OPRE 6302 & SYSM 6334: Operations Management

Course number:	OPRE 6302.0w1 & SYSM 6334.0w1
Pre-requisites:	Please refer to coursebook.utdallas.edu
Instructor:	Professor Wang (Guihua.Wang@UTDallas.edu)
Instruction Mode:	Online
Office Hours:	Mondays 9 – 10 am
Location:	Microsoft Teams
Teaching Assistant:	Tianyu Yan
Office Hours:	Fridays 5 – 7 pm
Location:	Microsoft Teams

ABOUT THE INSTRUCTOR:

Professor Wang is a faculty member of Operations Management at the Naveen Jindal School of Management, The University of Texas at Dallas. He obtained his PhD from the University of Michigan – Ann Arbor, MSc from the Georgia Institute of Technology, MSc and BEng from the National University of Singapore. Prior to his PhD study, Professor Wang worked as a supervisor of the industrial engineering department at United Parcel Service Asia headquartered in Singapore. Professor Wang's research focuses on the intersection of empirical econometrics and machine learning with application to personalized healthcare. More specifically, Professor Wang has developed new causal machine learning techniques such as the instrumental variable forest, the first-difference causal forest, and the multi-treatment forest for heterogeneous treatment effect analyses using observational healthcare data.

Professor Wang has published many peer-reviewed articles in *Management Science, Manufacturing & Service Operations Management, Production and Operations Management, Advances in Applied Probability, Transportation Research Part C, Surgery, Annals of Thoracic Surgery, Management and Business Review, and International Journal of Logistics Systems and Management*. His research has been covered by *Associated Press, Austin' NPR Station - KUT, Crain's Detroit, Financial Times, Fredericksburg Free Lance-Star, Go Dan River, Hickory Daily Record, Houston Chronicle, INFORMS Newsroom, JSOM Management Magazine, KULR 8, Lynchburg News and Advance, McDowell News, Medical Xpress, Medium, Michigan News, Montana Standard, National Affair, National Interest, North Platte, Opelika-Auburn News, Patch, Public Radio International, Quad-Cities Online, Roanoke Times, Science Daily, Simply Flying, Statesville Record & Landmark, Texas McCombs, The Conversation, UTD News Center, Yahoo! News*.

Professor Wang was a Sydney Smith Hicks Faculty Fellow, the winner of the Chelliah Sriskandarajah Early Career Research Accomplishments Award, the winner of the Conference on Health IT and Analytics (CHITA) Best Paper Award, the winner (twice) of the INFORMS Health Applications Society Student Paper Competition, a runner-up of the POMS College of Healthcare Operations Management Best Paper Award, a runner-up of the INFORMS Service Section Best Cluster Paper Competition, a runner-up of the POMS College of Service Operations Management Best Student Paper Award, a finalist of the POMS College of Operational Excellence Junior Scholar Best Paper Competition, a finalist of the MSOM Service Management SIG Best Paper Award, a finalist of the INFORMS Health Applications Society Pierskalla Best Paper Award, a finalist (twice) of the MSOM Student Paper Competition, a finalist (three times) of the INFORMS Service Science Best Student

Paper Award Competition, and a finalist of the INFORMS Service Science Best Cluster Paper Award Competition.

COURSE DESCRIPTION:

Operations Management studies the design and management of the processes that transform inputs into finished goods or services. Operations are one of the primary functions of any organization. This course teaches various ways and means to improve operations, specifically focusing on using analytical methods and techniques to improve processes. Topics include reducing customer wait times, measuring productivity, streamlining process flows, tracking outcomes and performance metrics, and improving operations management processes. The level of analysis varies considerably, from operations strategy to daily control of business processes. The objective of this course is to assist students in building the skills necessary to participate actively in decision-making involving operations management issues.

STUDENT LEARNING OBJECTIVES:

The student should be able to determine performance measures of manufacturing/service processes/systems in key operational dimensions. The student should also know what factors affect these measures, how these measures can be calculated and how these measures can be improved. More specific objectives are as follows:

- Describe and explain services, manufacturing, just in time, and total quality management strategies.
- Derive and compute optimal decisions, and performance measures such as costs and profits.
- Develop analytical thinking in operations practices.

COURSE MATERIALS:

Required Case Package:
Available for purchase online at: https://hbsp.harvard.edu/import/1297202 (registration with Harvard Business Publishing is required). It contains a case we will discuss in class.

