Introduction to the Master Courses of the Chair of Production Management

Analytics and Production Management Focus

Prof. Dr. Raik Stolletz

AACSB ACCREDITED EFMD EQUIS ACCREDITED ASSOCIATION OF MBAS ACCREDITED

University of Mannheim, Fall Term 2025

Chair of Production Management: Chair Holder

Prof. Dr. Raik Stolletz

- Studies of Mathematics, Business Administration, and Computer Science (TU Berlin, 1999)
- Dr. rer. pol. in Business Administration (TU Clausthal, 2002)
- Habilitation in Business Administration (University of Hannover, 2009)
- Associate Professor for Operations Management (Technical University of Denmark, 2009/2010)
- Chair Holder of Production Management (since December 2010)

TECHNISCHE UNIVERSITÄT BERLIN

TU Clausthal

Leibniz Universität Hannover

DTU Technical University of Denmark

UNIVERSITY OF MANNHEIM

Team

Prof. Dr. Raik Stolletz

Daniela Fichtenmayer-Hüßler (Office)

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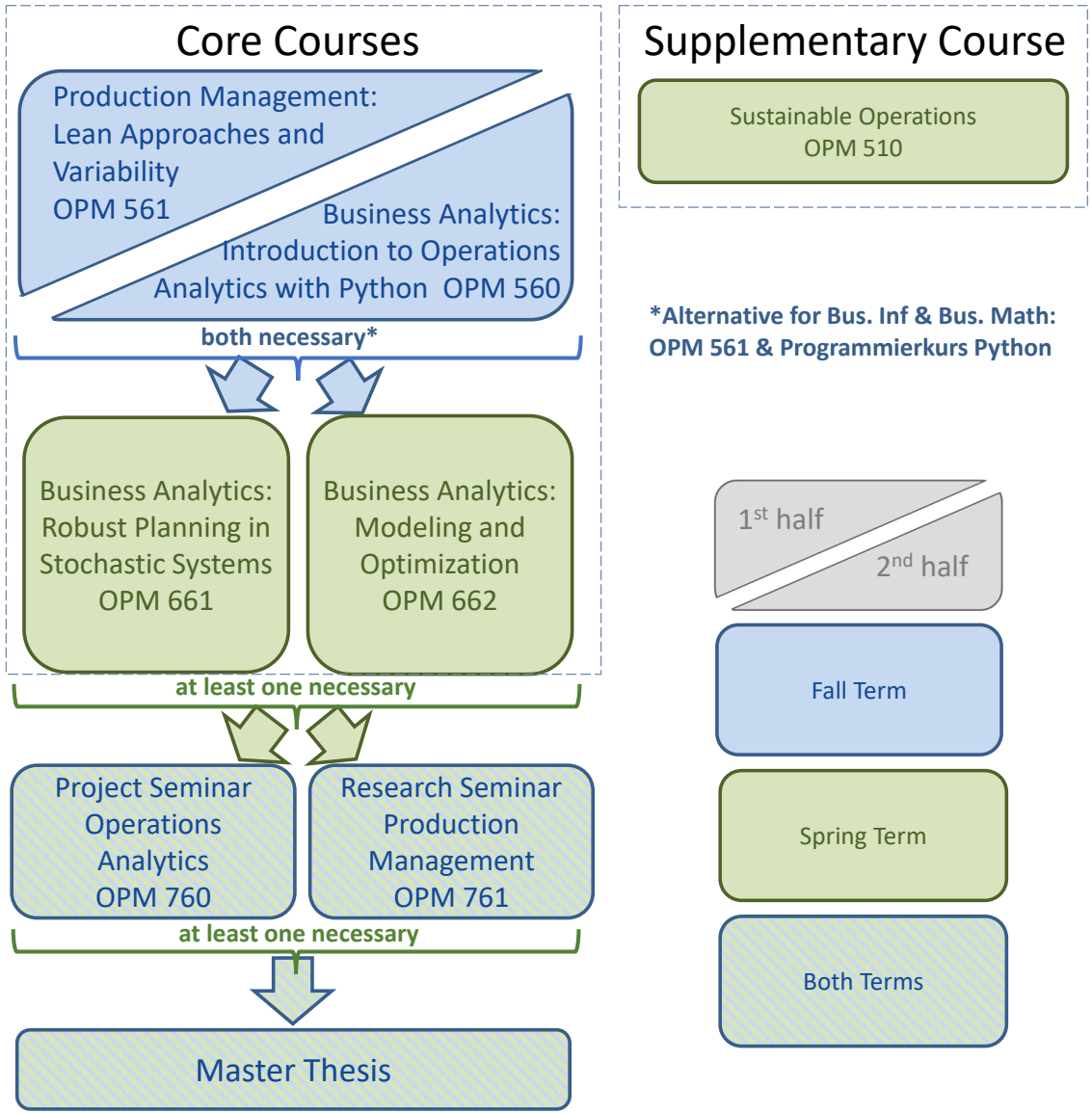
Dr. Mohammad Zenouzzadeh

