PStO 2024

M.Eng. Sustainable Energy (PStO 2025)

Module catalog

Contents

Module descriptions

<table>
<tr><td rowspan="9">Module ACES</td><td colspan="5">Analysis and Complexity of Energy Systems (ACES)</td></tr>
<tr><td colspan="5">Analyse und Komplexität von Energiesystemen</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">15 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">12 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td>Workload (total)</td><td colspan="2">450 h</td></tr>
<tr><td>Semester offered</td><td>Every spring semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>180 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>270 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="3">Students acquire basic knowledge in the modeling and optimization of sustainable energy systems. They can analyze energy systems with regard to their sustainability and develop possible supply strategies as well as analyze options for the system integration of renewable energies. They understand basic interactions of sustainable energy systems and their implementation in mathematical problems. In addition, they become familiar with various modeling approaches and programming languages, one of which they specialize in and are thus able to apply. They acquire basic knowledge of scenario development and the handling of complex data and are able to prepare, process and verify large amounts of data. They can analyse and visualize the results (data).</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="3">Students have problem-oriented knowledge of the modeling and optimization of sustainable energy systems. They are able to critically analyze and evaluate several dimensions and problem framings of sustainable energy systems, depending on their choice of submodules. They can evaluate transformation processes of energy systems and discuss these with regard to sustainability issues. Students have acquired a basic understanding of how to develop and plan their own projects, with a focus on the particular challenges of energy system modeling. They have created a detailed project concept and reflected intensively on potential obstacles and strategies for overcoming them.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="3">The module focuses on quantitative methods for modelling and optimizing sustainable energy systems. In the submodules, students learn about different modeling approaches and programming languages and are able to apply these practically in case studies. They understand the problems involved in obtaining the necessary data and learn how to assess data quality. On this basis, they are able to create their own models. They are able to understand and evaluate the models used in practice.</td></tr>
<tr><td colspan="2">Social and personal skills:</td><td colspan="3">Students are able to transfer their specialist skills to new modelling and optimization problems. They can plan and organize a research project independently and in cooperation with others, apply quantitative methods and write an academic report. In doing so, they further develop their analytical thinking skills and methodological skills. They acquire time and project management skills, reflective capacity, and the ability to work in a team.</td></tr>
</table>

*Continuation of **module ACES**:*

Course and study formats:	Lecture, laboratory, discussions and interactions, project work, presentation
Module coordinator:	Pao-Yu Oei, Bernd Möller
Prerequisites:	None
Applicable degree program:	M.Eng. Sustainable Energy This is a required module in all three tracks of the Sustainable Energy degree program.
Notes / Other:	There is a choice within the module regarding the desired methodological modeling specialization.
Literature:	Scharf, H., Möst, D.: Optimierungsmodelle und Forschungsfragen in der Elektrizitätswirtschaft Ravindra K. Ahuja, Thomas L. Magnanti, James B. Orlin: Network Flows: Theory, Algorithms, and Applications, Prentice Hall, 1993

ACES: **Submodule 1**	ACES-1 Analysis and Complexity of Energy Systems				
	ACES-1 Analyse und Komplexität von Energiesystemen				
	Submodule code number		**Type of course**		Lecture
	SWS	4 SWS	**Workload (submodule)**		120 h
	Type of submodule	Required	**Of which**	**Attendance time**	60 h
	Planned group size	60		**Self-study**	60 h
ACES: **Submodule 2**	ACES-2 Analysis and Complexity of Energy Systems				
	ACES-2 Analyse und Komplexität von Energiesystemen				
	Submodule code number		**Type of course**		Lecture
	SWS	4 SWS	**Workload (submodule)**		120 h
	Type of submodule	Required	**Of which**	**Attendance time**	60 h
	Planned group size	60		**Self-study**	60 h
ACES: **Submodule 3**	ACES-3 Analysis and Complexity of Energy Systems				
	ACES-3 Analyse und Komplexität von Energiesystemen				
	Submodule code number		**Type of course**		Seminar
	SWS	4 SWS	**Workload (submodule)**		120 h
	Type of submodule	Required	**Of which**	**Attendance time**	60 h
	Planned group size	20 (Transition & Development) 10 (Engineering)		**Self-study**	60 h
ACES: **Module examination**	Module examination				
	Modulprüfung				
	Examination number		**Scope of the exam**		See comments
	Examination format	Project-oriented group term paper and presentation	**Exam preparation, Examination time**		90 h
	Graded exam	Yes			
	Comments on the module examination	Project-oriented group homework (8,000 words) and presentation (30 minutes) on a cross-module issue			
					Updated on: DD.MM.YYYY

<table>
<tr><td rowspan="8">Module SEnSe</td><td colspan="5">Sustainable and Just Energy System Solutions (SEnSe)</td></tr>
<tr><td colspan="5">Nachhaltige und gerechte Energiesystemlösungen</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">15 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">12 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>450 h</td></tr>
<tr><td>Semester offered</td><td>Every fall semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>180 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>270 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="5">Students gain an overview of energy and climate policy fundamentals, interrelationships and measures in the context of sustainable and equitable energy systems. They can critically assess approaches and framework conditions, identify problems, and develop strategies at national, international and local levels. They can determine and classify core areas of political analysis and apply them to case studies. Students develop an understanding of sufficiency, climate justice and acceptance in the context of sustainable energy systems, as well as the limits and opportunities of energy and climate policy, and are able to analyze and critically assess their backgrounds. They are also familiar with qualitative methods of energy system research and can assess the benefits of the respective methodological instruments in relation to specific issues. They have developed methodological skills in qualitative social research and are able to design and carry out their own qualitative research projects in a structured manner.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="5">Students are able to critically analyze multiple dimensions and problem framings of sustainable and fair energy systems in relation to the relevant current theoretical foundations and practical fields of societal application in a problem-oriented manner, depending on their choice of submodules. They can recognize political contexts that arise in their professions, analyze problem constellations and methodically develop different approaches to solving them. Furthermore, basic knowledge of the underlying national and international political processes is conveyed so that students can evaluate developments in the political sphere in an interdisciplinary manner. From the compulsory submodule "Sustainability and Energy Research Lectures," they gain knowledge of potential fields of practice and can reflect on and evaluate their scope and impact on the design of sustainable and fair energy systems. This also enables them to develop and consolidate their professional visions and goals.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="5">The module focuses on qualitative methods of research-based learning. Students are able to interpret, criticize and competently present complex academic texts. They learn to plan, organize and carry out research projects independently. They learn to define problems and develop research questions. In doing so, they can develop a research design, gain points of entry into the field, conduct qualitative interviews, process, evaluate and analyze collected material and present results in a research report. Students can also assess which methodological instruments (qualitative or quantitative) are suitable for addresssing specific research questions.</td></tr>
</table>

*Continuation of **module SEnSe**:*

Social and personal competence:	Students are able to critically reflect on the fields of application and limits of sustainable energy system research. In discussions, they show progress in their academic communication and discussion skills and demonstrate their skills in self-presentation, social engagement, moderation and information processing. The same applies to their ability to think in abstract and networked ways. They also have the ability to transfer their subject-specific expertise to new fields (also beyond the realms of academic research) and have further developed their ability to analyze, synthesize and empathize. Students can plan and organize project work independently and in cooperation with others. They possess time and project management skills, reflective capacity, and the ability to work in a team.
Course and study formats:	Lectures, project work, small-group discussions, presentations, posters, excursions
Module coordinator:	Pao-Yu Oei, Frauke Wiese
Prerequisites:	None
Applicable degree program:	M.Eng. Sustainable Energy This is a required module in all tracks of the Sustainable Energy degree program.
Notes / Other:	The module offers a choice with regard to the desired project specialization.
Literature:	IPCC (2023): Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change United Nations (2023): The Sustainable Development Goals Report. Special edition. Towards a Rescue Plan for People and Planet. New-York. Dennis Meadows et al. (1972): Die Grenzen Des Wachstums: Bericht Des Club of Rome Zur Lage Der Menschheit. Stuttgart: Deutsche Verlags-Anstalt. Uwe Schneidewind & Angelika Zahrnt (2014): The Politics of Sufficiency - Making it easier to live the Good Life Thomas Princen (2005): The Logic of Sufficiency Jonas Lage et. al (2023): Citizens call for sufficiency and regulation — A comparison of European citizen assemblies and National Energy and Climate Plans Spangenberg, J.H. (2018): Sufficiency: a pragmatic, radical visionary approach In: Rijnhout, L., Mastini, R. (eds.)

