IE 459 Supply Chain and Production Planning

Spring 2025

It is the responsibility of students to read and understand the course syllabus. Students enrolled in this course agree to all terms specified in the syllabus.

Contents

1 Course Overview

This is an undergraduate-level course on the study of *supply chain management and production planning*, also called *operations management*. We will study how to plan and manage operations using mathematical models and tools. Topics covered in this course include (1) Introduction to Operations Management, (2) Providing Goods & Services, (3) Forecasting, (4) Capacity Planning, (5) Inventory Management, (6) Aggregate Planning and Material Requirements Planning (MRP), (7) Scheduling, and (8) Lean Operations.

The learning outcomes include the following: naming the essences of operations management, classifying operations, identifying an operations strategy, classifying products and processes, calculating productivity, analyzing different approaches to forecasting and evaluating forecasts, applying queueing theory to model waiting lines, incorporating waiting times in capacity planning models, differentiating conservative and aggressive capacity strategies, using inventory management models to determine optimal ordering quantities and time of re-ordering, differentiating demand aggregate strategies, developing MRP based on a given bill of materials, applying different scheduling methods, using gantt charts to obtain optimal schedules, listing the implications of lean operations on cost and delivery frequency.

1.1 Instructor

Dr. Cai is the instructor of this course. See Table 1 for her contact information. She is an Associate Professor in the Department of Mechanical and Industrial Engineering at the Newark College of Engineering. She received a B.S. in both Electrical and Computer Engineering and Operations Research & Industrial Engineering at Cornell University and an M.S. and a Ph.D. from Industrial Engineering & Operations Research at University of California, Berkeley.

She joined NJIT as an Assistant Professor in Fall 2012 and has been teaching a number of courses, including IE 706 Queuing Theory and Applications, IE 650 Advance Topics in Operations Research, EM 602 Management Science, IE 459 Production Planning and Control, IE 439 Deterministic Models in Operations Research. Her research interest is in Operations Management, focusing on theoretical advancement of OR methodologies and economic models as well as their applications in managing sustainable energy systems, pricing in e-commerce, designing incentives to foster public-private partnership, and primary care planning and scheduling.

Table 1: Instructor's Contact Information

Email address: cai@njit.edu	Phone: 973-596-3338	Office: MEC 308

1.2 Course Delivery

This course will be conducted in person. Classes meet in GITC 2305 on Mondays and Wednesdays 1:00 pm - 2:20 pm. *Canvas*, NJIT's Learning Management System (LMS), will be used to disseminate lecture notes, feedback, and grades as well as to collect in-class exercises, homework assignments, and exams. The course website is

hhttps://njit.instructure.com/courses/33971.

See *Canvas* Student Guides for instructions on how to use various features of Canvas.

1.3 Required Textbook

Practical Operations Management by Natalie Simpson and Philip Hancock, **2nd. Edition**. Hercher Publishing Inc., 2017.

- Print ISBN13: 9781939297136, ISBN10: 1939297133.
- eText ISBN13: 9781939297143, ISBN10: 1939297141

1.4 Course Restrictions

- All exams can only be taken using the computers in GITC 2305. See Table 2 for exam dates.
- All exams must be proctored via the *Respondus LockDown Browser* and the instructor.
- Exams contain different types of questions. They are multiple-choice, true/false, fill-in-the-blanks, and essay questions (which require students to show detailed work). Students must be willing to learn how to use the *Canvas* editors.

1.5 Academic Integrity

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues your degree. As members of the NJIT community, it is the responsibility of students to protect their educational investment by knowing and following the University Policy on Academic Integrity.

Please note that it is the instructor's professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing, or using any online software inappropriately will lead to disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. Students who have questions about the code of Academic Integrity should contact the Dean of Students Office at dos@njit.edu.

