This is a translated version. In case of discrepancy the Swedish version prevails.

Research Methodology, 5 credits

Forskningsmetodik, 5 högskolepoäng

Course code:	FOES025
Third-cycle subject:	Energy and Environmental Engineering
School:	School for Business, Society and Engineering
Division	Division of Sustainable Environment and Construction
Valid from:	Autumn term 2024
Established by:	The Dean of the School
Decision date:	2024-11-20
Last modified:	--
Level of education:	Third cycle level

Course objective

The course is offered to students who are in the initial stages of their PhD. The course introduces theories and methods relevant to research and development in the engineering sciences. A further aim is to encourage reflection and constructive critical discussion of current research, research methods and their theoretical background.

Course content

The course will give PhD students an introduction to theories of science and various types of research methods appropriate for engineering research, and skills to apply central research methodologies in the engineering field.

The course will have a major focus on identification of the research area, identification of research tasks, proposals for research methodology and research approach suitable for the PhD project, planning and performing a research project, and procedures to solve the tasks.

Intended learning outcomes

After the course, the doctoral student will be able to:

1. Identify and formulate a problem statement
2. Identify and apply the required research methods to perform the research in an adaptive manner
3. Present research methods in both written and oral form to different audiences
4. Write a short theoretical section on the research approach to be followed, accompanied by relevant scientific references

5. Understand and counteract possible negative environmental or ethical aspects related to the research project.

The intended qualitative targets in relation to the Higher Education Ordinance, appendix 2.

Knowledge and understanding

For the Degree of Doctor, the doctoral student shall demonstrate:

- A1: [...] understanding of the research field as well as advanced and up-to-date specialised knowledge in a limited area of this field, and
- A2: familiarity with research methodology in general and the methods of the specific field of research in particular.

Competence and skills

For the Degree of Doctor, the doctoral student shall demonstrate:

- B1: the capacity for scholarly analysis and synthesis as well as to review and assess new and complex phenomena, issues, and situations autonomously and critically,
- B2: the ability to identify and formulate issues with scholarly precision critically, autonomously, and creatively, and to plan and use appropriate methods to undertake research and other qualified tasks within predetermined time frames and to review and evaluate such work,
- B3: through a dissertation the ability to make a significant contribution to the formation of knowledge through his or her own research,
- B4: the ability in both national and international contexts to present and discuss research and research findings authoritatively in speech and writing and in dialogue with the academic community and society in general, and
- B5: the ability to identify the need for further knowledge.

Judgement and approach

For a Degree of Doctor the doctoral student shall demonstrate

- C2: specialised insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used.

Teaching formats

Seminars and workshops.

Examination

INL1, written assignment, 1.5 cr, concerning learning outcomes 1-5, grade Fail (U) or Pass (G).

INL2, written assignment, 1.5 cr, concerning learning outcome 2, grade Fail (U) or Pass (G).

PRO1, project, 2 cr, concerning learning outcomes 1-5 grade Fail (U) or Pass (G).

Grade

Examinations included in the course are assessed according to a two-grade scale, fail or pass.

A person who has not passed the regular examination shall be given the opportunity to retake the test.

Requirements

To participate in the course and the examinations included in the course, the applicant must be admitted to doctoral studies. Exceptions can be made at the discretion of the course responsible and course examiner for industry professionals holding a relevant MSc degree or equivalent experience in the subject.

Specific entry requirements

The course is suitable for PhD students in the field of energy, aerospace, controls, fluid mechanics, heat transfer, and production system optimization as well as embedded system applications.

Selection criteria

Selection of applicants will be made in accordance with the ranking below:

1. Doctoral students in Energy and Environmental Engineering
2. Doctoral students at Mälardalen University
3. Doctoral students at other universities in Sweden
4. Doctoral students at higher education institutions outside Sweden
5. Industry professionals holding a relevant MSc degree or equivalent experience in the subject

Transitional and other provisions

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