SEnSe: **Submodule 1**	SEnSe-1 Sustainable and Just Energy System Solutions				
	SEnSe-1 Nachhaltige und gerechte Energiesystemlösungen				
	Submodule code number		**Type of course**		Lecture
	SWS	2 SWS	**Workload (submodule)**		75 h
	Type of sub-module	Required	**Of which**	**Attendance time**	30 h
	Planned group size	60		**Self-study**	45 h
SEnSe: **Submodule 2**	SEnSe-2 Sustainable and Just Energy System Solutions				
	SEnSe-2 Nachhaltige und gerechte Energiesystemlösungen				
	Submodule code number		**Type of course**		Lecture
	SWS	2 SWS	**Workload (submodule)**		75 h
	Type of submodule	Required	**Of which**	**Attendance time**	30 h
	Planned group size	60		**Self-study**	45 h
SEnSe: **Submodule 3**	SEnSe-3 Sustainable and Just Energy System Solutions				
	SEnSe-3 Nachhaltige und gerechte Energiesystemlösungen				
	Submodule code number		**Type of course**		Lecture
	SWS	4 SWS	**Workload (submodule)**		150 h
	Type of submodule	Required	**Of which**	**Attendance time**	60 h
	Planned group size	60		**Self-study**	75 h
SEnSe: **Submodule 4**	SEnSe-4 Sustainable and Just Energy System Solutions				
	SEnSe-4 Nachhaltige und gerechte Energiesystemlösungen				
	Submodule code number		**Type of course**		Seminar
	SWS	4 SWS	**Workload (submodule)**		150 h
	Type of submodule	Required	**Of which**	**Attendance time**	60 h
	Planned group size	20		**Self-study**	75 h
SEnSe: **Module examination**	Module examination				
	Modulprüfung				
	Examination number		**Scope of the exam**		See comments
	Examination format	Project-oriented group term paper and presentation	**Exam preparation, Examination time**		30 h
	Graded exam	Yes			
	Comments on the module examination	Project-oriented group term paper (8,000 words) and presentation (30 minutes) on a cross-module issue			
					Updated on: DD.MM.YYYY

<table>
<tr><td rowspan="8">Module EE</td><td colspan="5">Ecological Economics</td></tr>
<tr><td colspan="5">Ökologische Ökonomik</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Semester offered</td><td>Every fall semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">Students are familiar with different theories of economic development and their ecological implications and preconditions, as well as the common methods for defining and measuring sustainable development. Students are also familiar with key data sources for the empirical analysis of environmental policy processes and measures.
Students can identify basic concepts of plural economic research and use them to evaluate environmental policy measures for sustainable economic development from the perspective of different economic paradigms and identify the reasons for different assessments.
In case studies, students learn to apply their knowledge by analyzing and evaluating the implementation of environmental economic instruments. In doing so, they learn to independently formulate, design and implement plural economic questions and to communicate their results appropriately.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students can explain interactions between economic and ecological systems and are able to draw general conclusions to support the justification and design of environmental economic instruments. They can explain and apply the central contents and methods of a plural economic research program and explain the corresponding state of research. Students demonstrate their acquired subject-specific skills by developing the content and concept of a project and presenting the results. They can place the knowledge they have acquired into a wider context, in order to deepen it in a targeted manner over the course of their careers.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">Students are able to define problems themselves and develop processing strategies in independent projects. They can independently apply empirical and theoretical methods to the analysis of economic problems and critically evaluate them. They can discuss and strategically work to resolve issues and problems as a team, and defend these in academic debates.</td></tr>
</table>

*Continuation of **module EE**:*

Social and personal competence:	Students are able to critically scrutinize common environmental economic instruments and assess their advantages and disadvantages in specific use cases. They can offer a comparative argument about how different environmental economic instruments relate to each other and can critically assess the changes they can bring about. They are also able to transfer their specialist skills to new fields and are able to reflect on the planned progression of their specialist skills. In addition, they can actively participate in inter- and transdisciplinary discourses on ecological economics and can engage in the academic exchange of information, complex issues, ideas, and strategies for action with research scholars, scientists, and representatives from civil society.
Course and study formats:	Lectures, small-group discussions, presentations, posters, project
Module coordinator:	Claudius Graebner-Radkowitsch
Prerequisites:	None
Applicable degree program:	M.Eng. Sustainable Energy This is a required module in the "Transition" track of the Sustainable Energy degree program.
Notes / Other:	n/a
Literature:	Common, M. S., & Stagl, S. (2005). Ecological economics: An introduction. Cambridge University Press. Dixson-Declève, S., Gaffney, O., Ghosh, J., Randers, J., Rockström, J., & Stoknes, P. E. (2022). Earth for all: A survival guide for humanity. New Society Publishers. Harris, J. M., & Roach, B. (2017). Environmental and Natural Resource Economics (4th ed.). Routledge. Spash, C. L. (Ed.). (2018). Routledge Handbook of Ecological Economics: Nature and Society. Routledge.

<table>
<tr><td rowspan="5">EE: Submodule 1</td><td colspan="5">EE-1 Ecological Economics</td></tr>
<tr><td colspan="5">EE-1 Ökologische Ökonomie</td></tr>
<tr><td>Submodule code number</td><td></td><td colspan="2">Type of course</td><td>Seminar</td></tr>
<tr><td>SWS</td><td>4 SWS</td><td colspan="2">Workload (submodule)</td><td>90 h</td></tr>
<tr><td>Type of submodule</td><td>Required</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Planned group size</td><td>20</td><td>Self-study</td><td>30 h</td></tr>
<tr><td rowspan="6">EE: Module examination</td><td colspan="5">Module examination</td></tr>
<tr><td colspan="5">Modulprüfung</td></tr>
<tr><td>Examination number</td><td></td><td colspan="2">Scope of the exam</td><td>See comments</td></tr>
<tr><td>Examination format</td><td>Poster development and presentation
or
Project-oriented term paper and presentation
or
Written exam</td><td colspan="2" rowspan="2">Exam preparation,
Examination time</td><td rowspan="2">60 h</td></tr>
<tr><td>Graded exam</td><td>Yes</td></tr>
<tr><td>Comments on the module examination</td><td colspan="4">Poster development & presentation (15 minutes)
or
Project-oriented term paper (approx. 4,000 words) & presentation (15 minutes)
or
Written exam (90 minutes)</td></tr>
<tr><td colspan="6">Updated on: DD.MM.YYYY</td></tr>
</table>

Module EWS					
Energy Transition Showcases					
Energiewende Showcases					
Module type		Required elective			
Module identification number					
Credit points (CP)		5 CP			
Semester hours per week (SWS)		4 SWS			
Phase of study	1st or 2nd semester	**Workload (total)**		150 h	
Semester offered	Every spring semester	**Of which**	**Attendance time**	60 h	
Duration	One semester		**Self-study**	90 h	
Qualification objective:	As part of the "Energy Transition Showcases" module, students learn about different applications and actors in the energy transition by way of example. They understand the role of actors in the context of sustainable energy systems and are able to develop solution-oriented approaches to the challenges on the way to a sustainable society. The aim of the module is to gain more practical experience through site visits and discussions with on-site actors and be able to better assess the overall complexity of the system. This helps students to identify and develop their own interdisciplinary research or practical projects.				
Subject-specific competence:	Students get to know the actors involved in the energy transition and are able to draw practical conclusions to support the justification and design of sustainable energy systems. They can place the knowledge they have acquired in a broader context, acquire knowledge about possible fields of practice, and can reflect on and evaluate their scope and impact on the design of sustainable energy systems. This also enables students to develop and consolidate their professional visions and goals.				
Methodological competence:	Students are able to understand different professional and practice areas in the field of sustainable energy systems in relation to one another and to summarize and explain the complexity of interdisciplinary problems. They learn to identify and differentiate professional fields and thematic content areas on the energy transition and can understand how they relate to each other. They also learn to relate their own skills and acquired knowledge to practice.				
Social and personal competence:	Students are able to argue from a comparative perspective how different actors are interrelated and can critically assess the changes they bring about and shape. They can discuss and strategically work to resolve issues and problems in the context of sustainable energy systems as a team, and defend these in academic debates. They also have the ability to transfer their subject-specific competence to new fields and have further developed their ability to analyze, synthesize and empathize.				
Course and study formats:	Lectures, project work, small-group discussions, presentations, posters, excursions				
Module coordinator:	Pao-Yu Oei, Frauke Wiese				
Prerequisites:	None				

*Continuation of **module EWS**:*

Applicable degree program:	M.Eng. Sustainable Energy This is a required module in the "Transition" track of the Sustainable Energy degree program.
Notes / Other:	N/A.
Literature:	Christian von Hirschhausen, Clemens Gerbaulet, Claudia Kemfert, Casimir Lorenz, Pao-Yu Oei (2018): Energiewende "Made in Germany", Springer Verlag. Weibezahn, J./ Krumm, A./ Oei, P.-Y./ Färber, L. (2021): "Erfolgsstory mit mehr Potenzial: die Erneuerbaren". In Das Energiesystem der Zukunft in Smart Cities und Smart Rural Areas, herausgegeben von Alexander Schlüter und Juan Bernabé-Moreno. München: Carl Hanser Verlag.

