Hochschule für
Wirtschaft und Umwelt
Nürtingen-Geislingen

Module Description
Sustainable Mobilities (SUM)
(short version)

Sustainable Mobilities

Inhalt

Introduction

Sustainable Mobilities (SUM) is an interdisciplinary, social-science-based master program, which prepares students for the fast moving and changing mobility markets and industries. 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 a system 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 ecomically, 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.1.1 Sustainable mobilities – theories, concepts, approaches

Credits	Workload	Study Semester	Recurrence	Duration
4 ECTS	4 x 25 hours = 100 hours	1	Every semester	1 semester

1	Attendance/Contact Hours	Weekly Attendance (SWS)	Self Study/Home-work/Preparation	Time for Exercises/ Group Work	Group Size
	30 hours	1	35 hours	35 hours	appr. 15

2 Learning Outcomes / Competencies

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). It introduces to the main authors in the field and deals with the quantitative and qualitative aspects of mobility developments and sustainability. 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 in modern societies and why the current level and organization of mobility and transport is unsustainable and therefore 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 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 and problem-based investigation will be developed as key expertise. 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.

3 Content

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. 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.

4	**Teaching Forms** Lecture, case study, media work and project work.	
5	**Exam (Type and Duration) I.1.1 + I.1.2** StA (Seminar Paper) + K90 (Written Exam)	**Weighting** 60 % 40 %
6	**Impact of grade on final grade** 8/120 of the entire program	
7	**Module Coordinator** Prof. Dr. Sven Kesselring	
8	**Comments / Admission Criteria**	

Module Code and Module Name
418-001 SUM I.1.2 Basic concepts of social science mobilities research

Credits	Workload	Study Semester	Recurrence	Duration
4 ECTS	4 x 25 hours = 100 hours	1	Every semester	1 semester

1	Attendance/Contact Hours	Weekly Attendance (SWS)	Self Study/Home-work/Preparation	Time for Exercises/ Group Work	Group Size
	30 hours	1	30 hours	40 hours	appr. 15

2 Learning Outcomes / Competencies

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). It introduces to the main authors in the field and deals with the quantitative and qualitative aspects of mobility developments and sustainability. 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 in modern societies and why the current level and organization of mobility and transport is unsustainable and therefore 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 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 and problem-based investigation will be developed as key expertise. 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.

3 Content

The lecture deepens the knowledge of what it means to study mobility and transport from a "mobilities perspective" (Urry 2007). 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.	
4	**Teaching Forms** Lecture, case study, media work and project work.	
5	**Exam (Type and Duration) I.1.1 + I.1.2** StA (Seminar Paper) + K90 (Written Exam)	**Weighting** 60 % 40 %
6	**Impact of grade on final grade** 8/120 of the entire program	
7	**Module Coordinator** Prof. Dr. Sven Kesselring	
8	**Comments / Admission Criteria**	

Module Code and Module Name
418-022 SUM I.2 Applied philosophy of science

Credits	Workload	Study Semester	Recurrence	Duration
6 ECTS	6 x 25 hours = 150 hours	1	Every semester	1 semester

1	Attendance/Contact Hours	Weekly Attendance (SWS)	Self Study/Home-work/Preparation	Time for Exercises/ Group Work	Group Size
	60 hours	2	40 hours	50 hours	appr. 15

2 Learning Outcomes / Competencies

Knowledge on the main epistemological principles of scientific practice.

Knowledge about different philosophies and methodological concepts of science and scientific knowledge.

Knowledge on the methodological basis for the research-oriented master in Sustainable Mobilities

Competences to understand the background when formulating research questions and to operationalize them into a reliable and valid research design and concept.

3 Content

The course 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 a preparation for the field course on networked mobilities, the problem based 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.

4 Teaching Forms

Lectures, group work, class discussions

5	Exam (Type and Duration)	Weighting
	StA (Seminar Paper) +	60 %
	eK60 (Electronic Exam)	40 %

6 Impact of grade on final grade

6/120 of the entire program

7	**Module Coordinator** Prof. Dr. Sven Kesselring
8	**Comments / Admission Criteria**

Module Code and Module Name
418-003 SUM I.3.1 Research methods

Credits	Workload	Study Semester	Recurrence	Duration
4 ECTS	4 x 25 hours = 100 hours	1	Every semester	1 semester

1	Attendance/Contact Hours	Weekly Attendance (SWS)	Self Study/Home-work/Preparation	Time for Exercises/ Group Work	Group Size
	30 hours	2	30 hours	40 hours	appr. 15

2 Learning Outcomes / Competencies

At the end of this module, the students will understand the fundamentals of mobility concepts based on the knowledge of theoretical sustainable concepts and their practical application-

The focus is to recognize mobility as a socio-technical system. Modifications in mobility are based on cultural changes.

