Executive Master Program
Electronic Systems 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 and development of its graduates.

The benefits of the executive master programs are manifold, for participants as well as 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.

A world without electronic and embedded systems is not imaginable any more. Whether in cars, mobile phones or energy systems: electronic systems and components are crucial for the viability and development in many essential areas of life. The situation is that new technologies enable new applications but the currently used processes, methods and tools only to a certain extend support the development of those innovative systems.

As a consequence the master program Electronic Systems Engineering & Management covers the demands in this vital field and prepares high potential professionals for the challenges of today and the future.

Engineers for embedded systems need to master the development mechanics, electronics, and, increasingly, software. In this program, professionals will learn state-of-the-art engineering methods on the complete process of embedded systems engineering, also taking into consideration the worldwide release and configuration management in today’s globalized industry.

Participants of this master program will get used to new and already established methods (e.g. V-model, CMMI, SPICE, ISO 26262), tools and techniques for model-based development (e.g. Matlab, SysML), rapid prototyping, simulation based validation using XIL techniques (e.g. PROVEtech), HW/SW synthesis, and embedded operating systems (including AUTOSAR) will be introduced. Components for realisation data communication technologies and the final integration complete the story.

On top the Electronic Systems Engineering & Management shares five management modules with the other master programs. This foster the network cross-branches 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.
At the beginning an introduction to embedded systems and software engineering is given. Processes, methods and tools from object-oriented approaches, via the V-model to agile methods are presented. Among those, HW-/SW-Co-design and rules how to decide which way to go are explained. All these aspects are discussed considering the constraints of distributed development all around the world.

How to assess these approaches according to SPICE and CMMI and how to follow the demands of safety (relying on ISO 26262) and security is introduced focusing on the transportation industry.

In order to realize an embedded system in the end concrete components need to be used. Controllers and processors or ASICs and FPGAs will implement the application. The interfaces to the environment is enabled by actuators and sensors. All these technologies will be explained in this module.

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Implementation and integration leads to testing the overall system according to the early requirements. During the overall process of engineering, testing has been prepared and done in order to check the maturity level. In simulations and prototyping environments quality assurance has been executed. At the end of those phases for the first time the real system can be tested to check finally the user requirements in a Hardware-in-the-Loop environment or even in real test scenarios.
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, analyzing 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: Human Resource Management
Human Resource Management addresses challenges head on, exploring the key elements of innovation, creativity, 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.

MM 5: Law & Contracts
This module comprises both economics and legal sections. In the economics section, a groundwork is laid for decision theory, expected utility, risk and ambiguity, bargaining and basic incentive theories. 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.

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

«For me it was an effective way to gain an overview of the development areas of embedded systems and disciplines surrounding them, e.g. financial activities, methods, constraints & opportunities, marketing regarding customer behaviour & price-product-promotion-place aspects, as well as the management of different resources during development. Also the view in the future activities regarding new technologies and contacts to key persons of one of the elite universities in Germany are essential factors they will help me in the future in my decision making processes.»

Alumni Voices
Head of Department Electronics/Layout R&D, Endress + Hauser GmbH & Co.KG

Curriculum may be subject to change.
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.

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