<table>
<tr><td rowspan="6">EWS: Submodule 1</td><td colspan="5">EWS-1 Energy Transition Showcases</td></tr>
<tr><td colspan="5">EWS-1 Energy Transition Showcases</td></tr>
<tr><td>Submodule code number</td><td></td><td colspan="2">Type of course</td><td>Seminar</td></tr>
<tr><td>SWS</td><td>4 SWS</td><td colspan="2">Workload (submodule)</td><td>90 h</td></tr>
<tr><td>Type of submodule</td><td>Required</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Planned group size</td><td>20</td><td>Self-study</td><td>30 h</td></tr>
<tr><td rowspan="6">EWS: Module examination</td><td colspan="5">Module examination</td></tr>
<tr><td colspan="5">Modulprüfung</td></tr>
<tr><td>Examination number</td><td></td><td colspan="2">Scope of the exam</td><td>See comments</td></tr>
<tr><td>Examination format</td><td>Poster development and presentation
or
Project-oriented term paper and presentation
or
Written exam</td><td colspan="2" rowspan="2">Exam preparation, Examination time</td><td rowspan="2">60 h</td></tr>
<tr><td>Graded exam</td><td>Yes</td></tr>
<tr><td>Comments on the module examination</td><td colspan="4">Poster development & presentation (15 minutes)
or
Project-oriented term paper (approx. 4,000 words) & presentation (15 minutes)
or
Written exam (90 minutes)</td></tr>
<tr><td colspan="6">Updated on: DD.MM.YYYY</td></tr>
</table>

<table>
<tr><td rowspan="8">Module TS</td><td colspan="5">Transformation Studies</td></tr>
<tr><td colspan="5">Transformationsstudien</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Semester offered</td><td>Every spring semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">Students are able to identify core fields of inter- and transdisciplinary transformation and sustainability research and can define and differentiate between various contemporary socio-ecological problem constellations (such as climate change, loss of biodiversity, etc.). They can use examples to explain and evaluate their effects on societies. Students also know how to classify the societal complex of causes underlying various environmental changes. They can localize and present differences and similarities between various disciplines in relation to the field of transformation research.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students are able to critically analyze multiple dimensions and problem framings of socio-ecological transformations in relation to the relevant current theoretical foundations and practical fields of societal application in a problem-oriented manner. They can explain and illustrate interdependencies between the individual and society in relation to current environmental changes. They can give example-based insights into the interconnected relationships between societies in the Global South and the Global North. They are also able to recognize connections between the individual contemporary diagnoses and to assess their respective scopes and limits.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">The module focuses on methods of research-based learning. Students are able to interpret, criticize and competently present complex academic texts. In doing so, they become familiar with methodological approaches and research practices other than those of their home disciplines, which are applied in the context of transformation research. They can state their premises and explain which questions are currently being investigated with which methodological instruments in the academic discourse on sustainability and future viability.</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="4">Students can construct and present complex instructional content at an advanced level, both independently and collaboratively in small groups. They are able to engage critically in group discussions, adopt multiple viewpoints, and argue their positions. They are also able to transfer their specialist skills to new fields and have further developed their ability to analyze, synthesize and empathize.</td></tr>
<tr><td colspan="2">Course and study formats:</td><td colspan="4">Lecture, small-group discussions, presentations, project</td></tr>
</table>

*Continuation of **module TS**:*

Module coordinator:	Matthias Schmelzer
Prerequisites:	None
Applicable degree program:	M.Eng. Sustainable Energy The module is a required elective in the "Transition" track of the Sustainable Energy degree program.
Notes / Other:	There are options within the module regarding the desired specialization.
Literature:	Brand, Ulrich, and Markus Wissen. *The Imperial Mode of Living: Everyday Life and the Ecological Crisis of Capitalism*. New York: Verso, 2021. Brand, Karl-Werner. *Die sozial-ökologische Transformation der Welt: Ein Handbuch*. Campus Verlag, 2017. Kallis, Giorgos, Susan Paulson, Giacomo D'Alisa, and Federico Demaria. *The Case for Degrowth*. Cambridge, UK ; Medford, MA: Polity, 2020. Pohl, Christian, and Gertrude Hirsch Hadorn. *Principles for Designing Transdisciplinary Research*. Oekom, 2007. WBGU. *World in Transition: A Social Contract for Sustainability*. Berlin: WBGU, 2011.

TS: **Submodule 1**	*TS-1 Transformation Studies*				
	TS-1 Transformation Studies				
	Submodule code number		**Type of course**		Seminar
	SWS	4 SWS	**Workload (submodule)**		100 h
	Type of submodule	Required	**Of which**	**Attendance time**	60 h
	Planned group size	20		**Self-study**	40 h
TS: **Module examination**	Module examination				
	Modulprüfung				
	Examination number		**Scope of the exam**		See comments
	Examination format	Poster development and presentation or Project-oriented term paper and presentation or Written exam	**Exam preparation, Examination time**		50 h
	Graded exam	Yes			
	Comments on the module examination	Poster development & presentation (15 minutes) or Project-oriented term paper (approx. 4,000 words) & presentation (15 minutes) or Written exam (90 minutes)			
					Updated on: DD.MM.YYYY

<table>
<tr><td rowspan="8">RTS module</td><td colspan="5">Resource Transition & Sustainability</td></tr>
<tr><td colspan="5">Ressourcenübergang und Nachhaltigkeit</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Semester offered</td><td>Every fall semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">As part of the "Resource Transition & Sustainability" module, students learn about various core fields of inter- and transdisciplinary transformation and sustainability research and are able to define and differentiate between various current socio-ecological problem constellations and explain and evaluate their effects on societies using examples. They learn about different aspects of resources and sustainability as well as approaches that offer solutions for building a sustainable society. In addition, they understand a broad spectrum of interactions between resources, sustainability and issues of sustainable development.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students are able to analyze multiple dimensions and ways of framing resource and sustainability issues within the context of the energy transition for real-world societal use contexts. They are able to explain and illustrate interdependencies between resources, individuals and society in relation to current sustainability issues and are able to draw general conclusions to support the justification and design of sustainable energy systems. Students demonstrate their acquired subject-specific competence by developing the content and concept of a practice-oriented project and presenting the results. They are able to situate their acquired knowledge within a broader context, in order to build on it in a targeted manner throughout their professional careers</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">Students are able to interpret academic texts and present them competently. They become familiar with various methods for analyzing and evaluating aspects of resources and sustainability and are able to examine and reflect on the effectiveness and efficiency of these instruments. Among other things, they learn about methods for evaluating resource consumption (e.g. life cycle assessment) and can categorize their fields of application. In addition, they are able to explain which problems are currently being investigated with which methodological instruments in the academic discourse on resources and sustainability.</td></tr>
<tr><td colspan="2">Social and personal skills:</td><td colspan="4">Students can construct and present complex instructional content at an advanced level, both independently and collaboratively in small groups. They are able to engage critically in group discussions, adopt multiple viewpoints, and argue their positions. They are also able to transfer their specialist skills to new fields and have further developed their ability to analyze, synthesize and empathize.</td></tr>
</table>

*Continuation of **module RTS**:*

Course and study formats:	Lecture, project work, small-group discussions, presentations, posters
Module coordinator:	Pao-Yu Oei, Frauke Wiese
Prerequisites:	None
Applicable degree program:	M.Eng. Sustainable Energy This is an elective module within the Sustainable Energy degree program.
Notes / Other:	N/A.
Literature	WBGU - German Advisory Council on Global Change (2023): Healthy living on a healthy planet. Berlin: WBGU. SRU - German Advisory Council on the Environment (2023): For a Systematic Integration of Environment and Health, Berlin. Rockström, J., Steffen, W., Noone, K. et al. A safe operating space for humanity. Nature 461, 472-475 (2009).

<table>
<tr><td rowspan="6">RTS: Submodule 1</td><td colspan="5">RTS-1 Resource Transition & Sustainability</td></tr>
<tr><td colspan="5">RTS-1 Ressourcenübergang & Nachhaltigkeit</td></tr>
<tr><td>Submodule code number</td><td></td><td colspan="2">Type of course</td><td>Seminar</td></tr>
<tr><td>SWS</td><td>4 SWS</td><td colspan="2">Workload (submodule)</td><td>90 h</td></tr>
<tr><td>Type of submodule</td><td>Required</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Planned group size</td><td>20</td><td>Self-study</td><td>30 h</td></tr>
<tr><td rowspan="6">RTS: Module examination</td><td colspan="5">Module examination</td></tr>
<tr><td colspan="5">Modulprüfung</td></tr>
<tr><td>Examination number</td><td></td><td colspan="2">Scope of the exam</td><td>See comments</td></tr>
<tr><td>Examination format</td><td>Poster development and presentation
or
Project-oriented term paper and presentation
or
Written exam</td><td colspan="2" rowspan="2">Exam preparation, Examination time</td><td rowspan="2">60 h</td></tr>
<tr><td>Graded exam</td><td>Yes</td></tr>
<tr><td>Comments on the module examination</td><td colspan="4">Poster development & presentation (15 minutes)
or
Project-oriented term paper (approx. 4,000 words) and presentation (15 minutes)
or
Written exam (90 minutes)</td></tr>
<tr><td colspan="6">Updated on: DD.MM.YYYY</td></tr>
</table>

