DISTANCE LEARNING PROGRAMME
MASTER OF ENGINEERING

SOFTWARE ENGINEERING FOR EMBEDDED SYSTEMS

- COMPONENT-BASED SOFTWARE DEVELOPMENT
- DEPENDABILITY ENGINEERING
- MODEL-BASED COMPONENT ENGINEERING
- PROJECT MANAGEMENT
- REAL-TIME SYSTEMS
- REQUIREMENTS ENGINEERING
- SOFTWARE ARCHITECTURE FOR EMBEDDED SOFTWARE SYSTEMS
- SOFTWARE DEVELOPMENT FOR EMBEDDED SYSTEMS
- SOFTWARE ENGINEERING INTRODUCTION
- SOFTWARE PRODUCT LINE ENGINEERING
- SOFTWARE QUALITY ASSURANCE
This distance education programme is a practical guide to project management as a whole and project management techniques in particular.

DR. GERHARD PEWS
CAPGEMINI CONSULTING

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Welcome

We would like to thank you for your interest in the distance learning programme “Software Engineering for Embedded Systems” and present you with this study guide.

The aim of this study guide is to answer the most important questions you may have about our distance learning degree programmes. It will provide you with an overview of the organisational processes including, e.g., information on applications, graduation and programme content. In the first sections, you will receive general information about how the academic programmes are organised as well as the relevant formalities and procedures. Then, we will present the necessary examination prerequisites and components, content of the programme and information on the authors of the learning materials.

The final section includes general information on the Technische Universität Kaiserslautern (TUK). We hope that this guide will provide you with all the necessary information and help you make an informed decision about your future distance learning degree programme.

Prof. Dr. Dr. h. c. Dieter Rombach
Technische Universität Kaiserslautern (TUK)
Software Engineering Processes and Measurement Research Group
Scientific Head of the Distance Learning Programme
“Software Engineering for Embedded Systems”
WHAT CHARACTERISES ADVANCED SCIENTIFIC TRAINING?

ADVANCED SCIENTIFIC STUDY

- assumes an ability to study,
- assumes experience in scientific and academic work,
- expects a willingness to discuss other viewpoints,
- uses scientific language that is not always immediately accessible to a lay audience,
- expects a willingness to reflect on and interact with other linguistic forms and ways of thinking.

Do not expect easily “consumable” or “digestible” knowledge. Advanced scientific training imparts scientific theories as well as sound strategies and tools that can be reflected on and applied in your own professional career.

The field of advanced training offers a whole range of different training opportunities. They can be distinguished by, e.g., their different target audiences. Some courses do not require any special educational prerequisites and can be taken by any interested and willing applicant. Other providers of advanced training, however, develop special courses that are aimed at a select group of people.

This limitation is due to some educational programmes requiring a certain degree of prior knowledge for successful completion. This also applies to “advanced scientific training”. Even though, in principle, no one should be excluded from insights and knowledge gained through science and research, it is nonetheless impossible to waive certain requirements for participation. In general, this includes a willingness to acquire the language of science. In particular, however, applicants require basic scientific knowledge of the respective subject to be studied.
Distance learning programmes are basically defined by the fact that students do not physically attend the institution of higher education but, instead, the institution of higher education comes to them. The notion of “independent learning” is fundamental to the design of advanced distance learning programmes at DISC. Our students become experts of their own learning process, which results in a sustainable consolidation and increase of their domain-specific knowledge.

The DISC concept is essentially based on self-study phases that are consolidated and enhanced through on-campus phases. Both programme organisation and the didactically prepared learning materials and formats are based on the concept of independent learning. Each academic programme has an own virtual learning environment in the online campus that accompanies students for the duration of their programme and includes the following elements:

Self-study material that was specifically developed for this academic programme and includes: substantiated and practice-oriented content, learning and reflection tasks with exemplary solutions, glossaries and tips for further reading. Relevant texts and additional learning materials are available for students online. Main text-based learning materials are available thanks to the print-on-demand service: You can commission one of our printing service providers to print, bind, and send you the materials.

