

Information on the elective Research Practice

One module from the following list must be chosen:

- LRG0002 term paper or
- LRG0003 Team project or
- LRG0004 Research internship

1. Term paper (LRG0002):

1.1. Form of examination:

The module examination consists of the following:

Scientific elaboration in the form of a term paper: With the term paper, students demonstrate that they are able to solve problems from the area of the Master's programme by independently carrying out a practical research project. In doing so, they take into account learned professional approaches and apply scientific methods. The students also show that they are confident in writing scientific texts.

1.2. Competencies:

After successful completion of the module, students are able to independently work on a scientific problem from the subject area of the Master's programme or to assess and evaluate it using the methods acquired during the programme and/or relevant specialist literature that is independently used. The results are to be evaluated, summarised, checked for plausibility and scientifically interpreted. On this basis the students are able to formulate new observations and findings. The students are able to create an individual project plan and to complete it within the planned period.

At the end of the course students are confident in writing a scientific paper. This includes the use of scientific language and the rules of citation, the structure of the paper as well as the presentation and discussion of the results.

1.3. Content:

Students solve experimentally, constructively or theoretically a problem from the area of the Master's programme. For this purpose, they independently write a scientific paper in accordance with the guidelines for securing scientific practice. The quality criteria of good scientific practice are deepened and applied.

1.4. Teaching/learning method:

By participating in the module term paper, students practice the activities of an engineer. The term paper is designed as a project work. **Each student works on his or her own project in independent individual work.**

Each student is assigned his/her own examiner. This examiner supports the students at the beginning of the work by introducing them to the topic, provides suitable literature and gives advice both in the technical work and in the preparation of the written paper.

Brief summary:

- Independent writing of a paper on an engineering problem
- Application of scientific methods
- Individual support by examiner

2. Team Project (LRG0003):

2.1. Form of examination:

The module examination consists of the following:

Scientific elaboration within the framework of a team project (**individual examination**):

With the preparation of the scientific elaboration for the team project, students demonstrate that they are able to solve problems from the area of the Master's programme by independently carrying out a practical research project, taking into account the learned professional approaches and using scientific methods (**100% of the module grade**). The students also show that they are confident in writing scientific texts.

2.2. Competencies:

After successful completion of the module, students are able to work on an **individual project** (a scientific problem from the subject area of the Master's programme) which **is part of a larger project and in which several students work in parallel on partial aspects of this larger project under the guidance of an examiner**.

They are able to assess and evaluate problems using the methods acquired in the course of their studies and/or relevant specialist literature, **which is used independently and can be exchanged within the team**. They are able to evaluate and summarize the results, as well as to check them for plausibility and to interpret them scientifically. On this basis students are able to formulate new observations and findings.

Students are able to draw up an individual project plan for a single project within a larger project and to complete it within the planned time frame.

At the end of the course, students are confident in writing a scientific paper. This includes the use of scientific language and the rules of citation, the structure of the paper as well as the presentation and discussion of the results. **They are able to exchange information within the project team and can create and implement project plans within their team.**

2.3. Content:

Students solve a problem from the area of the Master's programme experimentally, constructively or theoretically. **The results of the individual projects are used to work on a superordinate project.** For this purpose they independently write a scientific elaboration according to the guidelines for securing scientific practice. The quality criteria of good scientific practice are deepened and applied.

2.4. Teaching/learning method:

By participating in the module, students practise the activities of an engineer. The team project is designed as project work. **Each student works on his or her own project in independent individual work (individual project), which is part of a larger project.** Each group is assigned its own examiner. This examiner supports the students at the beginning of the work by introducing them to the topic, providing suitable literature and giving advice on both the technical work and the preparation of the written work.

Brief summary:

- Independent writing of a scientific paper on a major engineering problem
- Working on a single project within a larger project on which several students are working
- Creation of a joint project plan per team and exchange of information
- Supervision of the team by examiner

3. Research internship (LRG0004):

3.1. Form of examination:

The module examination takes the form of a project work (including written documentation and presentation). In several phases (problem definition, brainstorming, criteria development, decision, implementation), students should demonstrate that they can independently work out a scientific problem from the topic area of the Master's programme and find their own solutions.

By **preparing a written documentation in the form of a report or a scientific poster as well as a presentation**, they show, for example, that they are able to assess and evaluate the methods learned during their studies and/or relevant specialist literature and thus independently work out this scientific problem and find their own solutions. Furthermore, they show their ability to summarize evaluated results in a meaningful way and to interpret them scientifically. They are able to formulate their observations and findings rhetorically and present them to an expert audience.

3.2. Competencies:

After successful completion of the module, students are able to independently work out a scientific problem from the subject area of the Master's programme and find their own solutions. They are able to assess and evaluate this problem using the methods learned in the course of their studies and/or relevant specialist literature that is independently consulted. They are able to evaluate and summarise the results, to check them for plausibility and to interpret them scientifically. On this basis students are able to formulate new observations and findings and **to present them in writing and orally**.

Students are able to create an individual project plan and to implement it within the planned period. At the end of the module students are confident in evaluating and presenting scientific results. They are capable of professional exchange within a scientific working group.

3.3. Content:

The students work out their own problem from the area of the Master's programme and solve it experimentally, constructively or theoretically. **Ideally, the research internship thus serves as the basis for the Master's thesis.** For this purpose they independently write **a scientific report or a scientific poster**. Through the **exchange within a scientific working group** they learn to convince rhetorically, which they can then prove in a **presentation**.

3.4. Teaching/learning method:

By participating in the module, students practice the activities of an engineer **in a research institution**. The research internship is designed as a project work. **Each student works on his or her own project in independent individual work. Each student is assigned his/her own examiner.** This examiner supports the students at the beginning of the work by introducing them to the topic, providing suitable literature and giving advice on both the subject and the project work. Under the guidance of academic staff, students work out **their own engineering problems** and identify possible solutions. These can then be worked on further in the subsequent Master's thesis.

This format can be supplemented by additional seminar-like events, journal clubs (peer review in small groups) and **retreats** (workshops lasting several days to deepen and discuss scientific topics). These events serve to **apply presentation techniques** as well as the **ability to analyse and evaluate possible solutions and to communicate accordingly**.

Brief summary:

- Individual project work in several phases
- Elaboration of own engineering problems and outline of possible solutions
- Ideally preparation for Master's thesis
- Preparation of a written documentation about an engineering problem in the form of a report or a scientific poster and a presentation of the results
- Individual support by examiner