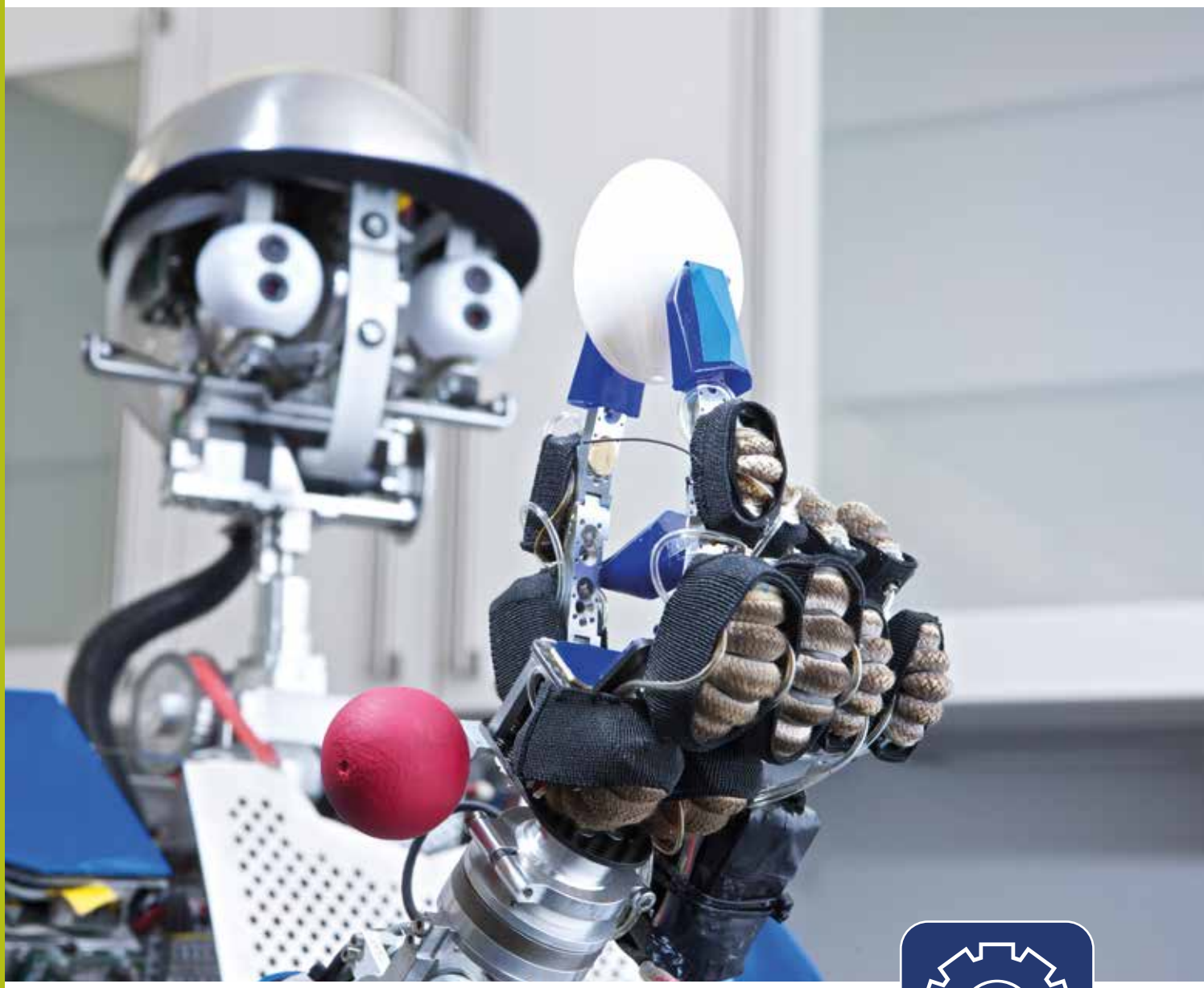
HECTOR SCHOOL
Technology Business School of the KIT

Karlsruhe Institute of Technology



Executive Master Program

Management of Product Development

ASD – Agile Systems Design

Technology + Management

The HECTOR School is the Technology Business School of the Karlsruhe Institute of Technology (KIT). It is named after Dr. Hans-Werner Hector, one of the co-founders of SAP SE.

The school aims to provide professionals with **state-of-the-art technological expertise and management know-how within part-time education programs**. The HECTOR School fosters lifelong learning within industry. Participants are supported in their career development with executive master degree programs, certificate courses, and customized partner programs.

