

Syllabus: Operations Research (AQM 2041)

Prof. Dr. Hendrik Lambrecht

Hochschule Pforzheim / Pforzheim University

Course	AQM2041 – Operations Research
Grading	Written exam, 60 minutes, at the end of the semester
ECTS-Credits	2 SWS - 3 Credits
Accompanying Material	Course slides, exercises and further information are available on the corresponding moodle course. Inscription is required to keep yourself up to date.
Prerequisites:	Analysis and Linear Algebra (AQM1041) Mathematical Optimization (AQM1142)
Lecturer	Prof. Dr. Hendrik Lambrecht Büro: W1.4.052 Office hours: We, 13.45-15.15 after prior appointment (E-Mail) e-mail: hendrik.lambrecht@hs-pforzheim.de Internet: http://umwelt.hs-pforzheim.de/team/hendrik-lambrecht/
Room and Time	cf. LSF

Outline of the course

Lecture	Topic
1-4	Decision Theory: multiple criteria and uncertainty
5-6	Portfolio theory
7-8	Sensitivity analysis LP
9-10	Revenue Management
11-13	Investment under uncertainty

Literature

- Rardin, Ronald L. (2017): Optimization in Operations Research. Pearson.
- Dörsam, P.: Grundlagen der Entscheidungstheorie, 3. Aufl., 2001, Heidenau
- Bitz, M.: Entscheidungstheorie, 1981, München.
- Laux, H.: Entscheidungstheorie, 6. Aufl., 2005, Berlin.

Learning Objectives

By the end of the course, the students shall...

- be able to translate a decision problem into an adequate decision matrix
- be able to distinguish between decisions under risk and under uncertainty and know appropriate approaches to handle them
- know the basic principles of Portfolio theory
- be able to analyse investment decisions under uncertainty
- be able to perform sensitivity analysis for LPs

Teaching and Learning Approach

The course is a lecture in applied mathematics. Focus is not on rigorous proofs. Different optimization techniques are illustrated with appropriate examples. You shall become familiar with the “optimization paradigm” and learn how to translate real world problems into mathematical optimization models. You shall understand both the algorithmic solution of optimization models and how to use software tools.

I highly recommend to practice the skills acquainted in the course and to work on the exercises given in the lecture in groups.

Questions are welcome! In particular, right when they come to your mind during the course: they will not only help yourself but also your fellow students.

If you are better off learning yourself at home with the powerpoint slides and/or a book. No problem, I will not blame anyone for absence. However, if you come: please keep mentally track with the course and contribute to a productive working atmosphere.

Good luck!

Hendrik Lambrecht

Course contributions to bachelor programs' common learning goals:

Learning Objective / Outcome		Contributions to learning objectives	Assessment
1	Expert knowledge Students show that they have sound basic knowledge ...		
1.1	... in Business Administration.	X	
1.2	... in Economics	X	
1.3	... in Business Law.	X	
1.4	... in Quantitative Methods	Approaches to handle multicriteria decision problems and decision under uncertainty: e.g. weighting and Monte Carlo simulation	Written exam
2.1	Use of information technology Students demonstrate proficiency in using computer programs to solve business problems.	X Standard tools for solving linear programs like LINGO and EXCEL are introduced. Focus is on understanding and correctly interpreting software generated solution reports	Written exam/Excercises
2.2	Students are able to use information systems effectively in real world business settings.	X	
3.	Critical thinking and analytical competence Students are able to apply analytical and critical thinking skills to complex problems.	Critical appraisal of different approaches to support decision problems. "Translation" of real world problems in mathematical optimization models improves the students abstraction skills	Written exam
4.	Ethical awareness Students are able to develop business ethics strategies and apply them to typical business decision-making problems.	X	
5	Communication skills		
5.1	Students are able to express complex problems effectively in writing	X	
5.2	Students demonstrate their oral communication skills in presentations and papers.		
6.	Capacity for teamwork Students show that they are able to work successfully in a team by performing practical tasks.	X	