HECTOR SCHOOL
Technology Business School of the KIT

KIT
Karlsruhe Institute of Technology

Executive Master Program

Information Systems Engineering & Management
Digital Transformation of Products, Services, and Organizations

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

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, 6 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.

MARKETING & DATA IT SAFETY & SECURITY AUTONOMOUS ROBOTICS AGILE & SELF-ORGANIZING NETWORKS DECISIONS & RISK SERVICE SYSTEMS CLOUD ENGINEERING IOT & INDUSTRY 4.0 PRESCRIPTIVE ANALYTICS FINANCE & VALUE MOBILE BUSINESS & COMMUNICATION BIG DATA ARTIFICIAL INTELLIGENCE DIGITALIZATION STRATEGY & PEOPLE INNOVATION & PROJECTS MACHINE LEARNING DISTRIBUTED SYSTEMS SERVICE ENGINEERING

Prof. Dr. Andreas Oberweis
Institute of Applied Informatics & Formal Description Methods, KIT

Prof. Dr. Ralf Reussner
Institute for Program Structures and Data Organization, KIT

Prof. Dr. Martin E. Ruckes
Institute of Finance, Banking, and Insurance, KIT

Program Directors ISEM

Digitalization enables new business models, creates new service opportunities and redefines existing products. All of that is done through software implemented innovation. This transforms our economy towards software realized added values in an unprecedented way. Hence, the capabilities of efficiently developing high quality software are becoming crucial for nearly for all enterprises. In our Master´s program Information Systems Engineering and Management accordingly we concentrate on software engineering, software quality, in particular security, cloud service engineering and AI technologies. Prof. Dr. Ralf Reussner

During the last decades, we witnessed a growing importance of information technology (IT) in business and society alongside increasing speed of innovation cycles. IT has become core for businesses from an operational company-internal and external customer perspective. Today, companies have to rethink their way of doing business. Digital products and services will characterize tomorrow's world and organizations are digitally transformed across all functional areas. Capturing the emerging opportunities requires globally thinking visionaries and managers, who are able to combine profound competence in information technology with excellent know-how in management.

The Master Program Information Systems Engineering & Management (ISEM) qualifies graduates to drive digital transformation of products, services, and organizations from a business and IT perspective. Graduates encounter digitalization challenges with an engineering orientation and solve them with the help of modern management methods. They are also in a position to make efficient and effective use of information technologies within organizations following a socio-technical paradigm. Competitive and innovative digital products and services are developed and optimized to successfully accompany and direct digital changes in organizations and business networks.

