Department of Management Sciences
University of Waterloo

MSCI 334: Operations Planning and Inventory Control

Winter 2018

Instructor:

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Undergraduate Calendar Course Description:

This course exposes students to production planning and inventory control approaches in industrial and service systems. Production planning topics cover capacity and resources planning, production scheduling, manufacturing resource planning, Just-In-Time and lean manufacturing. Inventory control topics cover lot sizing policies, deterministic and stochastic inventory policies. The course involves a design project of a production and/or inventory system.
Prereq: MSCI 131, MSCI 252, MSCI 331.

Prerequisites:

An introductory course in calculus, probability, and statistics is required. An introductory course in linear programming/optimization is also required. Knowledge of Microsoft Excel (Excel Solver) is assumed.

Course Learning Objectives:

By the end of the class students should be able to:

- Understand deterministic and stochastic inventory models and be able to select appropriate inventory models for different situations;
- Understand basic forecasting models and be able to select appropriate forecasting model for different situations;
- Understand aggregate planning models and know how to disaggregate aggregate plans;
- Understand push and pull systems and identify the strengths and weaknesses of each;
- Apply course topics successfully to a real-world problem (through the course project).

Lectures/Tutorial:

• Lectures:	Tuesdays	2:30 - 3:50 pm	CPH 3681
	Thursdays	2:30 - 3:50 pm	CPH 3681
• Tutorials:	Mondays	2:30 - 3:20 pm	CPH 3681 (beginning Jan. 15)
• Labs:	Wednesdays	**2:30 - 4:20 p.m.**	CPH 3681 (dates to be confirmed) Tentatively: Jan. 10, Jan. 31, Feb. 14, Mar. 14

Required Textbook:

Production & Operations Analysis (2015), 7th Ed., by Steven Nahmias and Tava Lennon Olsen (ISBN 978-1-4786-2306-9), Waveland Press. (Available as an e-book through Amazon.ca)
(at least one copy of the book is on a 3-hour reserve at the DC Library)

Also acceptable:

Steven Nahmias, *Production & Operations Analysis,* 6th Ed., McGraw-Hill 2009 (ISBN 978-0-07-337785-8). *(At least one copy of the book is on a 24-hour reserve at the DC Library.)*

The preceding (6th edition) may also still be available from Wohl Publishing (same author and title): ISBN 978-1-935938-25-5.

Course Website:

This course is supported by a web site (LEARN): http://learn.uwaterloo.ca. **Some of the** *lecture slides, review problems, assignments and corresponding solutions, course schedule, other instructions,* and *announcements* will be posted **(whenever possible)** on the course web page.

Evaluation:

1. Assignments (Lab Exercises) (4):	20%
2. Test 1:	10%: (closed-book)
3. Test 2:	10%: (closed-book)
4. Project + Presentation:	25%
5. Class Participation and Subjective Assessment	5%
6. Final Exam:	30%: (closed-book)
	100%

Notes:

1) **Tests 1 and 2**, each 1 hour long, will respectively be held on **Wednesday, January 24**, 2:30-3:30 pm, and **Wednesday, March 7**, 2:30-3:30 pm, during the Lab period.
2) Participation will be evaluated based on your engagement in class discussions and attendance of the class.
3) Assignments ("Lab" topics) will be handed out during the Lab period (that day), and will be due by the beginning of a specified class. (Generally, 1-2 weeks later.) No late submissions.
4) Tutorials will be used to work on practice questions, sometimes exam reviews, or lectures if necessary. The tentative subjects and dates of tutorials are given on page 5.

Course Project:

This project will allow students to apply what they have learned during lectures to a real-world problem. The course project includes the following steps/stages:

- Select a firm, company, or organization

  The organization is up to you and your teammates.

  A **document** listing your team members, selected company (or 2-3 possible firms you will approach), and why you selected that organization(s), is due **Thurs, Jan. 18**, in Lecture.

- Identify the system you will study within the organization and classify the system using terminology covered in lecture.

  The system should relate in some way to one of the following course topics: forecasting, production/operations planning, JIT, MRP, Inventory Control. Additional topics need the approval of the course instructor.

  A document (**Project Proposal**) describing the organization's problem that you have decided to study and how it relates to the course is **due Thursday, February 15**, in Lecture.

  This document should include your plan to study the problem including a discussion on: what data you intend to collect, how you will collect these data, how you will analyze the data, and the allocation of tasks to team members.

- Design an approach on how to improve the current system

- **Project Report**

  The report should be a description of the entire project (i.e., should include all of the information in the documents previously submitted) as well as your designed approach and the reasoning behind your proposed approach.

  Reports are due on **Tuesday, Mar. 27**, in Lecture.

- Project Presentations

  Presentations will be given during the Labs at the end of the term (dates to be confirmed); tentatively, **Wed. Mar. 21 and Wed. Mar. 28**.

