Executive Master Program
Energy Engineering & Management

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 the SAP AG.

The school envisions to provide professionals with state-of-the-art technology expertise and management know-how in part-time education formats. With Executive Master Programs, Certificate Courses, and Customized Partner Programs, the HECTOR School fosters lifelong learning approaches of its industry partners and the executive development of its graduates.

The benefits of the executive master programs are manifold, for participants as well as for their companies:

- **Unique holistic approach**: combination of technology expertise with management know-how
- **Direct transfer of state-of-the-art knowledge**: from research of the Karlsruhe Institute of Technology (KIT)
- **Part-time structure**: allows participants to continue with demanding careers whilst acquiring new skills
- **The master thesis provides an excellent opportunity to set up innovation projects**: companies gain outstanding added value through the consultation of such projects by professors from KIT
- **Excellent network opportunities**: professional networking is fostered across industries and on an international scale

**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 in October

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

*Admission Requirements*
- An academic degree: e.g., Bachelor, Master, or Diploma
- 1-2 years work experience (depending on the first degree’s level; recommended > 3 years)
- TOEFL score of at least 230 or 90 iBT

*Accreditation*
All M.Sc. programs are accredited by ASIIN. ASIIN was acknowledged as the first European continental accreditation agency by the Washington Accord (W.A.) in 2003.

**Energy Systems & Technologies for the Future**
Master Program Energy Engineering & Management (EEM)

» The energy transition is associated with many challenges such as an increase in efficiency of energy conversion systems based on renewable energies and their integration into future energy systems, requiring e.g. the development of capable energy storage systems and an intelligent demand side management. EEM covers all these aspects providing the skills to successfully face the challenges.«

Prof. Dr.-Ing. Hans-Jörg Bauer and Prof. Dr.-Ing. Mathias Noe

The master program Energy Engineering & Management is focused on professionals working in companies which are dealing with the generation, transportation, distribution, storage and sales of energy (electrical, thermal, etc.), their suppliers and energy-intense industrial sectors. Graduates of the program stand out due to an extensive overview on present and future technology for new energy systems. They are capable to significantly participate in the successful introduction of new sustainable energy systems and to rate not only the sustainability but as well aspects of operating efficiency, availability and safety and consider them in an adequate way.

Graduates can therefore understand, quantitatively describe, evaluate and optimize the elements of energy systems in particular and their complex interactions. They are able to understand innovation processes and can effectively and successfully apply their knowledge either in existing companies or in the foundation of “start-ups”. Thereto, professional, methodical, process and management knowledge is essential, as interceded in the modules of Energy Engineering & Management.

On top of this, internationalization and mobility are key factors of the master program, since the energy sector is acting internationally. This is underlined by the cooperation with the Knowledge Innovation Centre InnoEnergy and therefore supports the aims of the European Union to achieve a climate-neutral and sustainable energy supply. Furthermore one result of the cooperation is an exchange module with the worldwide renowned business school ESADE in Barcelona/Spain.

Next to the engineering expertise Energy Engineering & Management shares five management modules with the other master programs. This fosters the network across industries and provides the participants with general knowledge in finance, accounting, marketing, international multiproject management, international law, and human resource management. By this they can consider the commercial implications of project decisions and develop a holistic view.
Engineering Modules (EM)
State-of-the-art technology expertise in energy systems & technologies

EM 1: Renewables
The module starts with a general introduction to the challenges of energy supply, examining the historic and future developments of global energy requirements and existing primary energy sources and reserves. Aside from this, it provides an overview of the energy cascade, from the primary energy sources, through the various stages of energy conversion, the transportation and distribution of energy, to its ultimate use. Technical, ecological and socio-economic aspects are highlighted. Within the presentation of energy systems based on renewable sources of energy, the focus is laid on wind and hydroelectric power, as well as geothermal and solar thermal energy. For didactic reasons, systems based on other renewables, such as Photovoltaics and Biomass, are dealt with in other engineering modules.

For the processes covered in this course, the supply of renewable primary energy provided by nature is first described. Before investigating the individual technical features of the power plants, Wind energy plants serve as an example to convey the interdisciplinary nature of energy conversion plants, in which fluid mechanical, static, mechanical, electrical and electronic considerations are all closely linked to systemic and economic aspects.

