pre-requisite: IE 23000; IE 33500

| Term | Enrollment |
|---|---|
| Fall 2017 | 37 |
| Fall 2018 | 34 |
| Fall 2019 | 21 |
| Spring 2023 | 59 |
| Spring 2024 | 56 |
| Fall 2025 | 60 |

**TO:**

IE 47900 – Supply Chain Engineering and Strategy

Fall; Spring

3 total credits; Lecture

Pre-requisite: IE 23000; IE 33500

This course explores approaches to inventory management, forecasting, network planning, and supply contracts. Students will examine procurement and outsourcing strategies, flexibility, global logistics, and risk management to navigate complex supply chain challenges. Topics will be covered through lectures, case studies, and a hands-on, semester-long business simulation, where student teams manage a company and make strategic decisions.

RATIONALE:

This course has been offered as an elective in IE numerous times with significant enrollment, and is part of the long-term plan for the School. It is also expected to become part of the Space Engineering Certificate, if approved for a permanent number.

DocuSigned by:
Young-Jun Son
24BB57CFD2DE491...

Young-Jun Son
Head of the Edwardson School of Industrial Engineering

Link to Curriculog entry: https://purdue.curriculog.com/proposal:34828

# IE 47900 –Supply Chain Engineering and Strategy

**Instructor:** Stephan Biller
Office: GRIS 382
Email: sbiller@purdue.edu
Phone: 765-494-8943
Office Hours: by appointment
Bio: Stephan Biller is the Amrine Distinguished Professor in the School of Industrial Engineering and the Purdue School of Business at Purdue University. In addition, he serves as the Director of Dauch Center for the Management of Manufacturing Enterprises and the co-Director and Founder of Purdue's national initiative in eXcellence in Manufacturing and Operations (XMO). Previously, he served as Founder & CEO of Advanced Manufacturing International, Vice President of Product Management for AI Applications & Watson IoT at IBM, Chief Manufacturing Scientist & Manufacturing Technology Director at General Electric, and Tech Fellow & Global Group Manager for Manufacturing Systems at General Motors. Dr. Biller is a founding Board member of the Smart Manufacturing Leadership Coalition and was recognized by SME as one of the 30 thought leaders of Industry 4.0 and Smart Manufacturing. He was recently named the top academic influencer of Industry 4.0 by Onalytica. He received Purdue's James E. Greene Outstanding Educator Award in 2023 for excellence in teaching, advising, research supervision and mentoring. He holds an electrical engineering degree from RWTH Aachen, Germany, a Ph.D. in Industrial Engineering and Management Sciences from Northwestern University, and an MBA from the University of Michigan. He is an IEEE Fellow and a member of the National Academy of Engineering.

**Teaching Assistant:**
TA Office:
Email:
Office Hours:

**CapSim Support**
Phone: 877-477-8787 (Mo-Fr 9am-9pm)
Email: support@capsim.com (24/7)

**Class Schedule**
Date: Tuesdays & Thursdays
Time:
Location:
Instructional Modality: Face-to-Face
No electronic devices allowed … please turn off cellphone … exceptions with permission of instructor

**Prerequisites**

- IE 335 Operations Research: Optimization (or equivalent)
- IE 23000 - Probability And Statistics in Engineering I (or equivalent)

You need to install Analysis ToolPak and Solver AddIn

- Mac: Excel -> Tools (all the way at the top band) -> Excel Add-ins (free in Excel) -> check all boxes and save.
- PC: Excel -> File -> Options (on the left side bottom) -> Add-Ins. Install Solver AddIn and Analysis ToolPak by highlighting and clicking ok.
- If you are still not able to install the tool via directions above, please go to this website for help: https://support.microsoft.com/en-us/office/view-manage-and-install-add-ins-for-microsoft-365-programs-16278816-1948-4028-91e5-76dca5380f8d