Optional Reading:
"Matching Supply with Demand: An Introduction to Operations Management" by Cachon, G. and C. Terwiesch. New York, NY: McGraw-Hill / Irwin, 3rd edition. ISBN: 978-0073525204. This book is strongly recommended.

"Fundamentals of Linear Optimization: A Hopefully Uplifting Treatment" by Topaloglu, H. The book is available at https://people.orie.cornell.edu/huseyin/lp_book.pdf.

COURSE RESOURCES:

Course Notes:
Before each lecture, a deck of slides will be posted on eLearning. Most of the time, these slides will be incomplete, and you will be expected to fill in the blanks in class. To access the course content,

complete the Virtual Learning Launchpad in eLearning. Follow these instructions: Student JSOM Virtual Learning Launchpad Instructions.

Assignments and Solutions:
Homework assignments will be posted at least three days before their due date. Solutions will be posted within one week after a homework assignment is graded.

Practice Problems:
Practice problems and solutions will be made available before the tests.

Grades:
Grades on assignments and tests will be posted on eLearning.

GRADING:

The course grades will be assigned based on the following points,

Category	Weight
Participation	5%
Homework	35%
Test 1	30%
Test 2	30%

Your final letter grade will be determined relative to your classmates.

Participation

Class participation is required. A portion of the grade for this course is directly tied to your participation. Successful participation is defined as consistently adhering to university requirements, as presented in this syllabus. Failure to comply with these University requirements violates the Student Code of Conduct (https://policy.utdallas.edu/utdsp5003).

You are expected to go through the required materials each week (see the Course Outline for details). You are expected to participate in the eLearning Discussion Board and complete a group homework assignment. You are responsible for all material discussed and all course schedule changes announced during class.

Homework
Homework assignments 1-2 and 4-9 are to be done individually. Homework assignment 3 is to be done as a group (please sign up for a group at eLearning Assignment). You need to download them from eLearning, write your answers (scan if necessary), and upload your answers to eLearning. The due dates for homework are always 11:59 pm on Sunday. There is a **one-point deduction per minute for late submission under any circumstance**. The lowest assignment score will be dropped.

Please follow these conventions when submitting homework assignments: (1) use either pdf or Word, (2) name the documents as <Homework#>_<Name>.docx or <Homework#>_<Name>.pdf (e.g., Homework1_FirstName_LastName.pdf), and (3) arrange the pages in sequence.

Tests 1 and 2

There are two paper tests in this course. Test 1 covers the materials from sessions 1-4. Test 2 covers sessions 5-9. There is no comprehensive exam. The tests must be taken either at the UTD Testing Center or at an off-campus location approved by the UTD Testing Center. For test 1, please schedule a two-hour appointment on 7/9, 7/10, or 7/11. For test 2, please schedule a two-hour appointment on 8/13, 8/14, or 8/15. Be sure to schedule your appointment early and arrive on time for the tests.

Students taking tests at the UTD Testing Center should visit the UTD Testing Center webpage to schedule their appointment. Review their Student Guidelines prior to taking the tests. Reserve your seat as soon as possible to avoid scheduling issues. The Testing Center recommends that students register for both tests early and in advance, preferably at the beginning of the semester and no later than 48 hours prior to exam appointment time via their Student Guidelines page.

Students taking the tests off-campus should use an approved off-campus location. Please follow the step-by-step instructions using the Testing Center Distance Learning page to schedule your appointment. The Testing Center enforces a strict 10-business-day off-campus proctored exam application submission deadline. Any questions related to off-campus testing should be sent to tcdl@utdallas.edu.

No alternative test will be offered except in a medical emergency, which requires a medical certificate from a physician. Missing a test without the instructor's pre-authorization will result in a zero score and will not be given an alternative test. Any concern regarding the grading of tests should be addressed to your instructor and TA no later than three days after the grade is posted. We will review all your test answers, which may lead to an increase or decrease in your final grade.

COURSE POLICIES:

- There is a one-point deduction per minute for late homework submission under any circumstance.
- **No** alternative test will be offered except in a medical emergency (certificate required).
- **No** extra credit work will be given under any circumstances.
- Academic dishonesty results in a zero score for the corresponding work. In particular, cheating on a homework assignment results in a zero score for the homework assignment; cheating on a test results in a zero score for the test.
- Course materials and resources may **not** be reproduced or shared with those not in the class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements violates the Student Code of Conduct (https://policy.utdallas.edu/utdsp5003).