The benefits of the executive master programs are numerous for participants as well as for the companies they work for:

- Unique Holistic Approach: A combination of technology expertise and management know-how.
- State-of-the-Art Knowledge: Direct transfer from the Karlsruhe Institute of Technology (KIT) research.
- Part-Time Structure: Allows participants to continue with their demanding careers whilst acquiring new skills.
- Master Thesis to set up Innovation Projects: Companies gain outstanding added value through the consultation of such projects by professors from KIT.
- Excellent Networking Opportunities: Professional networking is fostered across industries and on an international scale.

Portrait of the HECTOR School
on our YouTube Channel

Key Facts: Part-Time Master of Science (M.Sc.) Programs

Program Structure

- Part-time, 10 x 2-week modules
- Duration: part-time lecture period of ~15 months
- Master thesis: project work in the company, 9 months
- 5 Engineering and 5 Management Modules
- Teaching language: English
- Yearly program start: October

Academic Degree

Master of Science (M.Sc.) from the KIT (90 ECTS)

Admission Requirements

- A first academic degree: e.g. Bachelor, Master or Diploma
- At least 1-2 years work experience (depending on the level of the first degree, recommended > 3 years)
- If English is not your mother tongue nor has it been the language of instruction for the last five years, language proficiency is required, e.g. test certificate (e.g. TOEFL score of at least 570 PBT; 230 CBT; 90 iBT or IELTs at least 6,5 points) or appropriate proof of C1 level.

Accreditation

The KIT is system-accredited by AAQ. All HECTOR School master programs are accredited by the internal quality assurance system of the KIT.

Master Program

Management of Product Development (MPD)

MARKETING & DATA DECISIONS & RISK VIRTUAL ENGINEERING INTERGRATED PRODUCT DEVELOPMENT COMPUTER SCIENCE DESIGN THINKING SIMULATION METHODS STRATEGY & PEOPLE INDUSTRY 4.0 INNOVATION & PROJECTS AGILE METHODS & SCRUM LIGHTWEIGHT DESIGN EFFICIENCY IMPROVEMENT & TARGET COSTING LIFECYCLE MANAGEMENT FINANCE & VALUE PLM, PDM, ERP, CRM & SCM SYSTEMS

Prof. Dr.-Ing. Dr. h. c. Albert Albers
Institute of Product Engineering, KIT

Prof. Dr. Martin Klarmann
Institute of Information Systems & Marketing, KIT

Program Directors MPD

»Product development is the driver of innovation. You learn to manage product development in an efficient, methodical, creative and success-oriented way in this master program. You become qualified to be the driving force for successful product innovation in your company with the scientifically sound and practice-oriented training program for professionals.«

Prof. Dr.-Ing. Dr. h.c. Albert Albers

Product development is the process of entirely planning and prototyping novel technical systems. It ranges from finding the product profile to creating a concept, designing, making prototypes, testing and validating. The actual manufacturing phase follows subsequently and is the second and final stage of the product creation process.

Thus, product development is certainly one of the core means of adding value into companies and is crucial for their success through innovation. Creativity and performance potential define the success of product development.

Participants of the master program Management of Product Development (MPD) are able to analyze, design, operate and implement the product development process in their companies in an optimized way by means of acquired research and application-oriented methods and processes.

Based on an integrated approach to product creation processes, the graduates can successfully implement innovative ideas and innovation in competitive products, while they draw a special focus on major criteria such as customized product solutions, the reduction of production costs as well as the optimization of quality standards. Furthermore, they are capable of implementing creativity techniques to accompany further innovation processes.

Additionally, due to increasing performance and competition pressure in product development, graduates can counteract shorter development times and product life cycles with appropriate methods and techniques.

Finally, Management of Product Development shares five management modules with the other master programs. This fosters networking across sectors and provides the participants with general knowledge in finance, accounting, marketing, international multi-project management, international law, and human resource management. In this way, they can consider the commercial implications of project decisions and develop a holistic view.

Engineering Modules (EM)

State-of-the-Art Technology Expertise in Product Development Processes

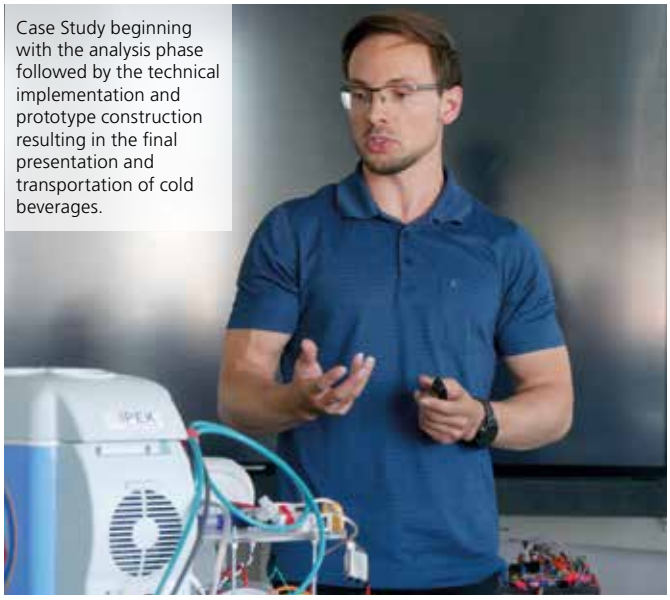
EM 1: Integrated Product Development by ASD – Agile Systems Design