The program empowers graduates to apply an interdisciplinary approach to problems and trains adequate solution with a systems-oriented mindset. From an engineering perspective, graduates understand the role and potential of digital platforms from an enterprise and market point of view including state-of-the-art technologies such as Internet-of-Things and Blockchain. They know modern software and system engineering techniques with a specific emphasis on the cloud computing paradigm.
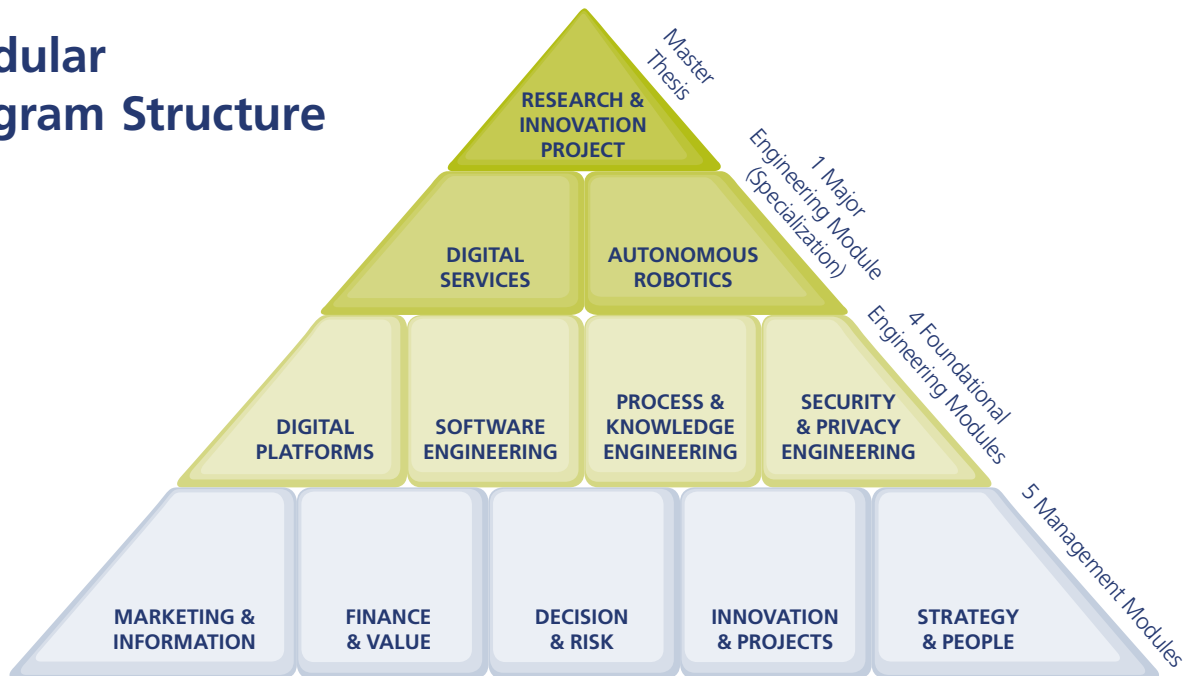
ISEM graduates can design and optimize business processes following a top-down and bottom-up approach. They also know how to transform (big) data to actionable knowledge following an engineering approach. These competencies are enriched with security and privacy engineering concepts and technologies complemented with real-world cases on critical infrastructure management. Finally, ISEM graduates can specialize in digital services or autonomous robotics. In the respective specialization modules, they collect deep knowledge in one of the two fields.

In addition to the engineering expertise, ISEM graduates share five management modules with other master programs at HECTOR School. This fosters interdisciplinary networking across industries and provides the participants with state-of-the-art business knowledge in strategy, finance, accounting, marketing, innovation management, project management, decision and risk management and human resource management. Therefore, they can consider the commercial implications of technology-centric decisions and develop a holistic view on business and IT.

Engineering Modules (EM)
Digital Transformation of Products, Services, and Organizations

Modular
Program Structure

RESEARCH &
INNOVATION
PROJECT

Master
Thesis

DIGITAL
SERVICES

AUTONOMOUS
ROBOTICS

1 Major
Engineering Module
(Specialization)

DIGITAL
PLATFORMS

SOFTWARE
ENGINEERING

PROCESS &
KNOWLEDGE
ENGINEERING

SECURITY
& PRIVACY
ENGINEERING

4 Foundational
Engineering Modules

MARKETING &
INFORMATION

FINANCE
& VALUE

DECISION
& RISK

INNOVATION
& PROJECTS

STRATEGY
& PEOPLE

5 Management Modules

EM 1: Digital Platforms

The module enables participants to understand and design digital platforms for organizations and markets in order to drive internal and external digitalization. The module first introduces state-of-the-art Enterprise System platform architectures and concepts covering a process-, information-, and people-centric perspective. Furthermore, participants understand trade-offs between standardization and flexibility and know how to leverage digital platforms in organizations in order to find a good balance. Complementing the organizational perspective, market engineering puts an emphasis on the design of information-centric markets and services in order to realize new digital business models. Finally, this module also introduce key concepts and technologies of the Internet of Things (IoT) as an enabler for realizing contemporary digital platforms.

EM 2: Software Engineering

This module focuses on two important aspects: first, the fundamental principles, methods and tools behind state-of-the-art software & systems engineering are introduced, and second principles for advanced Web applications as well as cloud computing concepts and technologies are explained. In a first step, the participants obtain a detailed overview of the stages of software systems development and they are qualified to apply the required methods and tools in the development process. Both, the well-established software systems development

lifecycle as well as the agile software development approach will be introduced and discussed. Current modeling and programming languages e.g., HTTP, SOAP or WSDL, explain the architecture of Web applications. The participants will learn how advanced Web applications need to be engineering on this basis. Finally, cloud computing concepts and technologies taught within the module enable the participants to assess the opportunities and challenges of web-scale service applications.