**Course Overview** We will discuss the basic issues of Supply Chain Management such as inventory management, forecasting techniques, network planning and supply contracts. We will cover procurement and outsourcing strategies, flexibility, global logistics and risk management. Current topics such as supply chain resiliency, COVID implications, and reshoring will be discussed. As supply chains generally cross firm boundaries, we will look at integration and alliances from a supply chain perspective. Also, as more and more information can be gathered about customers, you will learn how to judge the value of this information. The above issues will be covered at a strategic level; whenever possible, you will also learn how to quantitatively make trade-offs between alternatives. Teaching methods will be lecture, class discussion, case studies, and a heavy emphasis of experiential learning using a business simulation called CapSim.

**Reference Materials**

1. **Supply Chain Management, Strategy, Planning and Operations** by Sunil Chopra. 7th edition. (**required**). This textbook covers all the cases will we discuss and is generally considered one of the best supply chain books https://www.linkedin.com/pulse/top-4-supply-chain-books-every-student-should-read-mohammed-boualam/).
Rent or buy at https://www.pearson.com/en-us/subject-catalog/p/supply-chain-management-strategy-planning-and-operation/P200000005863/9780137502844 or your favorite bookstore.

2. **The Goal** by Eliyahu Goldratt. Any edition. **Optional**. (Required for **optional** research report). Best-selling business novel that most supply chain and manufacturing executives will have read. Introduces the concept of Theory of Constraints

**Grading**

Grades will be based on:

| | |
|---|---|
| Case studies (11) | 50% |
| CapSim Simulation | 50% |

Extra Credit:

| | |
|---|---|
| CapSim Training (Week 1) | 1% |
| Winner (by Marketcap) CapSim | 5% |
| Runner-up (by Marketcap) CapSim | 3% |
| Most stocks sold | 2% |
| Best stock portfolio | 2% |
| Optional Research Report | 3% |

Grading Scale
In this course, grades reflect the sum of your achievement throughout the semester. You will accumulate points as described in the assignments portion, with each assignment graded according to a rubric. At the end of the semester, final grades will be calculated by adding the total points earned and translating those numbers (out of 100) into the following letters (no partial points or rounding).

| | |
|---|---|
| A+ | > 102% (note the extra credit opportunities, max possible points 113%) |
| A | 93 – 102 % |
| A- | 90 – 92 % |
| B+ | 87 – 89% |
| B | 83 – 86 % |
| B- | 80 – 82% |
| C | 70 – 79 % |
| D | 60 – 69 % |
| F | ≤ 59 % |

**Lecture:** We will follow the required textbook closely. Please read and be prepared to discuss the chapter prior to attending class. Only highlights of the chapters will be covered in class but you are responsible for the entire chapter. We will use class mostly for discussions.

**Case studies:** Case studies are generally considered the best method to learn how analyze business situations. This course will give you ample opportunities to improve your ability to analyze business situations, which will be helpful to you during case interviews (especially if you are planning to go into consulting) and your first job. It is also the preferred teaching method in business schools; hence, you will better understand after this course whether you would enjoy getting an MBA later. There will be 11 case studies with your lowest grade dropped. All cases are at the end of each chapter of the required textbook. **All written case submissions through Gradescope via pdf files, which can be found in Brightspace -> Content. All Excel files need to be uploaded to Brightspace in the assignment section.**

Case studies are due at noon on the days of class. **No late submission will be allowed** since we will (mostly) discuss the case during the class when you submit. Please give credit if you receive a hint from a classmate: For example, "Taylor Swift told me to use the EOQ formula to compute the order quantity for the Cool Wipes case." For individual assignments you should always write down your answers by yourself, for team assignments only with your team. Cases will get more complex during the course. Hence, cases 1-5 will be individual submissions. For cases 6-11, you will work with up to two other students of your choosing (meaning up to three students per team). Self-group enrollment is February 13 after class to February 15 @noon. Thereafter, I will assign unenrolled students. We will rename your group in Brightspace to your consulting companies name containing your last names (e.g., "SwiftGagaSheeran Consulting").