Supervised online learning
The self-study phases are supervised in the online learning environment. The following interaction, communication and information channels are available:
- Communication forum for exchanges with peers and supervisors;
- Organisation of programme: information on examination prerequisites and components (e.g. information on writing a Master’s thesis), registration for face-to-face contact hours, overview of dates and deadlines, submission of examination prerequisites;
- Online tutorials as well as video-based question times with tutors on the current modules’ study packages.

Depending on the academic programme and semester, some compact courses, such as online seminars, colloquia or tutorials, may also be held in the online environment. These services are contingent on the requirements of the programme and learning objectives.

The aim of on-campus phases is to consolidate the learned content and take examinations. On-campus phases take place two days in the first semester and one week each in the second and third semester.

OBJECTIVES OF THE DISTANCE LEARNING PROGRAMME

Today, traditional hardware-dominated product domains are increasingly turning into software dominated domains. Many of the companies and organisations in these transitional domains still predominantly employ traditional engineers with limited basic education and training in software and software engineering. These companies are facing the challenge of qualifying experienced engineers for the software engineering domain. This transition is anything but easy. The increasing complexity of software, the rising demand for secure and high-quality software in embedded systems, and the constant change and stream of new software engineering methods, techniques, and tools require engineers in embedded system domains (e.g., automotive and military) to receive professional education. As long as the situation remains unchanged, the enormous and continuously increasing challenges caused by current software developments will not be mastered adequately. The necessary education and training cannot be imparted in company-in-ternal programmes, nor can companies afford to offer lengthy leaves of absence for their experienced engineers.

The aim of this distance education programme is therefore to convey a well-founded, broad foundation of knowledge for the development, implementation, and evaluation of software for embedded systems. As a result, programme graduates should be able to assess the manifold interrelationships and effects of these new technologies. On this basis, they will have the ability to elaborate useful applications for their own institutions.

TARGET GROUP

The distance learning programme is designed for professionals working in the field of software development who need to acquire advanced knowledge about emerging technologies and who wish to broaden their software engineering skills by pursuing graduate-level education in software engineering.

Applicants may also be accepted who have relevant work experience but have not graduated from a university. They must hold a university entrance qualification, be able to certify several years of relevant work experience and pass an aptitude test.

PROGRAMME DURATION

The standard period of study in the distance learning programme “Software Engineering of Embedded Systems” is four semesters, including examinations. Students require a total of 60 credit points to complete the programme. The programme starts in October every year.
The application period is generally from mid-May to mid-July. The programme starts in October. Current enrolment dates and the application deadlines for upcoming semesters are available from DISC or the Department of Distance Student Affairs at the TUK. The required application documents can also be requested there. For more information on enrolment, please go to: www.zfuw.de/application

If your application was successful, you will receive additional information on the enrolment procedure. Separate conditions apply for candidates with professional experience but no university degree. All information is available at www.zfuw.de/entrancequalification

You can discontinue or interrupt your distance learning programme at the end of each semester. The associated certificates of de-registration or leave of absence will also be issued at the end of the semester. The registration fee and the tuition fee cannot be reimbursed in the case of withdrawal after successful admission to the programme. Experience has shown that it is nonetheless possible to successfully graduate from the programme despite other commitments. Contact the programme managers in time so that they can potentially help you to find an individual solution in order to avoid interrupting or even discontinuing your academic programme.

OBJECTIVES, STRUCTURE AND ORGANISATION

ADMISSION REQUIREMENTS

1. ADMISSION WITH A UNIVERSITY DEGREE
The requirement for admission to the programme “Software Engineering for Embedded Systems” is a graduate degree either in an engineering discipline (electrical or mechanical engineering), computer science or business information technology, physics or mathematics. A minimum of two years of professional experience in the area of embedded systems (including at least one year of relevant experience) following a first degree is also required.

Please include the following in your application for admission: a certified copy of your Diploma, Diploma certificate or university degree as well certified copies (not originals!) of your references, or a confirmation from your employer (in the original!). We also require respective proof in the case of name changes.