The key factor of successful product development is the systematic planning and use of adequate tools and methods depending on various situations. For example the application of the portfolio analysis, of mind mapping or Design Structure Matrices (DSM) is essential. ASD – Agile Systems Design supports the product developer across the entire product development process. By a situation-oriented combination of structuring and agile elements, as well as the consistent integration of the model of PGE – Product Generation Engineering, the developer is able to develop products efficiently and effectively through continuous customer integration. ASD – Agile Systems Design also supports the developer in continuous validation. The first prototypes are set up early in the process and continuously gain functionality and maturity through joint validation with the customer. In this way, the direction of development is secured at an early stage and late, expensive changes to the product are avoided. In addition, customers, users and provider benefits are systematically integrated in the form of product profiles.

ASD – Agile Systems Design structures development processes, follows nine integrated principles, integrates problem solving techniques and a methodological toolbox, through which current development methods are recommended according to the situation and needs of the development team. Participants realize the effect and impact of design modifications as well as the influence of prototypes or simulations on the innovation process. In addition to that, an understanding of structures, standards, and modifications in CAx and VR systems is provided. Knowledge of the background of information technology is an absolute necessity.

EM 2: Design and Validation Process & Information Systems for Product Development (PD)

The module offers in-depth insight into the fundamentals of product development processes and its challenges. Individual process steps and the organization are defined. Moreover, the product lifecycle is implemented in the form of a Product Lifecycle Management (PLM) system. When using virtual reality systems (e.g. CRM, ERP), it is important to identify both the opportunities and limits for this new technology. The participants identify workflows relevant to data modeling.



Case Study beginning with the analysis phase followed by the technical implementation and prototype construction resulting in the final presentation and transportation of cold beverages.

EM 3: Simulation and Target Values in PD

While the first two modules systematically explain and deepen knowledge of the principles of the product development process, this module focuses on further aspects for successful product development. Crucial success factors in product development, such as Total Quality Management (TQM) and Total Cost of Ownership (TCO), are explained and illustrated by examples. Methods presented, such as FMEA (Failure Mode and Effects Analysis) and FTA (Failure Tree Analysis) as well as target costing, are efficient tools to support the product development process.

Using examples, the participants learn to structure and systematically manage the design process in teams. The participants are aware of the significance and limitations of modern interface technologies. They can assess and classify business strategies in terms of international competitiveness.

Furthermore, methods are presented for analyzing lightweight potentials in overall systems, design by multi-material as well as methods for synthesis and structural optimization of isotropic and anisotropic materials. The module also covers methods of validation in a Product Design Project (PDP) and specific environment simulations (e.g. FEM, BEM). The typical approach to planning and executing a simulation study is applied.

Project Work serves to acquire competence in the use of development methods. For this purpose, the development task is to be refined based on the market situation. Then, this definition is to be implemented in a product concept. Intuitive and discursive creativity techniques based on TRIZ-

box or methods of cost control are used under close-to-reality conditions. Based on this, all skills and theories learned are implemented in a practice-oriented environment. Product planning, product specification, and concept development processes are applied.

EM 4: Validation and Verification in PD

Systems engineering is an interdisciplinary approach to the early definition of customers' needs and functionalities, the documentation of system requirements to be developed, and the continuous synthesis and validation of the system during the development process. A wide range of methodological aids is available to support the developer in systems synthesis and analysis. Eco-design methods are adequate tools to use ecological aspects as chances for product innovations. Methods and tools for prototyping, verification, and validation are introduced and used directly in the project work.

EM 5: Tools and Methods of Product Engineering

Successful work on complex multi-technological systems requires work in interdisciplinary teams. Apart from the use of appropriate support methods, such as the V-model, understanding of the varying perspectives of the team members is required. This results in high requirements on the quality assurance of interdisciplinary product development processes. Basic principles are presented and made available in the form of a practical guide.