**Regrades** of submissions will be considered only if students provide the submissions with a written statement explaining why they believe it was misgraded. Requests must be submitted to the instructor in paper form in class (original copy of submission plus written statement) within 7 days of the assignment's return or the grade's posting (whichever comes first). No email will be accepted.

You are always welcome to ask questions about assignments to understand the material better. You can bring your assignments to office hours and ask as many questions as you like. However, no regrades will be discussed in person and no points will be added during such discussions.

**CapSim Simulation**: A large part of this class is a business simulation, where your team of 4-5 will run a company competing with 5 other teams of 4-5 students (total of 30 students). You will make decisions on R&D, product development, production, marketing, capacity expansion, financing, and HR. If you ever wanted to run your own company, here is your chance. The winning team will be the one that increased the value of the company the most. 30 students will comprise world A and an additional 30 students will compete in world B. These two worlds are completely independent and do not compete with each other. Teams will be assigned prior to the first practice round. Just as in any job, you cannot switch teams and amicable conflict resolution is a core competency that will be very useful for you during job interviews; you should expect conflicts within your team during this class. **Expert tip**: Conflict resolution works best if you agree in the beginning what process you will use to solve conflicts. Everybody is expected to model Integrity, Excellence, Collaborative Spirit, Respect, and Kindness. There will be a teammate evaluation at the end of the simulation. You should have gotten an email from CapSim to set up your account.

This simulation has a steep learning curve, and you will have to read the user guide quickly since decision of the first **practice** round is due on Sunday night of the first week (Jan 14, 11:59 pm). Here are some resources you will find helpful. More on Brightspace and the CapSim Website when you login.

CapSim Videos Intro https://www.youtube.com/watch?v=AgQEUIj-T30
Overview https://www.youtube.com/watch?v=dZET8uE7Q_s.

During the first 4 weeks, we will have practice rounds, which will have no impact on your final **performance** grade. Everybody will get full score (5%) if they submit decisions in all four rounds but do note that a large part of your grade (15%) will come from the competition round, so you want to take these practice rounds seriously to learn the ropes. On February 6, we will start the CapSim competition and at the end of the week (Feb 11, 11:59), you will have to submit the decisions for the first competition round. After a total of four rounds (and spring break), you will have to present to your shareholders in class and submit a shareholder letter (more on that below). After that, we execute four more rounds, and you must submit a team simulation reflection report at the end of the last class (April 25). In this reflection report, you should demonstrate what you learned, what went well, and what did not go well. Extra CapSim credit for winners, runners-up, best stock portfolio, and most stocks sold.

**Stockholder presentations**

Stockholder presentations are scheduled for March 26 and March 28. All teams of world A will present for exactly 10 minutes on March 26. The goal of the presentations (and letter to the stockholders) is to convince the teams of world B to buy stock in their world A company. Each team of world B has $10 million, which they can use to buy stocks in any company of world A. For example, World B team B-Digby invests $5 million in World A team A-Andrews, $3 million in world A team A-Ferris, and $2 million in world A team A-Chester, since they are convinced that Andrews has the best business plan and/or their stock is undervalued. Submission of investment of all world B teams is due at the end of class (1:30 pm on March 26). On March 28, we will reverse

roles and world B teams will present and world A teams will invest. Submission of investment of all world A teams is due at the end of class (March 28 by 1:30 pm). **Note that Letter to shareholders is due on March 30**. Extra credit for the two teams (one in world A and one in world B) that sell most stocks during that week and the two teams (one in world A and one in world B) that invest most profitably (evaluated on April 23).

