



School of Mechanical Engineering and Safety Engineering

Classes available in English

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Workload	5 ECTS
Written exam	120 minutes
Oral exam	30 minutes

Remarks:

- The course can be held in German or English. The language of instruction will be determined at the beginning of the semester.

Contents:

The content of the course is the development and elaboration of innovative concepts with a focus on product safety and functional expansion. The following topics are covered in detail in the lecture:

- Basic rules and principles of safety-oriented innovation
- Product documentation and product liability
- Product analysis and section
- innovation planning
- Systematic product innovation
- Evaluation and selection of product concepts
- Risk analysis and assessment
- Basic rules and principles of safety-conscious design
- Quality assurance in the early phases of product development

The scientifically founded methods taught in the lecture are illustrated by practical examples. In the exercise, the students apply the gained knowledge to a real product and independently develop an innovative product concept taking safety restrictions into account.

Workload	5 ECTS
Written exam	120 minutes
Oral exam	30 minutes

Remarks:

- Language of instruction: English. A good command of English (written and spoken) is required.
- The course includes an excursion of several days to a foreign partner university.
- Information on secondary literature will be provided in the course.

Contents:

The content of the lecture is the development of an innovative product concept within an international development team of engineers and designers. The team members come from participating partner universities all over the world. Within the framework of the class, several international teams collaboratively develop their own product concepts. The teams compete against each other. Throughout the duration of the course, all teams take part together in comprehensive lecture units. Due to the different time zones of the participating locations, the lecture will be held digitally using online media. Topics of the lecture units are in detail:

- Design thinking and product development methods of interdisciplinary development:
- Research & Project Definition
- Brainstorming & Ideation
- Sketching & Designing
- Making & Modeling
- Testing & Refinement

In regular design reviews in front of an international committee, students present their results and train their communication and presentation skills. The development activities are intensified in a joint presence phase and presented to an international audience in a concluding "All-Team show-and-tell event" at one of the participating universities.

Workload	5 ECTS
Written exam	120 minutes
Oral exam	30 minutes

Remarks:

- Participation in the class presupposes the existence of a reliable technical foundation or product idea of one's own.
- For the practical development of marketable product concepts, basic knowledge of mechanics, design, machine elements and engineering tools (e.g. 3D CAD system, MS Excel, FEM tool, etc.) or computer science and electrical engineering is required.
- The module can be offered in English or German. This is to be determined at the beginning of the semester.

Contents:

The aim of the class is to enable the participating students to set up their own start-up company with a marketable product concept based on their own (technical) product idea.

In addition, the class will generally focus on the implementation and safeguarding of an economic, safety-oriented, technical product concept.

Within the framework of the class, the participants will be enabled to fulfill the technical and organizational boundary conditions for placing a product on the market with their own product idea (e.g. required product documentation). Particular emphasis is placed on risk minimization and aspects of general product integrity and safety-oriented product innovation.

At the same time, individual coaching for the successful acquisition of subsidies in the start-up scene and accompanying start-up management is provided.

Workload	5 ECTS
Written exam	120 minutes
Oral exam	30 minutes

Remarks:

- Participation in the class presupposes the existence of a reliable technical foundation or product idea of one's own.
- For the practical development of marketable product concepts, basic knowledge of mechanics, design, machine elements and engineering tools (e.g. 3D CAD system, MS Excel, FEM tool, etc.) or computer science and electrical engineering is required.
- The module can be offered or taken in English or German. This is to be determined at the beginning of the semester.

Contents:

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At the same time, individual coaching for the successful acquisition of subsidies in the start-up scene and accompanying start-up management is provided.

Workload	5 ECTS
Oral exam	30 minutes

Remarks:

- Language of instruction: English. A good command of English (written and spoken) is required.
- The course includes an excursion of several days to a foreign partner university.

Contents:

The content of the lecture is the development of an innovative product concept in the field of automotive engineering. The team members are from participating partner universities abroad. Within the framework of the class, student teams develop their own interdisciplinary product concepts under guidance.

The lectures will be held jointly in English and broadcast via the Internet. During the exercises, a technical and design task is processed by the students in teams made up of students from each department (mechanical engineering, design, systems engineering).

The project includes an excursion to the foreign partner university as well as a return visit by the students.

A final presentation of the results and the production of models, mock-ups and prototypes are part of the curriculum.

Workload	5 ECTS
Written exam	120 minutes
Oral exam	30 minutes

Remarks:

- The course can be held in German or English. The language of instruction will be determined at the beginning of the semester.
- The course requires a basic knowledge of the general operation of a computer. The exercise is partly computer-supported in a PC pool.

Contents:

Content of the course are methods and strategies of Product Lifecycle Management (PLM) and the associated processes and tools for the implementation of so-called Smart Engineering in safety-compliant product development. The following topics will be covered:

- Product Lifecycle Management (PLM) as Paradigm
- PLM in the context of Product Development / Product Data Management (PDM)
- Systems Engineering and Model Based Systems Engineering
- Smart products, IoT and industry 4.0
- Engineering IT and interfaces

The scientifically founded methods taught in the lecture are illustrated by practical examples. In the exercise, the students apply the knowledge imparted in the form of guided, computer-assisted practical exercises themselves. Common software tools from industrial practice are used.

Workload	5 ECTS
Written exam	120 minutes
Oral exam	30 minutes

Remarks:

- The course can be held in German or English. The language of instruction will be determined at the beginning of the semester.
- The course requires basic knowledge in the areas of product development/design or design systematics.
- If possible, participants should have already gained their first industry experience in the form of internships.

Contents:

The course deals with the area of production development / production management regarding the following topics:

- Basics and boundary conditions of production development and production management
- Company and planning processes
- Product structure and product architecture design
- Rationalization in product development and variant management
- Change management
- Lean management
- Tools and methods of optimization in production management
- Value stream method
- Work, production and assembly planning
- Expenses
- Production and work control

The scientifically founded methods taught in the lecture are illustrated by practical examples. In the exercise, the students apply the knowledge conveyed in the form of guided exercises themselves.