2. ADMISSION WITH A PROFESSIONAL QUALIFICATION
Applicants may also be accepted who have relevant work experience but have not graduated from a university. The aptitude test is intended to determine whether the applicant’s qualifications are comparable to those of a completed undergraduate degree.

Individuals with work experience can submit their application documents for the aptitude test between 01 November and 31 January every year. If the aptitude test is passed successfully, these candidates can participate in the regular application process between mid-May and mid-July of every year. More information about the admission requirements and the aptitude test can be found at www.zfuw.de.

PROOF OF ENGLISH PROFICIENCY

APPLICATION & ENROLMENT

The application period is generally from mid-May to mid-July. The programme starts in October. Current enrolment dates and the application deadlines for upcoming semesters are available from DISC or the Department of Distance Student Affairs at the TUK. The required application documents can also be requested there. For more information on enrolment, please go to: www.zfuw.de/application

INTERRUPTIONS OF STUDY

You can discontinue or interrupt your distance learning programme at the end of each semester. The associated certificates of de-registration or leave of absence will also be issued at the end of the semester. The registration fee and the tuition fee cannot be reimbursed in the case of withdrawal after successful admission to the programme. Many students experience periods in which they need to focus more strongly on their careers or families while enrolled in an academic programme. Experience has shown that it is nonetheless possible to successfully graduate from the programme despite other commitments. Contact the programme managers in time so that they can potentially help you to find an individual solution in order to avoid interrupting or even discontinuing your academic programme.
The current tuition fee for the advanced distance learning Master’s programme “Software Engineering for Embedded Systems” is 1,990 Euro per semester (plus the registration fee of currently 102 Euro per semester) as well as a one-time fee for the Master’s thesis of currently 500 Euro. In accordance with the applicable DISC fee structure, tuition fees are reduced to 30 percent as of the third semester exceeding the standard period of study. This does not apply to the fee for the Master’s thesis. This covers, among other things, the costs for online learning materials, on-campus phases and administrative fees.

Furthermore, you can also use our online learning environment to commission one of our printing service providers. For a surcharge, they will print, bind and send you the available learning materials (print-on-demand). Additional costs that are not included in the tuition fee may be incurred due to the on-campus phases (bed, board, transport, etc.).

Tuition fees are charged every semester, depending on your enrolment or re-registration status. If you are enrolling for the first time, it is very important that you do not transfer the tuition fee until you have received your letter of admission.

We try to ensure that our study guide is always up-to-date. Despite regular revisions, information on costs and programme content may deviate due to short-term amendments. We therefore kindly ask that you visit our website for information on the current programme conditions prior to submitting your application.

The state offers individual tax incentives in Germany for advanced training measures. Depending on your personal income and job situation, you may be able to offset the costs of your distance learning programme as advertising expenses or special expenses and receive a partial or full refund. For more information, please contact an independent expert or your local tax authority. Unfortunately, financial support cannot be granted in accordance with the Sozialgesetzbuch - Drittes Buch (SGB III) (Social Security Code - Book Three) or the Bundesausbildungsförderungsgesetz (Bafög) (Federal Training Assistance Act). Further information on support measures can be accessed at www.zfuw.de/sponsorship as well as in the DGWF brochure “Fördermöglichkeiten in der Weiterbildung” (Support measures for advanced training), which is available in the download area (in German only).

Please also consult with relevant authorities in your home country or international organisation for information on additional support measures.

Students with disabilities or severe disabilities can receive disadvantage compensation to counterbalance disability-related disadvantages. Disadvantage compensation is normally only granted once students submit proof of a severe disability as well as further conditions (marks).
In the first three semesters there will be two modules in each semester. For every module there will be one to two textbooks, which have been specifically designed for distance learning. The fourth semester is dedicated to the Master's thesis. It is estimated that the study programme requires approximately 14 hours of study time per week. This amount of time will be particularly crucial at the start of the course since, as a rule, it will take more time to find your personal working and learning style, and to accustom yourself to the course contents and online learning environment.