Students will address and manage the social/economic/technological tensions and critical points emerging in the implementation of the transition toward sustainable mobility.

3 Content

Mobility development depends on technological impact for transportation, communication technologies and social processes.

The interlink of social and vehicular mobility and the impact of communication has to be examined.

The focus of the analysis is on the changes in social and spatial mobility as well as the role of communication technologies. Research methods should support reconstructing processes of everyday mobilities. The reconstruction of mobility is based on:

- Social science description of mobility processes,
- Studies of empirical data and concepts for design
- the analysis of available qualitative and quantitative data.

4 Teaching Forms

Lecture, small projects presented by the students.

5	Exam (Type and Duration)	Weighting
	StA (Seminar Paper)	60 %

6 Impact of grade on final grade

8/120 of the entire program

7 Module Coordinator

Prof. Dr. Sven Kesselring

8 Comments / Admission Criteria

Module Code and Module Name
418-003 SUM I.3.2 Research methods

Credits	Workload	Study Semester	Recurrence	Duration
4 ECTS	4 x 25 hours = 100 hours	1	Every semester	1 semester

1	Attendance/Contact Hours	Weekly Attendance (SWS)	Self Study/Home-work/Preparation	Time for Exercises/ Group Work	Group Size
	30 hours	2	30 hours	40 hours	appr. 15

2 Learning Outcomes / Competencies

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, where the students develop a complete research concept based on an individually develop topic, problem formulation and research question.

3 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 a whole research concept based on the different methods and how different methods can be combined to achieve a coherent concept.

4 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.

5	Exam (Type and Duration)	Weighting
	K90 (Written Exam)	40 %

6 Impact of grade on final grade

8/120 of the entire program

7 Module Coordinator

Prof. Dr. Sven Kesselring

8 Comments / Admission Criteria

Module Code and Module Name
418-023 SUM I.4 Mobility solution design 1

Credits	Workload	Study Semester	Recurrence	Duration
8 ECTS	8 x 25 hours = 200 hours	1	Every semester	1 semester

1	Attendance/Contact Hours	Weekly Attendance (SWS)	Self Study/Home-work/Preparation	Time for Exercises/ Group Work	Group Size
	30 hours	2	100 hours	70 hours	appr. 15

2 Learning Outcomes / Competencies

Participants …

- … know what a (sustainable) mobility solution could be
- … and comprehend how a (sustainable) mobility solution could be developed

3 Content

- What are mobility solutions?
- What are the credit requirements?
- How can mobility solutions be developed?
  - How to define the problem?
  - How to understand stakeholders?
  - How to ideate solutions?
  - How to prototype solutions?
  - How to test solutions
- Optional: What has to be done till launch?

4 Teaching Forms

Lecture, exercises, case study, assisted paper design

5 Exam Type — **Weighting**

StA (Seminar Paper) — 100 %

6 Impact of grade on final grade

8/120 of the entire program

7 Module Coordinator

Prof. Dr. Rainer Erne

8 Comments / Admission Criteria

418-005 SUM II.1 Basic knowledge for the mobility transition

Credits	Workload	Study Semester	Recurrence	Duration
8 ECTS	8 x 25 hours = 200 hours	2	Every semester	1 semester

1	Attendance/Contact Hours	Weekly Attendance (SWS)	Self Study/Home-work/Preparation	Time for Exercises/ Group Work	Group Size
	30 (x2) hours	4	30 (x2) hours	40 (x2) hours	appr. 15

2 Learning Outcomes / Competencies

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.