EM 5 is held at the KIT China Branch in Suzhou in cooperation with the Global Advanced Manufacturing Institute (GAMI). Many global companies not only have production but also development capacities in China. In order to adapt or develop their products for the local market a thorough understanding of the market as well as of potential cultural differences in the development team are crucial success factors.

**Case Study*

During their studies, we give participants the opportunity to directly implement what they have learned in a development project based on a given problem. During the course of the project, participants are accompanied by academic staff, so that they acquire the necessary knowledge about processes, methods, and tools in their project work. For example, analysis methods, universal problem-solving methods as well as verification and validation methods (DoE, XiL - X-in-the-Loop) are used. This teaching format characterizes an extremely practical education and optimally prepares the participants for their future tasks in companies.

Engineering Modules

EM 1: Integrated Product Development by ASD - Agile Systems Design

Courses: Mission & Vision in Product Development, Integrated Product Development*, Industrial Design Engineering, Information Systems: Fundamentals of Computer Science for Engineers

EM 2: Design & Validation Process and Information Systems for Product Development (PD)

Courses: Structured Problem Solving in Mechatronic System Development - SPALTEN*, Product development processes and activities*, Patent Strategy in Industry, Introduction and Application to SysML, Lightweight Design, Information Systems: Product Lifecycle Management

EM 3: Simulation and Target Values in PD

Courses: Methods of Simulation, Target Costing, Information Systems: Virtual Engineering, Project Work I: Conception*

EM 4: Validation and Verification in PD

Courses: Project Work II: Realization*, Test Based Development, Systems Engineering, Eco-Design Methodology of Sustainability

EM 5: Tools and Methods of Product Engineering

Courses: Project Work III: 2DR Documentation*, Project Work IV: Reflection Theory and Practice*, Excursion, Quality Management, Supplier Management

Curriculum may be subject to change.

Management Modules (MM)

Economic Know-How for Successful Managers

Management Modules

MM 1: Marketing & Information

Courses: Designing and Selling Solutions (incl. Negotiation Training), Information Systems Management, Big Data Methods, Legal Aspects of Information

MM 2: Finance & Value

Courses: Management Accounting, Financial Accounting, Strategic Financial Management, Case Studies

MM 3: Decisions & Risk

Courses: Decision Modeling, Risk Aware Decisions, Interactive Decisions, Robust and Stochastic Optimization

MM 4: Innovation & Projects

Courses: Technology Driven Innovation, International Intellectual Property Law, Project Management, Multi-Project Management in an International Setting

MM 5: Strategy & People

Courses: Business Management, Managerial Economics, Business Organization and Corporate Law, Strategic Human Resource Management, Leadership and Conflict Management

Curriculum may be subject to change.

Order your free course guide book with detailed contents of the Master Program!

MM 1: Marketing & Information

Many of today's most successful businesses excel in satisfying customer needs because their decisions are based on data instead of good feeling. This is what this module is about: One focus is on how to use data for designing customer solutions (and get paid according to their value) and the other focus is a more general one at issues surrounding the use of (big) data for business decision-making.

MM 2: Finance & Value

Modern corporate governance is based on the creation of values. In the Finance & Value module, students learn essential methods of measuring, processing, and communicating the value added by corporate decisions that enable effective planning, management, and monitoring of corporate activity and corporate units. External value-based communication makes it possible to win stakeholders who are committed to the company over the long term.

MM 3: Decisions & Risk

Management implies making decisions. A valid data warehouse forms the basis for these decisions. The aim of this module is to give students a toolkit of various quantitative decision-making models so that the possibilities and limitations of methodical decision-making support (among others also optimization methods) can be used efficiently in the day-to-day running of projects.

MM 4: Innovation & Projects

Numerous paradigm shifts are currently being driven by the development and extensive use of new technologies. Profound changes in rapidly changing markets flow directly from this. Consequently, apart from classic project management, new management tools and methods are required because agility and innovation are some of the success factors in the current business climate. The module thus focuses on one of KIT's unique selling points: technology-driven innovation.

MM 5: Strategy & People

The key to corporate success lies in the correct strategy. But how do you recognize opportunities, develop a viable concept, and successfully implement it? In times of scarce human capital, it is more important than ever before to ensure employees are a perfect fit for their position and to motivate them to implement the strategy together. The module imparts state-of-the-art management techniques and know-how on evidence-based human resources management, people analytics, and leadership approaches.

A HECTOR School Master: Leadership Know-How for Demanding Careers.