The actual study time required depends on a number of factors: your individual study habits, who study or work at the TUK as well as by students in distance learning programmes during the on-campus phases. Furthermore, we offer free online courses such as e.g. “Work-Life-Learn-Balance”. For more information, please contact the programme manager.

The actual study time required depends on a number of factors: your individual study habits, your personal and professional situation, and your prior knowledge. It will also be necessary to participate on three on-campus phases. These on-campus phases comprise of one weekend in the first semester and one week at the end of the second and at the end of the third semester. Obviously, it is highly unlikely you will be able to continue your previous activities and hobbies in the same manner if you intend to properly complete the required course work. We strongly advise you realistically assess your working capacity, your interests and existing time commitments before applying for this programme.

Experience has shown that forming voluntary learning groups is beneficial to our students. In these groups, students can regularly discuss the learning materials and help each other prepare for examinations. Our online learning environment also supports students in organising car pools and founding learning groups either at the beginning of the academic programme or during your programme’s kick-off event in the first semester. We further provide students with the opportunity to share experiences and information, or to simply become better acquainted, in our online discussion forums or during the kick-off event.

Many students are also parents and want to combine their family life with their academic programme or career. TUK is dedicated to improving the conditions for reconciliation of academic programme/science and family life. Our services include, among other things, an appealing family room that can be used by parents who study or work at the TUK as well as by students in distance learning programmes during the on-campus phases. Furthermore, we offer free online courses such as e.g. “Work-Life-Learn-Balance”. For more information, please contact the programme manager.

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The online learning environment is a central component of the distance learning programme and provides, e.g., information on important semester dates and organisation of the distance learning programme as well as examination registrations, access to materials, and an opportunity to connect with other students. All learning materials are uploaded to the online environment and students can register for the on-campus phases here as well. You also have the possibility to discuss and connect with other students here.

The written learning materials were developed specifically for the distance learning programme and constitute a key component of independent self-study. For this reason, the documents have a self-explanatory structure. The materials include all significant factual information on the topic and have been didactically and formally designed in such a way as to enable independent and autonomous knowledge acquisition.

Enrolled students can access the material online as PDF as via the password-protected learning platform OpenOLAT. The respective semester’s necessary documents are available right after the beginning of the semester. You can also use our print-on-demand service to commission one of our printing service providers to print, bind, and send you the materials.

On-campus phases give you an opportunity to do more in-depth study and take your written exams. Besides you get practical insights in the Fraunhofer IESE labs. It’s also an important opportunity to meet your fellow students, share experiences and form study groups. It’s also possible to get in contact with IESE tutors (to plan the Master’s thesis for example). A studio module requires that you join a team of about five other students to develop software by applying the methods, techniques, and tools you have learned.

The DISC takes no responsibility for accommodations during on-campus phases, but we do offer assistance in searching for it.

ON-CAMPUS PHASES

The on-campus phases take place at the end of each semester for all participants except in the last semester. All on-campus phases are scheduled in a compact format: two days in the first semester, usually Friday and Saturday, and two on-campus phases of one week’s length each in the second and third semester, usually Sunday to Friday.

An additional voluntary information day (kick-off) takes place on-campus, typically in November at the start of the programme. The goal is to become acquainted with the university, the tutors and fellow students. A few months before any on-campus phase, you will receive the schedule and the online-registration will be activated.

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The materials include a table of contents followed by a glossary that clarifies domain-specific terminology as well as all foreign words necessary to understand the text for study. The list of references can be found after the brief introduction to the authors. Then, the learning objectives - that are of significant importance for all distance learning students - are defined. Finally, the objectives are followed by the actual text for study. In turn, the text for study contains formulas and exercises. You can independently check the solutions to the exercises with the help of the respective solutions or hints in the appendix. The marginalia (side notes) make the text for study more accessible by providing summaries on the state and progress of the text. In addition, you can use the space for own comments and amendments. The texts for study also contain information on further recommended reading. In the appendix, you will find supplementary and/or explanatory information, images, flow charts, source texts etc. that could not be included in the actual text for study.

