

Research Methods in Civil Engineering

Lecturers

Arnaud DERAEMAER (Coordinator), Dimitrios ANGELIS and Marijke Huysmans

Course mnemonic

PROJ-H407

ECTS credits

3 credits

Language(s) of instruction

English

Course period

Second term

Campus

Solbosch

Course content

Six seminars will be given by Prof A. Deraemaeker from covering the following topics :

- > Introduction to research and RMCE objectives
- > Extracting and structuring information from a set of references
- > Linking the state-of-the-art with the objectives and the methodology
- > Building a workplan and associating a timeline
- > Guidelines for writing a clear report (Figures, References, ...)
- > Making efficient scientific presentations

The first five seminars are directly linked to the main objective of the course related to the delivery of the report.

The last seminar is an introduction to oral presentations of scientific research and will serve as a preparation for the master thesis defense in master 2, and for the oral defense of the report in the present course.

Time line :

- > list of master thesis topics available for the students
- > choice of topics by the students
- > draft report submitted to the promotor
- > evaluation of the report by the promotor
- > meeting with the promotor to discuss the draft report
- > final report

A short summary of the discussions of the promotor during the meeting should be provided separately from the final report.

Objectives (and/or specific learning outcomes)

The main objective of the course is to teach the necessary background to conduct research in the field of civil engineering and prepare for the research work to be performed during the

master thesis. The main deliverable of the course is a 10-12 pages report which serves as a preparation for the master thesis. The student will choose a research topic in a list provided by the master thesis promotors and write a report containing

- > A short abstract (½ page)
- > An introduction giving the background, context and motivation and general objective of the work (1-2 pages)
- > A critical and structured state-of-the-art containing the most important references, a description of the relevant information from these publications and their link with the topic of the research, as well as their adequacy or limitations with respect to the problem treated. The state-of-the-art should clearly identify the gaps in the existing methods/ applications which motivate the research and define the goals. (2-3 pages)
- > A clear and structured work plan. The work plan should be clearly linked to the gaps identified in the state-of-the-art and be aimed at filling these gaps, by proposing specific methods. In doing so, the work should be structured in tasks, which are themselves gathered in work packages. A Pert chart showing the links between work packages and tasks (which output result is used as an input to which task?) should be included (2-3 pages)
- > A tentative schedule. At this stage it is important to imagine how the tasks defined in the work plan should be arranged in time in order to finalize the research work by the end of the academic year. As always in research, this is only tentative and will be used as an adaptable roadmap during the thesis. (1 page)
- > A reference list. Note that all references present in the list should be referenced directly in the text (no 'free reference'). The choice of the referencing style is left free, but note that referencing with footnotes is not a common practice in civil engineering, so they should be avoided. (1-2 pages)

The total length of the report should be between 10 and 12 pages, and follow a template (provided in word and latex)

Pre-requisites and co-requisites

Course having this one as pre-requisit

MEMO-H501 | Master thesis civil engineering | 24 crédits

Teaching method and learning activities

12h seminars

100h personal work

Contribution to the teaching profile

This module contributes to the following programme outcomes for the Master of Science in Engineering:

The Master in Engineering Sciences has in-depth knowledge and understanding of

1. exact sciences with the specificity of their application to engineering
2. integrated structural design methods in the framework of a global design strategy
3. the advanced methods and theories to schematise and model complex problems or processes

The Master in Engineering Sciences can

4. reformulate complex engineering problems in order to solve them (simplifying assumptions, reducing complexity)
5. conceive, plan and execute a research project, based on an analysis of its objectives, existing knowledge and the relevant literature, with attention to innovation and valorisation in industry and society
6. correctly report on research or design results in the form of a technical report or in the form of a scientific paper
7. present and defend results in a scientifically sound way, using contemporary communication tools, for a national as well as for an international professional or lay audience
9. work in an industrial environment with attention to safety, quality assurance, communication and reporting
10. develop, plan, execute and manage engineering projects at the level of a starting professional
11. think critically about and evaluate projects, systems and processes, particularly when based on incomplete, contradictory and/or redundant information

The Master in Engineering Sciences has

12. a creative, problem-solving, result-driven and evidence-based attitude, aiming at innovation and applicability in industry and society
13. a critical attitude towards one's own results and those of others
14. consciousness of the ethical, social, environmental and economic context of his/her work and strives for sustainable solutions to engineering problems including safety and quality assurance aspects
16. an attitude of life-long learning as needed for the future development of his/her career

References, bibliography and recommended reading

- D. V. Thiel, 'Research Methods for Engineers', Cambridge University Press (2014).
- R. Fellows and A. Liu, 'Research Methods for Construction', J. Wiley&Sons (2015).

E.-C. Leong et al., 'Guide to Research Projects for Engineering Students', CRC Press (2016).

S. G. Naoum, 'Dissertation Research & Writing for Construction Students', Elsevier (2007).

Other information

Place(s) of teaching

Solbosch

Contact(s)

Arnaud.Deraemaeker@ulb.be

Evaluation method(s)

Written report and Oral presentation

Evaluation method(s) (additional information)

Final report and oral presentation.

Determination of the mark (including the weighting of partial marks)

The final mark is given by the jury composed of the three professors responsible for the course (Prof A. Deraemaeker, D. Van Hemelrijck and M. Huysmans). It is based on two written evaluations (one by the promotor of the work, one by an external reader), and the quality of the presentation and answer to questions. It is not the result of a weighted average, but given by consensus in the jury.

Main language(s) of evaluation

English

Programmes

Programmes proposing this course at the Brussels School of Engineering

MA-IRCN | **Master of science in Civil Engineering** | finalité Professionnel/unit 1