UT DALLAS SYLLABUS POLICIES AND PROCEDURES:

The information in the following link constitutes the University's policies and procedures segment of the course syllabus. Please go to http://go.utdallas.edu/syllabus-policies for these policies.

ACADEMIC SUPPORT RESOURCES:

See https://provost.utdallas.edu/syllabus-policies/#academic-support-resources for a list of the University's academic resources for all students.

STUDENT ACCESSIBILITY RESOURCES:

See https://studentaccess.utdallas.edu/ for a list of the University's academic resources for students with disabilities.

COVID-19 GUIDELINES AND RESOURCES:

See http://go.utdallas.edu/syllabus-policies for the University's COVID-19 resources.

COMET CREED:

The Comet Creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same: "*As a Comet, I pledge honesty, integrity, and service in all that I do*."

TENTATIVE COURSE OUTLINE

Week	Dates	Session/Topic	Homework	Notes
1	6/2-6/8	1. Introduction & Process Flow Analysis I	1	Sign up for a group
2	6/9-6/15	2. Process Flow Analysis II	2	Kristen's Cookie
3	6/16-6/22	3. Process Flow Analysis III	3	National Cranberry
4	6/23-6/29	4. Project Management	4	
5	6/30-7/6	5. Inventory Management – EOQ	5	
6	7/9-7/11	Test I		UTD Testing Center
7	7/14-7/20	6. Inventory Management – Newsvendor	6	
8	7/21-7/27	7. Queueing Theory	7	
9	7/28-8/3	8, Linear Programming	8	
10	8/4-8/10	9. Quality Control / Supply Chain	9	
11	8/13-15	Test II		UTD Testing Center

The descriptions and guidelines contained in this syllabus are subject to change at the discretion of the Professor. The latest version is available at eLearning.

OPTIONAL REFERENCE READING

All the material covered in the assignments and tests will be available on the slides. The books below are optional, although they are strongly recommended.

"Matching Supply with Demand: An Introduction to Operations Management" by Cachon, G. and C. Terwiesch. New York, NY: McGraw-Hill / Irwin, 3rd edition. ISBN: 978-0073525204.

"Fundamentals of Linear Optimization: A Hopefully Uplifting Treatment" by Topaloglu, H. The book is available at https://people.orie.cornell.edu/huseyin/lp_book.pdf.

SESSION TOPIC	**OPTIONAL READING**
Introduction & Process Flow Analysis I	Cachon and Terwiesch 2.1, 2.2, 3.1, 3.2, 3.3
Process Flow Analysis II	Cachon and Terwiesch 3.4, 3.5, 4.1 to 4.4
Process Flow Analysis III	Cachon and Terwiesch 3.6, 7.1 to 7.3
Project Management	Cachon and Terwiesch 5.1 to 5.7
Inventory Management - EOQ	Cachon and Terwiesch 2.3, 2.4, 7.6 and 7.7
Inventory Management - Newsvendor I	Cachon and Terwiesch 12.1 to 12.8
Inventory Management - Newsvendor II	Cachon and Terwiesch 17.3 to 17.5
Queueing Theory	Cachon and Terwiesch 8.1 to 8.6, 8.9
Linear Programming	Topaloglu Chapters 1-2
Quality Control	Cachon and Terwiesch 10.1 to 10.5, Chapter 11
Supply Chain Management	Cachon and Terwiesch Chapter 17

STRATEGIES FOR SUCCESS

Workload Expectation

The key to success in this course is **PRACTICE**. You will be given the opportunity to work on many practice problems. The university guidelines specify that you study at least two hours per week for every credit hour you are enrolled. Because this course has three semester credit hours, you should spend **at least six hours** per week outside class: preparing for and reviewing class materials, solving homework assignments, and preparing for tests. Trimming this time input will diminish the value of the educational experience for everyone. Please recognize the importance of advanced preparation and begin now to level-load your course time input.

Class Preparation

The learning objectives, before-class preparations, and after-class activities appear below. In and after each class, you will be expected to:

a. Be completely up to date with the materials covered so far. A lot of the materials in this course build on materials taught earlier, so a significant recall will be involved.
b. Follow along with the professor as concepts are explained and examples are solved on paper.
c. Ask questions, contribute to eLearning discussions, and be prepared to answer questions posted by the professor or other students.
d. After class, review the covered materials thoroughly and refer to the optional textbooks or additional readings if necessary.