In order to provide students with additional exercises, the preceding year’s assignments will also be made available on the e-learning platform.

Once you have completed all the requirements for the “Software Engineering for Embedded Systems” programme, you will be awarded a “Master of Engineering” (M.Eng.) diploma.

The successful completion of the master’s programme “Software Engineering for Embedded Systems” is certified by three documents:

- transcript of grades
- certificate of the award of the academic degree “Master of Engineering” (M.Eng.) with the overall grade
- Diploma Supplement in English

A Diploma Supplement is issued by most universities in the European Union to provide an overview of the university and grading structure within each country along with explanatory information about each specific university’s course requirements and grading methods.
SOFTWARE ENGINEERING FOR EMBEDDED SYSTEMS

OVERVIEW OF MODULES

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COURSE CREDITS AND EXAMINATION RESULTS

The degree programme consists of two phases that last for one or three semesters respectively: the core phase and the advanced phase. The average student weekly workload is approx. 14 hours. Students complete the required examination components during the course of the programme in the form of examinations, mail-in assignments or by taking part in practical training or tutorials during the on-campus phases that take place once per semester. All end-of-semester on-campus phases culminate in written examinations for which students receive grades. Mail-in assignments are a preparatory measure for the on-campus phases. Active participation during and passing oral test at the end of on-campus phases are required for successful conclusion of them.
B-M.1: SOFTWARE ENGINEERING BASICS
Authors: Prof. Dr. Dr. h. c. Dieter Rombach, Prof. Dr. Norbert Wehn, Prof. Dr. Jesse Poore and Dr. Stacy Prowell
The module consists of two study packages. The study package “Software Engineering Introduction” covers, among other things, the following topics:
- Key differences between software and hardware
- Key differences between software engineering and hardware engineering
- The existing body of knowledge – including the risks of not applying it

The content of the second study package “Software Development for Embedded Systems” includes the following aspects:
- Awareness of the role that embedded systems developers play in product safety and in meeting industrial or government standards
- Correct conceptualisation of the relationships between various abstractions and embedded systems software
- Avoiding some of the most vexing problems associated with embedded software
- The role of discrete software controls within the environment of an embedded system
- The aspects of code writing that are unique to embedded software

V-M.1: SOFTWARE QUALITY ENGINEERING
Authors: Prof. Dr.-Ing. Peter Liggesmeyer and Dr. Martin Becker
The study package “Software Quality Assurance” covers, among other things, the following topics:
- Overview of existing testing technologies and how they are used
- Introduction and evaluation of various dynamic and static testing techniques
- Choosing the best suited testing technique for current software
- Understanding and performing formal software reviews and inspections

The content of the second study package “Software Product Line Engineering” includes the following aspects:
- Basic principles, concepts and terms of software product line engineering
- Key differences between conventional single-system engineering and engineering a set of related systems in accordance with the product line engineering approach
- Planning a product line
- Managing the variability of the product line approach and understanding its impact on the engineering processes
- Key techniques for realizing variability at the implementation level while ensuring integrated quality assurance

B-M.2: PROJECT MANAGEMENT
Authors: Dr. Gerhard Pews and Felix Möhrle
The module consists of one study package and covers the following content:
- Overview of the basics of project management (interdependency between scope of work, time, budget and quality)
- Initiating, planning, controlling and managing a project
- Successful project toolbox

V-M.2: SOFTWARE CONCEPT ENGINEERING
Authors: Dr. Christian Weibel, Ingo Paech, Prof. Dr.-Ing. Norbert Wehn, Dr. Pablo Oliveira Antonino de Assis, Dr. Thomas Kuhn, Dr.-Ing. Matthias Jung, Dr. Andreas Morgenstern
The study package “Requirements Engineering” covers:
- The relevance of requirements engineering and problems caused by ignoring requirements engineering
- Methods and techniques for requirements elicitation and conflict resolution strategies
- Introduction to basic activities of requirements management
- Summary of basic types of requirements management tools and insights into state-of-the-art requirements management tools