3 Content

This module provides basic knowledge for the transition towards sustainable mobilities, in particular, the following topics are discussed:

- Automobility and reducing car-use
- Cycling and mobility transitions
- Sharing cultures and cities
- Mobility Transitions beyond transport
- Sustainable Cities and Liveable Cities
- Politics of Mobility Transitions: resource politics
- Innovations for Mobility Transitions
- Governing Mobility Transitions
- Mobility Transitions in Germany
- Mobility Transitions in China, Africa, Latin America
- Social Sustainability in Mobility Transitions
- Mobility Transitions in Rural Areas
- Two-wheeler Mobilities and Sustainability
- Sustainability and Urban Design
- Making food and cargo mobilities sustainable.
- Politics in Energy Transitions
- E-mobility and active mobility (walking, cycling)

4 Teaching Forms

It introduces students to inter- and transdisciplinary research related to transitions. Not only social sciences, but also engineering and economic literature will be used to frame case studies and

	discussions of current best practice. The final evaluation of students will be based on the results of their in-class performance and essentially, their final written paper, which is to be presented in class. There will be no written exam. The final grade consists of the grade for the oral presentation of the final paper and for the paper itself.	
5	**Exam Type**	**Weighting**
	StA (Seminar Paper) +	60 %
	P (Presentation)	40 %
6	**Impact of grade on final grade** 8/120 of the entire program	
7	**Module Coordinator** Prof. Dr. Sven Kesselring	
8	**Comments / Admission Criteria**	

Module Code and Module Name
418-024 SUM II.2 Urban mobilities

Credits	Workload	Study Semester	Recurrence	Duration
8 ECTS	8 x 25 hours = 200 hours	2	Every semester	1 semester

1	Attendance/Contact Hours	Weekly Attendance (SWS)	Self Study/Home-work/Preparation	Time for Exercises/ Group Work	Group Size
	70 hours	4	70 hours	60 hours	appr. 15

2 Learning Outcomes / Competencies

Knowledge on different types of sustainable mobility systems which is examined through a four-day field trip

Knowledge on different approaches and concepts from mobilities research and relevant methodologies.

Competences to formulate own research questions and to operationalize them into a reliable and valid research design and concept.

Competences on the methodological basis for the research-oriented master in Sustainable Mobilities and qualifications to develop theory driven applied research designs.

3 Content

This course 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 applied philosophy of science course as well as the lecture series.

Before the field course the student has 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.

4 Teaching Forms

Lectures, field work, group work, presentations

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

6	**Impact of grade on final grade** 8/120 of the entire program
7	**Module Coordinator** Prof. Dr. Sven Kesselring
8	**Comments / Admission Criteria**

Module Code and Module Name
418-025 SUM II.3 Mobility solution design 2

Credits	**Workload**	**Study Semester**	**Recurrence**	**Duration**
6 ECTS	6 x 25 hours = 150 hours	2	Every semester	1 semester

1	**Attendance/Contact Hours**	**Weekly Attendance (SWS)**	**Self Study/Home-work/Preparation**	**Time for Exercises/ Group Work**	**Group Size**
	30 hours	2	75 hours	45 hours	appr. 15

2 Learning Outcomes / Competencies

- Participants are able to identify relevant sustainability aspects of mobility solutions
- Participants know sustainability criteria for the evaluation of mobility solutions and are able to apply them

3 Content

- Socio-economic and environmental impacts of mobility solutions
- Defining and applying evaluation criteria to sustainable mobility solutions
- Sustainability related impact chains and their relevance for evaluations
- Stakeholder perspectives in evaluation processes regarding sustainability aspects of mobility solutions

4 Teaching Forms

Lecture, Presentations of (preliminary) research results, Group exercises

5

Exam Type	**Weighting**
StA (Seminar Tasks and Paper)	100 %

6 Impact of grade on final grade

6/120 of the entire program

7 Module Coordinator

Prof. Dr. Brigitte Biermann

8 Comments / Admission Criteria

Module Code and Module Name
418-026 SUM II.4 Mobility policies 1

Credits	**Workload**	**Study Semester**	**Recurrence**	**Duration**
8 ECTS	8 x 25 hours = 200 hours	2	Every semester	1 semester

1	**Attendance/Contact Hours**	**Weekly Attendance (SWS)**	**Self Study/Home-work/Preparation**	**Time for Exercises/ Group Work**	**Group Size**
	X hours	2	X hours	X hours	appr. 15

2	**Learning Outcomes / Competencies** -	
3	**Content**	
4	**Teaching Forms**	
5	**Exam Type** StA (Seminar Paper) + R (Presentation)	**Weighting** 60 % 40 %
6	**Impact of grade on final grade** 8/120 of the entire program	
7	**Module Coordinator** Prof. Dr. Sven Kesselring	
8	**Comments / Admission Criteria**	