Tim Weber

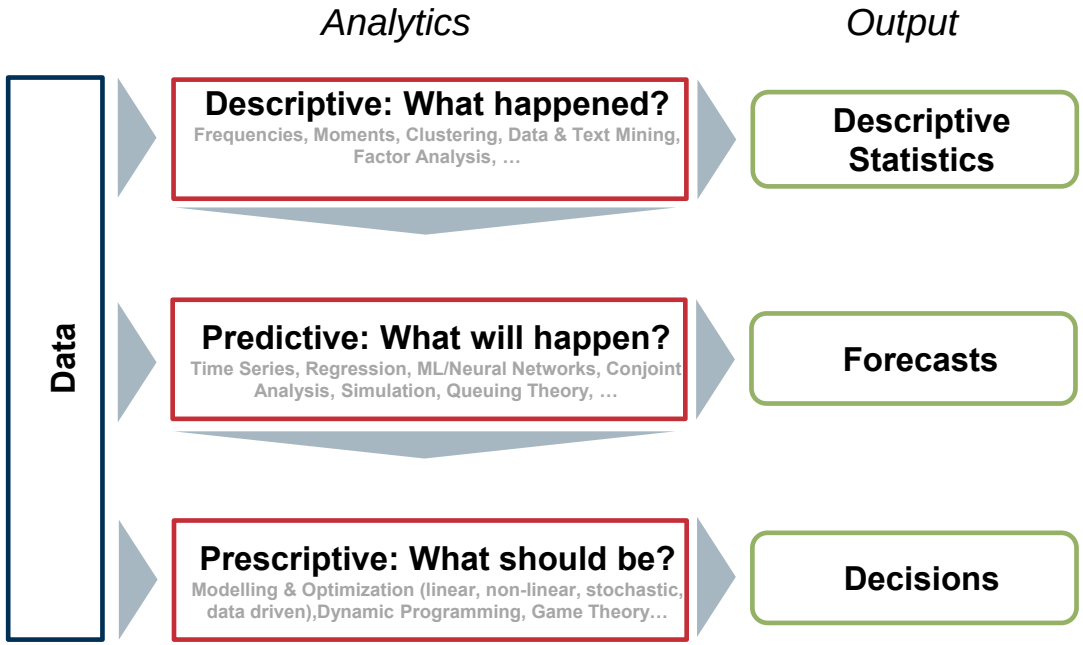
https://www.bwl.uni-mannheim.de/en/stolletz/

Course Program - Master (M.Sc.)



Analytics-oriented Approach

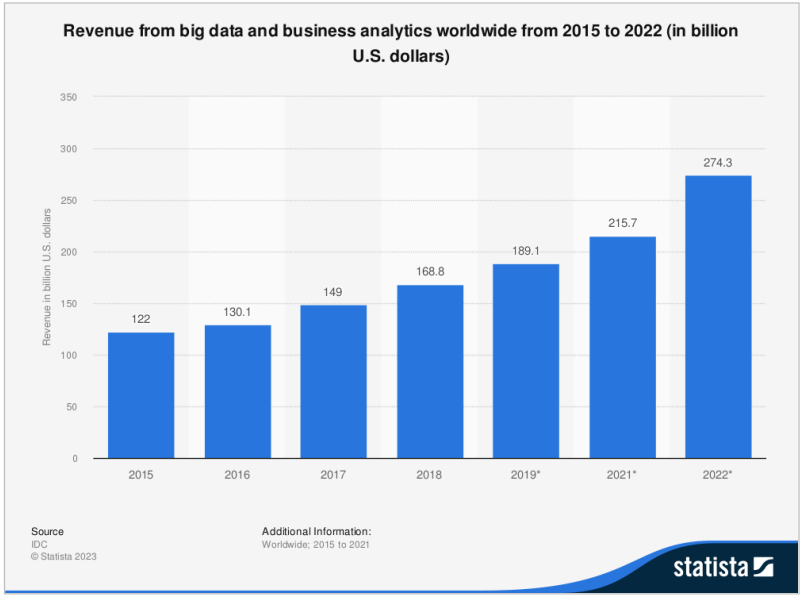
- Address complexities of **managerial decision making** by means of analytics
- Wide range of **advanced analytical methods**
- Combination of **methodological expertise** and **intimate domain knowledge** in relevant areas of operations management
- Focus on how to **generate value** from data by enabling **better decisions**