The second study package “Software Architectures for Embedded Software Systems” deals with topics such as:
- Overview of the topic “Software Architecture” including motivation and use
- Introduction to basic principles of architecture and how to leverage them throughout the entire systems engineering process
- Consolidated view of the notion of architecture in the context of engineering software-intensive systems
V-M.3: SOFTWARE COMPONENT ENGINEERING

Authors: Prof. Dr. Arnd Poetzsch-Heffter, Prof. Dr.-Ing. Jens Brandt, Dr. habil. Mario Trapp, Dr. Thomas Kuhn

The study package “Component-based Software Development” discusses the following:

- Motivation, notions and benefits of component-based software development
- Goals, structures, features and services of component frameworks
- The specific requirements of component-based software development for embedded systems
- Relating component-based software development to programming paradigms and techniques

Among other things, the study package “Model-based Component Engineering” covers:

- Specification of components
- Differences between components and other structural elements or subsystems
- Components as parts of an architecture
- Different component realization methods

V-M.4 EMBEDDED SOFTWARE ENGINEERING

Authors: Prof. Dr. Hans Hansson et al., Dr. Rasmus Adler

The study package “Real-time Systems” is dedicated to the following topics:

- Difference between real-time systems and traditional computer systems; explain major misconceptions between these two
- Basic concepts in real-time operating systems; introduction to commercially available systems
- Real-time scheduling (different algorithms, consequences of shared resources, guarantee timing behaviour)
- Medium Access Control (principles, common protocols, holistic analysis)

The study package “Dependability Engineering” is concerned with:

- Threats to dependability
- Faults, errors and their relation to failure of a system
- Means to attain dependability through fault prevention, fault tolerance, fault removal and fault forecasting
- Safety assurance and how safety processes / project management, safety engineering and safety related product engineering can be applied to dependability attributes
Leading international experts from industry sources and research institutes have taken on responsibility for the quality of the programme contents. These include:

PROF. DR. DR. H. C. DIETER ROMBACH
TU Kaiserslautern, Faculty of Computer Science, Software Engineering Processes and Measurement Research Group

PROF. DR.-ING. NORBERT WEHN
TU Kaiserslautern, Faculty of Electrical and Computer Engineering, Microelectronic Systems Design Research Group

DR. GERHARD PEWS
Capgemini Consulting

PROF. DR.-ING. PETER LIGGESMEYER
TU Kaiserslautern, Faculty of Computer Science, Software Engineering Research Group

DR. MARTIN BECKER
Fraunhofer ISE, Embedded Systems Engineering

PROF. DR. HANS HANSSON
Mälardalen University Sweden, School of Innovation, Design and Engineering

PROF. DR. ARND POETZSCH-HEFFT
TU Kaiserslautern, Faculty of Computer Science, Software Technology Research Group

PROF. DR.-ING. JENS BRANDT
Hochschule Niederrhein, Electrical Engineering and Computer Science, Digital Systems and Embedded Programming

DR. HABIL. MARIO TRAPP
Fraunhofer ISE, Model-based Component Engineering, Fraunhofer ISE, Division Software Development

DR. RASMUS ADLER
Fraunhofer ISE, Embedded System Quality Assurance
The programme is a cooperative venture between the Distance and Independent Studies Center (DISC) and the Department of Computer Science at the TU Kaiserslautern and the Fraunhofer Institute for Experimental Software Engineering (IESE). The programme is organized and run by the DISC. The following sections provide more detailed information on all departments.