**CapSim Grading:**

50% of your grade comes from the CapSim Simulation, which are distributed as follows

| | |
|---|---|
| Practice round | 5% |
| Shareholder Presentation | 10% |
| Letter to shareholders | 10% |
| CapSim Performance | 15% |
| Reflection Report | 10% |

**Extra Credit CapSim**

| | |
|---|---|
| Training (Week 1) | 1% |
| Winner CapSim | 5% |
| Runner-up CapSim | 3% |
| Most stocks sold | 2% |
| Best stock portfolio | 2% |

**CapSim Team Conflicts:**

Team conflicts occur naturally in almost all business situations. I would encourage you to solve these conflicts with our class values in mind: integrity, respect, collaborative spirit, and kindness. Excellent teams help each other: if one of you has a situation that requires them to contribute less in one week, they should contribute more the following weeks. If your team gets to that level of collaboration, you will be very strong as a team. However, sometimes it is not possible to get to that level of team excellence. So, if the entire team states (with individual emails to me) that someone did not contribute to a CapSim decision within 48 hours of the decision making, I will give that team member no credit for that week. Secondly, it would be preferable if your team wrote the final reflection paper as a team and I would like to encourage you to do However, you may (1) write it by yourself, (2) write it with 1-3 teammates. You will have to inform me and your teammates by email by April 14 (11:59pm) if you opt out of the entire team option ... you must write an email addressed to me and copy the entire team. I will need emails from all people who opt out of the entire team option. For example, if A and B decide to work together on the paper, both A and B have to send an email to me and copy teammates C, D, and E. Note that you CANNOT write it with somebody who is not on your team.

**Optional Research Report:**

Your boss must attend a senior executive leadership retreat on April 28 , 2023. The company's CEO sent her entire leadership team a copy of Eli Goldratt's book "The Goal" and asked everybody to come prepared to discuss it. Your boss is swamped and asks if you would be willing to do some extra work for him and prepare a book report with executive summary and major themes of the book. He doesn't care about the love story (which is cheesy anyway) but really needs to understand the Theory of Constraints (which is the core concept of the book). He is also wondering if he could analyze recent events with this Theory of Constraints concept. For example, COVID-19

demonstrated the problems of lean supply chains and how the lack of supply chain resiliency led to shortcomings in ventilators, PPE, microchips, and toilet paper. How would the Theory of Constraints address those problems? What about sustainable supply chains? What about reshoring? You are not sure you really understand the boss's terminology but might be able to figure it out googling the unknown terms. The boss also throws in the always annoying "or whatever you can think of so I look smart in front of our CEO"; so whatever else you come across might be helpful, too. Worse, he didn't even prescribe a length or format; how are you supposed to know how much you should write? In addition, there are many book summaries on the web about this book out there; he probably did not mean that you should copy them because he could find this easily himself. You *think* that you have done well this year and expect the full bonus at the end of April but cannot really be sure. Bonuses are always competitive, and you don't know what your colleagues have done … they might also write a report for him. Maybe you could get an additional 5% bonus on top if you write a fantastically outstanding report. The boss is too busy to answer any questions and you must deliver the report by April 25 @1:30pm, so he will have time to read your report in time for the retreat. It will take quite some time for you to get this report done; so, you must start early if you decide to do it. You have all the information needed and could start today. You will only get feedback from him if your report will make a difference to your final bonus. You are taking a supply chain course @ Purdue in your spare time: your instructor does not have time to explain all concepts in detail but maybe he can discuss concepts that are not clear with you after you have researched them thoroughly first. Note that you will have to state on top your paper that you did not use ChatGPT for this assignment: "As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. I did NOT use generative AI or any similar help during this assignment." You will lose a full letter grade of your final grade if the use of generative AI is highly probable.

**CAPS Information:** Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and http://www.purdue.edu/caps/ during and after hours, on weekends and holidays, or through its counselors physically located in the Purdue University Student Health Center (PUSH) during business hours.