1.6 Office Hours

The instructor offers in-person office hours on Mondays 2:30pm -3:30pm in her office (MEC 308) and virtual office hours on Mondays 8pm - 9pm via Zoom. During office hours, the instructor will answer questions regarding the course materials students may have.

1.7 Communications

The instructor post important information, including comments, corrections, and updates on *Canvas*. Students are responsible to check the course webpage regularly.

The instructor will **not** answer emails or online posts that are **not professional**. The following links offer examples of professional email etiquette, but also applies to online posts:

https://www.wikihow.com/Email-a-Professor and
https://marktomforde.com/academic/undergraduates/Email-Etiquette.html.

The instructor encourages students to help foster a learning community by posting questions on *Canvas Discussions* rather than emailing. When students email questions of an academic nature, the instructor will answer these questions on *Canvas Discussions* so all students can see.

The instructor will respond within 2 business days: Monday - Friday. Questions received on Saturdays and Sundays will be replied on Monday.

2 Learning Activities and Assessments

This is a three-credit, semester-long course. Students should expect to spend at least 6 hours per week on coursework and assignments. To facilitate student learning and assess learning outcomes, the instructor includes the following types of learning activities and assessments: in-class participation, homework assignments, and exams.

2.1 In-class Participation

Students are expected to attend classes and participate in exercises and discussions. During classes students are asked to work on problems in groups. The goal of these in-class exercises is to get the students started on a problem but not necessarily finish. Students must submit their work via *Canvas* at the end of each class. Neither late submissions or submissions via email will be graded, and zero points will be assigned.

2.2 Homework Assignments

Homework assignments are intended to help students learn the topics and keep up with the pace of the course. Deadlines are set so feedbacks, such as solutions and grades, can be offered promptly.

2.2.1 Homework Submission Policy

- *Canvas Quizzes* are used to disseminate homework questions and homework collection. Learning the features and functionalities (such as types of questions, various editors) of *Canvas* Quizzes help students prepare for exams.
- The cutoff submission time is set at **11:30 pm on the due date.**
- **Late submission is not accepted and will receive zero points.**
- **No submissions via emails will be accepted.**
- Depend on the questions, students may be asked to type their answers in the given space. They may also be asked to upload files that contain detailed work. Only two formats are accepted: portable document format (pdf) and *Excel* spreadsheet (xls or xlsx).
  - If a question requires a pdf file submission, students may either type up their answers or scan their hand-written answers. Label each part of the question and sort them either in a numerical order (part 1, part 2, etc.) or in an alphabetical order (part a, part b, etc.).
  - If a question requires an xls or xlsx submission, students must submit a single *Excel* spreadsheet that includes both the model and the solution. The instructor will run the model(s) to check whether the solution is generated by the *Solver*. Use multiple tabs if more than one model is required.

- **Submit a separate file for each problem that requires a file submission**. This is the most efficient method because it
  - ensures consistency in grading: the instructor can grade the answers to one question from all students before moving on to the next question.
  - facilitates prompt feedback: the instructor needs to minimize time in opening up files, loading pages, and searching for answers. Otherwise, feedback will be delayed significantly and students learning may be negatively affected.
  - allows the instructor to link a problem to a learning outcome and analyze whether or not mastery of the learning outcome is achieved. This is an important step in continuous improvement required by accreditation.

  Example of how homework questions are graded: Two questions (Q1 and Q2) in an assignment require file submissions.
  - Correct submission: Submit one file (F1) to Q1 and another (F2) to Q2. Grading: Q1 will be graded based on F1 and assigned a grade. Q2 will be graded, after everyone's Q1 is graded, based on F2 and assigned another grade.
  - Incorrect submission: Submit a single file (F) to Q1 and submit no file to Q2. F has answers to both Q1 and Q2. Grading: Q1 will be graded based on F and assigned a grade. Q2 will receive zero points because no file was submitted to Q2.

