Executive Master Program
Financial Engineering

Technology + Management
The HECTOR School of Engineering & Management offers seven Executive Master Programs. The HECTOR School – named after Dr. Hans-Werner Hector, one of the co-founders of the software company SAP – is the Technology Business School of the Karlsruhe Institute of Technology (KIT).

The Master Programs are more than typical MBA programs, because they combine management with engineering topics. The primary goal is to enable professionals to take a holistic approach when managing highly interdependent processes and to be aware of the latest state of technology in the respected field of expertise.

All programs share five Management Modules, providing the participants with general leadership know how for engineers: knowledge in Finance, Accounting, Marketing, Business Strategy, International Project Management and Intellectual Property Rights. On this basis they can consider commercial implications of business decisions. Workshops and case studies allow ample opportunity to explore the direct application of the know-how, simulating the real business environment.

Essential part of the HECTOR School is the part-time philosophy of its Master Programs. Intermittend periods of lectures are scheduled to allow participants to continue with demanding careers while acquiring new skills & knowledge.
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 of 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. With its long tradition of interdisciplinary programs, the Karlsruhe Institute of Technology (KIT) provides an ideal interdisciplinary environment. Building on the long-established reputation for excellence in business engineering, the two-part program combines an in-depth knowledge and understanding of fundamental concepts in business, finance, and management, with the latest developments in financial engineering.

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

Meet us, to explore the Financial Engineering track at the Karlsruhe Institute of Technology (KIT). Join us, to acquire the tools that will guide your career path in this exciting area.

Prof. Dr. Marliese Uhrig-Homburg
Program Director Financial Engineering
Chair of Financial Engineering and Derivates, Karlsruhe Institute of Technology (KIT)
Information & Service Management

Nowadays financial as well as other service markets are characterized by a strong interrelation with Information Service Management due to the original set-up of the financial markets. New financial products depend e.g. on the information technological feasibility.

The overall objective of the module is therefore to provide an introduction into 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 and adaptation processes and thus get an idea of, among other things, innovation diffusion. Innovation driver analyses make participants systematically identify the difference between invention and innovation.

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

Global Financial Markets

Open up any quality newspaper and you 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 in general hold financial assets to save for retirement. It is therefore a natural question 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 help you understand global financial markets. The main focus is on building valuable intuition that will turn out to be very useful for advanced courses and for the 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 in the long-run equity beats bond investments, and why it is even more advantageous to combine both asset classes into a single portfolio.
Introduction to Financial Engineering

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. For the corporate finance applications, this module teaches how managers optimize the financing structure and the dividend policy of firms. For the asset/risk management application, the module conveys essential quantitative and computational tools to build superior forecasting models for expected returns and risks of equity and fixed-income investments.

Advanced Financial Engineering

This module provides a unifying 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. Tools of risk management enable the participants to carry out major risk assessments and sensitivity analyses. They learn how to use computer-assisted methods for 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 yield curve, apply option price theory to assess interest derivatives and acquire the ability of managing interest change risks.

Advanced Risk & Asset Management

In this module, risk management is introduced by 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 are acquainted with the possibilities of engineering contracts for transfer of selected risks and know 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.

Overview Engineering Modules (EM)

EM 1: Information & Service Management
Courses: Information & Market Engineering, Service Management & Innovation

EM 2: Global Financial Markets
Courses: Global Financial Markets

EM 3: Introduction to Financial Engineering
Courses: Corporate Financial Engineering, Tools for Financial Engineering

EM 4: Advanced Financial Engineering
Courses: Derivatives, Fixed Income

EM 5: Advanced Risk & Asset Management
Courses: Advanced Risk & Asset Management
Management Modules - Topics

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.

**International Project Management**

International Project Management is a key to the world of business. Participants will get familiar with objectives of project management and scheduling, analysing planned projects and controlling project execution. Particular attention is paid to the construction of project networks and Gantt charts, heuristic solution procedures and rescheduling. Modelling, planning and scheduling, which arise in a great variety of practical situations, are also emphasized.

**Finance for Executives**

Finance for Executives provides participants with an understanding of the key financial statements and its underlying accounting principles. The course gives an overview of investment rules and financial decisions.

**Business Strategy, Marketing & Controlling**

This module comprises three important challenges in companies, Business Strategy, Marketing and Controlling. Particular emphasis is placed upon the process of strategic management containing strategic analysis, formulation and evaluation based on competitive advantage, and portfolio strategy. In addition to these concepts approaches of modern marketing that show a strong reference to business strategy are presented.

**Stochastic & Games**

This module enables participants to gain a better understanding of stochastic phenomena and, in particular, to use this knowledge in helping them to make decisions when in a state of uncertainty. Uncertainty can arise from either »nature« or from playing against conscious opponents (»strategic uncertainty«).

**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, e.g. 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 about international patent, trademark and copyright law.

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**Overview Management Modules (MM)**

**MM 1: International Project Management**
Courses: Project Management & Scheduling, Multi-Project Management in an International Setting, Development Management, Intercultural Management

**MM 2: Finance for Executives**
Courses: Introduction, Financial Accounting, Fundamentals of Finance

**MM 3: Business Strategy, Marketing and Controlling**
Courses: Business Strategy, Introduction to Management Accounting, Marketing

**MM 4: Stochastic & Games**
Courses: Decisions under Risk & Uncertainty, Optimization under Uncertainty, Applied Game Theory, Simulation & Case Study

**MM 5: Law & Contracts**
The Master Program concludes with a Master Thesis.

The Master Thesis is set up as a project work in the company, starting after the successful completion of at least nine modules according to the personal study plan.

Participants of the Master Service Management & Engineering also need to take part in a 2-day crash course in probability & statistics (date t.b.a.).