

## Module Description Sustainable Mobilities (SUM)

Study and Exam Regulation starting summer semester 2019



## Content

Introduction .....	3
418-001 SUM I.1 Sustainable mobilities – theories, concepts, approaches .....	4
I.1.1 Sustainable mobilities - theories, concepts, approaches	
I.1.2 Basic concepts of social science based research	
418-022 SUM I.2 Applied philosophy of science .....	10
I.2.1 Applied philosophy of science	
I.2.2 SPSS	
418-003 SUM I.3 Research Methods .....	14
418-023 SUM I.4 Mobility solution design 1 .....	19
418-005 SUM II.1 Basic knowledge for the mobility transition .....	22
418-024 <b>SUM II.2 Urban mobilities</b> .....	29
<b>418-025 SUM II.3 Mobility solution design 2</b> .....	34
418-026 SUM II.4 Mobility policies 1 .....	38
<b>418-027 SUM III.2 Mobility policies 2</b> .....	41
418-010 SUM III.3 Problem based research project 1 .....	45
418-011 SUM III.4 Problem based research project 2 .....	48
418-028 SUM III.5 Mobility solution design 3 .....	51
418-013 SUM IV.2 Master's Thesis.....	55
418-013 SUM IV.3 Master Colloquium .....	58
418-030 Elective: Data Analysis and Visualization .....	61

## Introduction

*Sustainable Mobilities* (SUM) is an interdisciplinary, social-science-based master program, which prepares students for the needs of a fast moving and changing job market from business & consultancy to public services and the non-profit sector. New mobility concepts, Mobility-as-a-Service (MaaS) and the rising sharing economy (car, bike, scooter sharing, ride hailing etc.) and new modes of transport, autonomous vehicles, volocopters and drone-based logistics will change the landscapes of mobility and transport and the adjacent industries, jobs and professions significantly.

Mobility and transport is moving from a “system of automobility” to systems of multiple mobilities. Sustainable, smart, connected and integrated modes of transport will be shaping the future of cities, rural areas and the everyday lives of people and businesses.

*Sustainable Mobilities* addresses these multiple mobilities and tailors a program deploying key competences, skills and forms of knowledge to work in this fast changing environment and shape the transition towards economically, socially and ecologically sustainable mobility and transport.

The overarching goal is to prepare and educate students for leading positions in mobility research and planning, consultancy and in business. In addition, *Sustainable Mobilities* opens up opportunities for academic careers and in research organizations close to universities. The internationality of the education all in English guarantees the students' employability in a European and increasingly global job market.

The problem-oriented pedagogical and didactic concept of the master program qualifies for a wide range of professions and jobs in which problem solving, innovative thinking and researching, expertise in methods and the development of research designs and problem solving strategies are essential and demanded. The interdisciplinarity of *Sustainable Mobilities* qualifies in thinking in complexity and identifying the potentials of connected and networked solutions beyond disciplinary limitations.

In addition, students study and learn in an intercultural environment with teachers, students and guest lecturers from different nationalities and disciplines.

## Module Code and Module Name

**418-001 SUM I.1 Sustainable mobilities – theories, concepts, approaches**

## Significance of Module for the Goals of the Study Course

### Qualification Goals

This module introduces to the main theories, concepts and scientific approaches in the field of sustainable mobilities and to the basics in social-science-based research on mobility and transport. It is split into two lectures (I.1.1 and I.1.2) and introduces to current debates and the main authors in the field. I.1.1 deals with the quantitative and qualitative aspects of mobility developments and sustainability. I.1.2 teaches a major competence for the education: writing essays and scientific papers. By so doing, it also gives access to interdisciplinary mobility research from social science and anthropology to planning, design and engineering.

The module aims for a deeper understanding of why mobility is a general principle, a human need and major demand in modern societies. Students learn why the current level and organization of mobility and transport is unsustainable and subject to transition and change. Understanding mobility as a social and cultural phenomenon helps to generate better and more sustainable products, services and solutions for modern societies. Both lectures teach key competences and skills and prepare the students to the challenges and opportunities of the current transformation of mobility and transport towards a connected and networked system of multiple mobilities.

The main goal is to develop and strengthen the students' skills and capacities to deal with complex questions of mobility and sustainability. They shall be able to understand and apply theories, concepts and different scientific approaches and be able to work with them individually and independently and in an applied perspective.

The module prepares for problem-based and solution-oriented work in projects, teams and applied research throughout all four semesters of the study program. The ability for critical assessment, problem-based investigation and the capacity to formulate orally and write consistently are being developed as key asset. It is a fundamental element of developing the students' employability in the mobility market. SUM teaches how to generate the necessary overview, insight and functional knowledge to handle concrete tasks and to increase the problem solving capacities of the students.

### Content

The following aspects play a key role in this module:

- Social-science based mobilities theories
- Basic knowledge on mobility, climate change & social inequalities
- Sustainable mobility and transport
- Current changes in mobility markets of products and services
- Social ecology
- Mobility justice

### Teaching Methods

The module consists out of two lectures (I.1.1 and I.1.2). Both lectures include knowledge transfer through oral lecturing as well as active and activating elements of group work, individual assignments and the like. Didactic materials such as movies, online teaching materials, newspaper articles etc. will be used to structure the courses interactively and dynamically. Active participation and discussion are essential parts of the teaching method and the students are invited to raise questions and formulate comments to the teaching content. By the use of group work and mobile methods the courses introduce to basic skills of scientific work and different forms of team and project work. The organization of the lecture follows the concept of problem-based learning. Working groups of 3-5 students will be formed to work on specific projects. The students will be prepared for the written exam in I.1.1 and the essay in I.1.2.

### Requirements for Participation

Knowledge, skills, competencies	Basic skills in scientific work are mandatory including working with reference managers (Citavi, Endnote, Mendeley etc.), structured reading of scientific literature, database research etc. Preparations before and after the courses are mandatory.
Preparation for the module	Urry, J. (2004). The 'System' of Automobility. Theory, Culture & Society, 21(4-5), 25–39.  Leinfelder, Reinhold. (2011). The Anthropocene. Video. <a href="http://dx.doi.org/getinfo/emedial1.bsb-muenchen.de/10.5446/4457#t=03:31,03:38">http://dx.doi.org/getinfo/emedial1.bsb-muenchen.de/10.5446/4457#t=03:31,03:38</a>  Nicholas Stern: Why Are We Waiting? The Logic, Urgency and Promise of Tackling Climate Change ( <a href="https://www.youtube.com/watch?v=4Jq69WWqDnY">https://www.youtube.com/watch?v=4Jq69WWqDnY</a> )  John Urry: Mobilities and societies beyond oil - Hawke Talks: ( <a href="https://www.youtube.com/watch?v=Xd86ykg4PC4">https://www.youtube.com/watch?v=Xd86ykg4PC4</a> )  World Business Council for Sustainable Development (2004). Mobility 2030: Meeting the Challenges to Sustainability. The Sustainable Mobility Project. Full Report 2004. Retrieved from <a href="http://www.wbcasd.org/web/publications/mobility/mobility-full.pdf">http://www.wbcasd.org/web/publications/mobility/mobility-full.pdf</a> .

### Practicability of Module

Relationship to other modules within this study course	Module I.1 builds up key knowledge for all following modules.
Relevance to other study courses	Module I.1 is relevant for all study courses.

### Contribution of the Module to Sustainable Development

#### Content

The module directly relates to sustainable development since it introduces to the basics of social-science-based research on sustainable mobilities.

## Exam Requirements (necessary for the awarding of points)

Type and Duration (min)	Weighting %
StA (Seminar Paper) + K90 (Written Exam)	60% + 40 %

## Organization

<b>Responsible for Module</b> Prof. Dr. Sven Kesselring		
<b>Type of Module</b> Mandatory	<b>Recurrence</b> Every Semester	<b>Duration</b> 1 Semester
<b>Admission Criteria</b> none	<b>ECTS Points</b> 8	<b>Weekly Attendance (SWS)</b> 4
<b>Workload</b> 8 x 25 h = 200 h, distributed as follows:		
<b>Attendance/Contact Hours</b> 60 hrs / 30 %	<b>Preparation/Homework/Self-Study</b> 70 hrs / 35 %	<b>Time for Exercises/Group Work</b> 70 hrs / 35 %

## Module Elements

Module Element	
Code I.1.1	Sustainable Mobilities – Theories, Concepts, Approaches
Code I.1.2	Basic concepts of social science mobilities research

## Description of the Module Element

Code: 418-001 I.1.1	Title of Module Element Sustainable Mobilities – Theories, Concepts, Approaches
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## Content Structure

<b>Qualification Goals (vgl. Leitfaden Punkt 3)</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System	X		
Self	X	X	X
Social		X	X
<b>Content</b>			
<p>The lecture introduces to what it means to study mobility and transport from a “mobilities perspective” (Urry 2007). Students learn basic knowledge, skills and competencies for the study program Sustainable Mobilities. This includes knowledge on sustainable development, mobility and transport, sustainable mobility and social science.</p> <p>Students will be introduced to social-science-based mobilities research and learn how to do research, how to find literature and data individually and in groups and how to deal with interdisciplinary and transsectoral knowledge, methods and skills.</p>			
<b>Teaching Forms (vgl. Leitfaden Punkt 5)</b>			
<p>Most learning happens in class with lecturing elements and group work. Some of the group work will be held in the library where the relevant books and journals are available. Key elements of the teaching concept are active participation, intense discussion and interactive settings.</p>			
<b>Teaching Methods (vgl. Leitfaden Punkt 6)</b>			
Lecture, case study, media work and group work.			
<b>Literature/Learning Materials</b>			
Literature, examples from practice, videos, newspaper articles.			
<b>Specifics</b>			
Guest lectures			