2.2.2 Homework Grading

- To receive full points, students must follow the instructions and meet the criteria specified for each problem in a homework assignment.
- The instructor will **not** deduct points for incorrect work. Instead, the instructor will provide meaningful feedbacks when the approach is incorrect or to clarify a concept.
- The instructor will finish grading and post grades within two weeks of the submission deadline.

2.2.3 Homework Solutions

Homework solutions will be posted on *Canvas* shortly after the submission deadline. **Students are responsible to compare their work to the homework solutions** and ask questions during office hours or via *Canvas Discussions*.

2.2.4 Homework Collaboration

The instructor strongly encourages students to form pairs and collaborate on homework. **Students, however, must report such collaboration by answering the first question in every homework assignment. Further, every student must type-up or write-up the solutions himself/herself and create his/her own *Excel* spreadsheet when applicable.**

The following acts violate academic integrity:

- Two or more students submit the same file;
- The collaboration question is not answered;
- Statements of collaboration do not corroborate. Example: A stated working alone, while B claimed to work with A.

Penalty for violating academic integrity:

- First offense: all students receive a zero on their homework, along with a warning from the instructor.
- Second offense: all students are reported to the DOS in addition to receiving a zero on their homework.
- Third offense: all students fail the course.

2.3 Exams

Two midterm exams and a final exam are scheduled, see Table 2 for exam dates.

- All exams are administered via *Canvas Quizzes*.
- To ensure academic integrity, all students are required to use the *Respondus LockDown Browser* while proctored by the instructor.
- Multiple versions of the exams will be used.
- The exams are comprehensive (or cumulative), closed book, and closed notes.
- Students may ask for blank sheets of paper.
- No personal electronics (calculators, cell phones, tablets, computers, smart devices, etc.) can be used during the exams.
- Students must show bring their NJIT student IDs to take the exams.
- Students found cheating on the exams, as defined in the University Policy on Academic Integrity, will receive a grade of XF for the course, and be reported to the Dean of Students.

2.3.1 Make-up Exam Policy

No make-up exams will be administered without formal approval from the Dean of Students. Typical reasons that will **not** grant a make-up exam include, but not limited to, (1) work matters, (2) planned vacations and other events, (3) lack of preparation, (4) start the exam late, or (5) misinformation.

Procedure to Request a Make-up Exam: To properly report absence of a midterm or a final exam, students must do the following:

1. Contact the Dean of Students (DOS) at dos@njit.edu **before** the exam. Provide necessary documentation to support the student's reason for missing an exam. To protect students' privacy*, do **not** copy the instructor on the email.

   Note: Students who have incapacitating illness or emergencies that prevent them from contacting the Dean of Students before or during the exams must notify the Dean of Students within 72 hours of the missed exams.

*NJIT Academic Policies and Procedures states the following: The university continues to make every effort to protect students' academic and personal information. Moreover, maintaining the confidentiality of students' medical information is a legal and ethical duty, as defined by federal and state laws and regulations, and by the courts. Whenever students have a situation that affects their academic standing, it should be brought to the Dean of Students. This includes medical or psychological documentation to support a student's claim. Students should not bring such information to their instructors, nor should it be requested by a faculty member. The Dean of Students has a physician and staff psychologists to evaluate such information to verify its legitimacy. The Dean of Students will then notify the faculty member(s) if a student has a legitimate absence and will ask that the student receive consideration in making up any missed course work or exam. This process ensures confidentiality of students' information and, just as important, consistency in dealing with such matters.

2. If circumstances warrant a makeup exam, the Office of DOS will email a formal notice to the instructor. The instructor will then notify the student the date and time of the makeup exam. Students cannot pick the date.

2.3.2 Technical Issues during Exams

To minimize technical failure during exams, a practice exam will be provided and give students an opportunity to practice to take an exam with the *Respondus LockDown Browser*.

2.3.3 Exam Grading

- The instructor will make her best effort to complete grading and post grades within two weeks of the submission deadline.
- A grading rubric will be provided for each essay question that asks students to show detailed work for the midterm exams. Partial credits may be awarded.

