



Course description for “Operations Research” during the Winter Semester 2022/23

Taught as part of module “EM Business Analytics”

Current as of 28 Jun 2022

Course Summary

A supply chain spans many partners. For example, BMW is working with 1,800 suppliers delivering from 4,000 locations to 30 plants. The aim of efficient supply chain management is to optimally align the processes and activities of the partners. The alignment of these processes and activities is complex as they are often subject to several constraints, such as time, money or other resources.

Operations Research (OR) is the analytical discipline that helps us make better decisions in light of these constraints to optimize the way we run an operation or supply chain. This is done using different modelling approaches with the objective to come up with an optimal solution, i.e., to minimize costs, to maximize profits, to increase customer satisfaction, to decrease lead times, etc.

In this course, we will be **solving real-life problems**, such as allocating production resources, planning social activities, structuring a supply chain network or setting up an airline network, by solving case studies. **You’ll learn how to derive insights from these problems, summarize your findings, and make actionable recommendations** to management. We’ll also be teaching you important **transferable skills** to help you succeed in this course and prepare you for upcoming academic and work adventures!

Course Format

We are very glad to be able to offer **in-person, face-to-face** teaching this semester. We’ve made small adjustments to the course schedule based on our room allocations and are combining elements from last year’s fully-online course which were well received, with significant in-person elements, in a **hybrid format**. We’re optimistic that this will be a fun, helpful, and interesting learning experience in the upcoming semester that will be robust to a variety of circumstances in the pandemic.

Concretely, we will have four elements for this course:

- Opening and closing sessions as well as interactive **workshops** to be taught **face-to-face**
- Weekly **exercise labs** to be held **in-person**. Except for a brief review of key contents, these will be **interactive sessions** where you will solve practical problems, not frontal lecturing
- **Five online content blocks**, with short videos, small exercises, or questions, which you complete at **your own schedule**. These replace classical, “we talk, you listen” lectures, allowing you to pause, rewind, and fast-forward content at your own pace.
- Optional **troubleshooting** sessions where we will help answer technical questions you may have, held **in-person**

In this way, we’re optimistic that we can offer you a great learning experience which caters to your learning needs, but also has the interactive elements with your fellow students and us in the faculty to keep you energized, motivated and on-track!

Prerequisites

Interest in the field and working knowledge of quantitative approaches in business administration.

This course builds on knowledge that you gathered from the course “Supply Chain Management”; thus, it is highly recommended that you have completed this or an equivalent course (for exchange students) prior to this course.

Prior knowledge of Excel is recommended but can be also gained (and expanded!) throughout the course and through the **Excel skills lab**, which is an optional resource we are launching one week prior to the start of the course.



Grading

The course will count 6 credit points (LP) according to the examination handbook from 2015.

As part of our effort to adapt the course to the changing circumstances, the **assessment for the course is a portfolio**:

- **Case Study**, completed individually as a take-home assignment (**80%**)
 - You will receive a case study, inspired by a real-world problem, which will require you to apply the learnings of the course. You'll be required to submit a written report (expect ~ 4 pages, details tbc) as well as an Excel file with the model.
- **4 short tests on ILIAS (20% in total)**
 - These tests will be made available at the end of units 1, 2, 3 and 5 (i.e., after the review & exercise session), you'll have two days to complete them at your discretion. Once a test is started, there is a time limit.
- Bonus points

In other words, there will **NOT be an exam** for this course. We've opted for this examination method because we believe this is the most representative and fair way for you to demonstrate your learnings from the course – we are keen to help you understand how to apply the contents of the course to practical problems, to present your findings, and to critically challenge the limitations of the models we will build.

Lecturer(s)

Daniel F. Gass

Dominik Walzner

Prof. Andreas Fügener

Contact

or@wiso.uni-koeln.de (Feel free to message us in English or German)

Once the course has started, there will be a dedicated tool in the ILIAS course to raise questions. **Please check here first whether your question has already been asked/ answered or not.**

Office hour

We will make slots available for booking on the course page in ILIAS.

Language

All sessions are taught in English.

You may answer the case study either in English or German.



Course Schedule

Monday	Tuesday	Wednesday	Thursday	Friday
October 3	4	5	6	7
<i>Optional Excel "skills lab" videos made available to get you up to speed on basics of using Excel.</i>				
10	11	12	13	14
Opening Session – Welcome to OR 11:00 – 13:00, Hörsaal B	Block 1: Linear Programming & What-If Analysis (Online, Self-Study)			
17	18	19	20	21
Lab 1 (Review & Exercise) LP & What If Analysis 10:00 – 12:00, Hörsaal B Optional Individual Excel Troubleshooting 12:00 – 13:30, Hörsaal B	Block 2: Integer Programming (Online, Self-Study)			
	DEADLINE TO REGISTER FOR "EXAMINATION" IN KLIPS @ 23:59			
24	25	26	27	28
Lab 2 (Review & Exercise) Integer Programming 11:00 – 13:00, Hörsaal B	Block 3: Network Optimization (Online, Self-Study)			
31	November 1	2	3	4
Lab 3 (Review & Exercise) Network Optimization 11:00 – 13:00, Hörsaal B	Block 4: Building advanced constraints (Online, Self-Study)			
	BANK HOLIDAY			
7	8	9	10	11
Lab 4 (Review & Exercise) Building advanced constraints 10:00 – 12:00, Hörsaal B Workshop Network Optimization – a consultancy case study w/ Accenture 12:00 – 13:30, Hörsaal B	Block 5: Modelling non-linear relationships & solving complex problems (Online, Self-Study)			
14	15	16	17	18
Lab 5 (Review & Exercise) Modelling non-linear relationships 11:00 – 13:00, Hörsaal B	Block 6: Ethics of Optimization (Online, Self-Study)			
21	22	23	24	25
Workshop How to successfully solve a case study 11:00 – 13:00, Hörsaal B Case Study released				
28	29	30	December 1	2
Closing Session, Q&A 11:00 – 13:00, Hörsaal B				DEADLINE Case Study Submission