## Organization

<b>ECTS Points</b> 4	<b>Hours/Week</b> 2	<b>Group work</b> Yes	<b>Recommended Semester</b> 1	<b>Language</b> English
<b>Workload</b> 4 x 25 h = 100 h, distributed as follows:				
<b>Attendance/Contact Hours</b> 30 hrs / 30 %		<b>Preparation/Homework/Self-Study</b> 35 hrs / 35 %		<b>Exercises/Group Work</b> 35 hrs / 35 %

## Description of the Module Element

Code: 418-001 I.1.2	Title of Module Element Basic concepts of social science mobilities research
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System	X		
Self	X	X	X
Social		X	X
<b>Content</b>			
<p>The lecture deepens the knowledge of what it means to study mobility and transport from a “mobilities perspective” (Urry 2007). It teaches specifically the oral and verbal skills of students and how to write scientific texts. This prepares for many assignments throughout the whole study program. Writing, visualizing, discussing and presenting findings to teachers, other students, practice partners and so forth is essential for the success in the program.</p> <p>Students get familiar with the main authors in the field and learn basic knowledge, skills and competencies for the study program Sustainable Mobilities. This includes knowledge on sustainable development, mobility and transport, sustainable mobility and social science. The students will be introduced to social-science-based mobilities research and learn how to do research, how to find literature and data individually and in groups and how to deal with interdisciplinary and transsectoral knowledge, methods and skills.</p>			
<b>Teaching Forms</b>			
<p>Most learning happens in class with lecturing elements and group work. Key elements of the teaching concept are active participation, intense discussions and interactive settings. Specific emphasize lies on working with interdisciplinary texts as key expertise of a research-oriented master program. Students work individually and in groups on specific texts and by so doing they gain the essential knowledge, skills and competencies to write scientific papers.</p>			
<b>Teaching Methods</b>			
Lecture, case study, media work and project work.			
<b>Literature/Learning Materials</b>			
Literature, media materials, newspapers etc.			
<b>Specifics</b>			
Essay writing			



## Organization

<b>ECTS Points</b> 4	<b>Hours/Week</b> 2	<b>Group work</b> Yes	<b>Recommended Semester</b> 1	<b>Language</b> English
<b>Workload</b> 4 x 25 h = 100 h, distributed as follows:				
<b>Attendance/Contact Hours</b> 30 hrs / 30 %	<b>Preparation/Homework/Self-Study</b> 30 hrs / 30 %		<b>Exercises/Group Work</b> 40 hrs / 40 %	

## Module Code and Module Name

**418-022 SUM I.2 Applied philosophy of science**

## Significance of Module for the Goals of the Study Course

### Qualification Goals

This module introduces to the main epistemological principles of scientific practice. It discusses aspects such as 'What is science?' and 'What qualifies a proposition as scientific?'. The lecture also shows that there is not one single understanding of this but different philosophies and also methodological concepts of science and scientific knowledge.

The main goal of the lecture is to enable students to understand the background for formulating their own research questions and to operationalize them into a reliable and valid research design and concept.

To obtain this, the lecture shows and discusses different approaches and concepts from mobilities research and illustrates this with examples from applied science.

This module provides the methodological basis for the research-oriented master in Sustainable Mobilities and qualifies the student to be able to develop theory driven applied research designs.

### Content

This lecture conveys the necessary skills to understand that and why scientific practice mainly builds upon ordered, controlled, verifiable and transparent procedures, which help to understand how the researchers and authors of a text come to their conclusions. This enables the student to distinguish between scientific and non-scientific work and how to ground research in reliable methodological concepts.

The concept of the lectures is to create an understanding of how to work with sustainable mobilities in a social sciences framework and reflecting on the meaning and significance of the different outset people working in this area have. The course is also a preparation for the research projects and the master thesis later on in the education where it is expected that the student is able to reflect on his/her outset for doing the work and the significance it can have for practice.

### Teaching Methods

Lecture: the exercise in module 1.3 is connected to this lecture and applies some of its contents in relation to research methods and applications.

## Requirements for Participation

<b>Knowledge, skills, competencies</b>	The students should have basic knowledge in the philosophy of science from their specific disciplinary backgrounds (such as social science, engineering, planning, architecture).
<b>Preparation for the module</b>	

## Practicability of Module

Relationship to other modules within this study course	The modules 1.2 and 1.3 are closely connected and refer to each other. It is recommended to attend both modules at the same time.
Relevance to other study courses	

## Contribution of the Module to Sustainable Development

Content
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## Exam Requirements (necessary for the awarding of points)

Type and Duration (min)	Weighting %
StA (Seminar Paper) + e-exam (60 min)	60% + 40%

## Organization

Responsible for Module Prof. Dr. Malene Freudendal-Pedersen		
Type of Module Mandatory	Recurrence Each semester	Duration 1 Semester
Admission Criteria none	ECTS Points 6	Weekly Attendance 4
Workload 6 ECTS x 25 h = 150 h, distributed as follows:		
Attendance/Contact Hours 60 hrs / 40 %	Preparation/Homework/Self-Study 40 hrs / 27 %	Exercises/Group Work 50 hrs / 33 %

## Module Elements

Module Element	
Code I.2.1	Applied philosophy of science
Code I.2.2	Introduction to "SPSS"

## Description of the Module Element

Code: 418-022 I.2.1	Title of Module Element Applied philosophy of science
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System	X	X	X
Self	X	X	X
Social			
<b>Content</b>			
The course introduces into the basics of philosophy of science and enables students to critically reflect upon all sorts of scientific content, assess the quality of research and knowledge and their own scientific work including the practicalities of research and investigation.			
<b>Teaching Forms</b>			
Lecture and group work.			
<b>Teaching Methods</b>			
Active learning with input elements, group work and self-directed learning.			
<b>Literature/Learning Materials</b>			
Lewens, T. (2016). <i>The meaning of science: An introduction to the philosophy of science</i> . New York: Basic Books.			
<b>Specifics</b>			
Field trips.			

## Organization

<b>ECTS Points</b> 3	<b>Hours/Week</b> 2	<b>Group Work</b> Yes	<b>Recommended Semester</b> 1	<b>Language</b> English
<b>Workload</b> 3 ECTS x 25 h = 75 h distributed as follows:				
<b>Attendance/Contact Hours</b> 30 h / 40%		<b>Preparation/Homework/Self-Study</b> 20 h / 27%		<b>Exercises/Group Work</b> 25 h / 33%

## Description of the Module Element

Code: 418-022 I.2.2	Title of Module Element Introduction to SPSS
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## Content Structure

<b>Qualification Goals (vgl. Leitfaden Punkt 3)</b>			
Know-how	Knowledge	Skills	Competencies
Subject	x	x	x
System	x	x	x
Self			
Social			
<b>Content</b>			
Basic knowledge of SPSS to enable students to undergo statistical analysis to <ul style="list-style-type: none"> <li>- analyze data</li> <li>- do research</li> <li>- understand large and complex data sets quickly with advanced statistical procedures</li> </ul>			
<b>Teaching Forms</b>			
Students gain the ability to work with SPSS and do basic statistical analysis for future projects or the master's thesis.			
<b>Teaching Methods</b>			
Practical lesson with exercises			
<b>Literature/Learning Materials</b>			
<b>Specifics</b>			

## Organization

<b>ECTS Points</b> 3	<b>Hours/Week</b> 2	<b>Group Work</b> No	<b>Recommended Semester</b> 1	<b>Language</b> English
<b>Workload</b> 3 ECTS x 25 h = 75 h distributed as follows:				
<b>Attendance/Contact Hours</b> 30 hrs / 30 %		<b>Preparation/Homework/Self-Study</b> 15 hrs / 30 %		<b>Exercises/Group Work</b> 30 hrs / 40 %

## Module Code and Module Name

**418-003 SUM I.3 Research Methods**

### Significance of Module for the Goals of the Study Course

#### Qualification Goals

This module presents and introduces different qualitative research methods which can be applied in studies of sustainable mobilities.

#### Content

The module introduces and elaborates basic but vital methods that students can apply in problem-based research and master thesis research project. The module transfers knowledge but uses also active participation and applied learning techniques. Students learn to work independently and self-organized in ethnography and participant observation, interviews, visual based research, case-study method etc.. Potentials of other methods such as mobile methods, discourse analysis and action research are also discussed.

#### Teaching Methods (vgl. Leitfaden Punkt 5)

Teaching methods include lectures and practical lessons. In both modalities students receive theoretical and practical knowledge from practicing and experienced social science researchers. The main goal is to prepare students to conduct their own research and apply problem-solving skills and increase their competencies in data collection and analysis.

### Requirements for Participation

Knowledge, skills, competencies	Basic understanding of research design, willingness to work creatively with data collection and analysis.
Preparation for the module	Students should be prepared to work with research literature and participate actively in class discussions and literature reviews.

### Practicability of Module

Relationship to other modules within this study course	The module is essential for undertaking an independent study as it deals with the intricacies of research project design, data collection and data analysis. Specifically the problem-based research project (III.3 and III.4) and the master thesis will directly benefit from the gained expertise.
Relevance to other study courses	Relevant to all courses.