3 Course Grade

3.1 Numerical Grade

A numerical weighted-average score is calculated based on a student's performance in homework assignments, participation in online discussion, midterm exams, and the final exam. Weights assigned to each category are shown in the following table:

Category	Homework Assignments♠	In-class Participation♣	Midterm Exam 1	Midterm Exam 2	Final Exam	Total
Weight	15%	10%	20%	25%	30%	100%

♠ Average homework score calculation: For various reasons (health, work, religion, etc.), students may not be able to submit their homework before the deadlines. The lowest score from homework assignments will be dropped. Therefore, students who miss up to one (1) homework submission will have no negative impact on their average HW score.

♣ Average in-class participation score calculation: The lowest three in-class participation scores will be dropped.

Example of course grade calculation: A student receives an average score of 95 (after dropping the lowest) on homework assignments, 100 (after dropping the lowest three) on in-class participation, 85 on exam 1, 78 on exam 2, 80 on the final, the student's cumulative score is

$$\underbrace{95}_{HW} \times 15\% + \underbrace{100}_{In-class} \times 10\% + \underbrace{85}_{Exam1} \times 20\% + \underbrace{78}_{Exam2} \times 25\% + \underbrace{80}_{Final} \times 30\% = 84.8$$

3.2 Letter Grade

Mapping from the course grade to a letter grade:

Course Grade	86%-100%	79%-85%	72%-78%	65%-71%	58%-64%	51%-57%	<51%
Letter Grade	A	B+	B	C+	C	D	F

3.3 Extra Credit

No extra credits will be awarded. Please click here to read an article for a detailed explanation.

3.4 Incomplete (*I*)

The university's policy on requesting and awarding an *I* grade is as follows:

- The *I* grade is only given in rare instances when a student who would normally have completed the course work but who could not do so because of extenuating circumstances.
- When a student invokes extenuating circumstances and requests an *I* grade, the student must contact the Dean of Students first. The Dean of Students will be making the determination of whether extenuating circumstances exist or not and will be notifying the instructor accordingly.
- Except for cases determined by law, the instructor is **not** required to accommodate student requests even when extenuating circumstances are certified by the Dean of Students.
- When giving an *I* grade, the instructor will notify the student (and copy the Department Chair and the Dean of Students), in writing, of the exact work to be completed and the date by which it must be submitted.
- If the specified work is **not** submitted by the specified date. The *I* grade will be automatically changed to a *F* grade in the next regular semester.

The instructor will only grant an *I* grade when **all** of the following conditions are satisfied:

1. There is a written statement from the Dean of Students certifying the student's circumstance qualifies for an *I*.
2. The student has completed at least 70% of all coursework when requesting an *I* grade.
3. The instructor and the student are able to come to an agreement, in writing, before the final grade due date on the exact work to be completed and the date by which it must be submitted.

4 Other

4.1 Technical Assistance

The Office of Digital Learning manages all courseware, such as *Canvas*, *Respondus LockDown Browser*, and *Zoom*. When encountering any technical issue with any courseware, submit a ticket to the IST Service Desk using this website:

https://servicedesk.njit.edu/CherwellPortal/IST.

The IST Service Desk, after receiving a ticket, will assign a representative to help resolve the technical issue. **Please note that the instructor has neither the admin authorization nor the in-depth knowledge to help students with technical issues.**

4.2 *Respondus LockDown Browser* Q&A

- *Q: What is the Respondus LockDown Browser?*

  A: It is a proctoring application that assists with the academic integrity of online exams by preventing students from printing, copying, going to another URL, or accessing other applications during an exam. Students cannot access the exam via a standard web browser.

- *Q: What role does the Respondus LockDown Browser play during an online exam?*

  A: It will access the students' webcams to record them during the entire exam.