EM 3: Process & Knowledge Engineering

In organizations, processes and knowledge are known to be closely linked to one another. In this module, the participants gain the ability to effectively and efficiently adapt the particular demands of business processes following an engineering approach leveraging appropriate methods and tools. Furthermore, participants learn methods and tools of process mining that follows a data-driven approach for process analysis and optimization. Understanding the need for data & knowledge engineering in businesses, participants of this module are also able to implement concepts for the modeling, representation, and management of data and knowledge. Finally, with the rise of Big Data participants acquire the necessary skills to implement and manage large-scale Big data solutions.

EM 4: Security & Privacy Engineering

Today's information systems are required more than ever to guarantee security and privacy. This modules enables participants to acquire the necessary knowledge to

systematically engineer security and privacy in information systems. This module first introduces information security to prevent, detect, document and counter threats to information. Second, key concepts of applied cryptography are introduced. Legal aspects play a critical role in security & privacy engineering. Therefore, the fundamental legal concepts of data protection regulation are explained. Complementing the security perspective, information privacy and privacy enhancing technologies are discussed. The module is complemented with a specific emphasis on critical infrastructures and the role security & privacy engineering plays in these infrastructures.

EM 5: Specialization Digital Services

Services already account for more than 60% of the gross value added of developed economies. Even product companies try to increasingly tap into the application processes of their customers ("servitization"); thus, comprehensive knowledge on how to strategically use, design, engineer, and manage services are key. Current trends, like Digital nature, Data & analytics and System & platform perspectives make the familiarity with digital services a must for any future leader.

Digital nature: Digital creation and delivery of these services trigger a number of options like immediate globalization capabilities, agile development and deployment (DevOps), simple inclusion of open innovation concepts, or the individualization of delivered solutions.

Data & analytics: Availability of "big data" (e.g., created via sensors or social media) and sophisticated AI-based analytics enable to build customer intimacy, to improve internal efficiency as well as to augment or completely innovate customer offerings.

System & platform perspectives: The notion of service (eco)systems connected via digital services opens up a variety of innovation options in interorganizational or co-opetitive business models ("smarter systems", e.g. in supply, health care, mobility or energy systems).

EM 5: Specialization Autonomous Robotics

The Specialization „Autonomous Robotics" will introduce you to the possibilities and challenges of designing, creating, and controlling autonomous robots in a production or logistics context. Working in teams in a lab, you will be introduced to the fundamental concepts of autonomous control in robotics. At the same time, you will be working on a task, which requires collaborating robots. Successively over the period of the module, you will be spending more time working in your team. Finally, you will connect your devices with those developed by other teams to jointly solve a task.

Engineering Modules

EM 1:   Digital Platforms

Courses: Enterprise Systems, IoT Technologies & Platforms, Platform and Market Engineering

EM 2:   Software Engineering

Courses: Software & Systems Engineering, Advanced Web Applications, Cloud Computing

EM 3:   Process & Knowledge Engineering

Courses: Business Process Engineering, Process Mining, Data & Knowledge Engineering, Big Data Management

EM 4:   Security & Privacy Engineering

Courses: Information Security, Applied Cryptography, Network Security, Data Protection Regulations, Emerging Technologies, Critical Information Infrastructures

Specialization

EM 5:   Digital Services

Courses: Service Innovation, Service Design Thinking, Digital Service Business Models & Transformation, Artificial Intelligence in Service Systems

EM 5:   Autonomous Robotics

Courses: Autonomous Robotics Lab

Curriculum may be subject to change.

Crash Course: Probability and Statistics
We highly recommend all applicants to participate in the course to update the technical knowledge, as it might be the crucial factor for a successful degree at HECTOR School.