## Contribution of the Module to Sustainable Development

<p><b>Content</b></p> <p>The module contributes to a deeper understanding of social sustainability and inclusion of different social groups in resolving issues related to environmental justice.</p>
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## Exam Requirements (necessary for the awarding of points)

<b>Type and Duration (min)</b>	<b>Weighting %</b>
StA (Seminar Paper) + K90 (Written Exam)	60% + 40%

## Organization

<p><b>Responsible for Module</b> Prof. Dr. Sven Kesselring</p>		
<p><b>Type of Module</b> Mandatory</p>	<p><b>Recurrence</b> Each Semester</p>	<p><b>Duration</b> 1 Semester</p>
<p><b>Admission Criteria</b> none</p>	<p><b>ECTS Points</b> 8</p>	<p><b>Weekly Attendance</b> 4</p>
<p><b>Workload</b> 8 ECTS x 25 h = 200 h with the following distribution</p>		
<p><b>Attendance/Contact Hours</b> 60 hrs / 30 %</p>	<p><b>Preparation/Homework/Self-Study</b> 60 hrs / 30 %</p>	<p><b>Exercises/Group Work</b> 80 hrs / 40 %</p>

## Module Elements

<b>Module Element</b>	
Code I.3.1	Research Methods (lecture)
Code I.3.2	Research Methods (practical)

## Description of the Module Element

Code: 418-003 I.3.1	Title of Module Element Research methods (lecture)
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## Content Structure

<b>Qualification Goals (vgl. Leitfaden Punkt 3)</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System		X	X
Self	X	X	X
Social		X	X
<b>Content</b>			
<p>The module introduces and elaborates basic but vital methods that students can apply in problem-based research and master thesis research project. The module transfers knowledge but uses also active participation and applied learning techniques. Students learn to work independently and self-organized in ethnography and participant observation, interviews, visual based research, case-study method etc.. Potentials of other methods such as mobile methods, discourse analysis and action research are also discussed</p>			
<b>Teaching Forms</b>			
Lecture, practical lessons (in class and out of class).			
<b>Teaching Methods</b>			
<p>Group Work and Individual Work (in class and out of class). Small Individual Projects to be presented in class. Small group projects to be done in class.</p>			
<b>Literature/Learning Materials</b>			
<b>Specifics</b>			
The content of the lectures ist he subject to change due to the group dynamics. Some topics can be adjusted and expanded (also considering the current pandemic situation).			

## Organization

ECTS Points 4	Hours/Week 2	Group work Yes	Recommended Semester 1	Language English
<b>Workload</b> 4 ECTS x 25 h = 100 h distributed as follows:				
Attendance/Contact Hours 30 hrs / 30 %		Preparation/Homework/Self-Study 30 hrs / 30 %		Exercises/Group Work 40 hrs / 40 %



## Description of the Module Element

Code: 418-003 I.3.2	Title of Module Element Research methods (practical)
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## Content Structure

Qualification Goals			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System		X	X
Self	X	X	X
Social		X	X

This module prepares students to apply key knowledge and expertise in how to conduct research and how to design a research concept. It introduces them to different research methods in social science based mobilities research. Students learn the main aspects and strengths and weaknesses of different research methods and approaches. Further, they will develop and deepen their knowledge and skills in at least one specific method, which will be applied in small-scale research in individual work. This is done by a ½ -day workshop and/or field trip, where the students develop a complete research concept based and apply different research methods in the field on an individually develop topic, problem formulation and research question.

**Content**

The module focuses on four topics: Interviews, action research, visual analysis and mobile methods. It furthermore introduces the students to literature management software and gives a brief introduction in research design and the structure for research papers. The module thereby introduces the main qualitative types of research, which are interviews and ethnographic fieldwork.

During the lecture the students work on different tasks based on different qualitative research methods with the aim to gain in-depth knowledge how to design a whole research concept based on the different methods and how different methods can be combined to achieve a coherent concept.

**Teaching Forms**

This module mixes lectures with individual and group work and discussions. It also includes one research excursion for ethnographic fieldwork (if possible). Furthermore, a referencing software is applied.

**Teaching Methods**

The teaching methods feature presentations, discussions, in-course group work and the individual conduct of research in different forms (e.g., interviewing, visual analysis) and application areas. It includes the in-course reading and discussion of articles relevant to the topics. The software MAXQDA is presented, thereby representing the whole process of data collection and analysis in a small-scale research.

**Literature/Learning Materials**

Brydon-Miller, M., Greenwood, D., Maguire, P., 2003. Why action research? Action Research 1, 9–28.  
Charmaz, K., 2006. Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis, 1st ed. ed. SAGE Publications Ltd., London.

Fahy, F., 2015. Participatory Action Research in Environmental and Ecological Studies, Second Edition, International Encyclopedia of the Social & Behavioral Sciences. Elsevier.

Flick, U. (Ed.), 2014. The SAGE Handbook of Qualitative Data Analysis, Sage. Sage Publications, Los Angeles, London, New Delhi, Singapore, Washington D.C.

Leech, B.L., 2002. Asking Questions: Techniques for Semistructured Interviews. *PS: Political Science and Politics* 35, 665–668.

Maxwell, J.A., 2012. A realist approach for qualitative research. Sage, Thousand Oaks, CA.

Merriman, P., 2014. Rethinking Mobile Methods. *Mobilities* 9, 167–187.

Parent, L., 2016. The wheeling interview: mobile methods and disability. *Mobilities* 11, 521–532.

Spinney, J., 2011. A Chance to Catch a Breath: Using Mobile Video Ethnography in Cycling Research. *Mobilities* 6, 161–182.

**Specifics**

One visit is undertaken to the mlab in Nürtingen in order to show the students where they can get help and resources for their upcoming group and individual research.

**Organization**

<b>ECTS Points</b> 4	<b>Hours/Week</b> 2	<b>Group work</b> Yes	<b>Recommended Semester</b> 1	<b>Language</b> English
<b>Workload</b> 4 ECTS x 25 h = 100 h distributed as follows:				
<b>Attendance/Contact Hours</b> 30 hrs / 30 %	<b>Preparation/Homework/Self-Study</b> 30 hrs / 30 %		<b>Exercises/Group Work</b> 40 hrs / 40 %	

## Module Code and Module Name

418-023 SUM I.4 Mobility solution design 1

## Significance of Module for the Goals of the Study Course

### Qualification Goals (vgl. Leitfaden Punkt 3)

Participants know what a (sustainable) mobility solution could be and how it could be developed

### Content

- What might a mobility solution be?
- Credit requirements
- How could a mobility solution be developed?

### Teaching Methods

Lecture, Group Exercises

## Requirements for Participation

Knowledge, skills, competencies	None
Preparation for the module	Will be provided in the lecture

## Practicability of Module

Relationship to other modules within this study course	Modules I.1, I.2, I.3, II.3, III.5
Relevance to other study courses	None

## Contribution of the Module to Sustainable Development

### Content

Knowledge of negative and positive impacts of sustainable mobility solutions  
Knowledge of implementing sustainable mobility solutions

## Exam Requirements (necessary for the awarding of points)

Type and Duration (min)	Weighting %
StA (Seminar Paper)	100%

## Organization

<b>Responsible for Module</b> Prof. Dr. Rainer Erne		
<b>Type of Module</b> Mandatory	<b>Recurrence</b> Every Semester	<b>Duration</b> 1 Semester
<b>Admission Criteria</b> none	<b>ECTS Points</b> 8	<b>Weekly Attendance</b> 2
<b>Workload</b> 8 ECTS x 25 h = 200 h distributed as follows:		
<b>Attendance/Contact Hours</b> 30 hrs. / 15%	<b>Preparation/Homework/Self-Study</b> 110 hrs. / 55%	<b>Time for Exercises/Group Work</b> 60 hrs. / 30%

## Module Elements

Module Element	
Code I.4	Mobility Solution Design I

## Description of the Module Element

Code: 418-023 I.4	Title of Module Element Mobility Solution Design I
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System	X	X	X
Self			
Social			
<b>Content</b>			
<ul style="list-style-type: none"> <li>• What might a mobility solution be?</li> <li>• Credit requirements</li> <li>• How could a mobility solution be developed?</li> </ul>			
<b>Teaching Forms</b>			
Lecture, Group Exercises			
<b>Teaching Methods</b>			
Presentations, Assignments, Group Work, Case Studies			
<b>Literature/Learning Materials</b>			
Will be provided in the lecture			
<b>Specifics</b>			
none			

## Organization

<b>ECTS Points</b> 8	<b>Hours/Week</b> 2	<b>Group Work</b> Yes	<b>Recommended Semester</b> 1	<b>Language</b> English
<b>Workload</b> 8 ECTS x 25 h = 200 h distributed as follows:				
<b>Attendance/Contact Hours</b> 30 hrs. / 15%		<b>Preparation/Homework/Self-Study</b> 110 hrs. / 55%		<b>Exercises/Group Work</b> 60 hrs. / 30%

**Module Code and Module Name****418-005 SUM II.1 Basic knowledge for the mobility transition****Significance of Module for the Goals of the Study Course****Qualification Goals**

This module provides basic knowledge for the transition towards sustainable mobilities. It helps to understand the obstacles, the power relations at work and the risks of redirecting the mobility sector towards sustainability.

It introduces students to inter- and transdisciplinary research related to sociotechnical transitions. Students will be able to assess the potentials, obstacles and risks of redirecting the mobility sector towards sustainability. Students will be given an opportunity to compare different case-studies as well as to conduct data-analysis for their case of choice. In-depth examination of South American, European and Chinese contexts will be given from diverse theoretical perspectives and with the live fieldwork experience of the lecturers.

**Content**

Not only social sciences, but also engineering and economic literature will be used to frame case studies and discussions of current best practice. Every lecture deals with an important concept or perspective and a case related to sociotechnical transitions in transportation. Teachers and students apply theoretical knowledge from the new mobilities paradigm to sociotechnical transition studies to develop a better and deeper understanding of the current situation in automotive industry and urban transportation specifically, and sustainable development in general.

**Teaching Methods**

The module consists out of one lecture and one practice-oriented seminar (Übung) where learning happens in group work, as well as via discussions based on analysis of lecture material and individual reading. Lectures are not based on monological speech but rather on the interactive question and answer modality as well as provocative debates generated by lecturer-instructor.

Together with the instructors the students develop their individual projects where they train to approach the field of mobility transitions and elaborate presentations at the end of the lecture course.

Different media are used from short videos and films to popular publications and academic articles. Students also have a chance to engage with invited guest speakers (online), experts in the field of sustainable mobilities.

Discussions are desirable format for the lectures, and students are stimulated to participate with their short presentations prepared at home (mid-term and at the end of the term).