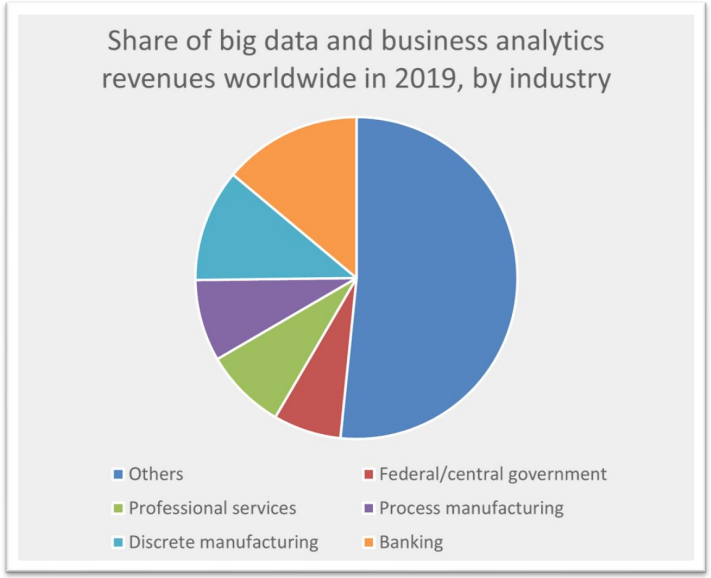


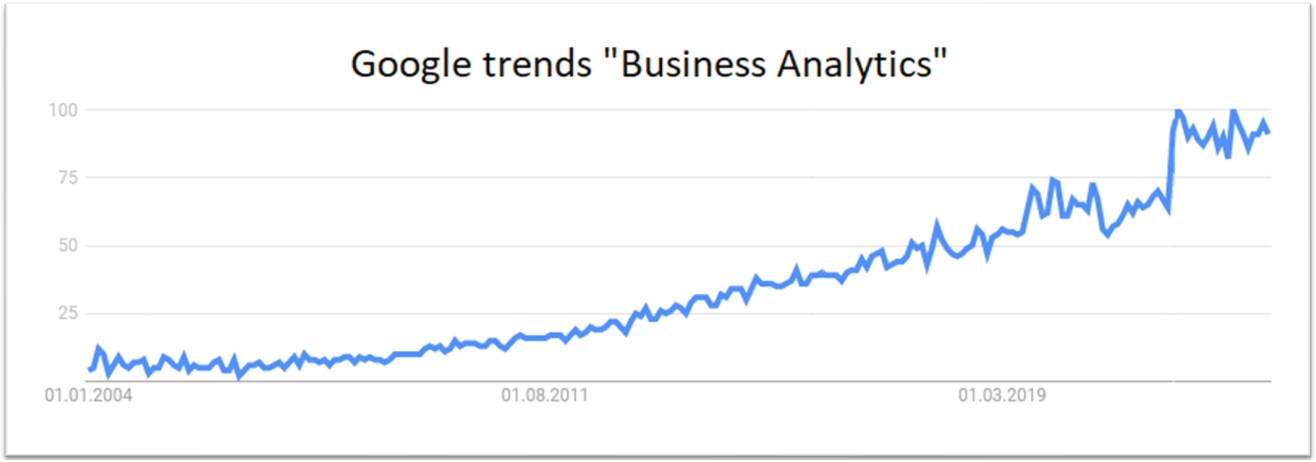
What is our teaching about

- Production and analytics topics
  - Descriptive, predictive, prescriptive analytics
  - Capacity planning
    - Optimization with constrained resources
  - Impact of variability
    - Hedging against different variability types
  - Sustainable production management
- Teaching style
  - Learning by doing
    - Interactive discussions and presentations
    - Inverted classroom
  - Test-yourself tasks
  - Guest lectures
- Assignments as graded part of the course
  - Application & implementation of business analytics methods & models
  - Generating managerial insights

The Analytics Job Market







Sources: Google.com, Statista.com

Career Opportunities

- Consulting (Management, Operations, Analytics, ...)
- Data science & engineering
- Developer / expert in business analytics
- Academic career in business analytics
- AI startups
- ...

