

**OIDD 611: Operations Management: Quality and Productivity**  
*Course Outline - Fall 2022*

**Faculty Contact Information**

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**Course Description**

For most students, OIDD611 will be the first course related to Operations Management. This course will teach students the principles about how organizations can provide the goods and services that their customers demand.

Consider the following examples:

- When in the Spring of 2020 hospitals experienced a rapid increase for patient care as a result of the Covid-19 pandemic, they were not only struggling to find enough doctors, nurses, and hospital beds. They also experienced a dramatic shortage in the supply of personal protective equipment (PPE) including gowns, masks, and gloves. Much of this supply was no longer available in Europe or the US as most of its production had been moved to Asia. Supply shortages were even more visible when the first Covid vaccines were launched. Millions and millions around the world were eagerly awaiting a vaccine appointment. However, the sophisticated and complex production processes that companies like Moderna and Pfizer/Biontech had designed took several months to ramp up to the large scale production required to meet demand.
- In addition to the videoconferencing platform Zoom, some of the big winners of the Covid-19 pandemic have been food delivery services such as DoorDash, UberEats, and DeliveryHero. These companies have been able to respond to customer orders (demand) by quickly and inexpensively delivering food from many sources of supply. Similarly, 20 years after the bankruptcy of grocery delivery retailer Webvan, ordering our groceries has become a part of daily routine during the pandemic.
- On April 20 in 2020, the price for oil for the May 2020 contract futures price for West Texas Intermediate (WTI) turned negative. Oil producers were struggling to find storage space for incoming tankers. A little over a year later, oil prices reached new highpoints in many areas of the world and energy supply shortages are seen as one of the major inflation drivers at the beginning of 2022.
- Sony launched its Playstation PS5 in November 2020. However, shortages in semiconductor supply severely limited sales and the demand for the PS5 still exceeds supply at the beginning of 2022. Shortages for semiconductors have also forced manufacturers of phones, computers, and automotive vehicles to reduce the utilization of

their production lines, leading to stranded assets for the manufacturers and frustrated customers waiting to see their orders filled.

As these examples illustrate, matching supply with demand is an enormous challenge for firms: excess supply is too costly, inadequate supply irritates customers. In the course, we will explore how firms can better organize their operations so that they more effectively align their supply with the demand for their products and services. Throughout the course, we illustrate mathematical analysis applied to real operational challenges – we seek rigor and relevance. Our aim is to provide both tactical knowledge and high-level insights needed by general managers and management consultants. We will demonstrate that companies can use (and have used) the principles from this course to significantly enhance their competitiveness.

In this course, the emphasis is on the design of business processes to maximize productivity and to achieve world-class quality. The course details different kinds of business processes and explains how to measure key process parameters like capacity and lead time. The course also covers process improvement and examines classic ideas in quality management and the Toyota Production System.

### **Course Timing for Q1-2022**

The two sections of the course will meet at 10:15 am and 1:45 pm in JMHH-255. The course will begin Tuesday, August 30 and will consist of 11 class sessions covering content. The last day of class that will introduce new content will thus be on Tuesday, October 4. On Thursday, October 6 there will be no class (Fall break). An optional review session will be held on October 11. The attendance of all other classes is mandatory.

The final exam will take place on October 13. Students can take this exam at any location. Students can start taking the exam at 0:01am EDT and must have uploaded their answers by 11:59pm on Canvas. The exam is a 2 hour open book, open notes exam.

### **Course Format**

Students are expected to attend all sessions in person unless Wharton/Penn move again to an online / hybrid format. This includes:

- Being on time for each session.
- Preparing an average of one case a week. There is no need to submit a formal case write-up, but students are expected to spend about 1h on case preparation for each case. Detailed instructions on how to prepare each case will be sent out in advance / provided in the prior session.
- Time for reading, reviewing, and preparing for homework assignments and the course exam (about two hours per week, on average, though this is not evenly distributed).
- Watch a set of asynchronous (pre-recorded) videos as assigned in Canvas and in class. These videos allow us to avoid spending too much class time in lecture mode. These videos also help students who have missed classes or whose class attendance might be constrained by Covid restrictions to make up for lost class time.

Canvas will be used to keep track of readings, assignments, and videos.

## **Asynchronous videos**

All course content is available in a library of asynchronous videos that are posted on Canvas. Students don't have to watch these videos. They are meant as a resource for students who could not attend class or are struggling for other reasons. All the action will be in the class room.

## **Grading**

Each student's final numerical score for the course is based on the following items and weights:

Homework assignments (24% of final grade). Each student must turn in his or her own assignment through Canvas. We encourage students to attempt to complete the assignments on their own. However, to promote learning, students are allowed to discuss each assignment with other students taking OIDD611 in the same quarter. There will be three homework assignments. HW1 and HW2 are based on last year's final exam (they are the final exam cut in the middle) and are worth 6% each. HW3 is the complete final exam from two years ago and is worth 12%.

Class participation (26% of final grade). The class participation score is based on class contributions throughout the entire course. To contribute during case discussions, students must prepare cases carefully before coming to class and be ready to discuss and defend recommended actions. Answers to cases do not have to be submitted.