## Requirements for Participation

Knowledge, skills, competencies	Basic skills in literature review and presentation techniques and the willingness to work in groups and prepare small projects for work in class. Analytical skills are highly desired.
Preparation for the module	No special preparation is needed

## Practicability of Module

Relationship to other modules within this study course	Module relates to the modules on project based research work, research methods.
Relevance to other study courses	Module relates to transportation and tourism study courses. It also relates to the courses on management of transitions or sociotechnical change.

## Contribution of the Module to Sustainable Development Goals

<p><b>Content</b></p> <p>The module covers diverse aspects of sustainable development: environmental politics, access to transportation, sustainable tourism. And thus covers the triple bottomline of sustainability (economic, environmental and social) as well as cultural aspects of sustainability.</p> <p>The module develops a systemic thinking required for tackling the problems of sustainable development and decarbonization. Importantly, it works on case-study basis, where successes and failures of decarbonization are analyzed by looking at specific geographic settings (innovations, policies).</p>
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## Exam Requirements (necessary for the awarding of points)

Type and Duration (min)	Weighting %
StA (Study Paper)+	60% +
R (Presentation)	40%

## Organization

<p><b>Responsible for Module</b> Prof. Dr. Sven Kesselring</p>		
<p><b>Type of Module</b> Mandatory</p>	<p><b>Recurrence</b> Every semester</p>	<p><b>Duration</b> 1 Semester</p>
<p><b>Admission Criteria</b> none</p>	<p><b>ECTS Points</b> 8</p>	<p><b>Weekly Attendance</b> 4</p>
<p><b>Workload</b> 8 ECTS x 25 h = 200 h distributed as follows:</p>		
<p><b>Attendance/Contact Hours</b> 60 hrs / 30 %</p>	<p><b>Preparation/Homework/Self-Study</b> 60 hrs / 30 %</p>	<p><b>Exercises/Group Work</b> 80 hrs / 40 %</p>

## Module Elements

Module Element	
II.1.1	Understanding the mobility transition
II.1.2	Main concepts and approaches in mobility transition research



## Description of the Module Element

Code: 418-005 II.1.1	Title of Module Element Understanding the mobility transition
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System	X	X	X
Self			
Social		X	X
<b>Content</b>			
<ul style="list-style-type: none"> <li>- Mobility Transitions in Germany</li> <li>- Mobility Transitions in China, Africa, Latin America</li> <li>- Social Sustainability in Mobility Transitions</li> <li>- Mobility Transitions in Rural Areas</li> <li>- Two-wheeler Mobilities and Sustainability</li> <li>- Sustainability and Urban Design</li> <li>- Making food and cargo mobilities sustainable.</li> <li>- Politics in Energy Transitions</li> <li>- E-mobility and active mobility (walking, cycling)</li> </ul>			
<b>Teaching Forms</b>			
Lecture material is presented for further discussion with students			
Students Prepare short presentations either at home or in class			
Students work on groups on small presentations related to the topic of the day (and present the results)			
Discussions of the visual material (documentaries)			
<b>Teaching Methods</b>			
Lectures			
Students' group work			
<b>Literature/Learning Materials</b>			
Geels F., R. Kemp, Dudley and G. Lyons 2012 Automobility in Transition? A Socio-Technical Analysis of Sustainable Transportation. Routledge.			
Handke, V. and H. Jonuschat (2013) Flexible Ridesharing. New Opportunities and Service Concepts for Sustainable Mobility. Springer.			
Hopkins D. and J. Highham (2016) Low Carbon Mobility Transitions Goodfellow Publishers. 2016			
(full list by topic see in Syllabus attached)			

**Specifics**

The content of the course is adjusted according to the group dynamics (with less students attending – more topic are covered, while with more students more group work in class is aimed for).

The content is subject to modification, as the lecturer may elaborate some topics for a more extended time.

**Organization**

<b>ECTS Points</b> 8	<b>Hours/Week</b> 2	<b>Group Work</b> Yes	<b>Recommended Semester</b> 1	<b>Language</b> English
<b>Workload</b> 4 ECTS x 25 h = 100 h distributed as follows:				
<b>Attendance/Contact Hours</b> 15 hrs. / 15%	<b>Preparation/Homework/Self-Study</b> 55 hrs. / 55%		<b>Exercises/Group Work</b> 30 hrs. / 30%	

## Description of the Module Element

Code: 418-005 II.1.2	Title of Module Element Main concepts and approaches in mobility transition research
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System	X	X	X
Self			
Social			
<b>Content</b> Main concepts and approaches in mobility transition research			
<p>The lecture will allow students to identify key factors for mobility transition on a general level as well as in the context of given conditions, with a particular focus on urban and peri-urban environments. A short introduction explains the relevance of urban mobility in time and space. This will be followed by a closer look at the historical development of urban mobility, including social, spatial and technological aspects. With this knowledge at hand, students will be able to identify and evaluate the main drivers of mobility transitions in urban settlements. Furthermore, they will work on the design of strategies that not only trigger these processes but also foster higher levels of sustainability regardless of the local conditions.</p>			
<b>Teaching Forms</b>			
<p>Block seminars cover the lecture material. This input provides the knowledge and the expertise needed to work on a practical level through individual and grouping tasks that students have to prepare before, during and after the block seminars.</p>			
<b>Teaching Methods</b>			
<p>The module includes both lecturing and active parts in order to foster problem-based learning.</p>			
<b>Literature/Learning Materials</b>			
<p>IPCC (2022) Working Group III contribution to the Sixth Assessment Report. Available here: <a href="https://www.ipcc.ch/site/assets/uploads/2018/03/AR6_WGIII_outlines_P46.pdf">https://www.ipcc.ch/site/assets/uploads/2018/03/AR6_WGIII_outlines_P46.pdf</a></p> <p>EC (2021). Amendment of the Regulation setting CO2 emission standards for cars and vans. Available: <a href="https://ec.europa.eu/info/sites/default/files/amendment-regulation-co2-emission-standards-cars-vans-with-annexes_en.pdf">https://ec.europa.eu/info/sites/default/files/amendment-regulation-co2-emission-standards-cars-vans-with-annexes_en.pdf</a></p> <p>EC (2021). Revision of the Directive on deployment of the alternative fuels infrastructure. Available; <a href="https://ec.europa.eu/info/sites/default/files/revision_of_the_directive_on_deployment_of_the_alternative_fuels_infrastructure_with_annex_0.pdf">https://ec.europa.eu/info/sites/default/files/revision_of_the_directive_on_deployment_of_the_alternative_fuels_infrastructure_with_annex_0.pdf</a></p> <p>EC (2021). Revision of the EU Emission Trading System Available: <a href="https://ec.europa.eu/info/sites/default/files/revision-eu-ets_with-annex_en_0.pdf">https://ec.europa.eu/info/sites/default/files/revision-eu-ets_with-annex_en_0.pdf</a></p> <p>Marx, R., de Mello, A. M., Zilbovicius, M., &amp; de Lara, F. F. (2015). Spatial contexts and firm strategies: applying the multilevel perspective to sustainable urban mobility transitions in Brazil. <i>Journal of Cleaner Production</i>, 108, 1092-1104.</p> <p>Terrien, C., Maniak, R., Chen, B., &amp; Shaheen, S. (2016). Good practices for advancing urban mobility innovation: A case study of one-way carsharing. <i>Research in Transportation Business &amp; Management</i>, 20, 20-32.</p>			

**Specifics**

One session will be dedicated to discussing with participants their topic of interests for the seminar paper. Students should prepare key research question and identified literature.

**Organization**

<b>ECTS Points</b> 4	<b>Hours/Week</b> 2	<b>Group Work</b> Yes	<b>Recommended Semester</b> 1	<b>Language</b> English
<b>Workload</b> 4 ECTS x 25 h = 100 h distributed as follows:				
<b>Attendance/Contact Hours</b> 15 hrs. / 15%	<b>Preparation/Homework/Self-Study</b> 55 hrs. / 55%		<b>Exercises/Group Work</b> 30 hrs. / 30%	

**Module Code and Module Name****418-024 SUM II.2 Urban mobilities****Significance of Module for the Goals of the Study Course****Qualification Goals**

This module focusses on the different characteristics of the networks of mobilities and how they constitute the opportunity spaces of individuals and organizations. Specific focus is different types of sustainable mobility systems which is examined through a four-day field trip.

The main goal of the module is to enable the students to formulate their own research questions and to operationalize them into a reliable and valid research design and concept.

To obtain this, the lecture and the field trip shows and discusses different approaches and concepts from mobilities research and relevant methodologies.

This module provides the methodological basis for the research-oriented master in Sustainable Mobilities and qualifies the student to be able to develop theory driven applied research designs.

**Content**

This module teaches the basic conceptual knowledge and skills for the module II.3. and II.4. It specifically develops the capacity to open up interdisciplinary knowledge and builds up the expertise to connect different resources and traditions in mobility research and practice. The module is built around a 4 days field trip where the students visits a city where sustainable mobilities is important for the city strategy. The students prepare for the field course through building upon the acquired skills from the first semester in the methodology course as well as the lecture series. Before the field course the student have to study their chosen research question and the context of the city they are visiting. At the field course the student will be introduced to the networked mobility of the city through guided tours around the city as well as through meetings with relevant actors related to their chosen research. After the field course the students have to work on their field trip report and make a presentation of their findings.

**Teaching Methods**

The module is centered around a lecture which is accompanied by a practice seminar. The main concepts for a deeper understanding of networked urban mobilities are taught in the lecture. The seminar deepens the concepts and gives space for practice-oriented examples and open questions.