DEPARTMENT OF COMPUTER SCIENCE AT THE TU
Kaiserslautern is famous for its soccer team “Red Devils” and was selected as one of the official venues for the 2006 FIFA World Cup. The city’s unique mixture of high tech and unspoiled nature, history and modernity makes for an international and multicultural teaching and research environment. The university has an inviting modern campus located in the Palatine Forest (UNESCO Biosphere Reserve). The university is home to about 14,700 students. Its focus on technical and science education is underlined by a strong cluster of affiliated research institutes in an adjacent science park. The university reflects a special profile and orientation towards applied research, which is emphasized by a number of highly prestigious centers of excellence and well-established cooperation with international and German industries. Its highly qualified and motivated faculty attracts talented students from all over the world, which creates an international and multicultural teaching and research environment. The computer science department is very active in research and education. There are currently 24 groups covering the entire spectrum of research topics, focusing particularly on:

- Information and Communication Systems
- System and Software Engineering
- Knowledge-based and Multimedia Systems
- System and Software Engineering

FRAUNHOFER INSTITUTE FOR EXPERIMENTAL SOFTWARE ENGINEERING (IESE)
Fraunhofer IESE develops innovative methods and solutions for the development of high-quality, complex information systems and embedded systems. In order to offer an immediate added value, it applies its methods directly during its customers’ product development and/or transfers its methods and solutions to them. In research, it performs contract research for its customers and conducts research in public projects. It has focused and tailored its competencies to its customers’ challenges in the information systems and embedded systems domain. Fraunhofer IESE addresses new upcoming systems of systems that combine information systems and embedded systems through its research focus on Smart Ecosystems. As basic competencies for all system classes, support is provided in the field of process management.

Fraunhofer IESE in Kaiserslautern is one of the worldwide leading research institutes in the area of software and systems engineering methods. A major portion of the products offered by its customers is defined by software. These products range from automotive and transportation systems via automation and plant engineering, information systems, and health care to software systems for the public sector. The institute’s software and systems engineering approaches are scalable, which makes Fraunhofer IESE a competent technology partner for organisations of any size from small companies to major corporations. Fraunhofer IESE currently has about 200 employees.

Fraunhofer IESE, which was founded in 1996, is directed by Prof. Peter Liggesmeyer and Prof. Dieter Rombach. It is one of 67 institutes and research units of the Fraunhofer-Gesellschaft, the largest applied research organisation in Europe, which has a major impact on shaping applied research in Europe and contributes to Germany’s competitiveness in international markets. Since the founding of the institute, a close relationship has existed between Fraunhofer IESE and the TUK in both academia and research. As assistant lecturers, employees of the institute contribute to the high level of practice-oriented education in the Department of Computer Science. The area of Software Engineering is represented by the Software Engineering Research Group: Processes and Measurement of Prof. Dr. Dieter Rombach and the Software Engineering Chair: Dependability led by Prof. Dr. Peter Liggesmeyer. In joint projects with third-party funds, the basic research of the Department of Computer Science and the applied research of Fraunhofer IESE complement each other ideally.

FRAUNHOFER ACADEMY
In 2005 the Fraunhofer Academy was established as a central unit to support Fraunhofer institutes in offering advanced training programmes. With the range of training and development courses, the Fraunhofer Academy seeks to contribute to the creation of a new innovation culture in Germany and Europe. Especially in-service online Master programmes like IESE’s “Software Engineering for Embedded Systems” are perfectly suited to create new opportunities for software professionals. In cooperation, we provide a programme that combines best-in-class theoretical and practical aspects of software engineering. Further information can be found at www.academy.fraunhofer.de.
The DISC was founded as the Zentrum für Fernstudien und Universitäre Weiterbildung in 1992 and is a key scientific department of the TU K. The DISC incorporates the three areas: Zentrum für Fernstudien und Universitäre Weiterbildung (ZFUW, Center for Distance Studies and Advanced University Training), eTeaching Service Center (eTSC) and Selbstlernzentrum (SLZ, self-directed study center) that each addresses the overarching range of DISC tasks in various fields: distance learning, e-teaching support and self-study skills.