Camelot ITLab Innovative Technologies Lab

elixum

PORSCHE

Deutsche Bank

ATHORIO YOUR WAY TO THE CLOUD

SAP

UR Universität Regensburg

OMP.

BCG The Boston Consulting Group

DAIMLER

OPM 561 - Production Management: Lean Approaches and Variability

Key topics:

Capacity planning in Operations Management

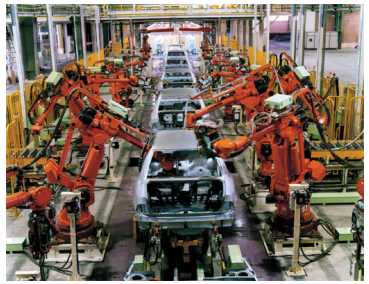
- Introduction to stochastic variability
- Design of production lines

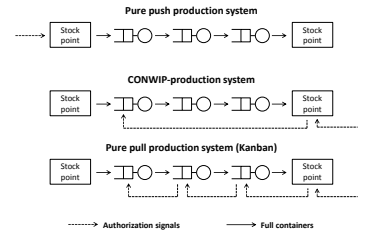
Lean Management & Industry 4.0

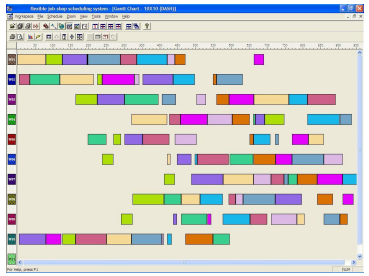
- Lean Philosophy
- Industry 4.0: Technologies and planning approaches

Operations Planning and Optimization

- Scheduling & Lot sizing







Grading: (4 ECTS)

- Written exam (60 min.)
- **Exam date: Midterm (probably 22.10.2025)**

Dates/course structure: **(1st half of semester only)**

- Lecture: Wed B2 (O 145), 10.09.-15.10.2025
- Exercise: Mon B5 (O 142), 11.09.-16.10.2025

OPM 561 - Course Structure

I Introduction

- Variability in Operations Management

II Capacity Planning in Operations Management

- Introduction to stochastic variability in production systems
- Lean flow lines
- Optimization of flow oriented production systems

III Lean Management

- Principles of lean management and implementation of lean systems

IV Scheduling Applications

- Job shop scheduling
- Lot sizing

V Industry 4.0

OPM 560 - Business Analytics: Introduction to Operations Analytics with Python

Key topics:

- Introduction: Basics of Python
- Hands-on implementation: Predictive & descriptive analytics models from OPM 561
- Managerial insights: Sensitivity analysis for capacity and operations decisions

Recommended: OPM 561

Grading: (6 ECTS)

- 70 % Assignments (individual and in groups)
- 30 % Programming Exam (45 min.)

Dates/course structure: (2nd half of semester, after OPM 561 exam)

- Lecture with integrated exercises:
  Wed B2 (O 145) & Thu B3 (O 142), 23.10.-04.12.2025
- Exercise (not mandatory, support assignments):
  Tue B3 and/or B4 (O 048), 28.10.-02.12.2025

OPM 560: Course Structure

I Get started with Python

- Simple types and operators
- Branching programs and conditional statements
- While loops, for loops and ranges
- Python data structure (list, dict, etc.)
- Functions

II Descriptive Analytics

- Read and write datasets
- Univariate and Bivariate analyses
- Quantify & visualize variability in datasets

III Predictive Analytics

- Analyzing functions and sensitivities
- Digital twins and random numbers

IV Prescriptive Analysis

- Implementation of Optimization models
- Design of numerical studies

OPM 661 - Business Analytics: Robust Planning in Stochastic Systems

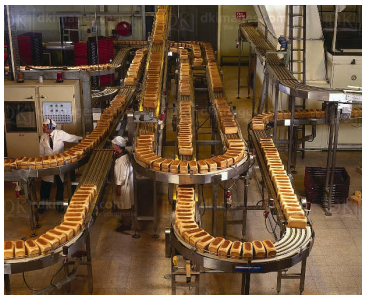
Key topics:

Methodological foundations of stochastic systems

- Stochastic processes and Markov chains
- Simulation and key performance measures

Implementation of predictive analytics approaches

- Performance analysis under stochastic variability
- Optimization concepts under uncertainty



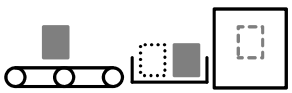
Prerequisites: OPM 561 and (OPM 560 OR IS 557)
(Alternative for Bus. Math./Inf. students: OPM 561 & Schlüsselqualifikation 1: Programmierkurs Python)

Grading: (8 ECTS)

- 70 % Assignments and presentations (individual and in groups) and 30 % written (45 min)/oral exam

Dates/course structure:

- Lecture with integrated exercise & non-mandatory exercise session (support assignments)
- Planned next offering: TBA



OPM 661 - Course Structure

I Introduction to performance evaluation

- Queueing systems, decisions, and applications
- Performance measures in queues

II Performance analysis of Markovian queueing systems

- Stochastic processes and Markov chains
- Birth & death processes and economies of scale

III Impact of variability in queueing

- Analysis of complex systems and simulation techniques
- Time-dependent analysis of queueing systems

IV Optimization and queueing

- Robust planning with scenarios

V Practical insights

- Predictive and prescriptive analytics with Python
- Guest lecture

OPM 662 - Business Analytics: Modeling and Optimization

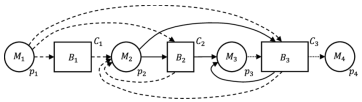
Key topics:

Mathematical optimization models

- Operations planning and workforce optimization
- Production system design

Implementation of prescriptive analytics approaches

- Optimization and algorithmic solution methods
- Robustness and fairness in optimization approaches
- Managerial insights and numerical studies



Minimize:

$$\sum_{m=\underline{M}+1}^{\overline{M}} z_m$$

Subject to:

$$\sum_{i=1}^{I} t_i(x_{im} + y_{im}) \leq C \cdot z_m \qquad m = \underline{M}+1, \ldots, M$$

$$\sum_{m=1}^{M} (x_{im} + y_{im}) = 1 \qquad i = 1, \ldots, I$$

$$\sum_{m=1}^{M} (M - m + 1)(x_{rm} - x_{sm}) \geq 0 \qquad \forall\, (r,s) \in P$$

$$\sum_{m=1}^{M} (M - m + 1)(y_{sm} - y_{rm}) \geq 0 \qquad \forall\, (r,s) \in P$$

Prerequisites: OPM 561 and OPM 560

(Alternative for Bus. Math./Inf. students: OPM 561 & Schlüsselqualifikation 1: Programmierkurs Python)

Grading: (8 ECTS)

- 70 % Assignments and presentations (individual and in groups) and 30 % written (45 min)/oral exam

Dates/course structure:

- Lecture with integrated exercise & non-mandatory exercise session (support assignments)
- Planned next offering: Spring 2026

OPM 662: Course Structure

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
- Scenario approaches for robust planning