Module Code and Module Name
418-030 SUM III.1 Data Analysis and Visualization

Credits	Workload	Study Semester	Recurrence	Duration
6 ECTS	6 x 25 hours = 150 hours	3	Every semester	1 semester

1	Attendance/Contact Hours	Weekly Attendance (SWS)	Self Study/Home-work/Preparation	Time for Exercises/ Group Work	Group Size
	32 hours (22%)	2	59 hours (39%)	59 hours (39%)	appr. 15

2 Learning Outcomes / Competencies

After this course students will be able to:

- Analyze and visualize spatial information.
- Analyze and visualize big datasets.
- Plot spatial information in the software QGIS.
- Represent numerical and categorical information using the statistical software R.

3 Content

Data Analysis and Visualization is a problem-based course. Students will plot and map big dataset related to mobility.

Moreover, students will learn to carry out data analysis including data collection and selection, preprocessing (cleaning, filtering), analysis (visualization, correlation) and post-processing (interpretation, documentation, evaluation). According to the data visualization, students will learn how to make professional-looking maps and graphics.

4 Teaching Forms

Lectures, workshops, student's presentations, tutorials, practical exercises, group work, project-based work

5

Exam Type	Weighting
StA (Seminar Paper)	100 %

6 Impact of grade on final grade

6/120 of the entire program

7 Module Coordinator

Prof. Dr. Sven Kesselring

8 Comments / Admission Criteria

Module Code and Module Name
418-027 SUM III.2 Mobility policies 2

Credits	**Workload**	**Study Semester**	**Recurrence**	**Duration**
6 ECTS	6 x 25 hours = 150 hours	3	Every semester	1 semester

1	**Attendance/Contact Hours**	**Weekly Attendance (SWS)**	**Self Study/Home-work/Preparation**	**Time for Exercises/ Group Work**	**Group Size**
	45 hours	2	45 hours	60 hours	appr. 15

2 Learning Outcomes / Competencies

- Students will understand basic EU policy-making and competencies at European level in contrast to national policies.
- Students will get an overview on European regulations regarding different transport modes and sustainability approaches.
- They will get a profound understanding of the interlinkage between policy objectives, strategies, individual policies and their evaluation.
- Students will be able to analyse key strategies as well as policies and measures regarding sustainable mobility approaches in the EU and European member states.
- Students will further their capacity to analyse policies and measures in small groups

3 Content

Part I: Overview

1. Transport policy basics
2. EU framework conditions
3. Policy development so far: Objectives & measures
4. EU 2020 Mobility Strategy
5. Analysis of policies and measures per transport mode

Part II: Sectorial investigation

Focus on one focal policy (e.g. rail, aviation, multi-modality etc.) per semester that will be analysed in detail.

4 Teaching Forms

Interactive lecture and workshop

5	**Exam (Type and Duration)**	**Weighting**
	StA (Seminar Paper) +	60 %
	R (Presentation)	40 %

6 Impact of grade on final grade

6/120 of the entire program

7 Module Coordinator

Prof. Dr. Marc Ringel

8	**Comments / Admission Criteria**

Module Code and Module Name
418-010 SUM III.3.1 Problem based research project 1

Credits	Workload	Study Semester	Recurrence	Duration
3 ECTS	3 x 25 hours = 75 hours	3	Every semester	1 semester

1	Attendance/Contact Hours	Weekly Attendance (SWS)	Self Study/Home-work/Preparation	Time for Exercises/ Group Work	Group Size
	11 hours	1	19 hours	45 hours	appr. 15

2 Learning Outcomes / Competencies

Students will be able to address practical problems in the energy-mobility-climate field from a theoretical perspective.

They will be able to apply competencies in qualitative and quantitative research to develop mixed-method designs.

Students will know about the methodological steps of problem-based learning and gain competence in applying this approach to subject-related practical research questions and problems.

3 Content

Problem-based learning (PBL) is an instructional approach that has been used successfully for over 30 years and continues to gain acceptance in multiple disciplines. It is an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem.

This class will apply PBL to the topic of sustainable mobility policies, allowing students to work in an independent and goal-oriented manner on a given problem statement. Topic will change from semester to semester, but mainly focus on the mobility-energy-climate nexus.

In part III.3 of the class the focus will rest on the development of a theoretical approach and methodology to the presented research problem.