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: Strategic Management, Managerial Economics, Business Organization and Corporate Law, Strategic Human Resource Management, Leadership and Conflict Management
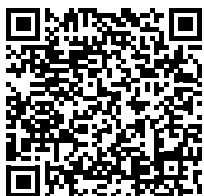
Curriculum may be subject to change.

Order your free course guide book with detailed contents of the Master´s 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.

»*The master program offers an excellent synergy of the disciplines informatics, business administration and international law. Close collaboration with lectures and applied studies in small groups with students from several industries supported me to share knowledge and bring state-of-the-art expertise into my business. Thanks to the well organized program and compact lecture sessions, I was able to successfully manage my studies alongside my job. In summary, the master program enriched both my expert knowledge and professional career.*«

Oliver Gündling
Managing Director
ITynamics Business Solutions GmbH

More Alumni Voices

Academic Calendar

September 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			

October 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
				01	02	03
MM1	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

November 2021						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
01	02	03	04	05	06	07
08	09	10	11	12	13	14
EM1	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
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 2022						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
					01	02
03	04	05	06	07	08	09
EM2	12	13	14	15	16	
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

February 2022						
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
MM2	23	24	25	26	27	
28						

March 2022						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
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07	08	09	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
MM3	30	31				

April 2022						
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	

May 2022						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
						01
02	03	04	05	06	07	08
EM3	11	12	13	14	15	
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

June 2022						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
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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			

July 2022						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
				01	02	03
EM4	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

August 2022						
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 2022						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
			01	02	03	04
05	06	07	08	09	10	11
MM4	14	15	16	17	18	
19	20	21	22	23	24	25
26	27	28	29	30		

October 2022						
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
EM5	26	27	28	29	30	
31						

November 2022						
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				

December 2022						
Mon	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*	*Sun*
			01	02	03	04
MM5	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	

|	
MM	Management Modules
EM	Engineering Modules
	Exams

Crash Course
2-day seminar in "Probability and Statistics"

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:** 6 months project work

Please note: Dates are subject to change.

More Master Programs

Technology Expertise (5 Modules)

Management Know-How (5 Modules)

ISEM • MPD • POM • MSEM • EEM • FE
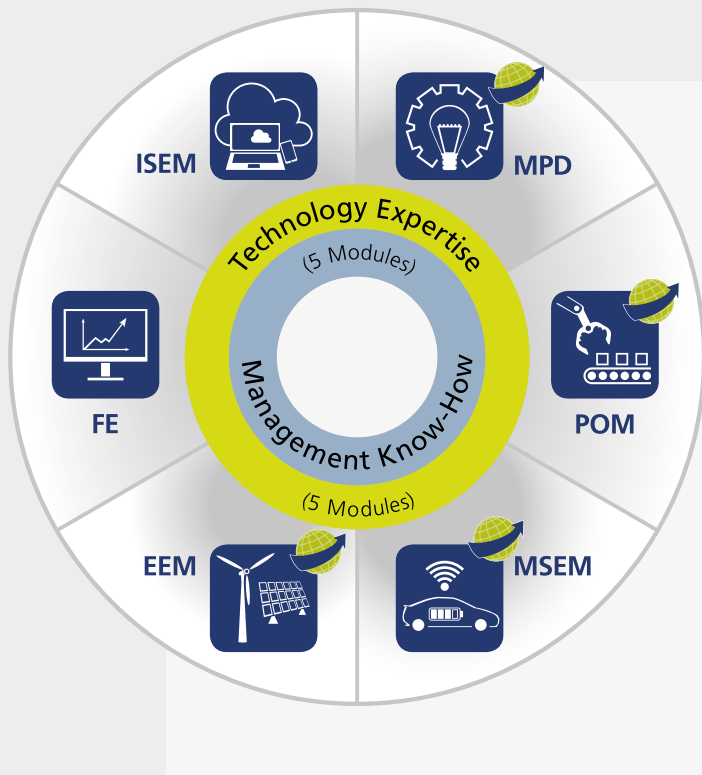
Six Part-Time Master of Science Programs in

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

Compact further education formats like Certificate Courses and more can be found in the HECTOR School Academy.

= International Module

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

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