I understand you have limited time. However, I strongly urge you to devote adequate time to the course because this is not the material you can cram over a day or two.

Homework

Because the weekly homework assignments are designed to improve your problem-solving skills further, they are usually more difficult than in-class examples and problems. I strongly encourage you to start working on these homework assignments early and submit them to eLearning on time. There is a one-point deduction per minute for late homework submission under any circumstance.

Tests 1 and 2

Tests 1 and 2 will consist of quantitative questions related to the course materials and homework assignments. Practice problems and solutions will be provided to prepare you for the tests. The combination of course notes, homework assignments, and practice problems will fully prepare you to take the tests. Both tests will be held via the UTD Testing Center or at an off-campus location approved by the UTD Testing Center. Students are responsible for scheduling their appointment and ensuring they appear for the tests on time. No alternative test will be offered except in a medical emergency.

How to Get Help

In addition to my office hours, your TA will hold additional office hours for those who need help. This course moves rapidly. **DO NOT FALL BEHIND**! It is recommended that you see your TA or your professor **immediately for any difficulties**.

DETAILED SESSION SCHEDULE (TENTATIVE)

A session-by-session outline of the entire course is provided below, where you will find the learning objectives, before-class preparations, and after-class activities for each session. I will attempt to follow this schedule as much as possible, although I reserve the right to modify the schedule depending on the evolution of the course. Details about the textbooks are provided in other parts of the syllabus.

WEEK 1 6/2-6/8

INTRODUCTION AND PROCESS FLOW ANALYSIS I

Learning Objectives:

- Define process views of organizations
- Explain the difference between the manufacture and service process
- Draw a process flow diagram
- Determine the capacity of a process

Preparation:

- Complete the JSOM Virtual Learning Launchpad at the eLearning Assignment.
- Sign up for a study group at the eLearning Assignment by 11:59 pm on 6/8.
- Introduce yourself at the eLearning Discussion Board by 11:59 pm on 6/8.
- Read optional textbooks: Cachon and Terwiesch 2.1, 2.2, 3.1, 3.2, 3.3.

After Class:

- Read required cases: Kristen's Cookie.
- Complete homework 1 and submit it to eLearning by 11:59 pm on 6/8.
- Read optional textbooks: Cachon and Terwiesch 3.4, 3.5, 4.1 to 4.4

WEEK 2 6/9-6/15

PROCESS FLOW ANALYSIS II

Learning Objectives:

- Define batch process
- Calculate setup time, batch size, and capacity with setup
- Explain the mismatch between capacity and demand
- Calculate flow rate, utilization, and labor cost

Preparation:

- Read required cases: Kristen's Cookie.
- Read optional textbooks: Cachon and Terwiesch 3.4, 3.5, 4.1 to 4.4.
- Watch the optional video: Shared Medical Appointments at Aravind Pondicherry.

After Class:

- Complete homework 2 and submit it to eLearning by 11:59 pm on 6/15.
- Read optional textbooks: Cachon and Terwiesch 3.6, 7.1 to 7.3.

WEEK 3. 6/16-6/22

PROCESS FLOW ANALYSIS III

Learning Objectives:

- Explain the difference between theoretical flow time and actual flow time
- Draw inventory dynamics

- Determine waiting time based on inventory dynamics
- Identify potential bottlenecks from utilization profile

Preparation:

- Read optional textbooks: Cachon and Terwiesch 3.6, 7.1 to 7.3.

After Class:

- Check your study group, complete homework 3, and submit it (one submission per group) to eLearning by 11:59 pm on 6/22.
- Read optional textbooks: Cachon and Terwiesch 5.1 to 5.7.

WEEK 4 6/23-6/29

PROJECT MANAGEMENT

Learning Objectives:

- Represent a project with a network diagram
- Compute the project duration and determine the critical activities
- Reduce the duration of the project in an economical way
- Explain how to deal with randomness

Preparation:

- Read optional textbooks: Cachon and Terwiesch 5.1 to 5.7.
- Watch the optional videos: Project Network Diagrams and Project Acceleration.

