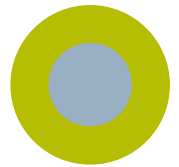


Executive Master Program Production & Operations Management



Master Program Schedule

The Master Programs are designed for working professionals. Intermittent periods of lectures are scheduled to allow participants to continue with demanding careers while acquiring new skills.

The programs lasts over a period of 18 - 20 months. They are divided into ten intensive modules of 14 days, each alternating with monthly breaks. The programs are completed with a masters thesis.

The primary goal of our programs is to enable young professionals to take a holistic approach when managing highly interdependent processes.

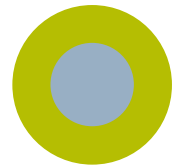
Leadership for engineers in today's fast changing and complex environment does imply technological and organizational responsibilities as well as requires economical accountability and Human Resource Management know-how.

The engineering emphasis is laid on five Modules adapted to each specialization. The lectures provide insight into the newest research topics and convey current and state of the art methodology necessary to master the scope of innovative technologies.

The following timetable shows the schedule for the Master Intake 2013. Current programs are also available depending on open places.

| March 2013 | | | | | | | April 2013 | | | | | | | May 2013 | | | | | | | June 2013 | | | | | | | |
|---------------|-----|-----|-----|-----|------|-----|---------------|-----|-----|-----|-----|------|-----|----------------|-----|-----|-----|-----|------|----------------------|---|-----|-----|-----|-----|------|-----|----|
| Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | |
| | | | | 01 | MM 1 | | 01 | 02 | 03 | 04 | 05 | 06 | 07 | | | 01 | 02 | 03 | 04 | 05 | | | | | | 01 | 02 | |
| 04 | 05 | 06 | 07 | 08 | 09 | 10 | 08 | 09 | 10 | 11 | 12 | MM 2 | | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 20 | 21 | 22 | 23 | 24 | EM 1 | | 17 | 18 | 19 | 20 | 21 | 22 | 23 | |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 | 29 | 30 | | | | | | 27 | 28 | 29 | 30 | 31 | | | 24 | 25 | 26 | 27 | 28 | 29 | 30 | |
| July 2013 | | | | | | | August 2013 | | | | | | | September 2013 | | | | | | | October 2013 | | | | | | | |
| Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | |
| 01 | 02 | 03 | 04 | 05 | EM 2 | | | | | 01 | 02 | 03 | 04 | | | | | | | 01 | | | | | | | | |
| 08 | 09 | 10 | 11 | 12 | 13 | 14 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 02 | 03 | 04 | 05 | 06 | MM 3 | | 01 | 02 | 03 | 04 | 05 | 06 | | |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | |
| 29 | 30 | 31 | | | | | 26 | 27 | 28 | 29 | 30 | 31 | | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | |
| | | | | | | | | | | | | | | 30 | | | | | | | 28 | 29 | 30 | 31 | | | | |
| November 2013 | | | | | | | December 2013 | | | | | | | January 2014 | | | | | | | February 2014 | | | | | | | |
| Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | |
| | | | | 01 | EM 3 | | | | | | | | 01 | | | 01 | 02 | 03 | MM 4 | | | | | | | | 01 | 02 |
| 04 | 05 | 06 | 07 | 08 | 09 | 10 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 10 | 11 | 12 | 13 | 14 | EM 4 | | |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | |
| 25 | 26 | 27 | 28 | 29 | 30 | | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 27 | 28 | 29 | 30 | 31 | | | 24 | 25 | 26 | 27 | 28 | | | |
| | | | | | | | 30 | 31 | | | | | | | | | | | | | | | | | | | | |
| March 2014 | | | | | | | April 2014 | | | | | | | May 2014 | | | | | | | June - December 2014 | | | | | | | |
| Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Master Thesis as a project work in the company: | | | | | | | |
| | | | | | 01 | 02 | | 01 | 02 | 03 | 04 | 05 | 06 | | | 01 | 02 | 03 | 04 | June - December 2014 | | | | | | | | |
| 03 | 04 | 05 | 06 | 07 | 08 | 09 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 05 | 06 | 07 | 08 | 09 | MM 5 | | | | | | | | | |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | | | | | | | | |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | | | | | | | | |
| 24 | 25 | 26 | 27 | 28 | EM 5 | | 28 | 29 | 30 | | | | | 26 | 27 | 28 | 29 | 30 | 31 | | | | | | | | | |
| 31 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

MM Management Modules EM Engineering Modules



Production & Operations Management

Fundamental concepts are conveyed for the analysis, formation, design and realization of innovative services and also for basic methods of screening the performance of a production industry.

