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 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.

**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.
The master program, Energy Engineering & Management, is focused on professionals working in companies that deal with the generation, transportation, distribution, storage and sale of energy (electrical, thermal, etc.), their suppliers and industrial sectors that rely on energy heavily. Graduates of the program stand out due to an extensive overview on present and future technology for new energy systems. They are able to significantly participate in the successful introduction of new sustainable energy systems and to appraise not only the sustainability but also the aspects of operating efficiency, availability and safety as well and can evaluate them adequately.

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

Additionally, internationalization and mobility are key factors of the master program since the energy sector operates internationally. This is emphasized 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, the cooperation with the worldwide renowned Business School ESADE in Barcelona/Spain fosters networking across industries and provides the participants with general knowledge in finance, accounting, marketing, international multi-project 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 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 as well as 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.

During the presentation of energy systems based on renewable sources of energy, the focus is placed 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 biogenic 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.

Based on 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 skills with regards to technology, economy and ecology.

EM 3: Electricity Generation & Energy Storage
In this module, the focus is on the generation of electricity on the one side and energy storage on the other. The most commonly used power generator in electrical power stations is the gas turbine. Understanding and knowledge of critical issues related to synchronous generator operation is provided.
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, its working principle and mechanisms to improve 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 efficient batteries. The module discusses the available state-of-the-art fuel cell technologies and their efficiencies as well as the respective opportunities and limitations.

**EM 4: Smart Networks & Energy Distribution**

This module gives an overview of major power system components, structure and main operation behavior. It starts with an introduction to power systems and basic knowledge of high voltage engineering.

The second part focuses on the main components and describes mainly the function, 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 in part four is on smart grids and their performance. Additionally, building performance with respect to energy balance and energy sources is included.

**EM 5: Energy Economics**

Various 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 within this module.

In order to be able to identify optimal strategies within this complex sector, there is an introduction into energy systems analysis 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. The 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

Management Modules (MM)
Economic Know-How for Successful Managers

MM 1: Marketing & Information
Courses: Designing and Selling Solutions (incl. Negotiation Training), Information Systems Management, Big Data Methods, Legal Aspects of Marketing and 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: Corporate Innovation and Intrapreneurship

MM 5: Strategy & People

Curriculum may be subject to change.
A HECTOR School Master: Leadership Know-How for Demanding Careers.

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

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.«

Alumni Voices on our YouTube Channel

The academic calendar 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

<table>
<thead>
<tr>
<th>September 2020</th>
<th>October 2020</th>
<th>November 2020</th>
<th>December 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>Tue</td>
<td>Wed</td>
<td>Thu</td>
</tr>
<tr>
<td>01</td>
<td>02</td>
<td>03</td>
<td>04</td>
</tr>
<tr>
<td>01</td>
<td>02</td>
<td>03</td>
<td>04</td>
</tr>
<tr>
<td>01</td>
<td>02</td>
<td>03</td>
<td>04</td>
</tr>
<tr>
<td>01</td>
<td>02</td>
<td>03</td>
<td>04</td>
</tr>
</tbody>
</table>

 academics, "Electrical Engineering" or "Thermodynamics, and Fluid Mechanics"

Exams

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.

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: 03/2020
Photos: International Department gGmbH, Karlsruhe Institute of Technology (KIT), iStock

Our Social Media Channels