EM 2: Thermal Energy Conversion
The module provides an overview on thermal processes for power and heat production from fossil and biogeneric fuels. The whole range of fuel to energy via thermal processes is covered, starting from the combustion process, coal and gas fired power plants, gas and steam turbines, CO₂ reduction by capture and storage and finally special aspects of biomass utilization.

From a sound knowledge of the technical fundamentals, the module will lead to the understanding of complex energy conversion systems and typical plants. The participants develop and improve their evaluation competence concerning aspects of technology, economy and ecology.

EM 3: Electricity Generation & Energy Storage
In this module electricity generation on the one side and energy storage on the other are in the focus. The most commonly used power generator in electrical power stations is a gas turbine. Understanding and knowledge of critical issues related to synchronous generator operation in transferred.

In addition, photovoltaics is one of the most discussed forms of renewable energy generation. It converts solar radiation directly into electrical energy. Participants will understand photovoltaics as an energy source, it’s working principle and mechanisms to improve the efficiency. This will provide insights into the public as well as scientific discussion and highlights boundary conditions with regard to requirements of energy storage.

Batteries and Fuel Cells are one way to store the power. The participants will become familiar with the concepts of electrochemical energy storage and the design of efficiently working batteries. The module discusses the available, state-of-the-art fuel cell technologies and their efficiencies as well as the involved opportunities and limitations.

EM 4: Smart Networks & Energy Distribution
The module gives an overview on major power system components, structure and main operation behavior. It starts with an introduction to power systems and the basic knowledge on high voltage engineering.

The second part focuses on the main components and describes mainly the function, the state-of-the-art and their behavior. The main transmission and distribution aspects are covered in the third part of the module, including network calculation and control. Due to recent and future changes in power systems a strong focus is in part four on smart grids and their performance. Additionally building performance with respect to energy balance and energy sources is included.

EM 5: Energy Economics
Within this module different peculiarities of the energy market (energy efficiency on the supply and demand side, electric mobility, market opening, regulation, etc.) are analyzed from a techno-economic point of view.

In order to be able to identify optimal strategies within this complex sector an introduction into energy systems analysis is at the beginning of the module. Energy systems analysis considers the totality and the interactions of energy systems, among other things, with the commodities industry, the building trade, industry and transport. Integration of energy systems and e-mobility concludes this module.

Order your free course guide book with detailed contents of the Master Program!
Management Modules (MM)
Fundamental economic know-how for successful managers

MM 1: 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.

MM 2: 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.

MM 3: 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.

MM 4: Corporate Innovation & Entrepreneurship
The module provides knowledge on strategies how to manage innovation within the company and how to apply tools, models and processes that are necessary to bring innovative ideas. It focuses on issues like corporate innovation, corporate entrepreneurship, measuring innovation and innovation in practice. Participants shall acquire competences as understanding the organizational context, managing change, decision making and innovation. It takes place at the ESADE Business School in Barcelona/Spain.

MM 5: Law & Contracts
This module comprises both economics and legal sections. In the economics section, a groundwork is laid through basic economic concepts of the market, supply and demand, price determination, and the role of firms in the market. The legal section is divided into lectures about the law of business organizations, law of business organizations about international patent, trademark and copyright law.

 Marcus Welz
Master in EEM
Head of Global Sales, SIEMENS AG

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

>> Master Thesis: 9 months project work
>> EM 0 (see page 5)
It will take place about 8 weeks before the program start. The exact date is available on request.

Curriculum may be subject to change.

Management Modules
Engineering Modules
Exam Days

Alumni Voices on our YouTube Channel

KIT provides an intensive, exciting, and focused opportunity to improve every aspect of my business & technology skills. It was an immensely stimulating experience. Every day was intense but extremely rewarding. KIT expanded my mind. After the master program, the world became smaller and my personal and professional goals grew bigger. Networking was valuable from a professional standpoint, but it was my classmates’ real-life experiences and diverse backgrounds that broadened my perspective. I developed solid relationships with many of my classmates. We often meet or email each other, and they are becoming something like a personal board of directors whose judgment I trust. This was an inestimable feature of the master program, and it's something I did not expect.”
More Master Programs.

Seven Part-time Master Programs

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

Next to the master programs, 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.com

Imprint
Publisher: Marketing Department HECTOR School of Engineering & Management
Edition: 1/2016
Photos: International Department gGmbH, fotolia.com, iStockphoto.com, Karlsruhe Institute of Technology (KIT), Barcodes generated with TEC-IT Barcode Software

Our Social Media Channels