- *Q: What role does the Respondus LockDown Browser play after an online exam?*

  A: It analyzes the recorded videos to catch violations of academic integrity. Click here to see NJIT's Academic Integrity Code.

- *Q: How does the Respondus LockDown Browser work?*

  A: Click here to watch a video to get a basic understanding of the *Respondus LockDown Browser*.

- *Q: How to install the Respondus LockDown Browser?*

  A: Click here to install the *Respondus LockDown Browser*.

- *Q: How to do the Respondus Environment Check?*

  A: Click here for a YouTube video that shows how to do *Respondus Environment Check*. Note: the video demonstration allows for a calculator. However, students may not bring a calculator. The *Respondus LockDown Browser* provides one.

4.3 Campus Resources

The most relevant on-campus resources are highlighted in this section.

- The Robert W. Van Houten Library (`http://library.njit.edu/`) offers electronic and print resources, including a core collection of academic books, databases, and journals, as well as research and consultation services.

- The Office of Accessibility Resources and Services (OARS), `https://www.njit.edu/accessibility/`, works in partnership with administrators, faculty and staff to provide reasonable accommodations and support services for students with disabilities.

- The Center for Counseling and Psychological Services (C-CAPS), `https://www.njit.edu/counseling/`, is committed to assisting students in the achievement of their academic goals as well as benefiting from their personal experience on campus.

4.4 Modifications to Syllabus

The syllabus is subject to change. Students will be notified by the instructor should any modifications or deviations from the syllabus occur.

5 Tentative Schedule and Learning Outcomes

Table 2: Tentative Schedule and Learning Outcomes

Date	Topic	Chapter	Learning Outcomes
1/22	Introduction	N/A	Access course webpage and its contents
1/27, 1/29	Introduction to OM	Ch1	Name the essences of operations management; Classify operations and operational decisions.
2/3, 2/5	Providing Goods & Services	Ch2	Identify an operations strategy; Classify products and processes; Calculate productivity.
2/10, 2/12, 2/17	Forecasting	Ch4	Analyze different approaches to forecasting and evaluate forecasts.
2/19, 2/24, 2/26	Capacity Planning	Ch5	Apply queueing theory to model waiting lines; Incorporate waiting times in capacity planning models; Differentiate conservative and aggressive capacity strategies.
3/3	Midterm Exam 1 Review		
3/5	Midterm Exam 1		
3/10, 3/12	Inventory Management	Ch10	Differentiate deterministic and stochastic models; Use inventory management models to determine optimal ordering quantities and time of re-ordering.
3/17, 3/19	Spring Recess - No classes		
3/24, 3/26	Inventory Management (Cont'd)	Ch10	Differentiate deterministic and stochastic models; Use inventory management models to determine optimal ordering quantities and time of re-ordering.

Table 2: Tentative Schedule and Learning Outcomes

Date	Topic	Chapter	Learning Outcomes
3/31, 4/2, 4/7	Aggregate Planning, Material Requirements Planning	Ch11	Differentiate demand aggregate strategies, develop material requirements plans (MRP) based on a given bill of materials.
4/9	Midterm Exam 2 Review		
4/14, 4/16	Midterm Exam 2		
4/21, 4/23, 4/28	Scheduling	Ch14	Identify planning horizon and prioritization in multiple settings; Apply different scheduling methods; Use gantt charts to obtain optimal schedules.
4/30	Lean Operations	Ch12	Classify operations systems (push, pull, just-in-time, etc.); List the implications of lean operations strategies on cost and delivery frequency.
5/5	Final Exam Review		
TBD	Check https://www.njit.edu/registrar/exams for the date of the Final Exam		

6 Honors Section

Students in the honors section are expected to present a case study later in the semester. Students may select a case study from the following chapters of the textbook: Chapters 3, 6, 7, 8, 9, 13, or 15. Because these chapters are NOT covered in the course, this work requires the students to investigate in an area on their own and gain additional expertise.