**Purdue Honors Pledge:** "As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue."

# Overarching Values

## Integrity – Respect – Excellence – Collaborative Spirit – Kindness

| Date | Required Reading | CapSim | Homework |
|---|---|---|---|
| 9-Jan-22 | Chap 1 | Introduction | |
| 11-Jan-22 | Chap 2 | Q & A | Short bio of yourself, Training Modules in CapSim |
| Jan 14, 11:59 pm | | Practice Round 1 due | Practice Round 1 due |
| 16-Jan-22 | NO CLASS | | |
| 18-Jan-22 | Chap 3 | Results & Discussion | |
| Jan 21, 11:59 pm | | Practice Round 2 due | Practice Round 2 due |
| 23-Jan-22 | Chap 4 | Results & Discussion | Case study 1 due: Walmart & Macy's (Chap 3) |
| 25-Jan-22 | Chap 5 | | |
| Jan 28, 11:59 pm | | Practice Round 3 due | Practice Round 3 due |
| 30-Jan-22 | Chap 5 | Results & Discussion | Case study 2 due; Blue Nile (Chapter 4) |
| 1-Feb-22 | Chap 6 | | |
| Feb 4, 11:59 pm | | Practice Round 4 due | Practice Round 4 due |
| 6-Feb | Chap 6 | Results & Discussion | Case study 3 due; Cool Wipes (Chapter 5) |
| 8-Feb | Chap 6 | | |
| Feb 11, 11:59 pm | | Competition Round 1 due | Competition Round 1 due |
| 13-Feb | Chap 7 | Results & Discussion | Self -Enroll in Business Case groups (3 students) starts after class, Case study 4 due: Forever Young (Chapter 6) |
| 15-Feb | NO CLASS: Supply Chain conference on | | Self -Enroll in Business Case groups (3 students) ends at noon |
| Feb 18, 11:59 pm | | Competition Round 2 due | Competition Round 2 due |
| 20-Feb | Chap 8 | Results & Discussion | Last individuell case study 5 due: SPC (Chapter 7), |
| 22-Feb | Chap 8 | | |
| Feb 25, 11:59 pm | | Competition Round 3 due | Competition Round 3 due |
| 27-Feb | Chap 9 | Results & Discussion | First team case study 6 due: Kloss, Planters and Harvesters (Chapter 8) |
| 29-Feb | Chap 9 | | |
| Mar 3, 11:59 pm | | Competition Round 4 due | Competition Round 4 due |
| 5-Mar | Chap 10 | Results & Discussion | Case study 7 due: Mintendo (Chapter 9) |
| 7-Mar | Chap 11 | | |
| Spring Break Mar 11-16 | | | |
| 19-Mar | Chap 11 | | |
| 21-Mar | Chap 12 | | Case study 8 due: KAR (Chapter 11) |
| 26-Mar | | Shareholder Meeting Presentations world A | Investments due for all world B teams at the end of class |
| 28-Mar | | Shareholder Meeting Presentations world B | All Letter to shareholders due before class. Investments due for all world A teams at the end of class |
| Mar 31, 11:59 pm | | Competition Round 5 due | Competition Round 5 due |
| 2-Apr | NO CLASS | | |
| 4-Apr | Chap 12 | Results & Discussion | |
| Apr 7, 11:59 pm | | Competition Round 6 due | Competition Round 6 due |
| 9-Apr | Chap 13 | Results & Discussion | Case study 9 due: ALKO (Chapter 12) |
| 11-Apr | Chap 13 | | |
| Apr 14, 11:59 pm | | Competition Round 7 due | Competition Round 7 due |
| 16-Apr | Chap 14 | Results & Discussion | Case study 10 due: The Need for Speed (Chapter 13) |
| 18-Apr | Chap 14 | | |
| Apr 21, 11:59 pm | | Competition Round 8 due | Competition Round 8 due |
| 23-Apr | Digital Transformation lecture | | Case 11 due: Michael's Hardware (Chapter 14) |
| 25-Apr | | Final Results & Discussion | Simulation Reflection Paper due |
| NO FINAL | | | |
| Before April 25 | | | OPTIONAL Research Report |