4 Teaching Forms

Inverted classroom; on demand teaching and coaching.

5	Exam Type	Weighting
	StA (Seminar Paper)	100 %

6 Impact of grade on final grade

6/120 of the entire program

7 Module Coordinator

Prof. Dr. Sven Kesselring

8 Comments / Admission Criteria

Module Code and Module Name
418-010 SUM III.3.2 Problem based research project 1

Credits	Workload	Study Semester	Recurrence	Duration
3 ECTS	3 x 25 hours = 75 hours	3	Every semester	1 semester

1	Attendance/Contact Hours	Weekly Attendance (SWS)	Self Study/Home-work/Preparation	Time for Exercises/ Group Work	Group Size
	25 hours	1	25 hours	25 hours	appr. 15

2	**Learning Outcomes / Competencies** 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.
3	**Content** 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.
4	**Teaching Forms** Lectures, group work, team work, field trips, contact with practice partner, interviews etc.
5	**Exam Type** — **Weighting** StA (Seminar Paper) — 100 %
6	**Impact of grade on final grade** 6/120 of the entire program
7	**Module Coordinator** Prof. Dr. Sven Kesselring
8	**Comments / Admission Criteria**

Module Code and Module Name
418-010 SUM III.4.1 Problem based research project 2

Credits	Workload	Study Semester	Recurrence	Duration
3 ECTS	6 x 25 hours = 150 hours	3	Every semester	1 semester

1	Attendance/Contact Hours	Weekly Attendance (SWS)	Self Study/Home-work/Preparation	Time for Exercises/ Group Work	Group Size
	11 hours	1	19 hours	45 hours	appr. 15

2 Learning Outcomes / Competencies

- Following up on class III.3, students will work on the practical implementation of their research concept. This will comprise group work, a mid-term peer review of results and the final presentation and appraisal of the solutions developed.
- Students will learn to follow up mixed-method designs and apply their methods to a practical problem.
- Students will follow up on the second part of the methodological steps of problem-based learning and gain competence in applying this approach to subject-related practical research questions and problems.

3 Content

Following up on class III.3, students will work on the practical implementation of their research concept. This will comprise group work, a mid-term peer review of results and the final presentation and appraisal of the solutions developed.

Problem-based learning (PBL) is an instructional approach that has been used successfully for over 30 years and continues to gain acceptance in multiple disciplines. It is an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem.

This class will apply PBL to the topic of sustainable mobility policies, allowing students to work in an independent and goal-oriented manner on a given problem statement. Topic will change from semester to semester, but mainly focus on the mobility-energy-climate nexus.

4 Teaching Forms

Inverted classroom; on demand teaching and coaching.

5	Exam Type	Weighting
	StA (Seminar Paper)	100 %

6 Impact of grade on final grade

6/120 of the entire program

7 Module Coordinator

Prof. Dr. Sven Kesselring

8	**Comments / Admission Criteria**

Module Code and Module Name

418-010 SUM III.4.2 Problem based research project 2

Credits	**Workload**	**Study Semester**	**Recurrence**	**Duration**
6 ECTS	6 x 25 hours = 150 hours	3	Every semester	1 semester

1	**Attendance/Contact Hours**	**Weekly Attendance (SWS)**	**Self Study/Home-work/Preparation**	**Time for Exercises/ Group Work**	**Group Size**
	15% (22,5 hours)	2	25% (37,5 hours)	60% (90 hours)	appr. 15

2	**Learning Outcomes / Competencies** Being able to conduct applied research and to realize the research design developed in III.3.
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.
4	**Teaching Forms** Lectures, project work, case study, field trips, data collection and analysis, writing of scientific reports, presentation of results.
5	**Exam Type** — **Weighting** StA (Seminar Paper) — 100 %
6	**Impact of grade on final grade** 6/120 of the entire program
7	**Module Coordinator** Prof. Dr. Sven Kesselring
8	**Comments / Admission Criteria**

Module Code and Module Name
418-028 SUM III.5 Mobility solution design 3

Credits	**Workload**	**Study Semester**	**Recurrence**	**Duration**
6 ECTS	6 x 25 hours = 150 hours	3	Every semester	1 semester

1	**Attendance/Contact Hours**	**Weekly Attendance (SWS)**	**Self Study/Home-work/Preparation**	**Time for Exercises/ Group Work**	**Group Size**
	X hours	2	X hours	X hours	appr. 15