Production and Operations Management is dealing with value creating production and services and its links to the other important value creating process which is product development and engineering.

Graduates of the Master's program Production & Operations Management (POM) are able to optimize the efficiency of value-added processes within the operation of production and service systems and consequently to comprehend and analyze these processes. They are also in a position to understand and formally describe requirements, identify basic conditions and goals and achieve a targeted improvement by means of the skills they acquired in the Master Program concerning industrial management with special focus on information technology, production, logistics and human resources as well as on the technical methods and tools required. The graduates know and are able to implement most current concepts and methods currently available in Operations Management. Depending on the specific application, for instance, techniques regarding decision support and decision

making process. In addition, graduates understand the possibilities and limitations of formal methods and models as well as the challenges that represent the transmission between the modeled world and reality. Given that nowadays in production and logistics the flow of data and products and the monetary aspect are interconnected, graduates are able to integrate these three factors.

Participants will work in groups on case studies and thus apply their newly acquired knowledge to challenging problems. We want them to improve their leadership skills while in the same time reaching new levels in their professional skills.



Prof. Dr.-Ing. Kai Furmans
Head of Institute for Conveying Technologies and Logistics (IFL)
Program Director Product Operations Management



Content Management Modules

The aim of the 5 Management Modules (MM) is to provide profound knowledge and understanding of the fundamental concepts which are essential for every successful manager.

- MM 1 Accounting & Controlling: Financial Accounting | Management Accounting
- MM 2 International Project Management: Project Management & Scheduling | Information and Process Modelling | Multiproject Management in an International Setting | Development Management | Intercultural Management | Project Risk, Change and Profit Management
- MM 3 Finance & Marketing: Fundamentals of Finance | Marketing | Marketing & Business Strategy | Intercultural Communication
- MM 4 Human Resource Management: Leadership & Conflict Management | Management Training | Human Resource Management
- MM 5 Law & Contracts: International Intellectual Property Law | Decisions, Contracts, Markets & Trade | International Law - The Law of Business Organizations

MM 1: Accounting & Controlling

Accounting focuses on measuring, processing and communicating information. In this course the concepts of both financial and managing accounting are covered, providing a powerful framework which supports participants in making successful business decisions. Particular emphasis is placed upon the implementation of new technologies in the current business environment and the analysis of real world business cases and relevant business practices.

MM 2: International Project Management

International Project Management is a key to the world of business. In order to become fully acquainted with this important discipline the module aims to help the participants to understand the objectives of project management and scheduling, to learn how to analyse planned projects and to control project execution. Particular attention is paid to the construction of project networks and Gantt charts, heuristic solution procedures and rescheduling as well as the completion of temporal and resource-constrained project scheduling computations. Modelling, planning and scheduling, which arise in a great variety of practical situations, are also emphasized.

MM 3: Finance & Marketing

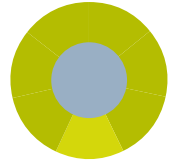
This module is comprised of two of the most important issues in management: Fundamentals of Finance and Marketing. The former addresses two fundamental financial questions, which are central to corporate and private investment: how to raise capital and how to invest it. Marketing focuses on creating optimal interaction between interest groups (e.g. company and customers, authorities and citizens, political parties and voters).

MM 4: Human Resource Management

This module addresses challenges head on, exploring the key elements of human resource management and leadership as well as the steps necessary to implement and manage it successfully. This multidisciplinary module provides valuable experience in implementing the techniques needed to ensure the company's continuing success.

MM 5: Law & Contracts

This module comprises both economics and legal sections. In the economics section, a groundwork is laid through introducing decision theory, expected utility, risk and ambiguity, bargaining and basic incentive theory. In addition, fundamental problems regarding world economics are discussed, for example stagnation and economic growth, unemployment and international division of labor, and harmonization of the international monetary system. The legal section is divided into lectures about the law of business organizations and lectures about international patent, trademark and copyright law.



Content Engineering Modules

- EM 1 Introduction to Production & Operations Management: Introduction Industrial Engineering | Information Systems I | Stochastic Models of Manufacturing Systems | Operations Research
- EM 2 IT Support of Production Systems: Information Systems II | Service Engineering | Operations Research II
- EM 3 Methods of Operations Management: Supply Network Management I | Production Engineering | Human Factors & Ergonomics | Production & Logistic Controlling
- EM 4 Networks of Supply & Production Systems | Supply Network Management II | Supply Network Management III | Distribution Networks | International Production
- EM 5 Production & Distribution Systems: Information Technology for Logistic Systems | Quality Management | Industrial Management Case Study

EM 1 Introduction to Production & Operations Management

Introduction Industrial Engineering

This introductory course is fundamental for the understanding of most of the lectures that will be held in „Production & Operations Management“. The participants will learn basic concepts of industrial engineering and understand how a goods producing company operates.

