



Executive Master Program Financial Engineering

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, 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 test certificate (e.g. TOEFL score of at least 570 PBT; 230 CBT; 90 iBT or IELTS at least 6,5 points).

Accreditation

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



**CUSTOMER VALUE PREPOSITION
NUMERICAL METHODS DECISION
& RISKS DIGITAL PLATFORMS
TRADING STRATEGIES INVESTMENT
PORTFOLIOS SENSITIVITY ANALYSES
DIGITAL TRANSFORMATION
MARKETING & DATA FINANCE &
VALUE ANALYSIS OF PROJECTS RISK
MANAGEMENT PRODUCT BASED
VALUE MANAGEMENT SAFETY &
SECURITY IN IT-SYSTEMS COST-
BENEFIT-ANALYSIS INNOVATION &
PROJECTS ASSET MANAGEMENT
DIGITAL TRANSFORMATION OF
SERVICE SYSTEMS FINANCIAL
MODELLING IN PYTHON**

»Fast-evolving financial markets constantly set new challenges while progress in quantitative tools and computer technology open up entirely new opportunities. Therefore, the finance industry needs people with deep knowledge of financial theory, mathematical tools and information technology as well as adequate methods of engineering and management tools. The master program qualifies graduates to meet all these needs.«

Prof. Dr. Marliese Uhrig-Homburg

Assessing and controlling different types of risks are key responsibilities in companies as well as in the financial sector. The quality of risk management processes is a crucial factor in the success or failure within the business. Increasingly complex financial products, various regulations and the enormous importance of information technology have created a great challenge both to financial and non-financial companies. Mastering these challenges requires a thorough understanding of complex financial strategies, financial modeling ability, computational proficiency, and managerial vision.

In response to this demand, our master program in Financial Engineering offers a unique combination of familiarity to finance theory, engineering methods, management tools, mathematical and computational techniques.



Prof. Dr. Marliese Uhrig-Homburg
Chair of Financial Engineering and Derivatives, KIT

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

Program Directors FE

The Karlsruhe Institute of Technology (KIT) provides an ideal interdisciplinary environment with its long tradition of interdisciplinary programs. Building on the long-established reputation for excellence in business engineering, the two-part program combines in-depth knowledge and understanding of fundamental concepts in business, finance, and management, as well as the latest developments in financial engineering.

Due to the pace of financial innovation, the need for highly qualified people trained in financial engineering has also increased. A demanding career in a financial company such as an investment or commercial bank, or in the corporate finance departments of companies would be an ideal place to work with the abilities attained in the program. The techniques are extremely beneficial for all candidates, since the material covered is well applicable to corporate finance and corporate risk management.

Additionally, the Financial Engineering Program shares five management modules with the other master programs. This fosters cross industry networking and provides the participants with general knowledge in finance, accounting, marketing, international multiproject management, international law, and human resource management. Therefore, they can consider the commercial implications of project decisions and develop a holistic view.

Engineering Modules (EM)

State-of-the-Art for Financial Companies & Corporate Finance Departments



EM 1: Digital Platforms

Nowadays, service markets are characterized by a strong interrelation with information service management due to the original set-up of service markets. The overall objective of the module is therefore to provide fundamentals of market engineering with an emphasis on the design and the further development of information markets and services.

The module enables participants to understand and analyze business innovation & adaption processes and thus learn about, among other things, innovation diffusion. Innovation driver analysis helps participants to systematically identify the difference between invention and innovation.

Since the structure of information markets is also discussed, participants are able to develop an understanding of how market actors operate. In addition, consideration of service competition as a business strategy helps participants structure the impact of service competition on the design of businesses, markets, products, processes, and services.

EM 2: Global Financial Markets

Open up any quality newspaper and you will see that global financial markets matter a great deal. Nearly all employers are directly or indirectly affected by changing market prices. On the other hand, employees and households hold financial assets to save for retirement. It is therefore natural

to want to understand how prices are formed on stock and bond markets and how to build optimal portfolios.

It is the goal of this module to shed light on both questions. This module introduces theoretical and empirical insights to understand global financial markets. The main focus is on building valuable intuition that will later be very useful for advanced courses and for one's professional career.

Participants will understand the main risk/return characteristics of equity and fixed-income markets from a conceptual and empirical point of view. There are scientific reasons for why equity beats bond investments in the long-run, and why it is even more advantageous to combine both asset classes into a single portfolio.

EM 3: Valuation & Financial Analytics

Financial Engineering is an important component of quantitative finance and risk & asset management. This module introduces and applies essential financial engineering tools to applications from corporate finance and quantitative asset/risk management. In terms of corporate finance applications, this module teaches managers to optimize the financing structure and the dividend policy of firms. In terms of asset / risk management applications, the module conveys essential quantitative and computational tools to build superior forecasting models for expected returns and risks of equity and fixed-income investments.

EM 4: Advanced Financial Engineering

This module provides a unified approach to the pricing of derivative securities. Moreover, the most important concepts pertaining to term structure modeling are discussed and participants are introduced to the efficient use and implementation of pricing and risk management methods on derivative and fixed income securities markets.

The participants develop an understanding of the underlying evaluation theory, realize its limitations, and apply economic and mathematical approaches to analyze and understand financial products. Risk management tools enable the participants to carry out major risk assessments and sensitivity analyses. They learn how to use computer-assisted methods for the implementation of evaluation and risk management methods.

