Course description for
"Operations Research" during the Winter Semester 2021/22

*Taught as part of module **"EM Business Analytics"***

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 *(may be subject to change depending on the pandemic situation)*

Last year, we made substantial changes to the course structure and format in order to guarantee a great learning experience during the pandemic. For this upcoming semester, we're planning a flexible, **hybrid teaching approach for this course,** combining in-person elements with flexible, "on-demand" elements that were well received last year. We're optimistic that this will be a fun, helpful, and interesting learning experience also in the upcoming semester.

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** (these will be **interactive**, not frontal lecturing)
- Three **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!

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:
	▪ **Exam (60%)**, individual, with focus on applying your learnings of the course – NOT memorizing definitions, concepts, etc.
	▪ **Case Study**, completed in groups of 3-4 students **(40%)**
	• 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 short, written report (expect ~ 4 pages, details tbc) as well as an Excel file
	▪ Bonus points
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	By request to above e-mail. Typically on Monday, 4pm – 5pm.
	Offered either in-person, or through Zoom, depending on the pandemic circumstances.
Language	All sessions are taught in English.
	You may answer the case study and the exam either in English or German.
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.

Universität zu Köln
Seminar für Supply Chain Management und Management Science

Course Schedule *(like all contents in this document, this is preliminary!)*

Monday	Tuesday	Wednesday	Thursday	Friday
October 4	5	6	7	8
11	12	13	14	15
Opening Session – Welcome to OR *10:00 – 11:30*	**Block 1: Linear Programming & What-If Analysis** (Online, Self-Study)			
18	19	20	21	22
Exercise Session Linear Programming & What If Analysis *10:00 – 11:30*	**OPTIONAL: Troubleshooting session - Solving LPs in Excel** *10:00 – 11:30*			
	Block 2: Network Optimization (Online, Self-Study)			
25	26	27	28	29
Exercise Session Network Optimization *10:00 – 11:30*	**Workshop** Network Optimization – a consultancy case study w/ Accenture *10:00 – 11:30*			
	Block 3: Integer Programming (Online, Self-Study)			
November 1	2	3	4	5
Exercise Session Integer Programming *10:00 – 11:30*	**Workshop** How to successfully solve a case study *10:00 – 11:30* *LAUNCH Case Study*			
8	9	10	11	12
OPTIONAL: Feedback sessions Case Study	**OPTIONAL: Feedback sessions Case Study**			
15	16	17	18	19
	Exam Preparation, Q&A, Closing Session *10:00 – 11:30*			*DEADLINE Group Case Study Submission*
22	23	24	25	26
	EXAM			

Exam: 23 November 2021, 10:00 (tbc)