OPM 662 Business Analytics: Modeling and Optimization

Business Analytics helps to optimize decisions for the design and management of operations systems and production processes. This course introduces concepts and tools for prescriptive analytics for modeling and optimization based on techniques from Operations Research. Operational and tactical planning tasks are formulated as linear and mixed integer linear programming models. Optimization models are analyzed and implemented in class. They are solved using standard tools of prescriptive analytics. Different heuristic techniques to cope with the complexity of real-world scheduling problems are introduced and implemented. Data-driven approaches to cope with stochastic variability are introduced and analyzed. During the course the students will work on several case studies and assignments (individual and in groups).

General Information

Lecturer	Prof. Dr. Raik Stolletz
Course Format	Integrated (lectures, exercises, self-study)
Credit Points	8 ECTS
Language	English
Grading	Assignments, Presentations, Programming exam or oral exam
Term	Spring Semester
Range of Application	M.Sc. MMM, M.Sc. Bus. Edu., M.Sc. Bus. Inf., M.Sc. Bus. Math., M.Sc. Econ.

Learning Goals

- Students learn how to structure operations planning and scheduling problems. They are able to translate them into mixed integer linear models.
- Students learn how to use Python to implement them and solve them with a standard solver to derive optimal plans/schedules (DOcplex Python Modeling API).
- They also learn to deal with the complexity of real world problems (e.g., via aggregation, relaxation, and decomposition techniques) and how to perform sensitivity analyses in order to obtain useful managerial insights.

Prerequisites:

Modules OPM 560 and OPM 561 OR: OPM 561 and "Schlüsselqualifikation1: Programmierkurs Python" (Angebot der WIM)

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Registration/Enrolment

The course requires a registration through Portal2. More information can be found there.

Detailed Agenda

I Applications of optimization models

- Aggregated production planning
- Lot sizing and detailed scheduling
- Workforce planning

II Business Analytics approaches

- Mathematical modeling
- Heuristic solutions for large-scale problems
- Stochastic optimization

III Managerial insights and numerical studies

- Design of numerical studies
- Sensitivity analysis
- Interpretation of solutions

IV Practical insights

- Business Analytics tool for modeling and optimization
- Guest lecture by business analytics professionals

Literature

- Williams, H. P. (2013). Model building in mathematical programming. John Wiley & Sons.
- McKinney, W. (2012). Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. " O'Reilly Media, Inc.".
- Journal papers will be announced during the lecture.

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