<table>
<tr><td rowspan="8">SEAP module</td><td colspan="5">Sustainable Energy Access Planning (SEAP)</td></tr>
<tr><td colspan="5">Energieplanung für den Zugang zu nachhaltiger Energie</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Semester offered</td><td>Every spring semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="5">In the "Sustainable Energy Access Planning" module, students learn to analyze the status of energy access in rural areas and other locations with inadequate energy infrastructures and to develop energy plans for sustainable energy access. They are able to quantify and localize renewable energy sources and the provision of sustainable energy access. They learn to consult stakeholders in rural energy planning processes and to moderate such processes. In addition, they can prepare and evaluate geographical data for the assessment of sustainable energy access.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="5">Students are able to analyze multiple dimensions and problem framings of renewable energy access planning in the context of sustainability aspects relevant to their practical societal fields of application. They demonstrate their acquired subject-specific competence by developing the content and concept of a practice-oriented project and presentiing the results. They are able to situate their acquired knowledge within a broader context, in order to build on it in a targeted manner throughout their professional careers</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="5">Students are able to define problems themselves and develop processing strategies for the planning of sustainable energies in independent projects. They understand the challenges of the required acquisition and learn how to use geographical information systems (GIS), in particular the management of spatial data, spatial analysis in the vector and raster area, as well as results visualization. They gain familiarity with planning methods, with a special focus on quantitative geographical data, and can apply these independently and question them critically in analyzing universal energy access.</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="5">Students are able to transfer their subject expertise to new applications. They can plan and organize a project independently and in collaboration with others, apply geographical information systems (GIS), and write a project-oriented report. In doing so, they further develop their analytical thinking and methodological skills. They have knowledge of time and project management, as well as the ability to work in a team.</td></tr>
<tr><td colspan="2">Course and study formats:</td><td colspan="5">Seminar with exercises in small groups, project work with concrete case studies</td></tr>
</table>

*Continuation of **module SEAP**:*

Module coordinator:	Bernd Möller
Prerequisites:	None
Applicable degree program:	M.Eng. Sustainable Energy This is a required module in the "Development" track of the Sustainable Energy degree program.
Notes / Other:	N/A
Literature:	Khan, I: Sustainable Energy Infrastructure Planning Framework: Transition to a Sustainable Electricity Generation System in Bangladesh. In: Asif, M (Ed.) Energy and Environmental Security in Developing Countries. Springer, 2021. Ugwoke B. *et al.* Demonstration of the integrated rural energy planning framework for sustainable energy development in low-income countries: Case studies of rural communities in Nigeria. Renewable and Sustainable Energy Reviews 144 (2021) 110983. Herington M.J. *et al.* Rural energy planning remains out-of-step with contemporary paradigms of energy access and development. Renewable and Sustainable Energy Reviews 67 (2017) 1412 - 1419. Riva F *et al.* Long-term energy planning and demand forecast in remote areas of developing countries: Classification of case studies and insights from a modeling perspective. Energy Strategy Reviews 20 (2018) 71-89. Nastasi B, Nezhad M (Eds.) GIS and Remote Sensing for Renewable Energy Assessment and Maps. Special Issue, MDPI Energies 2021. Law M and Collins A: Getting to know ArcGIS Pro 3.2 ESRI 2024. EN Smith, Goodchild and Longley: Geospatial Analysis (available under https://www.spatialanalysisonline.com/)

SEAP: Submodule 1					
	SEAP-1 Sustainable Energy Access Planning				
	SEAP-1 Energieplanung für den Zugang zu nachhaltiger Energie				
	Submodule code number		**Type of course**		Seminar
	SWS	4 SWS	**Workload (submodule)**		90 h
	Type of submodule	Required	**Of which**	**Attendance time**	60 h
	Planned group size	20		**Self-study**	30 h
SEAP: Module examination	Module examination				
	Modulprüfung				
	Examination number		**Scope of the exam**		See comments
	Examination format	Project-oriented term paper and presentation	**Exam preparation, Examination time**		60 h
	Graded exam?	Yes			
	Comments on the module examination	Project-oriented term paper (approx. 4,000 words) and presentation (15 minutes)			
					Updated on: DD.MM.YYYY

<table>
<tr><td rowspan="8">ODDC module</td><td colspan="5">Organizations and Diversity in Development Cooperation (ODDC)</td></tr>
<tr><td colspan="5">Organisationen und Diversität in der Entwicklungszusammenarbeit</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Semester offered</td><td>Every spring semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="5">Students acquire basic knowledge and skills in how to deal with people in international development cooperation organizations. They understand the tasks and roles in organizations and are able to develop solution-oriented problems on the way to a sustainably managed company, in particular time management, team building, personnel development, motivation, intercultural communication, leadership qualities and conflict management strategies.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="5">Students learn how to deal with people in organizations and are able to work in intercultural teams. They learn to take responsibility, lead and coordinate. They can place the knowledge they have acquired in a specific context, gain knowledge of possible fields of practice, and can reflect on and evaluate their scope and impact when dealing with people. This also enables them to develop and consolidate their professional visions and goals. Students demonstrate their acquired subject-specific competence by developing the content and concept of a project in an international team.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="5">Students are able to analyse, reflect on and evaluate specialist content and methods in dealing with processes and people in organizations. They are able to identify problems and develop negotiation, conflict and problem-solving strategies in independent projects. They learn about applications and methods in dealing with people in international organizations, particularly with regard to
- Intercultural communication and cooperation
- Organizations, organizational development and organizational management
- Leading, coaching and motivating people
- Teamwork and intercultural cooperation
- Coordination, presentation and moderation
- Ethical behavior, self-development and taking responsibility
- Time management and self- and project organization</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="5">Students can plan and organize project work independently and in cooperation with others. Students gain the ability to engage in intercultural groups, to discuss critically, to adopt different points of view, and to argue for them. In so doing, they learn to take responsibility and communicate. They also possess time and project management skills, reflective capacity, and the ability to work in a team.</td></tr>
</table>

*Continuation of **module ODDC**:*

Course and study formats:	Lecture, project, small-group discussions, role plays, presentations, posters
Module coordinator:	Dorsi Doï Germann
Prerequisites:	None
Applicable degree program:	M.Eng. Sustainable Energy This is an elective module in the "Development" track of the Sustainable Energy degree program.
Notes / Other:	There are no options within the module.
Literature:	Thomas, D.C. (2017): Cross-Cultural Management: Essential Concepts. Sage Publication, London, UK Mullins, Laurie J. (2013): Management and Organizational Behaviour, Pearson, London, UK Robbins, St.P., Judge, T.A. (2022): Organizational Behavior, Pearson, Harlow, England.

ODDC: **Submodule 1**	ODDC-1 Organizational Behaviour and Diversity Management				
	ODDC-1 Organisatorisches Verhalten und Diversitätsmanagement				
	Submodule code number		**Type of course**		Seminar
	SWS	2 SWS	**Workload (submodule)**		45 h
	Type of submodule	Required	**Of which**	**Attendance time**	30 h
	Planned group size	20		**Self-study**	15 h
ODDC: **Submodule 2**	ODDC-2 Development Strategies and Organizations in International Development Cooperation				
	ODDC-2 Entwicklungsstrategien und Organisationen in der internationalen Entwicklungszusammenarbeit				
	Submodule code number		**Type of course**		Seminar
	SWS	2 SWS	**Workload (submodule)**		45 h
	Type of submodule	Required	**Of which**	**Attendance time**	30 h
	Planned group size	20		**Self-study**	15 h
ODDC: **Module examination**	Module examination				
	Modulprüfung				
	Examination number		**Scope of the exam**		See comments
	Examination format	Individual term paper and presentation	**Exam preparation, Examination time**		60 h
	Graded exam?	Yes			
	Comments on the module examination	Individual term paper (approx. 4,000 words) and presentation with moderation (45 minutes)			
					Updated on: DD.MM.YYYY

<table>
<tr><td rowspan="8">ICEP module</td><td colspan="5">International Community Energy Project (ICEP)
Internationales Bürgerenergieprojekt</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">15 SWS</td></tr>
<tr><td>Phase of study</td><td>2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Semester offered</td><td>Every fall semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>120 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>30 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">As part of the "International Community Energy Project" module, students learn how to carry out international community energy projects and provide technical support. They have the skills to plan, prepare and carry out complex field studies in a multidisciplinary and multicultural team. They are able to present their results to the local population.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students are able to analyze and evaluate several dimensions and problem framings of citizen energy projects for the respective practical fields of societal application. They learn to write and present a research report in a team. They are able to place the knowledge they have gained in a wider context in order to deepen it in a targeted manner during the course of their studies and professional lives.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">Students are able to analyze problems independently and define a comprehensive research problem in independent projects, narrow it down to specific research questions and work on it using suitable methods. They can independently apply empirical and theoretical methods in analysis and critically scrutinize them. They can discuss questions and problems in a team, develop solution strategies together, and defend these in academic debate.</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="4">Students can construct and present complex teaching content at an advanced level both independently and cooperatively in groups. They can critically scrutinize instruments for planning community energy projects and assess their advantages and disadvantages in specific applications. The module enables them to use their problem-solving and conflict management skills and to critically assess the changes they can bring about. Students acquire the ability to engage in group discussions, discuss critically, adopt different points of view and argue for them. In addition, they have the ability to transfer their subject-specific expertise to new fields and are able to reflect on the planned development of their specialist skills.</td></tr>
<tr><td colspan="2">Course and study formats:</td><td colspan="4">Project work, excursion</td></tr>
<tr><td colspan="2">Module coordinator:</td><td colspan="4">Bernd Möller</td></tr>
<tr><td colspan="2">Prerequisites:</td><td colspan="4">None</td></tr>
</table>