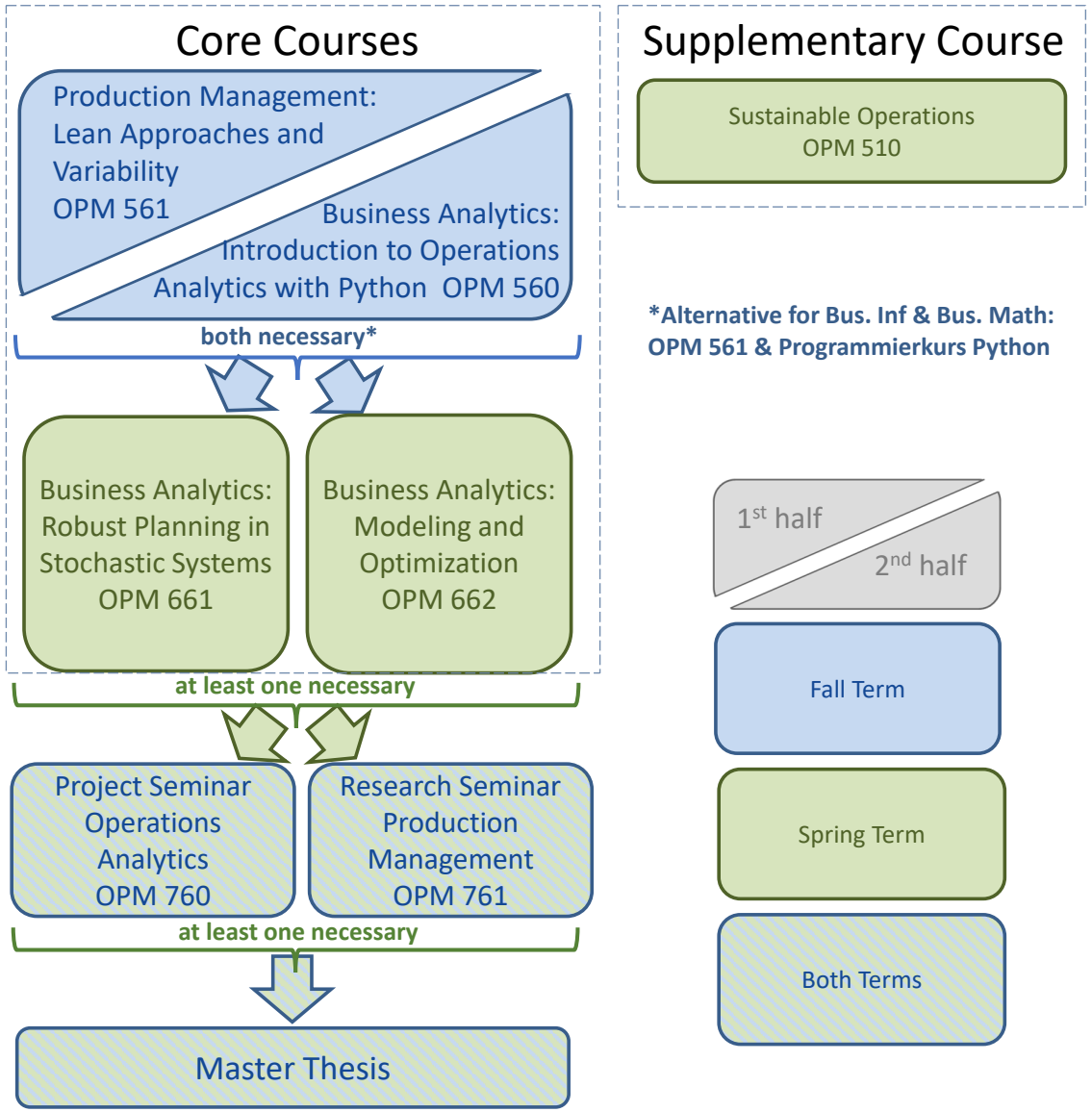
III Managerial insights and numerical studies

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

IV Practical insights

- Business Analytics tool for modeling and optimization
- Guest lecture

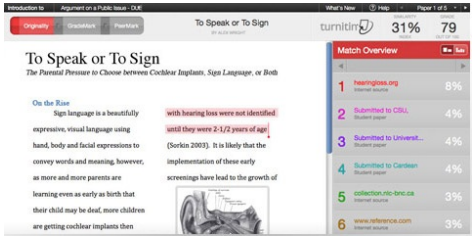
Course Program - Master (M.Sc.)



OPM 761 - Research Seminar Production Management

Key topics:

- Literature review of analytics models or approaches
- Paper discussion

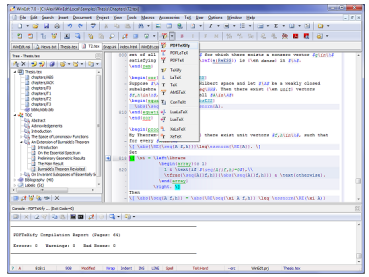


Prerequisites:

- At least one of the OPM 6xx courses (parallel attendance possible)

Grading: (6 ECTS)

- Seminar thesis (18-22 pages) (60%),
- Presentation (30%)
- Discussion (10%)



Master's thesis in the same semester is possible

For further information, see our website

OPM 760 - Project Seminar: Operations Analytics

Key facts:

- Implementation and comparison of predictive/ prescriptive analytics approaches
- Development of numerical studies to generate managerial insights
- Work individually or in small **teams**

Prerequisites:

- At least one of the OPM 661 or OPM 662 courses

Grading: (6 ECTS)

- Seminar thesis (18-22 pages) (60%),
- Presentation (30%)
- Discussion (10%)

Master's thesis in the same semester is possible

For further information, see our website

Master's Thesis

Types of topics:

- Implementation and extensions of predictive or prescriptive analytics approaches
- Literature reviews analytics models or approaches
- Collaboration with companies

Prerequisites: OPM 761 or OPM 760

Duration:

- 20 weeks
- Start possible any time

Application:

- Motivation letter, CV, bachelor certificate, transcript of records,

For further information and sample topics, see our website

Example Study Plan: Specialist - Analytics & Production (w/o exchange)

1st Semester - Fall

Course Title	ECTS
OPM 561 - Production Management: Lean Approaches and Variability	**4**
OPM 560 - Business Analytics: Introduction to Operations Analytics with Python	**6**
2 OPM courses out of 3: • OPM 501: Supply Chain Design • OPM 581: Service Operations Man. • OPM 591: Strategic Procurement	12
CC 501 - Decision Analysis	6

= 28 ECTS

3rd Semester - Fall

Course Title	ECTS
OPM 760 - Project Seminar: Operations Analytics or OPM 761 - Research Seminar: Production Man.	**6**
Remaining from OPM 501/581/591	6
Electives Area OPM	12
BE 510 - Business Economics I	6

= 30 ECTS

Electives Area Operations

Course Title	ECTS
Fall: • OPM 502 - Inventory Management • OPM 504 - Transportation Management: Aviation • OPM 544 - Supply Chain Risk Management • OPM 582 - Case Studies in Operations Management • OPM 593 - Negotiation • OPM 597 - Next Generation Procurement	6 4 4 6 4 4
Spring: • OPM 510 - Sustainable Operations • OPM 503 - Transportation Management: Road, Rail, and Sea Freight • OPM 582 - Case Studies in Operations Management	4 6

Σ = 120 ECTS

2nd Semester - Spring

Course Title	ECTS
OPM 661 - Business Analytics: Robust Planning in Stochastic Systems	**8**
OPM 662 - Business Analytics: Modeling and Optimization	**8**
At least 1 OPM course out of 3: • OPM 601: Supply Chain Strategy • OPM 682: Revenue Management • OPM 692: Strategic Sourcing	6
CC 503 - Empirical Methods	6
CC 504 - Corporate Social Responsibility	4

= 32 ECTS

4th Semester - Spring

Course Title	ECTS
BE 511 - Business Economics II	6
Master Thesis (Prof. Stolletz)	**24**

= 30 ECTS

Example Study Plan: Specialist - Analytics & Production (with exchange)

1st Semester - Fall

Course Title	ECTS
OPM 561 - Production Management: Lean Approaches and Variability	**4**
OPM 560 - Business Analytics: Introduction to Operations Analytics with Python	**6**
1 OPM course out of 3: • OPM 501: Supply Chain Design • OPM 581: Service Operations Man. • OPM 591: Strategic Procurement	6
CC 501 - Decision Analysis	6
BE 510 - Business Economics I	6

= 28 ECTS

3rd Semester - Fall

Course Title	ECTS
Exchange University	30

= 30 ECTS

Electives Area Operations

Course Title	ECTS
Fall: • OPM 502 - Inventory Management • OPM 504 - Transportation Management: Aviation • OPM 544 - Supply Chain Risk Management • OPM 582 - Case Studies in Operations Management • OPM 593 - Negotiation • OPM 597 - Next Generation Procurement	6 4 4 6 4 4
Spring: • OPM 510 - Sustainable Operations • OPM 503 - Transportation Management: Road, Rail, and Sea Freight • OPM 582 - Case Studies in Operations Management	4 6

Σ = 120 ECTS

2nd Semester - Spring

Course Title	ECTS
OPM 661 - Business Analytics: Robust Planning in Stochastic Systems	**8**
OPM 662 - Business Analytics: Modeling and Optimization	**8**
CC 503 - Empirical Methods	6
CC 504 - Corporate Social Responsibility	4
BE 511 - Business Economics II	6

= 32 ECTS

4th Semester - Spring

Course Title	ECTS
OPM 760 - Project Seminar: Operations Analytics or OPM 761 - Research Seminar: Production Man.	6
Master Thesis Production (Prof. Stolletz)	**24**

= 30 ECTS

General Introduction to the Chair

- General introduction to the teaching of the chair of Production Management
  - Wednesday, 10.09.2025, 10:15 - 11:45 (first Lecture of OPM 561)
  - Location: O 145

See you in our courses!

In case of questions: prod@uni-mannheim.de