## Requirements for Participation

Knowledge, skills, competencies	None
Preparation for the module	<p>Freudendal-Pedersen, M., &amp; Kesselring, S. (2018). Networked urban mobilities. In M. Freudendal-Pedersen &amp; S. Kesselring (Eds.), <i>Networked urban mobilities series: volume 1. Exploring networked urban mobilities: Theories, concepts, ideas</i> (1st ed., pp. 1–18). New York, NY: Routledge.</p> <p>Freudendal-Pedersen, M., &amp; Kesselring, S. (2018). Sharing mobilities. Some propaedeutic considerations. <i>Applied Mobilities</i>, 3(1), 1–7. <a href="https://doi.org/10.1080/23800127.2018.1438235">https://doi.org/10.1080/23800127.2018.1438235</a></p> <p>Freudendal-Pedersen, M., Hartmann-Petersen, K., &amp; Fjalland, E. L. P. (Eds.). (2018). <i>Experiencing networked urban mobilities: Practices, flows, methods</i> (1st). <i>Networked urban mobilities series: volume 2</i>. New York, New York, London, [England]: Routledge.</p> <p>Hajer, M. A., &amp; Dassen, T. (2014). <i>Smart about cities: Visualising the challenge for 21st century urbanism</i>. Rotterdam: Nai010 Publ. Retrieved from <a href="http://www.nai010.com/en/component/zoo/item/smart-about-cities">http://www.nai010.com/en/component/zoo/item/smart-about-cities</a></p> <p>Blokland, T., &amp; Savage, M. (Eds.). (2016). <i>Networked urbanism: Social capital in the city</i>. London, New York: Routledge.</p>

## Practicability of Module

Relationship to other modules within this study course	I.1.1; I.1.2; III.3; III.4
Relevance to other study courses	

## Contribution of the Module to Sustainable Development

<p><b>Content</b></p> <p>The module directly contributes to understanding sustainable development in urban environments and illustrates sustainable mobility in one of the leading cities in the field (Copenhagen).</p>
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## Exam Requirements (necessary for the awarding of points)

Type and Duration (min)	Weighting %
StA (Study Paper)+	60% +
K90 (written exam)	40%

## Organization

<b>Responsible for Module</b> Prof. Dr. Malene Freudendal-Pedersen		
<b>Type of Module</b> Mandatory	<b>Recurrence</b> Every Semester	<b>Duration</b> 1 Semester
<b>Admission Criteria</b> none	<b>ECTS Points</b> 8	<b>Weekly Attendance</b> 4
<b>Workload</b> 8 ECTS x 25 h = 200 h, distributed as follows:		
<b>Attendance/Contact Hours</b> 70 hrs / 35 %	<b>Preparation/Homework/Self-Study</b> 70 hrs / 35 %	<b>Time for Exercises/Group Work</b> 60 hrs / 30 %

## Modul Element

<b>Module Element</b>	
<b>Code</b> II.2	Urban mobilities

## Description of the Module Element

Code 418-024 II.2	Title of Module Element Urban mobilities
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System	X	X	X
Self	X	X	X
Social	X	X	X
<b>Content</b>			
<p>This module teaches the basic conceptual knowledge and skills for the module II.3. and II.4. It specifically develops the capacity to open up interdisciplinary knowledge and builds up the expertise to connect different resources and traditions in mobility research and practice. The module is built around a 4 days field trip where the students visits a city where sustainable mobilities is important for the city strategy. The students prepare for the field course through building upon the acquired skills from the first semester in the methodology course as well as the lecture series. Before the field course the student have to study their chosen research question and the context of the city they are visiting. At the field course the student will be introduced to the networked mobility of the city through guided tours around the city as well as through meetings with relevant actors related to their chosen research. After the field course the students have to work on their field trip report and make a presentation of their findings.</p>			
<b>Teaching Forms</b>			
Preparing lectures, field trip, guest lectures, field work and interviews with practitioners.			
<b>Teaching Methods</b>			
Different forms of activating and problem-based learning			
<b>Literature/Learning Materials</b>			
<p>Freudental-Pedersen, M., &amp; Kesselring, S. (2018). Networked urban mobilities. In M. Freudental-Pedersen &amp; S. Kesselring (Eds.), <i>Networked urban mobilities series: volume 1. Exploring networked urban mobilities: Theories, concepts, ideas</i> (1st ed., pp. 1–18). New York, NY: Routledge.</p> <p>Freudental-Pedersen, M., &amp; Kesselring, S. (2018). Sharing mobilities. Some propaedeutic considerations. <i>Applied Mobilities</i>, 3(1), 1–7. <a href="https://doi.org/10.1080/23800127.2018.1438235">https://doi.org/10.1080/23800127.2018.1438235</a></p>			
<b>Specifics</b>			
Field Trip to Copenhagen.			



## Organization

<b>ECTS Points</b> 8	<b>Hours/Week</b> 4	<b>Group works</b> Yes	<b>Recommended Semester</b> 2	<b>Language</b> English
<b>Workload</b> 8 ECTS x 25 h = 200 h, distributed as follows:				
<b>Attendance/Contact Hours</b> 70 hrs / 35 %	<b>Preparation/Homework/Self-Study</b> 70 hrs / 35 %		<b>Time for Exercises/Group Work</b> 60 hrs / 30 %	

**Module Code and Module Name****418-025 SUM II.3 Mobility solution design 2****Significance of Module for the Goals of the Study Course****Qualification Goals**

Participants are able to evaluate sustainability aspects of mobility solutions.

**Content**

- Definitions of evaluations
- Motives for and user groups of evaluations
- Determine scopes and most relevant sustainability aspects of mobility solutions
- How diverse perspectives contribute to sharpening an evaluation

**Teaching Methods**

Lecture, Exercises, Group Exercises, Presentations of work in progress

**Requirements for Participation**

Knowledge, skills, competencies	Module I.4
Preparation for the module	Will be provided in the lecture

**Practicability of Module**

Relationship to other modules within this study course	Module I.4, Module III.5
Relevance to other study courses	none

**Contribution of the Module to Sustainable Development****Content**

Overview of economic, environmental and social aspects of (alternative / more sustainable) mobility solutions, based on international sustainability standards & charters  
 Negative and positive sustainability impacts of mobilities  
 Sustainability related aspects and their integration into evaluations  
 Stakeholder involvement and perspectives of different stakeholder groups on evaluation processes regarding sustainability aspects of mobility solutions  
 Sustainability aspects and indicators and how to use them in evaluation processes

## Exam Requirements (necessary for the awarding of points)

Type and Duration (min)	Weighting %
StA (Seminar Paper)	100 %

## Organization

Responsible for Module Prof. Dr. Brigitte Biermann		
Type of Module Mandatory	Recurrence Every Semester	Duration 1 Semester
Admission Criteria none	ECTS Points 6	Weekly Attendance 2
Workload 6 ECTS x 25 hours = 150 hours distributed as follows:		
Attendance/Contact Hours 30 hrs. / 20%	Preparation/Homework/Self-Study 90 hrs. / 60%	Time for Exercises/Group Work 30 hrs. / 20%

## Module Element

Module Element	
Code II.3	Mobility Solution Design 2

## Description of the Module Element

Code: 418-025 II.3	Title of Module Element Mobility Solution Design II
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System	X	X	
Self			
Social		X	X
<b>Content</b>			
<ul style="list-style-type: none"> <li>• Overview of economic, environmental and social aspects of (alternative / more sustainable) mobility solutions, based on international sustainability standards &amp; charters</li> <li>• Knowledge of negative and positive sustainability impacts of mobilities</li> <li>• Apply motives, reasons and user groups to evaluations</li> <li>• Distinguish between products / services, solutions, and systems as objects of mobilities evaluations</li> <li>• Distinguish between sustainability related inputs, activities, outputs, outcomes and impacts / impact chains and integrate them into evaluations</li> <li>• Understand the value of stakeholder involvement and apply perspectives of different stakeholder groups to evaluations processes in the field of sustainable mobility solutions</li> <li>• Assign sustainability aspects and indicators to evaluations</li> <li>• Distinguish between evaluation indicators for organizations, local communities, for regions, and at global level</li> <li>• Enhancement of evaluations of sustainability impacts by applying diverse perspectives</li> </ul>			
<b>Teaching Forms</b>			
Lecture, Exercises, Group Exercises, Presentations of work in progress			
<b>Teaching Methods</b>			
Presentations, Active Listening, Assignments, Group Work, Case Studies			
<b>Literature/Learning Materials</b>			
Will be provided in the lecture			
<b>Specifics</b>			
None			

## Organization

<b>ECTS Points</b> 6	<b>Hours/Week</b> 2	<b>Group work</b> Yes	<b>Recommended Semester</b> 2	<b>Language</b> English
<b>Workload</b> 6 ECTS x 25 h = 150 h distributed as follows:				
<b>Attendance/Contact Hours</b> 30 hrs. / 20%	<b>Preparation/Homework/Self-Study</b> 90 hrs. / 60%		<b>Exercises/Group Work</b> 30 hrs. / 20%	

**Module Code and Module Name****418-026 SUM II.4 Mobility policies 1****Significance of Module for the Goals of the Study Course****Qualification Goals**

The role of politics and other stakeholders play an essential role in modern societies. Governance and policy networks need to be understood as power-related factors in modern societies which have a major influence on how mobility is organized and how contemporary mobility patterns, concepts and services look like. Sustainable mobilities cannot be developed in a laboratory but need to be implemented under life conditions.

**Content**

This module introduces key examples from mobility governance from local, national and supranational levels. The students work on key issues of the mobility transition in Germany and Europe and get insights into up-to-date cases of new mobility policies.

**Teaching Methods**

Lecture, flipped classroom & seminar

**Requirements for Participation**

<b>Knowledge, skills, competencies</b>	Active participation and willingness to take over individual and group assignments.
<b>Preparation for the module</b>	Reading lists will be published prior to each class, depending on the focal topic.

**Practicability of Module**

<b>Relationship to other modules within this study course</b>	Module will be followed up in third semester by module III.2 Governig mobilities in economy and society II: projects for the mobility transition (parts 1 and 2)
<b>Relevance to other study courses</b>	

**Contribution of the Module to Sustainable Development****Content**

All dimensions of sustainable development (ecological, economic and social) will be addressed by means of impact analysis following guidelines of the European Commission.