*Continuation of **module ICEP**:*

Applicable degree program:	M.Eng. Sustainable Energy This is a required module in the "Development" track of the Sustainable Energy degree program.
Notes / Other:	For excursion planning purposes, a deposit for participation must be paid before the start of the degree program.
Literature:	Patel, N: Performing energy justice futures: How visions of just futures shape discourses and practices in the United Kingdom's community energy sector. Energy Research and Social Science 111 (2024) 103475. Zhivov, A: Energy Master Planning towards Net Zero Energy Resilient Public Communities Guide. Springer Link, 2022. ZHB online access: https://link.springer.com/book/10.1007/978-3-030-95833-6 Sperling, Karl. 2017. How does a pioneer community energy project succeed in practice? The case of the Samsø Renewable Energy Island. Renewable and Sustainable Energy Reviews 71:884-897. https://doi.org/10.1016/j.rser.2016.12.116. Colell, A: Alternating Current - Social Innovation in Community Energy. Springer Link, 2021: ZHB online access: https://link.springer.com/book/10.1007/978-3-658-32307-3 Kerkeling P and Kettemann S: Community Power - The Story of How to Become a Driving Force of a Community Energy Project. Uppsala University, 2023. https://uu.diva-portal.org/smash/get/diva2:1773230/FULLTEXT01.pdf

ICEP: **Submodule 1**					
	ICEP-1 International Community Energy Project				
	ICEP-1 Internationales Bürgerenergieprojekt				
	Submodule code number		**Type of course**		Excursion
	SWS	15 SWS	**Workload (submodule)**		150 h
	Type of submodule	Required	**Of which**	**Attendance time**	120 h
	Planned group size	20		**Self-study**	15 h
	Compulsory participation	Participation in TM ICEP-1 is compulsory, in accordance with the PStO M.Eng. Sustainable Energy (2025).			

ICEP: **Module examination**				
	Module examination			
	Modulprüfung			
	Examination number		**Scope of the exam**	See comments
	Examination format	Documented project work, presentation and final report	**Exam preparation, Examination time**	15 h
	Graded exam?	Yes		
	Comments on the module examination	Documented project work, presentation and final report as joint work (2,000 words per student)		

Updated on: DD.MM.YYYY

<table>
<tr><td rowspan="8">MPM module</td><td colspan="5">Markets and Project Management</td></tr>
<tr><td colspan="5">Märkte und Projektmanagement</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td>Workload (total)</td><td colspan="2">150 h</td></tr>
<tr><td>Cycle</td><td>Every fall semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="5">As part of the "Markets and Project Management" module, students learn about a broad spectrum of interactions between international energy markets, resources and issues of sustainable development. They are able to analyze and evaluate fundamental aspects of international energy markets and can classify their ecological implications. In addition, they learn methods and instruments of project management. They will be able to plan and implement projects and present the results in a professional manner.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="5">Students are able to analyze several dimensions and problem framings of international energy markets for the respective practical social fields of application. They are able to explain and illustrate interdependencies between resources, individuals and society in relation to international energy markets and are able to draw general conclusions for the justification and design of sustainable energy systems. Students learn about and apply project management methods in the context of international development cooperation. They learn to analyze, reflect on, and evaluate projects and their management. Students demonstrate the acquired subject-specific competence by developing the content and concept of a practice-oriented project and presenting the results.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="5">Students can expertly plan, implement and present international development cooperation projects. They learn about different organizational and project management methods and are able to reflect on the effectiveness and efficiency of these instruments and classify them in suitable fields of application. In addition, they will be able to explain which problems are currently being addressed with which project management instruments with regard to intercultural teamwork in international development cooperation.</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="5">Students can construct and present complex teaching content at an advanced level both independently and cooperatively in small groups. Students acquire the ability to engage in group discussions, discuss critically, adopt different points of view, and argue for them. They also have the ability to transfer their subject-specific expertise to new fields and have further developed their ability to analyze, synthesize and empathize.</td></tr>
</table>

*Continuation of **module MPM**:*

Course and study formats:	Lectures, seminars, group work, small-group discussions, excursion to institutions and organizations of international development cooperation
Module coordinator:	Mominul Hasan
Prerequisites:	None
Applicable degree program:	M.Eng. Sustainable Energy The module is an elective in the "Development" track of the Sustainable Energy degree program.
Notes / Other:	N/A.
Literature:	Mack, Iries Marie (2014): Energy Trading and Risk Management: A Practical Approach to Hedging, Trading and Portfolio Diversification (Wiley Finance) Burger, Markus et. al (2014): Managing Energy Risk: An Integrated View on Power and Other Energy Markets Hull, John (2011): Options, futures and other derivatives Krishna, Vijay (2002): Auction Theory. Elsevier Science (USA) Lewis, J.P. (2011): Project Planning, Scheduling and Control. The ultimate Hands-on Guide to Bringing Projects in on Time and on Budget. McGraw Hill, New York, Toronto, US Usher G: Project Management in the 21st Century: What You Need to Know About the Elephant, Eco-system and Experience. Cham Springer International Publishing, 2021.

MPM: Submodule					
	MPM-1 International Energy Markets				
	MPM-1 Internationale Energiemärkte				
	Submodule code number		**Type of course**		Seminar
	SWS	2 SWS	**Workload (submodule)**		45 h
	Type of submodule	Required	**Of which**	**Attendance time**	30 h
	Planned group size	20		**Self-study**	15 h

MPM: Submodule					
	MPM-2 Project Management in International Development Cooperation				
	MPM-2 Projektmanagement in der internationalen Entwicklungszusammenarbeit				
	Submodule code number		**Type of course**		Seminar
	SWS	2 SWS	**Workload (submodule)**		45 h
	Type of submodule	Required	**Of which**	**Attendance time**	30 h
	Planned group size	20		**Self-study**	15 h

MPM: Module examination				
	Module examination			
	Modulprüfung			
	Examination number		**Scope of the exam**	See comments
	Examination format	Project-oriented term paper and presentation	**Exam preparation, Examination time**	60 h
	Graded exam?	Yes		
	Comments on the module examination	Project-oriented term paper (approx. 4,000 words) & presentation (approx. 15 minutes)		

Updated on: DD.MM.YYYY

<table>
<tr><td rowspan="8">Module ES</td><td colspan="5">Energy Storage</td></tr>
<tr><td colspan="5">Energiespeicher</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Semester offered</td><td>Every spring semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">Students gain an overview of the most important concepts and application areas of energy storage systems and are able to analyze and evaluate technical solutions qualitatively and quantitatively. Students will be able to identify and describe the benefits of energy storage for specific requirements and boundary conditions. On this basis, they are able to classify various technical concepts for specific applications and perspectives.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students are able to classify established energy storage concepts in various dimensions, such as area of application, storage principle or storage duration, and are able to evaluate new solutions comparatively. They are proficient in basic and advanced methods for the technical calculation of various storage concepts so that they can design them for any application and plan or forecast their use. Students use advanced scientific methods to evaluate the added value of energy storage systems for energy systems equipped with them. In doing so, they take into account various criteria, which can be of a technical, economic or ecological nature.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">Students acquire skills in an area of energy systems engineering characterized by a wide range of content and diverse technical solutions. To this end, they develop very different and in some cases sophisticated scientific methods and decide on their application for dealing with specific issues with a view to practical applicability and accuracy requirements. Students are able to adapt and further develop procedures and methods in such a way that they are able to work on new issues on a sound scientific basis and arrive at reliable solutions.</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="4">Students orient themselves in a multi-layered subject area and identify and develop their own areas of interest. They recognize the value of working cooperatively on large task fields by complementing individual (prior) knowledge and strengths in a meaningful way. However, they also know how to assess which prerequisites they need to bring with them, regardless of their own focus.</td></tr>
</table>

*Continuation of **module** ES:*

Course and study formats:	Lecturers, supervised treatment of tasks (in small groups or individually), seminar-based and project-based development of various topics within the subject area
Module coordinator:	Claudia Werner
Prerequisites:	N/A.
Applicable degree program:	M.Eng. Sustainable Energy Specialization in Engineering (further use: see notes)
Notes / Other:	The module can also be selected as an elective module in other master's degree programs or specializations in energy-related issues.