The range of measures that are offered in cooperation with the individual subjects and departments at the TU K include postgraduate distance learning programmes of varying duration and with different degrees. All distance learning programmes can be taken as dual study programmes. More than 4,300 students from Germany, Europe and the rest of the world are currently enrolled in the following academic programmes:

**“HUMAN RESOURCES” DEPARTMENT**
- Adult Education (Master of Arts)
- Human Resources Development (Master of Arts)
- Organizational Development (Master of Arts)
- School Management (Master of Arts)
- Social Sciences: Organisation and Communication (Master of Arts)
- Systemic Consulting (Master of Arts)
- Systemic Management (Certificate)

**“MANAGEMENT & LAW” DEPARTMENT**
- Commercial Law for Business Practice (Master of Laws)
- Economy and Management (Master of Arts)
- Management of Cultural and Non-Profit Organisations (Master of Arts)
- Management of Health and Social Institutions (Master of Arts)
- Master of Evaluation (Master of Arts)
- Sustainable Development Cooperation (Master of Arts)
- Tax Law for Business Operations (Master of Laws)

**“SCIENCE & ENGINEERING” DEPARTMENT**
- Financial Engineering (Master of Science)
- Fire Protection Planning (Master of Engineering)
- Medical Physics (Master of Science)
- Medical Physics and Engineering (Certificate)
- Nanobiotechnology (Certificate)
- Nanotechnology (Master of Science)
- Psychology of Developmental and Learning Disorders in Children (Master of Science)
- Software Engineering for Embedded Systems (Master of Engineering)

Additional to the above mentioned academic programmes the DISC offers certificate courses. We are constantly increasing our range of offered programmes. Further information is available at www.zfuw.de.
TECHNISCHE UNIVERSITÄT KAIERSLAUTERN

As a campus university with around 14,700 students, the TU K offers approx. 100 future-oriented degree programmes in twelve departments. The manageable size of the university also guarantees students close contact to professors and outstanding support. The TU K has a lot to offer its students, including a multitude of attractive degree programmes such as biophysics, biological or chemical engineering, food chemistry and engineering mathematics. Most degree programmes are interdisciplinary in nature and therefore unite various disciplines. A degree in a STEM subject (science, technology, engineering, mathematics) opens interesting and diverse career prospects.

The TU K enjoys an excellent international reputation in research and teaching. Students and (junior) scientists benefit from the numerous internationally renowned research institutions that cooperate closely with the TU K in the field of applied research. These include, amongst others, two Fraunhofer institutes, one Max Planck institute, the German Research Centre for Artificial Intelligence, and the Institute for Composite Materials.

KAISERSLAUTERN, AS A CENTRE FOR SCIENCE, IS ONE OF THE MOST SIGNIFICANT IT CLUSTERS IN EUROPE

The TU K is a member in the group “Universität der Großregion - UniGR” (University of the Greater Region). The other members are the universities in Lorraine, Liège, Luxembourg, Saarbrücken, and Trier. This means that TU K students can also benefit from, e.g., the range of courses offered at the partner universities. Further information: www.uni-kl.de/uni-gr

Students will also benefit from an appealing housing situation: There are more than 2,000 student rooms available in close proximity to the campus. All rooms naturally come with free internet. The Department of International Affairs/ISGS offers international students and scientists a broad range of support services to help them get settled at the TU K as quickly as possible. Junior scientists (e.g., doctoral candidates) are supported in their personal and professional development by the TU-Nachwuchsring (network for support of young scientists).

THE CAMPUS OF THE TU K ALSO HAS A LOT TO OFFER IN ADDITION TO PROFESSIONAL TRAINING

Thanks to the broad range of different sports and the variety of attractive excursions, the university’s sports programme has become a key component of recreational activities at the TU K. In the evening, students can attend concerts, the theatre, our cinema and various exhibitions on-campus. Furthermore, there are numerous student-led groups dedicated to most hobbies. The TU K’s event calendar also includes a variety of festivities, such as the summer ball or the summer party.

www.uni-kl.de

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www.uni-kl.de
DO YOU HAVE ANY QUESTIONS?

CONTACT US. WE ARE HERE TO HELP.

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Subject to change and errors.

For more information on the distance learning Master's programme “Software Engineering for Embedded Systems”, please go to: www.zfuw.de

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