During the course on derivatives, they thoroughly cope with financial and derivative markets, study static and dynamic trading strategies and conceive option price theory as a central approach to assessing derivative instruments. During the course on fixed income, the participants get acquainted with the central concept of a yield curve, apply option price theory to assess interest derivatives and acquire the ability to manage interest change risks.

EM 5: Risk Management

In this module, risk management is introduced through the following process aspects: risk analysis, risk sensitiveness, risk assessment, and risk rating regarding the economic and financial risks of an organization.

The graduates will be familiar with approaches to the dynamic optimization of risk-return profiles that are, for example, of importance to asset management in insurance companies or investment funds. Additionally, they will be acquainted with the possibilities of engineering contracts for the transfer of selected risks and learn that trading with such tools is an important risk management strategy.

During the courses on insurance, risk analysis and asset liability management, and credit risk and operational risk, the participants thoroughly cope with all these aspects of risk management and the limitations of the relevant methods. Hence, they are well prepared for career paths in e.g., banks, capital investment companies, insurance companies, consulting firms, and finance departments in large industrial enterprises in Germany and abroad.



Engineering Modules

EM 1: Digital Platforms

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

EM 2: Global Financial Markets

Courses: Financial Prototyping with Python, Managing Equity Risk, Managing Fixed Income Risk

EM 3: Valuation & Financial Analytics

Courses: Corporate Financial Engineering, Tools for Financial Engineering

EM 4: Advanced Financial Engineering

Courses: Derivatives, Fixed Income

EM 5: Risk Management

Courses: Financial Modelling with Python, Financial Econometrics, Machine Learning for Risk and Asset Management

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: 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 gut feeling. This is what this module is about. One week looks at how to use data for designing customer solutions (and get paid according to their value). The other week looks more generally 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.



Sandra Rohleder
Master in Financial Engineering
KfW Development Bank

»It is difficult to continuously keep up with the newest industry developments and integrate state-of-the-art expertise in our daily work. The master program in Financial Engineering at the HECTOR School provided me with exactly these strategic, expert and interpersonal skills, which I found highly valuable when facing the enormous challenges arising out of the on-going disruption in the banking business. During the program I further built up a network of like-minded professionals from different industries with an international background, whose diverse views I learned to appreciate in the various case study discussions we had in class. Amongst others, these experiences successfully guided my career in the international banking business.«

Alumni Voices
on our YouTube Channel

Academic Calendar

September 2019							October 2019							November 2019							December 2019						
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
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09	10	11	12	13	14	15	14	15	16	17	18	19	20	13	14	15	16	17	18	19	09	10	11	12	13	14	15
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MM1																											
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EM2	15	16	17	18	19		10	11	12	13	14	15	16	09	10	11	12	13	14	15	13	14	15	16	17	18	19
20	21	22	23	24	25	26	MM2	19	20	21	22	23	16	17	18	19	20	21	22	20	21	22	23	24	25	26	
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May 2020							June 2020							July 2020							August 2020						
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September 2020							October 2020							November 2020							December 2020						
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MM4	16	17	18	19	20		12	13	14	15	16	17	18	09	10	11	12	13	14	15	14	15	16	17	18	19	20
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28	29	30					EM5	28	29	30	31			23	24	25	26	27	28	29	28	29	30	31			

- MM Management Modules
- EM Engineering Modules
- Exams Exams

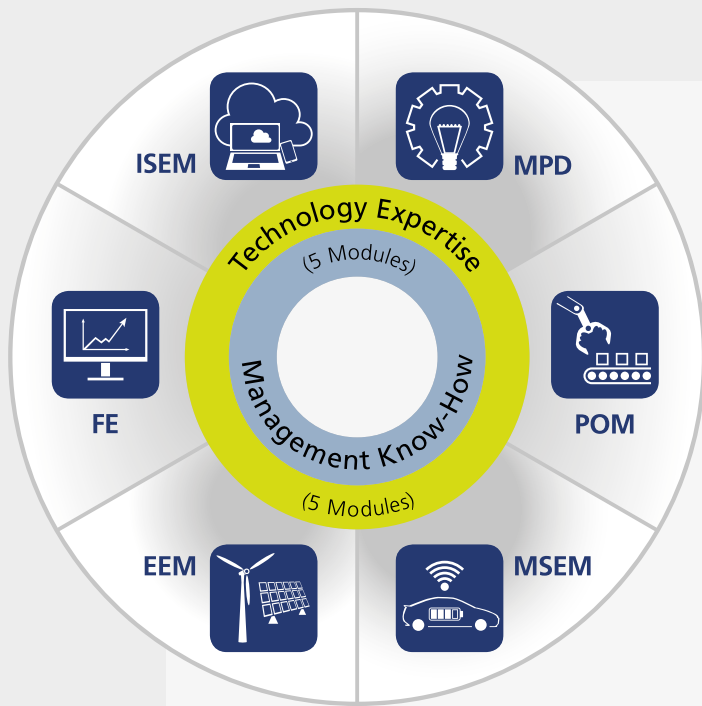
Crash Course 2-day seminar in Probability and Statistics

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

>> **Master Thesis:** 6 months project work

Please note: Dates are subject to change.

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**.



**Subject to the approval procedure of KIT and the Ministry for Science, Research and Art in Baden-Württemberg*

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

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Our Social Media Channels