ES: **Submodule 1**	ES-1 Energy Storage				
	ES-1 Energiespeicher				
	Submodule code number		**Type of course**		Lecture
	SWS	4 SWS	**Workload (submodule)**		90 h
	Type of submodule	Required	**Of which**	**Attendance time**	60 h
	Planned group size	20		**Self-study**	30 h
ES: **Module examination**	Module examination				
	Modulprüfung				
	Examination number		**Scope of the exam**		See comments
	Examination format	Exam	**Exam preparation, Examination time**		60 h
	Graded exam	Yes			
	Comments on the module examination	Written examination (120 minutes) The time required to prepare for a written examination (*Klausur*) should be roughly equivalent to the time required to prepare a term paper.			
					Updated on: DD.MM.YYYY

<table>
<tr><td rowspan="8">Module SE</td><td colspan="5">Sustainability in Engineering</td></tr>
<tr><td colspan="5">Nachhaltigkeit von Technologien</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Cycle</td><td>Every fall semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">Students recognize how different technologies for the production, use and disposal or recycling of products can be assessed in terms of their sustainability. Students evaluate selected technologies by applying suitable scientific concepts and methods. Students can assess the suitability of technologies as part of sustainable energy systems.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students are able to apply the concept of sustainability to products and the associated technologies in terms of ecological, economic and social sustainability. They establish connections between the use of technology and sustainability aspects and consider the various life cycle phases of a product, such as manufacture or construction, application or use through to disposal or dismantling and recycling. Students master methods to transparently evaluate different technologies in terms of their sustainability using defined criteria. On this basis, they can compare different technologies in terms of their ecological, economic and social sustainability based on the results of their evaluation.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">Students are able to differentiate between qualitative and quantitative statements on the sustainability of technologies. In particular, they develop methods to make sustainability assessment objective. They reflect on the evaluation results obtained in this way and are therefore able to recognise, in particular, the extent to which the chosen assessment procedures and methods influence the outcomes of sustainability analyses. They are able to adapt and further develop the methods and procedures they have learned so that they can also be applied to other technologies.</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="4">Using the concept of sustainability as an example, students recognize that fact-oriented communication requires agreement on objectifiable criteria. They recognize that their engineering actions in technology development have an impact on the sustainability of a technical object itself and the associated technologies in the various life cycle phases.</td></tr>
<tr><td colspan="2">Course and study formats:</td><td colspan="4">Lecture, supported treatment of examples individually and in small groups; seminar-based project work</td></tr>
</table>

*Continuation of **module SE**:*

Module coordinator:	Hinrich Uellendahl
Prerequisites:	None
Applicable degree program:	M.Eng. Sustainable Energy Required elective module within the Engineering specialization (further use: see notes)
Notes / Other:	The module can also be selected as an elective module in other master's degree programs or specializations related to sustainability.

<table>
<tr><td rowspan="5">SE: Submodule 1</td><td colspan="5">SE-1 Advanced Mechanical and Plant Engineering Components I</td></tr>
<tr><td colspan="5">SE-1 Fortschrittliche Komponenten von Maschinen und Anlagen der Energietechnik I</td></tr>
<tr><td>Submodule code number</td><td></td><td colspan="2">Type of course</td><td>Lecture</td></tr>
<tr><td>SWS</td><td>4 SWS</td><td colspan="2">Workload (submodule)</td><td>90 h</td></tr>
<tr><td>Type of submodule</td><td>Required</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Planned group size</td><td>20</td><td>Self-study</td><td>30 h</td></tr>
<tr><td rowspan="6">SE: Module examination</td><td colspan="5">Module examination</td></tr>
<tr><td colspan="5">Modulprüfung</td></tr>
<tr><td>Examination number</td><td></td><td colspan="2">Scope of the exam</td><td>See comments</td></tr>
<tr><td>Examination format</td><td>Written exam
or
Poster development and presentation
or
Project-oriented term paper and presentation</td><td colspan="2" rowspan="2">Exam preparation,
Examination time</td><td rowspan="2">60 h</td></tr>
<tr><td>Graded exam</td><td>Yes</td></tr>
<tr><td>Comments on the module examination</td><td colspan="4">Written exam (120 minutes)
or
Poster development and presentation (15 minutes)
or
Project-oriented term paper (approx. 4,000 words) & presentation (15 minutes).
The module’s qualification objective and curricular relevance can be represented or reflected through different courses, which may involve different forms of assessment. In light of the regularly updated course offerings in the area of technical elective modules (as noted under "Comments"), the examination format is determined by the specific course offered. To ensure equal treatment, the effort required to prepare for a written exam should be roughly equivalent to that required to prepare a term paper.</td></tr>
<tr><td colspan="5">Updated on: DD.MM.YYYY</td></tr>
</table>

<table>
<tr><td rowspan="8">Module TE 1</td><td colspan="5">Advanced Mechanical and Plant Engineering Components I</td></tr>
<tr><td colspan="5">Fortschrittliche Komponenten von Maschinen und Anlagen der Energietechnik I</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Semester offered</td><td>Every spring semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">Students analyze and evaluate modern mechanical and plant engineering components of energy technology using advanced engineering methods. They are able to develop detailed technical solutions for demanding energy technology applications and dimension them for specific boundary conditions. They therefore develop a high level of expertise in a specialist area of mechanical and systems engineering relevant to sustainable energy systems.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students master advanced methods of qualitative and quantitative treatment of energy-related issues in the field of mechanical and systems engineering, which are based on the corresponding engineering fundamentals and are specialized according to the subject matter, for example from heat or supply engineering. Students use these methods to deal with complex technical components at a high scientific level by evaluating the feasibility of existing or proposed solutions and developing technically sound concepts for challenging tasks.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">Students are able to acquire sophisticated engineering methods and apply them to problems that cannot be dealt with adequately or only roughly using simpler approaches. They decide on the choice of method after assessing the complexity of the task and, if necessary, use advanced mathematics or numerical methods. If required by the subject under consideration, students can adapt and further develop these methods so that they can also be applied to previously unknown problems.</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="4">Students make use of the freedom of choice when attending the courses for the energy technology specialization in order to develop their professional profile according to their professional interests, abilities and inclinations.</td></tr>
<tr><td colspan="2">Course and study formats:</td><td colspan="4">Lecture, guided work on examples individually and in small groups; seminar-based project work</td></tr>
<tr><td colspan="2">Module coordinator:</td><td colspan="4">Ilya Tushy</td></tr>
<tr><td colspan="2">Prerequisites:</td><td colspan="4">None</td></tr>
<tr><td colspan="2">Applicable degree program:</td><td colspan="4">M.Eng. Sustainable Energy
As a technical elective module in all specializations</td></tr>
<tr><td colspan="2">Notes / Other:</td><td colspan="4">This module is part of the technical elective modules. Each semester, at least four 5-credit courses are scheduled on an annual cycle, from which students must choose two courses in the Engineering track and one each in the Transition and Development tracks as required electives. The corresponding courses are regularly updated in terms of both content and methodology.</td></tr>
</table>

<table>
<tr><td rowspan="5">TE 1: Submodule 1</td><td colspan="5">TE 1-1 Advanced Mechanical and Plant Engineering Components I</td></tr>
<tr><td colspan="5">TE 1-1 Fortschrittliche Komponenten von Maschinen und Anlagen der Energietechnik I</td></tr>
<tr><td>Submodule code number</td><td></td><td colspan="2">Type of course</td><td>Lecture</td></tr>
<tr><td>SWS</td><td>4 SWS</td><td colspan="2">Workload (submodule)</td><td>90 h</td></tr>
<tr><td>Type of submodule</td><td>Required</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Planned group size</td><td>20</td><td>Self-study</td><td>30 h</td></tr>
<tr><td rowspan="6">TE 1: Module examination</td><td colspan="5">Module examination</td></tr>
<tr><td colspan="5">Modulprüfung</td></tr>
<tr><td>Examination number</td><td></td><td colspan="2">Scope of the exam</td><td>See comments</td></tr>
<tr><td>Examination format</td><td>Written exam
or
Poster development and presentation
or
Project-oriented term paper and presentation</td><td colspan="2" rowspan="2">Exam preparation, Examination time</td><td rowspan="2">60 h</td></tr>
<tr><td>Graded exam</td><td>Yes</td></tr>
<tr><td>Comments on the module examination</td><td colspan="4">Written exam (120 minutes)
or
Poster development and presentation (15 minutes)
or
Project-oriented term paper (approx. 4,000 words) & presentation (15 minutes).
The module’s qualification objective and curricular relevance can be represented or reflected through different courses, which may involve different forms of assessment. In light of the regularly updated course offerings in the area of technical elective modules (as noted under "Comments"), the examination format is determined by the specific course offered. To ensure equal treatment, the effort required to prepare for a written exam should be roughly equivalent to that required to prepare a term paper.</td></tr>
<tr><td colspan="5">Updated on: DD.MM.YYYY</td></tr>
</table>

<table>
<tr><td rowspan="8">Module TE 2</td><td colspan="5">Advanced Mechanical and Plant Engineering Systems I</td></tr>
<tr><td colspan="5">Komplexe maschinen- und anlagentechnische Systeme in der Energietechnik I</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Semester offered</td><td>Every spring semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">Students analyze and evaluate complex mechanical and plant engineering systems in energy technology using advanced engineering methods. They are able to develop concepts for sophisticated energy technology applications in which the challenge arises from the interaction of their individual components. Therefore, they acquire a high level of expertise in a specialized field of mechanical and systems engineering relevant to sustainable energy systems.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students master advanced methods for the qualitative and quantitative analysis and evaluation of energy technology systems in the field of mechanical and plant engineering. In doing so, they build on the relevant engineering fundamentals in order to deal with complex systems such as multivalent heat supply systems or sector-coupling systems appropriately at a high scientific level. Students assess existing or proposed systems in terms of their feasibility and suitability for purpose and develop technically sound solutions for energy system-oriented tasks in the field of mechanical and systems engineering.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">Students are able to acquire sophisticated engineering methods and apply them to problems that cannot be dealt with adequately or only roughly using simpler approaches. They decide on the choice of method after assessing the complexity of the task and, if necessary, use advanced mathematics or numerical methods. If required by the subject under consideration, students can adapt and further develop these methods so that they can also be applied to previously unknown problems.</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="4">Students make use of the freedom of choice when attending the courses for the energy technology specialization in order to develop their professional profile according to their professional interests, abilities and inclinations.</td></tr>
<tr><td colspan="2">Course and study formats:</td><td colspan="4">Lecture, supported treatment of examples individually and in small groups; seminar-based project work</td></tr>
<tr><td colspan="2">Module coordinator:</td><td colspan="4">Ilya Tushy</td></tr>
</table>

*Continuation of **module TE 2**:*

Prerequisites:	None
Applicable degree program:	M.Eng. Sustainable Energy As a technical elective module in all specializations
Notes / Other:	This module is part of the technical elective modules. Each semester, at least four 5-credit courses are scheduled on an annual cycle, from which students must choose two courses in the Engineering track and one each in the Transition and Development tracks as required electives. The corresponding courses are regularly updated in terms of both content and methodology.