## Exam Requirements (necessary for the awarding of points)

Type and Duration (min)	Weighting %
StA (Seminar Paper) + R (Presentation)	60% + 40%

## Organization

<b>Responsible for Module</b> Prof. Dr. Sven Kesselring		
<b>Type of Module</b> Mandatory	<b>Recurrence</b> Every Semester	<b>Duration</b> 1 Semester
<b>Admission Criteria</b> none	<b>ECTS Points</b> 8	<b>Weekly Attendance</b> 2
<b>Workload</b> 8 ECTS x 25 h = 200 h to be distributed as follows:		
<b>Attendance/Contact Hours</b> 60 hrs / 30 %	<b>Preparation/Homework/Self-Study</b> 80 hrs / 40%	<b>Time for Exercises/Group Work</b> 60 hrs / 30%

## Module Element

Module Element	
Code II.4	Mobility policies 1

## Description of the Module Element

Code 418-026 II.4	Title of Module Element Mobility policies 1
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System	X	X	X
Self	X		
Social	X		
<b>Content</b>			
Students will be presented the role of different mobility governance arrangements at national and European level. They will learn to understand the formal and informal coordination mechanisms between European, national, regional and local policy-making and gain insights into EU transport policies. A focal topic will be chosen each semester to highlight the role of regulatory options, measures and projects in the mobility sector(s).			
<b>Teaching Forms</b>			
Lecture, flipped classroom & seminar			
<b>Teaching Methods</b>			
Lecture, flipped classroom & seminar			
<b>Literature/Learning Materials</b>			
Reading lists will be published prior to each class, depending on the focal topic.			
<b>Specifics</b>			
Guest speakers and co-lecturers will be invited, depending on the topic.			

## Organization

<b>ECTS Points</b> 8	<b>Hours/Week</b> 2	<b>Group Work</b>	<b>Recommended Semester</b> 2	<b>Language</b> English
<b>Workload</b> 8 ECTS x 25 h = 200 h to be distributed as follows:				
<b>Attendance/Contact Hours</b> 60 hrs / 30 %		<b>Preparation/Homework/Self-Study</b> 80 hrs / 40%		<b>Time for Exercises/Group Work</b> 60 hrs / 30%



**Module Code and Module Name****418-027 SUM III.2 Mobility policies 2****Significance of Module for the Goals of the Study Course****Qualification Goals**

Following the in-depth understanding of governance structures established in module II.4, students will learn about ways to analyse and influence mobility policies in both (a) a research and (b) a political dimension.

**Content**

Part 1: The development of mobility policies cannot be understood without a firm knowledge of policy processes, especially at European level. The class will introduce the European co-legislators, actors and policy-makers and their interplay. Influencing strategies and methods of lobbying will be presented to understand the participation of stakeholder groups in policy shaping. In a self-learning unit, students will train themselves to analyse mobility policies following the concept of Impact Assessments as performed by the European Union.

Part 2: The assessment of economic, social and environmental impacts constitutes the basis for an in-depth methodological workshop and research working methods, deepening the understanding of (a) governance policies and (b) business models to implement new forms of mobilities.

**Teaching Methods**

Lecture, flipped classroom, self-learning unit & seminar

**Requirements for Participation**

<b>Knowledge, skills, competencies</b>	Active participation and willingness to take over individual and group assignments.
<b>Preparation for the module</b>	Reading lists will be published prior to each class, depending on the focal topic.

**Practicability of Module**

<b>Relationship to other modules within this study course</b>	Module builds on II.4 (Governing mobilities in economy and society I: Concepts and Case Studies )
<b>Relevance to other study courses</b>	

## Contribution of the Module to Sustainable Development

<p><b>Content</b></p> <p>All dimensions of sustainable development (ecological, economic and social) will be addressed by means of impact analysis following guidelines of the European Commission.</p>
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## Exam Requirements (necessary for the awarding of points)

Type and Duration (min)	Weighting %
StA (Seminar Paper) + R (Presentation)	60% + 40%

## Organization

<p><b>Responsible for Module</b> Prof. Dr. Marc Ringel</p>		
<p><b>Type of Module</b> Mandatory</p>	<p><b>Recurrence</b> Every Semester</p>	<p><b>Duration</b> 1 Semester</p>
<p><b>Admission Criteria</b> none</p>	<p><b>ECTS Points</b> 6</p>	<p><b>Weekly Attendance</b> 2</p>
<p><b>Workload</b> 6 ECTS x 25 h = 150 h distributed as follows:</p>		
<p><b>Attendance/Contact Hours</b> 60 hrs / 40 %</p>	<p><b>Preparation/Homework/Self-Study</b> 40 Std. / 27 %</p>	<p><b>Time for Exercises/Group Work</b> 50 Std. / 33 %</p>

## Module Elements

Module Element	
Code III.2.1	Governing mobilities in economy and society II: European Transport Policies (Part 1)
Code III.2.2	Governing mobilities in economy and society II: Projects for the Mobility Transition (Part 2)

## Description of the Module Element

Code: 418-027 III.2.1	Title of Module Element Governing mobilities in economy and society II: Projects for the Mobility Transition (Part 1)
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System	X	X	X
Self			
Social			
<b>Content</b>			
<ul style="list-style-type: none"> <li>• What should be specified from a Business Perspective?</li> <li>• Case Study</li> <li>• Why specifying a Business Plan?</li> <li>• How can a Business Plan be specified?</li> <li>• How can the Business idea be specified?</li> <li>• How can the Marketing be specified?</li> <li>• How can the Operations be specified?</li> <li>• How can the Financial Projections be specified?</li> <li>• Optional: How can the project be specified?</li> </ul>			
<b>Teaching Forms</b>			
Lecture, Group Exercises			
<b>Teaching Methods</b>			
Presentations, Assignments, Group Work, Case Studies			
<b>Literature/Learning Materials</b>			
Will be provided in the lecture			
<b>Specifics</b>			
none.			

## Organization

<b>ECTS Points</b> 3	<b>Hours/Week</b> 1	<b>Group works</b> Yes	<b>Recommended Semester</b> 3	<b>Language</b> English
<b>Workload</b> 3 ECTS x 25 h = 75 h distributed as follows:				
<b>Attendance/Contact Hours</b> 15 hrs. / 20%		<b>Preparation/Homework/Self-Study</b> 45 hrs. / 60%		<b>Exercises/Group Work</b> 15 hrs. / 20%

## Description of the Module Element

Code: 418-027 III.2.2	Title of Module Element Governing mobilities in economy and society II: Projects for the Mobility Transition (Part 2)
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X		
System	X	X	
Self			
Social	X	X	
<b>Content</b>			
<ul style="list-style-type: none"> <li>• Which governance forms to build the framework for a mobility solution?</li> <li>• Which governance forms play a role for stakeholder involvement and sustainability impacts of a mobility solution?</li> <li>• How to foster positive mid/long term sustainability impacts of a mobility solution by governance processes?</li> </ul>			
<b>Teaching Forms</b>			
Lecture, Individual and Group Exercises			
<b>Teaching Methods</b>			
Lecture, Analysis of Case Studies, Individual and Group Exercises			
<b>Literature/Learning Materials</b>			
Will be provided in the lecture			
<b>Specifics</b>			
none			

## Organization

ECTS Points 3	Hours/Week 1	Group work No	Recommended Semester 3	Language English
<b>Workload</b> 3 ECTS x 25 h = 75 h distributed as follows:				
<b>Attendance/Contact Hours</b> 15 hours / 20%		<b>Preparation/Homework/Self-Study</b> 45 hours / 60%		<b>Exercises/Group Work</b> 15 hours / 20%

## Module Code and Module Name

**418-010 SUM III.3 Problem based research project 1**

### Significance of Module for the Goals of the Study Course

#### Qualification Goals

The overarching goal of the master program is the development of the students' capacities to conduct individual research on the highest quality level. The expertise gained from there can be applied in many different fields such as consultancy, (strategical) planning, product and solution design, market research etc. The concept of the applied academic scholarship builds the basis of this understanding of research. Students are going to be enabled to develop consistent research designs, to conduct systematically and methodologically reliable problem-based research. Their competencies in assessing others' research and results and critically reflect their own role and procedures shall be developed and supported.

Sometimes, the research conducted in this module will be organized in collaboration with practitioners from business, politics, administration and civil society. Students work in groups, ideally 3-5 students and learn basic skills in teamwork, intercultural collaboration and goal attaining. Ideally, the projects will be developed and managed in collaboration with practice partners such as companies, public authorities and non-profit organizations.

#### Content

In preparation of the master thesis the students develop a consistent, comprehensive and feasible research design, including the elements of research concept, theory and problem formulation, methodology, methods and expected outcome and practicability. They present the work in a workshop to prepare the second step of the actual research.

#### Teaching Methods

The module is organized in group work with supervision.

### Requirements for Participation

Knowledge, skills, competencies	Basic knowledge on mobility, transport and sustainability; methods and experiences in project work and research design.
Preparation for the module	Will be provided at the course.