2	**Learning Outcomes / Competencies** -	
3	**Content**	
4	**Teaching Forms**	
5	**Exam Type** StA (Seminar Paper)	**Weighting** 100 %
6	**Impact of grade on final grade** 6/120 of the entire program	
7	**Module Coordinator** Prof. Dr. Malte Ackermann	
8	**Comments / Admission Criteria**	

Module Code and Module Name
900-004 SUM IV.1 Digital Transformation

Credits	Workload	Study Semester	Recurrence	Duration
6 ECTS	6 x 25 hours = 150 hours	4	Every semester	1 semester

1	Attendance/Contact Hours	Weekly Attendance (SWS)	Self Study/Home-work/Preparation	Time for Exercises/ Group Work	Group Size
	X hours	2	X hours	X hours	appr. 15

2 Learning Outcomes / Competencies

In this course we are exploring and building up “skillsets, toolsets and mindsets” for working and collaborating within an increasingly networked society. We do this from a conceptual and from a decidedly practical perspective that allows for in-depth project work in various areas of interest and application

Our main interest in this semester is a range of methods and concepts that are often labeled as “User Experience Design” (UX). The field of User Experience Design is a conceptual design discipline. It focuses on the interaction between human users/actors, machines & devices, (user-) interfaces, and the contextual environments of particular human activities. With the proliferation of networked devices in the workplace and all-day life, user experience has become an increasingly significant concern for the design of products, services, (user) interfaces, and so forth. UX Design is a multi-disciplinary field and includes elements of interaction design, information architecture, user research, applied psychology, and other disciplines. It is thus accessible for students from a wide range of disciplinary backgrounds who want to develop their personal competencies for working within the unfolding “digital transformation”.

3 Content

- what is User Experience Design (UX)?
- selected methods and tools for User Experience Design and User Research
- concepts of applied psychology in UX
- the role of User Experience Design for business innovation
- the rise of the Experience Economy

4 Teaching Forms

8 face-to-face sessions, one joint design workshop, active participation in weekly online activities/sessions, and self-directed project work.

5 Exam (Type and Duration) **Weighting**

StA (Seminar Paper)

6 Impact of grade on final grade

6/120 of the entire program

7 Module Coordinator

8	**Comments / Admission Criteria**

Module Code and Module Name

418-013 SUM IV.2 Master Thesis

Credits	**Workload**	**Study Semester**	**Recurrence**	**Duration**
22 ECTS	22 x 25 hours = 550 hours	4	Every semester	1 semester

1	**Attendance/Contact Hours**	**Weekly Attendance (SWS)**	**Self Study/Home-work/Preparation**	**Time for Exercises/ Group Work**	**Group Size**
			550 hours		appr. 15

2	**Learning Outcomes / Competencies** The aim here is to run a complete research and development process of an individual research project.
3	**Content** Students conduct their own research and will be supported by supervision. They apply theoretical, methodological and practical knowledge, skills and competencies they accumulated during the three semesters before. Students conduct their own research and will be supported by supervision. They apply theoretical, methodological and practical knowledge, skills and competencies they accumulated during the three semesters before.
4	**Teaching Forms** Individual work with supervision.
5	**Exam (Type and Duration)** — **Weighting** Ma (Master's Thesis) 4 months — 100 %
6	**Impact of grade on final grade** 22/120 of the entire program
7	**Module Coordinator** Prof. Dr. Sven Kesselring
8	**Comments / Admission Criteria**

Module Code and Module Name
418-014 SUM IV.3 Master-Colloquium

Credits	**Workload**	**Study Semester**	**Recurrence**	**Duration**
2 ECTS	2 x 25 hours = 50 hours	4	Every semester	1 semester

1	**Attendance/Contact Hours**	**Weekly Attendance (SWS)**	**Self Study/Home-work/Preparation**	**Time for Exercises/ Group Work**	**Group Size**
	X hours	1	X hours	X hours	appr. 15

2 Learning Outcomes / Competencies

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.

3 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.

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.

4 Teaching Forms

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

5 Exam (Type and Duration) — **Weighting**

M20 (Master Colloquium) — 100 %

6 Impact of grade on final grade

2/120 of the entire program

7 Module Coordinator

Prof. Dr. Sven Kesselring

8 Comments / Admission Criteria