Course exam (50% of final grade). There is 2h exam based on the contents of the course: analytical tools, case discussions, lectures, etc. The format of this exam is open book and open notes.

## **Course Text, Readings and Handouts**

All lectures will follow the textbook by Cachon and Terwiesch very closely:

Cachon, Gerard, Christian Terwiesch, *Matching Supply with Demand: An Introduction to Operations Management*, 4th edition, McGraw Hill (older editions and the international editions are cheaper to purchase and cover all relevant material)

Though the book is a recommended reading, it is not required. All definitions and formula will be provided in the slide decks. Cases will be made available via Canvas.

OIDD615: Operations Strategy is a related to this course. OIDD611 (this course) is about process analysis as a tool to match supply with demand. It uses the first half of the Cachon and Terwiesch book. OIDD615 is focusing on supply chains and covers the second half of the book.

## Ethics Matrix and Electronic Devices

The following table summarizes what materials students are allowed to use and with what set of people they are allowed to collaborate.

OID 611 Operations Management: Quality and Productivity	Materials							People				
	Approved calculator	Laptop	Tablet	Current book / class notes	Past notes / summaries	Past exams / assignments	Internet content / other outside materials	Learning team / approved work team	Other student(s) in same section	Student(s) in other sections (same term)	Wharton student not taking the class this term	Person outside of Wharton
Homework	A	A	A	A	X	X	X	A <sup>(1)</sup>	A	A	X	X
Cases	A	A	A	A	X	X	X	A <sup>(2)</sup>	A	A	X	X
Course Exam	A <sup>(3)</sup>	X	A <sup>(3)</sup>	A	X	X	X	X	X	X	X	X
	A = Allowed material X = Not allowed							A = Allowed to work together X = Not allowed				
<b>Other comments:</b>												
(1) Students are encouraged to test their understanding of the material by working on the homework individually. Once the student has diagnosed his/her skill level, communication is allowed (2) Students are encouraged to collaborate when preparing for cases or working on the end-of-chapter problems (3) You are not allowed to pre-program any macros or spreadsheet. To state the obvious, you are also note allowed to interact with fellow students during the exam time												
The information above covers many common situations but will not cover every circumstance. Remember: The <a href="#">Wharton MBA Code of Ethics</a> that you accepted requires, among other things, that you represent yourself and your work honestly, don't try to gain unfair advantage over other students, follow the instructor's guidelines and respect confidentiality of your work and the work of others.  Should you have questions, please contact me.												

The main point to emphasize from this matrix is that any form of collaboration on the course exam is a major ethics violation.

### Use of Electronic Devices

The following states our policy with respect to the usage of electronic devices during class time and during the exam: in class, students are allowed to use laptops and tablets only for work directly related to the class (no email, no other work). A set of Google Doc Spreadsheets will be used to quickly organize student input. They can be accessed via Canvas.

Lap-tops can be used during the exam. However, students are not allowed to pre-program any macros or Excel models. Also, students are not allowed to interact with other students / anybody (including TAs and faculty) during the full 24 hours of October 13 (the day of the exam).

### Session overview

There are 11 sessions covering new content in this course and three homework assignments. Cases and exercises are taken from a broad range of industries, including financial services, hospitality, retailing, manufacturing, and healthcare. Some of the detailed session planning might change. Please check the Canvas for the final assignments.

The course consists of 10 modules. Here is a mapping from the 12 sessions to the as well as the due dates of the assignments. Canvas has more information.

Class	Date	Key content	Module	Pework
1	Aug 30	WTP, Efficiency frontier, system inhibitors	INTRO	Loan Underwriting
2	Sep 1	Process analysis, capacity, bottleneck	PROC	
3	Sep 6	Subway analysis, labor productivity	FLOW	
4	Sep 8	Little's law, inventory turns, employee turnover	LITTLE	Retail data
5	Sep 13	Cranberry case, problem definition	MULTI	Cranberry case
6	Sep 15	Performance analysis, ROIC tree	KPI	HW1
7	Sep 20	Capital One case, lean operations	LEAN	Capital One case
8	Sep 22	Waiting times, types of queues	WAIT	
9	Sep 27	Call center case, lean transformation		Call center case
10	Sep 29	Loss models, blocking and starving	LOSS	
11	Oct 4	Quality, TPS, Six sigma	QUALITY	
	Oct 5			HW2
12	Oct 11	Review session (optional)		HW3
	Oct 13	Final Exam (remote)		

### TA Office Hours

Over the course of the quarter and especially close to Homework due dates and the exam, we will offer an assortment of TA office hours that are staffed by second year students. You can approach the TAs with specific questions and/or for general review. More details to come...

### Faculty Office Hours

Office hours with me can be scheduled as needed. My default time for meeting with students is from 12 to 1.30 on Mondays and Wednesdays via Zoom. However, we can schedule phone calls or zoom meetings pretty much any time over the quarter. In addition to office hours, I plan to schedule a handful of social gatherings over zoom and / or in person.