After Class:

- Complete homework 4 and submit it to eLearning by 11:59 pm on 6/29.
- Read optional textbooks: Cachon and Terwiesch 2.3, 2.4, 7.6, and 7.7.

WEEK 5 6/30-7/6

INVENTORY MANAGEMENT – EOQ

Learning Objectives:

- Explain holding cost and fixed cost
- Calculate optimal order quantity (EOQ)
- Determine lead time and reorder point
- Determine the reorder point under random demand
- Calculate economic production quality (EPQ)

Preparation:

- Read optional textbooks: Cachon and Terwiesch 2.3, 2.4, 7.6, and 7.7.

After Class:

- Complete homework 5 and submit it to eLearning by 11:59 pm on 7/6.
- Prepare for test 1 by reviewing sessions 1-4 lecture notes, homework, and practice problems.
- Read optional textbooks: Cachon and Terwiesch 12.1 to 12.8, 17.3 to 17.5.

WEEK6 7/9-7/11

TEST 1

Test 1 will be held at the UTD Testing Center or at an off-campus location approved by the UTD Testing Center. Please schedule a 2-hour appointment on 7/9, 7/10, or 7/11. It covers the materials from sessions 1-4. Practice problems and solutions will be provided to prepare you for the test. The test

is closed-book and closed-note, but you are allowed to bring one A4-size handwritten double-sided help sheet.

WEEK 7 7/14-7/20

INVENTORY MANAGEMENT – NEWSVENDOR

Learning Objectives:

- Recall probability
- Explain the newsvendor model
- Determine underage and overage costs, critical fractile, and optimal order quantity
- Utilize the newsvendor model in revenue management

Preparation:

- Read optional textbooks: Cachon and Terwiesch 12.1 to 12.8, 17.3 to 17.5.

After Class:

- Complete homework 6 and submit it to eLearning by 11:59 pm on 7/20.
- Read optional textbooks: Cachon and Terwiesch 8.1 to 8.6, 8.9.
- Read the optional article: The Poisson Distribution and Poisson Process Explained.

SESSION 8 7/21-7/27

QUEUEING THEORY

Learning Objectives:

- Explain how variability causes queues
- Describe process performance measures
- Utilize Little's Law and its applications
- Solve waiting problems in practice

Preparation:

- Read optional textbooks: Cachon and Terwiesch 8.1 to 8.6, 8.9.
- Read the optional article: The Poisson Distribution and Poisson Process Explained.

After Class:

- Complete homework 7 and submit it to eLearning by 11:59 pm on 7/27.
- Read optional textbooks: Topaloglu Chapters 1-2.
- (Optional) Install the Solver Add-in by reading the instructions and watching the video.

WEEK 9 7/28-8/3

LINEAR PROGRAMMING

Learning Objectives:

- Identify decision variables
- Develop the objective function and constraints
- Explain optimal solution and feasible solutions
- Solve a linear programming (LP) problem graphically
- (Optional) Utilize Excel Solver to solve an LP problem

Preparation:

- Read optional textbooks: Topaloglu Chapters 1-2.
- (Optional) Install the Solver Add-in by reading instruction and watching video.

After Class:

- Complete homework 8 and submit it to eLearning by 11:59 pm on 8/3.
- (Optional) Watch video: Linear Programming Optimization with Excel Solver.
- Read optional textbooks: Cachon and Terwiesch 10.1 to 10.5, Chapters 11 and 17.

WEEK 10 8/4-8/10

QUALITY CONTROL / SUPPLY CHAIN

Learning Objectives:

- Explain variability in quality
- Determine whether a process is in control
- Determine a process' performance in quality
- Explain the bullwhip effect in supply chain

Preparation:

- Read optional textbooks: Cachon and Terwiesch 10.1 to 10.5, Chapters 11 and 17.

After Class:

- Complete homework 9 and submit it to eLearning by 11:59 pm on 8/10.
- Prepare for test 2 by reviewing sessions 5-9 lecture notes, homework, and practice problems.

WEEK 11 8/13-8/15

TEST 1

Test 2 will be held at the UTD Testing Center or at an off-campus location approved by the UTD Testing Center. Please schedule a 2-hour appointment on 8/13, 8/14, or 8/15. It covers the materials from sessions 5-9. Practice problems and solutions will be provided to prepare you for the tests. The test is closed-book and closed-note, but you are allowed to bring one A4-size handwritten double-sided help sheet.