### Practicability of Module

Relationship to other modules within this study course	All modules.
Relevance to other study courses	

## Contribution of the Module to Sustainable Development

<p><b>Content</b></p> <p>The module deals with aspects of economic, ecological and social sustainability in a clearly applied and problem-based perspective of mobilities research. In close collaboration with practice students develop research and solution-oriented recommendations for practice partners.</p>
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## Exam Requirements (necessary for the awarding of points)

Type and Duration (min)	Weighting %
StA (Seminar Paper)	100%

## Organization

<p><b>Responsible for Module</b> Prof. Dr. Sven Kesselring</p>		
<p><b>Type of Module</b> Mandatory</p>	<p><b>Recurrence</b> Every semester</p>	<p><b>Duration</b> 1 semester</p>
<p><b>Admission Criteria</b> none</p>	<p><b>ECTS Points</b> 6</p>	<p><b>Weekly Attendance</b> 2</p>
<p><b>Workload</b> 6 ECTS x 25 h = 150 h with the following distribution:</p>		
<p><b>Attendance/Contact Hours</b> 50 hrs / 33%</p>	<p><b>Preparation/Homework/Self-Study</b> 50 hrs / 33%</p>	<p><b>Time for Exercises/Group Work</b> 50 hrs / 33%</p>

## Module Elements

Module Element	
<p><b>Code</b> III.3</p>	<p>Problem based research project 1</p>

## Description of the Module Element

Code: 418-010 III.3	Title of Module Element Problem based research project 1
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System			
Self	X	X	X
Social		X	X
<b>Content</b>			
<p>Students become holistically familiar with all conceptual steps towards conducting applied research. From theories, concepts and approaches to methodologies and methods and to problem-based and solution-oriented skills and competencies all levels of expertise are required and activated.</p> <p>They learn how to formulate research questions and design a feasible and concise research design. They also learn how to present the concepts and to convince possible customers and partners.</p> <p>They learn how to work self-responsible, structured and towards deadlines. Some of the teaching consists in group supervision. The students learn how to drive their own work process and how to activate teachers in case of problems or open questions.</p>			
<b>Teaching Forms</b>			
Lectures, group work, team work, contact with practice, interviews etc.			
<b>Teaching Methods</b>			
Presentations, workshops, supervision,			
<b>Literature/Learning Materials</b>			
Literature, group supervision			
<b>Specifics</b>			
Problem-based learning, activating teaching and direct contact with practice.			

## Organization

ECTS Points 6	Hours/Week 2	Group Works Yes	Recommended Semester 3	Language English
<b>Workload</b> 6 ECTS x 25 h = 150 h distributed as follows:				
Attendance/Contact Hours 50 hrs / 33%		Preparation/Homework/Self-Study 50 hrs / 33%		Time for Exercises/Group Work 50 hrs / 33%

**Module Code and Module Name****418-011 SUM III.4 Problem based research project 2****Significance of Module for the Goals of the Study Course****Qualification Goals**

Being able to conduct applied research and to realize the research design developed in III.3.

**Content**

Designing applied research in a problem-based learning environment. Handling real-world problems in collecting data and knowledge, getting access to stakeholders, working together in teams and with practice, conducting research, presenting and defending the results and reflecting on the challenges, opportunities and limits of applied research.

**Teaching Methods**

Problem- and practice-oriented method in the field and in collaboration with partners.

**Requirements for Participation**

<b>Knowledge, skills, competencies</b>	Successful passing of methods courses in semester 2.
<b>Preparation for the module</b>	Will be provided in form of syllabus and introductory lectures.

**Practicability of Module**

<b>Relationship to other modules within this study course</b>	all courses and modules.
<b>Relevance to other study courses</b>	

**Contribution of the Module to Sustainable Development****Content**

III.4 integrates all aspects of sustainable mobility and sustainability in general.

**Exam Requirements (necessary for the awarding of points)**

<b>Type and Duration (min)</b>	<b>Weighting %</b>
StA (Seminar Paper)	100%



## Organization

<b>Responsible for Module</b> Prof. Dr. Sven Kesselring		
<b>Type of Module</b> Mandatory	<b>Recurrence</b> Every Semester	<b>Duration</b> 1 Semester
<b>Admission Criteria</b> none	<b>ECTS Points</b> 6	<b>Weekly Attendance</b> 2
<b>Workload</b> 6 ECTS x 25 h = 150 h with the following distribution:		
<b>Attendance/Contact Hours</b> 50 hrs / 33%	<b>Preparation/Homework/Self-Study</b> 50 hrs / 33%	<b>Time for Exercises/Group Work</b> 50 hrs / 33%

## Module Elements

<b>Module Element</b>	
<b>Code</b> III.4	Problem based research project 2

## Description of the Module Element

Code: 418-011 III.4	Title of Module Element Problem based research project 2
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System	X		
Self		X	X
Social	X	X	X
<b>Content</b>			
<p>Being able to work in practice and to handle challenges and obstacles of applied research based on problem-based, self-organized learning. Intense group work with elements of agile management.</p> <p>Presentation techniques will be applied in internal workshops and public presentations (in case of external partners).</p>			
<b>Teaching Forms</b>			
Lectures, project work, case study, field trips, data collection and analysis, writing of scientific reports, presentation of results.			
<b>Teaching Methods</b>			
Group work and supervision, direct support with practice partners.			
<b>Literature/Learning Materials</b>			
Literature, expert interviews, supervision.			
<b>Specifics</b>			
Scientific and consultancy work close to practice and real work applications. Direct and intense involvement of practice partners (case specific).			

## Organization

ECTS Points 6	Hours/Week 2	Group work Yes	Recommended Semester Semester 3	Language English
<b>Workload</b> 6 ECTS x 25 h = 150 h with the following distribution:				
Attendance/Contact Hours 50 hrs / 33%		Preparation/Homework/Self-Study 50 hrs / 33%		Time for Exercises/Group Work 50 hrs / 33%

## Module Code and Module Name

418-028 SUM III.5 Mobility solution design 3

### Significance of Module for the Goals of the Study Course

#### Qualification Goals

Participants are able to understand, evaluate and specify digitalization and innovation in the context of mobility.

#### Content

Understanding Digital Transformation & Innovation

- What are the drivers and enablers of digitalization?
- What means Digital Transformation for business and society?
- What is Innovation and Innovation Management and why do we need it?
- What does sustainability means in the context of digitalization and innovation?
- Understand and evaluate frameworks in digitalization and innovation.
- Digitalization in the context of the automotive and mobility industry

#### Recommended Readings:

- The Digital Transformation Playbook – David Rogers
- Digital Compass – Statista
- Internet Trends (*yearly updated*) - Marry Meeker
- The Digital Transformation of the Automotive Industry – Catalysts, Roadmap, Practice, Uwe Winkelhake
- Digital Transformation of the Automotive Industry – Frost & Sullivan, March 2017
- Digital Transformation of Industries: Automotive Industry – World Economic Forum 2016

#### Teaching Methods

Lecture, Group Exercises

### Requirements for Participation

Knowledge, skills, competencies	Module I.4, Module II.3
Preparation for the module	Will be provided in the lecture

### Practicability of Module

Relationship to other modules within this study course	Module I.4, Module II.3
Relevance to other study courses	none

## Contribution of the Module to Sustainable Development

<p><b>Content</b></p> <p>Knowledge on Business Plans for realizing sustainable mobility solutions          Knowledge for differentiation between different forms of governance          Analytical skills for identifying governance forms which foster the realization of sustainable mobility solutions.</p>
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## Exam Requirements (necessary for the awarding of points)

Type and Duration (min)	Weighting %
StA (Seminar Paper)	100%

## Organization

<p><b>Responsible for Module</b>          Prof. Dr. Malte Ackemann</p>		
<p><b>Type of Module</b>          Mandatory</p>	<p><b>Recurrence</b>          Every Semester</p>	<p><b>Duration</b>          1 Semester</p>
<p><b>Admission Criteria</b>          none</p>	<p><b>ECTS Points</b>          6</p>	<p><b>Weekly Attendance</b>          2</p>
<p><b>Workload</b>          6 ECTS x 25 hours = 150 hours with the following distribution:</p>		
<p><b>Attendance/Contact Hours</b>          30 hrs. / 20%</p>	<p><b>Preparation/Homework/Self-Study</b>          90 hrs. / 60%</p>	<p><b>Time for Exercises/Group Work</b>          30 hrs. / 20%</p>

## Module Elements

Module Element	
Code III.5.1	Mobility Solution Design III (Part 1)
Code III.5.2	Mobility Solution Design III (Part 2)

## Description of the Module Element

Code III.5.1	Title of Module Element Mobility Solution Design III (Part 1)
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System	X	X	X
Self			
Social			
<b>Content</b>			
<ul style="list-style-type: none"> <li>• What should be specified from a Business Perspective?</li> <li>• Case Study</li> <li>• Why specifying a Business Plan?</li> <li>• How can a Business Plan be specified?</li> <li>• How can the Business idea be specified?</li> <li>• How can the Marketing be specified?</li> <li>• How can the Operations be specified?</li> <li>• How can the Financial Projections be specified?</li> <li>• Optional: How can the project be specified?</li> </ul>			
<b>Teaching Forms</b>			
Lecture, Group Exercises			
<b>Teaching Methods</b>			
Presentations, Assignments, Group Work, Case Studies			
<b>Literature/Learning Materials</b>			
Will be provided in the lecture			
<b>Specifics</b>			
none.			

## Organization

<b>ECTS Points</b> 3	<b>Hours/Week</b> 1	<b>Group works</b> Yes	<b>Recommended Semester</b> 3	<b>Language</b> English
<b>Workload</b> 3 ECTS x 25 h = 75 h distributed as follows:				
<b>Attendance/Contact Hours</b> 15 hrs. / 20%		<b>Preparation/Homework/Self-Study</b> 45 hrs. / 60%		<b>Exercises/Group Work</b> 15 hrs. / 20%

## Description of the Module Element

Code III.5.2	Title of Module Element Mobility Solution Design III (Part 2)
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X		
System	X	X	
Self			
Social	X	X	
<b>Content</b>			
<ul style="list-style-type: none"> <li>• Which governance forms to build the framework for a mobility solution?</li> <li>• Which governance forms play a role for stakeholder involvement and sustainability impacts of a mobility solution?</li> <li>• How to foster positive mid/long term sustainability impacts of a mobility solution by governance processes?</li> </ul>			
<b>Teaching Forms</b>			
Lecture, Individual and Group Exercises			
<b>Teaching Methods</b>			
Lecture, Analysis of Case Studies, Individual and Group Exercises			
<b>Literature/Learning Materials</b>			
Will be provided in the lecture			
<b>Specifics</b>			
none			

## Organization

ECTS Points 3	Hours/Week 1	Group work No	Recommended Semester 3	Language English
<b>Workload</b> 3 ECTS x 25 h = 75 h distributed as follows:				
<b>Attendance/Contact Hours</b> 15 hours / 20%		<b>Preparation/Homework/Self-Study</b> 45 hours / 60%		<b>Exercises/Group Work</b> 15 hours / 20%

**Module Code and Module Name****418-013 SUM IV.2 Master's Thesis****Significance of Module for the Goals of the Study Course****Qualification Goals**

The aim here is to run a complete research and development process of an individual research project, preferably in close collaboration with practice partners.