<table>
<tr><td rowspan="5">TE 2: Submodule 1</td><td colspan="5">TE 2-1 Advanced Mechanical and Plant Engineering Systems I</td></tr>
<tr><td colspan="5">TE 2-1 Komplexe maschinen- und anlagentechnische Systeme in der Energietechnik I</td></tr>
<tr><td>Submodule code number</td><td></td><td colspan="2">Type of course</td><td>Lecture</td></tr>
<tr><td>SWS</td><td>4 SWS</td><td colspan="2">Workload (submodule)</td><td>90 h</td></tr>
<tr><td>Type of submodule</td><td>Required</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Planned group size</td><td>20</td><td>Self-study</td><td>30 h</td></tr>
<tr><td rowspan="6">TE 2: Module examination</td><td colspan="5">Module examination</td></tr>
<tr><td colspan="5">Modulprüfung</td></tr>
<tr><td>Examination number</td><td></td><td colspan="2">Scope of the exam</td><td>See comments</td></tr>
<tr><td>Examination format</td><td>Written exam
or
Poster development and presentation
or
Project-oriented term paper and presentation</td><td colspan="2" rowspan="2">Exam preparation, Examination time</td><td rowspan="2">60 h</td></tr>
<tr><td>Graded exam</td><td>Yes</td></tr>
<tr><td>Comments on the module examination</td><td colspan="4">Written exam (120 minutes)
or
Poster development and presentation (15 minutes)
or
Project-oriented term paper (approx. 4,000 words) & presentation (15 minutes)
The module’s qualification objective and curricular relevance can be represented or reflected through different courses, which may involve different forms of assessment. In light of the regularly updated course offerings in the area of technical elective modules (as noted under "Comments"), the examination format is determined by the specific course offered. To ensure equal treatment, the effort required to prepare for a written exam should be roughly equivalent to that required to prepare a term paper.</td></tr>
<tr><td colspan="5">Updated on: DD.MM.YYYY</td></tr>
</table>

<table>
<tr><td rowspan="8">Module TE 3</td><td colspan="5">Advanced Electrical Engineering Components I</td></tr>
<tr><td colspan="5">Fortschrittliche Komponenten der elektrischen Energietechnik I</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Cycle</td><td>Every spring semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">Students analyze and evaluate modern technical components of electrical power engineering using advanced engineering methods. They are able to develop detailed technical solutions for demanding energy technology applications and dimension them for specific boundary conditions. They therefore develop a high level of expertise in a specialist area of electrical energy technology relevant to sustainable energy systems.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students master advanced procedures for the qualitative and quantitative treatment of energy technology issues in the field of electrical engineering, which are based on the corresponding engineering fundamentals and are specialized according to the subject matter, for example from power electronics or electrical drive technology. Students use these methods to deal with complex technical components at an advanced scientific level by evaluating the feasibility of existing or proposed solutions and developing technically robust concepts for challenging tasks.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">Students are able to acquire sophisticated engineering methods and apply them to problems that cannot be dealt with adequately or only roughly using simpler approaches. They decide on the choice of method after assessing the complexity of the task and, if necessary, use advanced mathematics or numerical methods. If required by the subject under consideration, students can adapt and further develop these methods so that they can also be applied to previously unknown problems.</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="4">Students make use of the freedom of choice when attending the courses for the energy technology specialization in order to develop their professional profile according to their professional interests, abilities and inclinations.</td></tr>
<tr><td colspan="2">Course and study formats:</td><td colspan="4">Lecture, guided work on examples individually and in small groups; seminar-based project work</td></tr>
<tr><td colspan="2">Module coordinator:</td><td colspan="4">Ilya Tushy</td></tr>
<tr><td colspan="2">Prerequisites:</td><td colspan="4">None</td></tr>
<tr><td colspan="2">Applicable degree program:</td><td colspan="4">M.Eng. Sustainable Energy
As a technical elective module in all specializations</td></tr>
<tr><td colspan="2">Notes / Other:</td><td colspan="4">This module is part of the technical elective modules. Each semester, at least four 5-credit courses are scheduled on an annual cycle, from which students must choose two courses in the Engineering track and one each in the Transition and Development tracks as required electives. The corresponding courses are regularly updated in terms of both content and methodology.</td></tr>
</table>

TE 3: Submodule 1

TE 3-1 Advanced Electrical Engineering Components I

TE 3-1 Fortschrittliche Komponenten der elektrischen Energietechnik I

Submodule code number		**Type of course**		Lecture
SWS	4 SWS	**Workload (submodule)**		90 h
Type of submodule	Required	**Of which**	**Attendance time**	60 h
Planned group size	20		**Self-study**	30 h

TE 3: Module examination

Module examination

Modulprüfung

Examination number		**Scope of the exam**	See comments
Examination format	Written exam or Poster development and presentation or Project-oriented term paper and presentation	**Exam preparation, Examination time**	60 h
Graded exam	Yes		
Comments on the module examination	Written exam (120 minutes) or Poster development and presentation (15 minutes) or Project-oriented term paper (approx. 4,000 words) & presentation (15 minutes) The module's qualification objective and curricular relevance can be represented or reflected through different courses, which may involve different forms of assessment. In light of the regularly updated course offerings in the area of technical elective modules (as noted under "Comments"), the examination format is determined by the specific course offered. To ensure equal treatment, the effort required to prepare for a written exam should be roughly equivalent to that required to prepare a term paper.		

Updated on: DD.MM.YYYY

<table>
<tr><td rowspan="8">Module TE 4</td><td colspan="5">Advanced Electrical Engineering Systems I</td></tr>
<tr><td colspan="5">Komplexe elektrotechnische Systeme in der Energietechnik I</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Cycle</td><td>Every spring semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">Students analyze and evaluate complex electrical engineering systems using advanced engineering methods. They are able to develop concepts for sophisticated energy technology applications in which the challenge arises from the interaction of their individual components. They therefore acquire a high level of expertise in a specialized field of electrical power engineering relevant to sustainable energy systems.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students master advanced methods for the qualitative and quantitative analysis and evaluation of systems in the field of electrical power engineering. In doing so, they build on the relevant engineering fundamentals in order to deal with complex systems, such as in electrical grid planning or the grid integration of electrical systems under changing boundary conditions, appropriately at a high scientific level. Students assess existing or proposed systems in terms of their feasibility and suitability for purpose and develop technically robust solutions for energy system-oriented tasks in the field of electrical engineering.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">Students are able to acquire sophisticated engineering methods and apply them to problems that cannot be dealt with adequately or only roughly using simpler approaches. They decide on the choice of method after assessing the complexity of the task and, if necessary, use advanced mathematics or numerical methods. If required by the subject under consideration, students can adapt and further develop these methods so that they can also be applied to previously unknown problems.</td></tr>
<tr><td colspan="2">Social and personal skills:</td><td colspan="4">Students make use of the freedom of choice when attending the courses for the energy technology specialization in order to develop their professional profile according to their professional interests, abilities and inclinations.</td></tr>
<tr><td colspan="2">Course and study formats:</td><td colspan="4">Lecture, guided work on examples individually and in small groups; seminar-based project work</td></tr>
<tr><td colspan="2">Module coordinator:</td><td colspan="4">Ilya Tushy</td></tr>
<tr><td colspan="2">Prerequisites:</td><td colspan="4">None</td></tr>
<tr><td colspan="2">Applicable degree program:</td><td colspan="4">M.Eng. Sustainable Energy
As a technical elective module in all specializations</td></tr>
<tr><td colspan="2">Notes / Other:</td><td colspan="4">This module is part of the technical elective modules. Each semester, at least four 5-credit courses are scheduled on an annual cycle, from which students must choose two courses in the Engineering track and one each in the Transition and Development tracks as required electives. The corresponding courses are regularly updated in terms of both content and methodology.</td></tr>
</table>

TE 4: Submodule 1

TE 4-1 Advanced Electrical Engineering Systems I

TE 4-1 Komplexe elektrotechnische Systeme in der Energietechnik I

Submodule code number		**Type of course**		Lecture
SWS	4 SWS	**Workload (submodule)**		90 h
Type of submodule	Required	**Of which**	**Attendance time**	60 h
Planned group size	20		**Self-study**	30 h

TE 4: Module examination

Module examination

Modulprüfung

Examination number		**Scope of the exam**	See comments
Examination format	Written exam or Poster development and presentation or Project-oriented term paper and presentation	**Exam preparation, Examination time**	60 h
Graded exam	Yes		
Comments on the module examination	Written exam (120 minutes) or Poster development and presentation (15 minutes) or Project-oriented term paper (approx. 4,000 words) & presentation (15 minutes). The module's qualification objective and curricular relevance can be represented or reflected through different courses, which may involve different forms of assessment. In light of the regularly updated course offerings in the area of technical elective modules (as noted under "Comments"), the examination format is determined by the specific course offered. To ensure equal treatment, the effort required to prepare for a written exam should be roughly equivalent to that required to prepare a term paper.		