Information Systems

This course is divided into three main parts. The first part is devoted to the Fundamentals of Information and Data Modeling. The second part describes the Product Life Cycle in terms of information types and different PDM, ERP, CRM, SCM systems within this approach. The functional overview of PLM systems as well as model driven Architectures are the main aspects in this part. The third part focuses on detailed description of IT Architecture, Communication Mechanisms and Commercial PLM Solutions.

Stochastic Models of Manufacturing Systems

The primary goal of this course is to describe the concept of factory physics. The participants will know how to derive and compute performance measures of stochastic networks after attending this course. Furthermore they can link the methods to their work experience in factories and distribution networks and understand the mechanisms employed in lean manufacturing.

Operations Research

The learning target of this course is the acquisition of knowledge of modeling and solution techniques for linear and network optimization problems as well as application of known and development of new solution procedures to/for solving special problems in the area of linear and network optimization.

EM 2 IT Support of Production Systems Information Systems II

This course is divided into three main parts. The first part is an introduction to modern CAD2 systems and modeling methods. The second part describes the CAx3 Systems including the CAD, CAPP, CAE4, etc. The third one is devoted to Virtual Engineering, based on the definition of a process, methodology and technology such as VR, AR and MR5.

Service Engineering

The participants will gain awareness of service engineering aspects and the relevance of transforming industrial engineering knowledge to the organization of services (and administrative tasks). Basic concepts for analyzing, designing and scheduling of service processes should be understood.

Simulation of Productions Systems

In this course participants will first be introduced to the concept of simulation. They will be taught to identify practical problems that can be solved by simulation and limitations involved in running simulations. The goal is to become competent in choosing the appropriate simulation tool, simulating a production system with a state of the art simulation tool and finally analyzing and evaluating the results of a simulation. In a follow-up discussion the methods learned will be mapped to the participants' experiences from work in factories and distribution networks to make it possible for them to apply the introduced methods in practice.

Operations Research II

Participants will gain knowledge of modern exact and heuristic solution algorithms that can handle large practical problems in the area of integer, nonlinear, and dynamic programming.

This course covers the following topics:

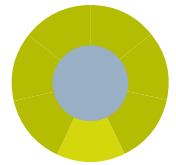
- Integer programming: Integer programs and LP relaxations, branch-and-bound and branch-and-cut methods, heuristic algorithms, important combinatorial optimization problems from practice.
- Nonlinear programming (NLP): Differences between LP and NLP models, optimality conditions in NLP, most useful NLP algorithms.
- Dynamic programming (DP): Sequential decision processes, Bellman's optimality principle and functional equation, solution of DP problems.
- Inventory control and lot sizing: Components of inventory or lot sizing models, deterministic models with continuous and periodic review, stochastic models.

EM 3 Methods of Operations Management

Supply Network Management I

This course covers topics in supply network management including supply network attributes, examples of supply networks (consumer goods manufacturing and computer assembly), strategic decision making in supply networks, supply network planning and tasks and requirements, hierarchical





planning, and architecture of an advanced planning system for supply network management.

Participants will gain knowledge of supply network processes involving procurement, production, distribution, and sales at long-term, mid-term, and short-term planning levels.

Production Systems

This specific course teaches structured approaches for the planning of production systems with appropriate methods and tools. The participants will be expected to know which information is relevant and how it can be used for the planning of production systems that meet all case-specific requirements.

Human Factors & Ergonomics

This course is designed to provide participants an understanding of human aspects in Production Management. It is itself a prerequisite for the „Industrial Management Case Study“ and the course „Project Management and Scheduling“. This course is unique in the curriculum, because it is the only course that deals with human oriented aspects.

Participants should learn to know the fundamentals of humans at work. They should understand basic concepts, measurements and effects of factors leading to stress and strain. Furthermore, approaches for ergonomic product design and work organization should be understood. The participants should also be sensitized to human-oriented workplace structuring.

Production & Logistic Controlling

The participants will be sensitized to aspects of production and logistics controlling and should learn concepts for controlling based on non-financial criteria, usually referred to as production logistics or performance

measurement. They should understand basic approaches for monitoring the performance of a goods producing company.

