

CT4030	Methodology for scientific Research	3
Instructor	Alex Fraaij	
Education Period	4th Education Period	
Exam Period	4th Exam Period, Exam by appointment	
Course Language	English	
Course Contents	<p>The growth of knowledge The course starts with the meaning of research methodology, the coincidence, chance and context in a reconstruction of research. The research will be analyzed in the classroom with the aid of questions asked by the instructor and the observations of the students.</p> <p>Methodological fundamentals Aspects such as different types of variables, different control systems to monitor and check the variables will be analyzed with the aid of examples in experimental research. Topics that will be discussed also are: types of experiments, statistical control, validity of research, the relation between the random sample survey and the total population, sample size and the effects of sample size, power of the test and meta-analysis.</p> <p>The analysis of research papers Published technical papers in the field of civil engineering will be discussed in depth on the topics mentioned above. Is the paper a correct reflection of a correct research, are there flaws in the research, is the methodology sound, did the researcher actually investigate the topic he/she wanted to research, are the conclusions correct, is the statistics correct or "forgotten"?</p> <p>The empirical cycle The empirical cycle will be highlighted to provide the student a theoretical basis and will be discussed with examples of different types of research.</p> <p>Aggravation to putting into operation and measurement Topics to be discussed are operational versus constitutive definitions, constructs, making more explicit of the measurement procedures and schemes, systems versus properties, what is actually "measuring" and some opinions about it.</p> <p>Research design In this section experimental and quasi-experimental designs for research will be discussed including topics as controlled factors in relation with experimental validity, representativeness</p> <p>Validity, reliability, generalization and quality judgement The concepts of validity and empirical validity (as well as predictive validity), reliability aspects (test and re-test, parallel measurements, split-half), the quality of the judgements and interpretations, research, objectivity, inter subjectivity, epistemology will be highlighted:</p> <p>design possibilities for research including research materials, research strategies, research planning</p> <p>the analysis of the different topics of a more complicated research paper in the field of civil engineering with the aid of the above mentioned items</p> <p>examples from the field of civil engineering (also in the framework of cases to be studied by the student)</p> <p>Qualitative Research</p> <p>Project Management</p>	
Study Goals	After the course the student should be able to design a research project and to examine critically the literature on the proper research methodology.	
Education Method	lectures discussion case study exercise	
Literature and	For Dutch speaking students the book from Christiaans, Fraaij, de Graaff & Hendriks	

Study Materials	<p>"Onderzoeksmethodologie". This book can be bought at the secretariat of the section Materials Science.</p> <p>For non-Dutch speaking students: The english book on "Research Methods for Construction" is recommended. The book must be ordered and bought at a bookshop.</p> <p>Obligatory other materials: cases Available at the section secretariat.</p>
Assessment	<p>The student can choose to do an oral examination or a written examination. The written exam consists of open questions. The oral examination focuses on the three cases presented by the student.</p>
Remarks	<p>This course is meant for those MSc students who plan to perform research activities and can be attended by students of different MSc studies in the technical educations.</p>
Judgement	<p>Prerequisite for participation in the exam is finishing the cases. average of the cases and the examination questions</p>