**Content**

Case specific research.

**Teaching Methods**

Individual work with supervision.

**Requirements for Participation**

<b>Knowledge, skills, competencies</b>	
<b>Preparation for the module</b>	

**Practicability of Module**

<b>Relationship to other modules within this study course</b>	Module IV.3
<b>Relevance to other study courses</b>	

**Contribution of the Module to Sustainable Development**

<b>Content</b>
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**Exam Requirements (necessary for the awarding of points)**

<b>Type and Duration (min)</b>	<b>Weighting %</b>
Ma (4 months)	100%

## Organization

<b>Responsible for Module</b> Prof. Dr. Kesselring		
<b>Type of Module</b> Mandatory	<b>Recurrence</b> Every Semester	<b>Duration</b> 4 months
<b>Admission Criteria</b> none	<b>ECTS Points</b> 22	<b>Weekly Attendance</b> no
<b>Workload</b> 22 ECTS x 25 h = 550 h with the following distribution:		
<b>Attendance/Contact Hours</b>	<b>Preparation/Homework/Self-Study</b> 550 hrs / 100%	<b>Time for Exercises/Group Work</b>

## Module Elements

Module Element	
Code	Master's Thesis
IV.2	



## Description of the Module Element

Code: 418-013 IV.2	Title of Module Element Master's Thesis
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	x	X
System	X	X	X
Self	X	X	X
Social	X	X	X
<b>Content</b>			
<p>Students conduct their own research supported by supervisors. They apply theoretical, methodological and practical knowledge, skills and competencies accumulated during the three semesters before.</p> <p>The master thesis topic should be problem-based and in an applied perspective.</p>			
<b>Teaching Forms</b>			
Self-diven research project with supervision.			
<b>Teaching Methods</b>			
<b>Literature/Learning Materials</b>			
<p>Bogner, Alexander; Littig, Beate; Menz, Wolfgang (Eds.) (2009): Interviewing experts. New York: Palgrave Macmillan (Research methods series).</p> <p>Büscher, Monika; Freudendal-Pedersen, Malene; Kesselring, Sven; Kristensen, Nikolaj Grauslund (Eds.) (2020): Handbook of research methods and applications for mobilities. Northampton: Edward Elgar Publishing (Handbooks of research methods and applications series).</p>			
<b>Specifics</b>			
Self-responsible and self-driven, teacher supported and supervision-led research project.			

## Organization

ECTS Points 22	Hours/Week	Group Work No	Recommended Semester 4	Language English
<b>Workload</b> 22 ECTS x 25 h = 550 h with the following distribution:				
Attendance/Contact Hours	Preparation/Homework/Self-Study 550 hrs / 100%	Exercises/Group Work		

**Module Code and Module Name****418-013 SUM IV.3 Master Colloquium****Significance of Module for the Goals of the Study Course****Qualification Goals**

The colloquium is the place to present and discuss the progress of the master thesis with the lecturer and other master student. The organization of the colloquium is based on the concept of 'critical friends' as developed in Scandinavia. Problems, even crises, obstacles and the feeling of imperfect information etc. belong to the research process and are important for the successful development of the master thesis. In a trustful and confidential atmosphere these issues can be discussed in the colloquium for the benefit of all participants.

**Content**

The students learn that problems can be shared with others and most of them are not individual but part of the working process of many others, too. They are part of an efficient research process and necessary to make progress. These are key knowledge and key experiences at the same time which are constitutional for a professional education and behavior.

**Teaching Methods**

Colloquium with master students, teachers and supervisors; individual presentations and group discussions.

**Requirements for Participation**

<b>Knowledge, skills, competencies</b>	Self-reflexivity shall be developed and supported as a basis for efficient and effective work and goal-attainment.
<b>Preparation for the module</b>	Work on the master thesis. No specific preparations.

**Practicability of Module**

<b>Relationship to other modules within this study course</b>	All modules.
<b>Relevance to other study courses</b>	

**Contribution of the Module to Sustainable Development****Content**

All aspects of sustainable development.

## Exam Requirements (necessary for the awarding of points)

Type and Duration (min)	Weighting %
M20 (oral exam)	100%

## Organization

Responsible for Module Prof. Dr. Kesselring		
Type of Module Mandatory	Recurrence Every Semester	Duration 1 Semester
Admission Criteria None	ECTS Points 2	Weekly Attendance 1
Workload 2 ECTS x 25 h = 50 h with the following distribution:		
Attendance/Contact Hours 16 hrs / 32%	Preparation/Homework/Self-Study 34 hrs / 68%	Time for Exercises/Group Work

## Content Structure

Module Element	
Code	Master's Colloquium

## Description of the Module Element

Code: 418- 014 IV.3	Title of Module Element Master's Colloquium
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject			
System	X		
Self	X	X	X
Social		X	X
<b>Content</b>			
Students learn to understand and reflect the process of writing a master thesis as a complex procedure which needs social expertise and self-reflexivity as an essential part besides scientific expertise and practical knowledge.			
<b>Teaching Forms</b>			
Presentations and group discussions			
<b>Teaching Methods</b>			
Collegial consultancy („critical friends“) and group supervision.			
<b>Literature/Learning Materials</b>			
None			
<b>Specifics</b>			
Eventually guests from practice.			

## Organization

<b>ECTS Points</b> 2	<b>Hours/Week</b> 1	<b>Group work</b> No	<b>Recommended Semester</b> 4	<b>Language</b> English
<b>Workload</b> 2 ECTS x 25 h = 50 h with the following distribution:				
<b>Attendance/Contact Hours</b> 16 hrs / 32%		<b>Preparation/Homework/Self-Study</b> 34 hrs / 68%		<b>Time for Exercises/Group Work</b>

## Module Code and Module Name

**418-030 Elective: Data Analysis and Visualization**

### Significance of Module for the Goals of the Study Course

Code: 418-030	Title of Module Elective: Data Analysis and Visualization
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### Significance of Module for the Goals of the Study Course

<b>Qualification Goals</b>  Today, big data is everywhere. High volume, velocity, and variety of data require high capabilities for organizing, processing, analyzing and visualizing them. The goal is that students can analyze and visualize a huge amount of information to search for patterns and relations..
<b>Content</b>  The aim of this course is to organize, process, analyze and visualize big amounts of data and geodata. The two main components of the course are 1) to have an introduction to analytics and visualization of data through the programming language R and 2) to have an introduction to spatial data processing and visualization through the software QGIS..
<b>Teaching Methods</b>  Lecture, practical exercises, project work, workshop

### Requirements for Participation

Knowledge, skills, competencies	Individual participation, active participation, self-training in data analysis and visualization software
Preparation for the module	

### Practicability of Module

Relationship to other modules within this study course	Introduction to SPSS
Relevance to other study courses	Master Thesis

### Contribution of the Module to Sustainable Development

<b>Content</b> This course aims to analyze, visualize and play with data to find patterns or relations to further understanding, treating, mitigating, searching for solutions related to economic, ecological, social aspects.
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## Exam Requirements (necessary for the awarding of points)

Type and Duration (min)	Weighting %
StA (Seminar Paper)	100%

## Organization

Responsible for Module Prof. Dr. Sven Kesselring		
Type of Module Elective	Recurrence Every Semester	Duration 1 Semester
Admission Criteria none	ECTS Points 6	Weekly Attendance 2
Workload 6 ECTS x 25 h = 150 h distributed as follows:		
Attendance/Contact Hours 24 h / 16%	Preparation/Homework/Self-Study 63 h / 42%	Exercises/Group Work 63 h / 42%

## Module Elements

Module Element	
Code 418-030	Data Analysis and Visualization

## Description of the Module Element

Code: 418-026	Title of Module Element Data Analysis and Visualization
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## Content Structure

<b>Qualification Goals</b>			
Know-how	Knowledge	Skills	Competencies
Subject	X	X	X
System	X	X	X
Self	X	X	
Social			
<p><b>Content</b> Students will learn to carry out data analysis including data preparations (collection and selection), preprocessing (cleaning, filtering, correction), analysis (visualization, correlation) and post-processing (interpretation, documentation, evaluation).</p> <p>According to the data visualization, students will learn how to make professional-looking maps and graphics.</p>			
<p><b>Teaching Forms</b> Lecture, Seminar (with exercise), Project work.</p>			
<p><b>Teaching Methods</b> Exercises, Project work</p>			
<p><b>Literature/Learning Materials</b></p> <ul style="list-style-type: none"> <li>• Maindonald, John, and John Braun. <i>Data analysis and graphics using R: an example-based approach</i>. Vol. 10. Cambridge University Press, 2010.</li> <li>• Chang, Kang-Tsung. <i>Introduction to geographic information systems</i>. Boston: McGraw-Hill Higher Education, 2006.</li> <li>• Oetiker, Tobias, et al. <i>The Not So Short Introduction to LATEX 2.</i>,2011.</li> </ul>			
<b>Specifics</b>			

## Organization

ECTS Points 6	Hours/Week 2	Group Work Yes	Recommended Semester 3 / 4	Language English
<p><b>Workload</b> 6 ECTS x 25 h = 150 h distributed as follows:</p>				
<p><b>Attendance/Contact Hours</b> 24 h / 16%</p>		<p><b>Preparation/Homework/Self-Study</b> 63 h / 42%</p>		<p><b>Exercises/Group Work</b> 63 h / 42%</p>