EM 4 Networks of Supply & Production Systems

Supply Network Management II

The course covers the following topics:

- Optimization of problems and solution approaches for the following modules of an Advanced Planning System (APS): Demand planning, supply network design, master planning, BOM explosion and lot sizing, detailed production planning, procurement planning, distribution planning, short-term transportation planning, and ATP.
- Specification of the APS modules for the examples „consumer goods manufacturing“ and „computer assembly“ discussed in part I of this course.

Supply Network Management III

In Supply Network Management III the fundamentals of material flow systems and logistic processes are introduced to the participants. Starting with basic elements of material flow systems and their transformation into models, they learn how to plan material flow systems. Further contents are stock management and order picking, different approaches for modelling logistic processes, the bullwhip-effect, stochastic effects in logistics systems and line balancing in the automotive industry.

Distribution Networks

This course provides the participants with fundamental knowledge in warehousing and distribution networks. Starting with an overview of the functional areas of distribution centers, the course will cover warehouse technology and dimensioning, cycle times, order picking and the control of a distribution centre in more detail. Subsequently the participants are introduced to the strategic perspective of distribution: from applicable distribution strategies, such as direct delivery or cross docking, to planning distribution networks.

The participants are intended to learn methods that enable them to plan warehousing systems and distribution networks. By mapping the methods with the participants' experiences from work in factories and distribution networks, it will be possible for them to apply the introduced methods in practice.

International Production

The course provides a comprehensive coverage of modern management knowledge

concerning international production. The objective is to give young professionals a sound understanding of the types and motivations for international production. Focus is the aim to show challenges and risks of international production and to support young professionals working in an international environment.

EM 5 Production and Distribution Systems

Information Technology for Logistic Systems

This course enables participants to understand the technical interactions and challenges of modern logistic systems. The lecture aims to show different aspects of today's critical issues within the field of logistics and how they can be solved. A field trip to a logistic company is summarizing the course.

Quality Management

The course provides a comprehensive coverage of modern quality management practice starting from basic principles and ending with state-of-the-art concepts and applications. The objective is to give young professionals a sound understanding of methods and tools and their practical application in a wide variety of both product and process situations.

Industrial Management Case Study

This case study deals with managing and re-structuring of a virtual bicycle factory. This factory is modelled in a simulation tool called INSIGHTS which was developed and run in a series of EU projects. The course consists of lectures, group work and a role game where each group has to present their results in front of the virtual company's board. The topics are: Production Planning and Control, Monitoring Logistic Characteristics, Defining Improvement Approaches, Establishing Project Management and Re-engineering by Work Structuring.

The participants should achieve professional and social skills by solving managerial problems related to operations management in group work. They should also deepen their knowledge from previous courses.

Your Notes:

Keyfacts of our Master Programs

HECTOR School Master Programs

Energy Engineering & Management (EEM)
Embedded Electronic Systems Engineering (ESE)
Financial Engineering (FE)
Green Engineering Mobility (GME)
Management of Product Development (MPD)
Production & Operations Management (POM)
Service Management & Engineering (SME)

Academic Degree

Upon successful completion of the Master Program participants will be awarded a Master of Science (M.Sc.) degree of the Karlsruhe Institute of Technology (KIT).

Language

The programs are taught in English. Foreign students are encouraged to take advantage of supplementary courses (for example German language classes).

Program Structure

The programs are run on a part-time basis with a program duration of 18 months. They are divided into 10 teaching units of 2 weeks, so called modules. The Masters Thesis (4-6 months) is designed as an industrial project supervised by the KIT.

Admission Requirements

- First university degree: e.g., Bachelor, Diploma (Uni/FH/BA)
- 3 years of relevant work experience with according references
- TOEFL score of at least 100 iBT-based or equivalent test
- Optional: GMAT, GRE or HECTOR School Assessment

Cost

Tuition fees for one entire Master Program are 30.000 €.

Service

The Master Programs are embedded into the environment of the International Department GmbH which also provides services like extra-curricula lectures, excursions as well as an attractive living and working environment.

Program Start

Intake 2013: March 04, 2013
Intake 2014: September 2014

Program starts are every 18 month in March/September. For individual solutions (e.g. schedules) please contact our program consultancy.



The Master Program is accredited by



PEOPLE | POTENTIAL | PERSPECTIVE



HECTOR SCHOOL OF ENGINEERING AND MANAGEMENT

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