»Personally, the Hector Master Program was an excellent experience. The Management in Product Development Program provided me with a comprehensive set of tools to master today's product development challenges. In addition, the course in business accounting and management expanded my knowledge for my daily professional work as Manager. The technical course delivered state-of-the-art-knowledge in technology and methodology, ready for use. Overall, the Executive Master Program was great professional development training.«

Thomas Kiefer
Master in Management of Product Development
Thales Group

Alumni Voices
on our YouTube Channel

Academic Calendar

September 2020						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
	01	02	03	04	05	06
07	08	09	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

October 2020						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
			01	02	03	04
MM1		07	08	09	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

November 2020						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
						01
02	03	04	05	06	07	08
09	10	11	12	13	14	15
EM1		18	19	20	21	22
23	24	25	26	27	28	29
30						

December 2020						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
	01	02	03	04	05	06
07	08	09	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

January 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
				01	02	03
04	05	06	07	08	09	10
EM2		13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

February 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
01	02	03	04	05	06	07
08	09	10	11	12	13	14
15	16	17	18	19	20	21
MM2		24	25	26	27	28

March 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
01	02	03	04	05	06	07
08	09	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

April 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
			01	02	03	04
05	06	07	08	09	10	11
MM3		14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

May 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
					01	02
03	04	05	06	07	08	09
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

June 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
	01	02	03	04	05	06
EM3		09	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

July 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
			01	02	03	04
05	06	07	08	09	10	11
EM4		14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

August 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
						01
02	03	04	05	06	07	08
09	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

September 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
		01	02	03	04	05
06	07	08	09	10	11	12
MM4		15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

October 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
				01	02	03
04	05	06	07	08	09	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
EM5		27	28	29	30	31

November 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
01	02	03	04	05	06	07
08	09	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
28	30					

December 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
		01	02	03	04	05
MM5		08	09	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

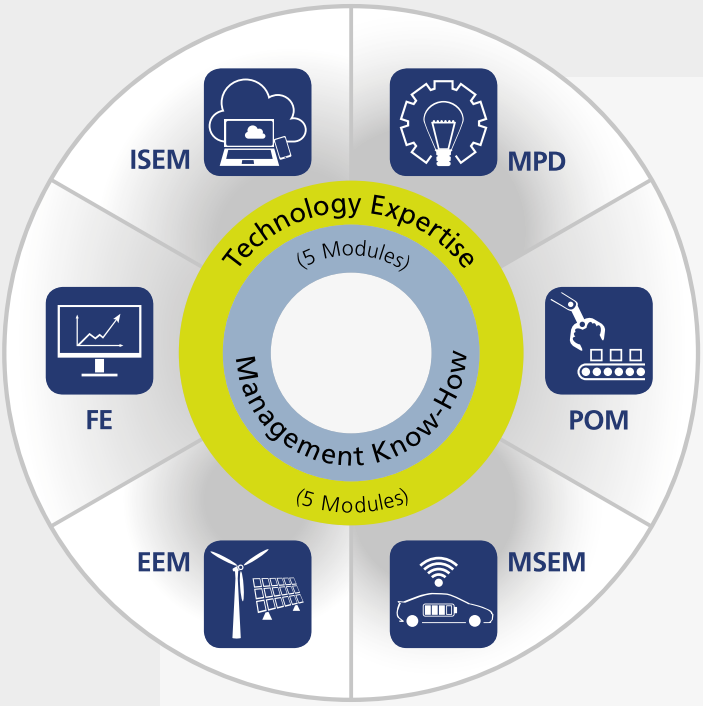
MM Management Modules
EM Engineering Modules
Exams

Please note: Dates are subject to change.

The academic calender for each program starts annually in October.
It consists of 10 modules, each with a duration of 2 weeks.
All programs conclude with a master thesis.

>> **Master Thesis:** 9 months project work

More Master Programs



Six Part-Time Master of Science Programs in

- Management of Product Development (MPD)
- Production & Operations Management (POM)
- Mobility Systems Engineering & Management (MSEM)
- Energy Engineering & Management (EEM)
- Financial Engineering (FE)
- Information Systems Engineering & Management (ISEM)

In addition to the master programs, the HECTOR School also offers **certificate courses** (3 - 5 day seminars on state-of-the-art technology topics) and **partner programs**.

HECTOR School of Engineering & Management
International Department of the
Karlsruhe Institute of Technology (KIT) gGmbH
Schlossplatz 19
76131 Karlsruhe/Germany

Phone +49 (0)721-608 47880
Fax +49 (0)721-608 47882
E-mail info@hectorschool.com
Web www.hectorschool.kit.edu

Order your free course guide book with detailed contents of the master program!

Imprint

Errors and omissions excepted.
Publisher: Marketing Department
HECTOR School of Engineering & Management
Edition: 02/2020
Photos: International Department gGmbH, Karlsruhe Institute of Technology (KIT), iStock

Our Social Media Channels