Additional information will be given throughout the term regarding the course project. Ask the instructor if you have any questions regarding the project during the term.

Note for the reports and presentations: You must get an organization's consent to disclose their information in your report and presentation. This means that you may have to submit your report and presentation to the organization early to get the necessary permissions.

Tentative Timetable:

Week	Date	Lecture Topics	Related Chapters
1	Thursday, January 4	Introduction	
2	Tuesday, January 9	Inventory control with known demand	Chapter 4
	Wednesday, January 10	**Lab 1**	**Chapter 4**
	Thursday, January 11	Inventory control with known demand	Chapter 4
3	Tuesday, January 16	Inventory control with known demand	Chapter 4
	Thursday, January 18	**First Project Document due**	
	Thursday, January 18	Inventory control with unknown demand	Chapter 5
4	Tuesday, January 23	Inventory control with unknown demand	Chapter 5
	Wednesday, January 24	**Test 1**	Chapter 4, first part of Chapter 5
	Thursday, January 25	Inventory control with unknown demand	Chapter 5
5	Tuesday, January 30	Inventory control with unknown demand	Chapter 5
	Wednesday, January 31	**Lab 2**	**Chapter 5**
	Thursday, February 1	Forecasting	Chapter 2
6	Tuesday, February 6	Forecasting	Chapter 2
	Thursday, February 8	Forecasting	Chapter 2
7	Tuesday, February 13	Aggregate planning (Sales & Operations Planning)	Chapter 3
	Wednesday, February 14	**Lab 3**	**Chapters 2, 3**
	Thursday, February 15	Aggregate planning (Sales & Operations Planning)	Chapter 3
	Thursday, February 15	**Project proposals due**	
8	Tuesday, February 20	**Reading Week**	
	Thursday, February 22		
9	Tuesday, February 27	Supply chain management	Chapter 6
	Thursday, March 1	Supply chain management	Chapter 6
10	Tuesday, March 6	Push and pull systems (MRP, JIT)	Chapter 8
	Wednesday, March 7	**Test 2**	Ch. 5 (remainder) Chapters 2, 3, 6
	Thursday, March 8	Push and pull systems (MRP, JIT)	Chapter 8
11	Tuesday, March 13	Push and pull systems (MRP, JIT)	Chapter 8
	Wednesday, March 14	**Lab 4**	**Chapters 8, 9**
	Thursday, March 15	Operations scheduling	Chapter 9
12	Tuesday, March 20	Enriched Topic 1	TBA
	Wednesday, March 21	Project Presentations (in Lab)	
	Thursday, March 22	Enriched Topic 2	TBA
13	Tuesday, March 27	**Project Reports Due** Manufacturing Strategy	Chapter 1
	Wednesday, March 28	Project Presentations (in Lab)	
	Thursday, March 29	Manufacturing Strategy	Chapter 1
14	Tuesday, April 3	Review for Final Exam (Concluded)	

Tutorials	(Mondays)	Subjects (Tentative)
1	Jan. 15	Inventory Management (Ch. 4)
2	Jan. 22	Inventory Management (Ch. 4, 5)
3	Jan. 29	Inventory Management (Ch. 5)
4	Feb. 5	Forecasting (Ch. 2)
5	Feb. 12	Forecasting (Ch. 2)
6	Feb. 26	Aggregate Planning (Sales & Operations Planning) (Ch. 3)
7	Mar. 5	Supply Chain Management (Ch. 6); Review for Test II
8	Mar. 12	Push and Pull Systems (MRP, JIT) (Ch. 8)
9	Mar. 19	Operations Scheduling (Ch. 9)
10	April 2	Begin review for final exam

(no tutorial March 26)

Attendance Policy

It is strongly suggested that you attend all scheduled lectures. You are responsible for all of the information discussed there and in tutorials. Attendance will be taken for the labs. The students who do not attend a lab will receive a 10% *individual* penalty on their Lab assignment submission.

Late Assignments/Project, Missed Exams

No late assignments or projects will be accepted and no make-up exams will be scheduled, except for valid excuses (e.g. illness or severe family emergency). Please discuss any valid excuses with the instructor as early as possible.

Rules for Correspondence

When you send an e-mail to the instructor or TAs, please remember the following:

- Use only your University of Waterloo email account.
- All emails should have the following on the subject line: **MSCI 334:**
- If your email includes attachments, please list the names of attached files.
- Be polite, respectful, and professional.
- Use an appropriate greeting, and sign your full printed name.
- Give the instructor or TAs at least 2 business days to respond before sending the request again.

University Policies

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility. (Check www.uwaterloo.ca/academicintegrity/ for more information.)

Discipline: A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline.

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4.

Appeals: A student may appeal the finding and/or penalty in a decision made under Policy 70 -Student Petitions and Grievances (other than regarding a petition) or Policy 71 – Student Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals.

Note for students with disabilities: The AccessAbility Services office, located in Needles Hall Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AS office at the beginning of each academic term.