Updated on: DD.MM.YYYY

<table>
<tr><td rowspan="8">Module TE 5</td><td colspan="5">Advanced Mechanical and Plant Engineering Components II</td></tr>
<tr><td colspan="5">Fortschrittliche Komponenten von Maschinen und Anlagen der Energietechnik II</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Cycle</td><td>Every fall semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">Students analyze and evaluate modern mechanical and plant engineering components of energy technology using advanced engineering methods. They are able to develop detailed technical solutions for demanding energy technology applications and dimension them for specific boundary conditions. They thus develop a high level of expertise in a specialist area of mechanical and systems engineering relevant to sustainable energy systems. In combination with the module Advanced Components of Machines and Systems in Energy Technology I, which is different in terms of subject matter, they may broaden their expertise in the field of components.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students master advanced methods of qualitative and quantitative treatment of energy-related issues in the field of mechanical and systems engineering, which are based on the corresponding engineering fundamentals and are specialized according to the subject matter, for example from heat or supply engineering. Students use these methods to deal with complex technical components at a high scientific level by evaluating the feasibility of existing or proposed solutions and developing technically sound concepts for challenging tasks.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">Students are able to acquire sophisticated engineering methods and apply them to problems that cannot be dealt with adequately or only roughly using simpler approaches.
They decide on the choice of method after assessing the complexity of the task and, if necessary, use advanced mathematics or numerical methods. If required by the subject under consideration, students can adapt and further develop these methods so that they can also be applied to previously unknown problems.</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="4">Students make use of the freedom of choice when attending the courses for the energy technology specialization in order to develop their professional profile according to their professional interests, abilities and inclinations.</td></tr>
<tr><td colspan="2">Course and study formats:</td><td colspan="4">Lecture, supported treatment of examples individually and in small groups; seminar-based project work</td></tr>
<tr><td colspan="2">Module coordinator:</td><td colspan="4">Ilya Tushy</td></tr>
<tr><td colspan="2">Prerequisites:</td><td colspan="4">None</td></tr>
</table>

*Continuation of **module TE 5**:*

Applicable degree program:	M.Eng. Sustainable Energy In all specializations as a technical elective module
Notes / Other:	This module is part of the technical elective modules. Each semester, at least four 5-credit courses are scheduled on an annual cycle, from which students must choose two courses in the Engineering track and one each in the Transition and Development tracks as required electives. The corresponding courses are regularly updated in terms of both content and methodology.

TE 5: Submodule 1

TE 5-1 Advanced Mechanical and Plant Engineering Components II

TE 5-1 Fortschrittliche Komponenten von Maschinen und Anlagen der Energietechnik II

Submodule code number		**Type of course**		Lecture
SWS	4 SWS	**Workload (submodule)**		90 h
Type of submodule	Required	**Of which**	**Attendance time**	60 h
Planned group size	20		**Self-study**	30 h

TE 5: Module examination

Module examination

Modulprüfung

Examination number		**Scope of the exam**	See comments
Examination format	Written exam or Poster development and presentation or project-oriented term paper and presentation	**Exam preparation,** **Examination time**	60 h
Graded exam	Yes		
Comments on the module examination	Written exam (120 minutes) or poster development and presentation (15 minutes) or project-oriented term paper (approx. 4,000 words) & presentation (15 minutes). The module's qualification objective and curricular relevance can be represented or reflected through different courses, which may involve different forms of assessment. In light of the regularly updated course offerings in the area of technical elective modules (as noted under "Comments"), the examination format is determined by the specific course offered. To ensure equal treatment, the effort required to prepare for a written exam should be roughly equivalent to that required to prepare a term paper.		

Updated on: DD.MM.YYYY

<table>
<tr><td rowspan="8">Module TE 6</td><td colspan="5">Advanced Mechanical and Plant Engineering Systems II</td></tr>
<tr><td colspan="5">Komplexe maschinen- und anlagentechnische Systeme in der Energietechnik II</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Semester offered</td><td>Every fall semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">Students analyze and evaluate complex mechanical and plant engineering systems in energy technology using advanced engineering methods. They are able to develop concepts for sophisticated energy technology applications in which the challenge arises from the interaction of their individual components. You will thus acquire a high level of expertise in a specialized field of mechanical and systems engineering relevant to sustainable energy systems. Together with the module Complex Mechanical and Plant Engineering Systems in Energy Technology I, which is different in terms of subject matter, they may broaden their expertise in the field of systems.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students master advanced methods for the qualitative and quantitative analysis and evaluation of energy technology systems in the field of mechanical and plant engineering. In doing so, they build on the relevant engineering fundamentals in order to deal with complex systems such as multivalent heat supply systems or sector-coupling systems appropriately at a high scientific level. Students assess existing or proposed systems in terms of their feasibility and suitability for purpose and develop technically sound solutions for energy system-oriented tasks in the field of mechanical and systems engineering.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">Students are able to acquire sophisticated engineering methods and apply them to problems that cannot be dealt with adequately or only roughly using simpler approaches.
They decide on the choice of method after assessing the complexity of the task and, if necessary, use advanced mathematics or numerical methods. If required by the subject under consideration, students can adapt and further develop these methods so that they can also be applied to previously unknown problems.</td></tr>
<tr><td colspan="2">Social and personal skills:</td><td colspan="4">Students make use of the freedom of choice when attending the courses for the energy technology specialization in order to develop their professional profile according to their professional interests, abilities and inclinations.</td></tr>
<tr><td colspan="2">Course and study formats:</td><td colspan="4">Lecture, supported treatment of examples individually and in small groups; seminar-based project work</td></tr>
</table>

*Continuation of **module TE6**:*

Module coordinator:	Ilya Tushy
Prerequisites:	-
Applicable degree program:	M.Eng. Sustainable Energy As a technical elective module in all specializations
Notes / Other:	This module is part of the technical elective modules. Each semester, at least four 5-credit courses are scheduled on an annual cycle, from which students must choose two courses in the Engineering track and one each in the Transition and Development tracks as required electives. The corresponding courses are regularly updated in terms of both content and methodology.

TE 6: **Submodule 1**					
	TE 6-1 Advanced Mechanical and Plant Engineering Systems II				
	TE 6-1 Komplexe maschinen- und anlagentechnische Systeme in der Energietechnik II				
	Submodule code number		**Type of course**		Lecture
	SWS	4 SWS	**Workload (submodule)**		90 h
	Type of submodule	Required	**Of which**	**Attendance time**	60 h
	Planned group size	20		**Self-study**	30 h
TE 6: **Module examination**	Module examination				
	Modulprüfung				
	Examination number		**Scope of the exam**		See comments
	Examination format	Written exam or Poster development and presentation or Project-oriented term paper and presentation	**Exam preparation, Examination time**		60 h
	Graded exam	Yes			
	Comments on the module examination	Written exam (120 minutes) or Poster development and presentation (15 minutes) or Project-oriented term paper (approx. 4,000 words) & presentation (15 minutes). The module's qualification objective and curricular relevance can be represented or reflected through different courses, which may involve different forms of assessment. In light of the regularly updated course offerings in the area of technical elective modules (as noted under "Comments"), the examination format is determined by the specific course offered. To ensure equal treatment, the effort required to prepare for a written exam should be roughly equivalent to that required to prepare a term paper.			
					Updated on: DD.MM.YYYY

<table>
<tr><td rowspan="8">Module TE 7</td><td colspan="5">Advanced Electrical Engineering Components II</td></tr>
<tr><td colspan="5">Fortschrittliche Komponenten der elektrischen Energietechnik II</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td>Workload (total)</td><td colspan="2">150 h</td></tr>
<tr><td>Cycle</td><td>Every fall semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="5">Students analyze and evaluate modern technical components of electrical power engineering using advanced engineering methods. They are able to develop detailed technical solutions for demanding energy technology applications and dimension them for specific boundary conditions. They thus develop a high level of expertise in a specialized field of electrical power engineering relevant to sustainable energy systems. In combination with the module Advanced Components of Electrical Power Engineering I, which is different in terms of subject matter, they may broaden their expertise in the field of components.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="5">Students master advanced procedures for the qualitative and quantitative treatment of energy technology issues in the field of electrical engineering, which are based on the corresponding engineering fundamentals and are specialized according to the subject matter, for example from power electronics or electrical drive technology. Students use these methods to deal with complex technical components at an advanced scientific level by evaluating the feasibility of existing or proposed solutions and developing technically robust concepts for challenging tasks.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="5">Students are able to acquire sophisticated engineering methods and apply them to problems that cannot be dealt with adequately or only roughly using simpler approaches. They decide on the choice of method after assessing the complexity of the task and, if necessary, use advanced mathematics or numerical methods. If required by the subject under consideration, students can adapt and further develop these methods so that they can also be applied to previously unknown problems.</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="5">Students make use of the freedom of choice when attending the courses for the energy technology specialization in order to develop their professional profile according to their professional interests, abilities and inclinations.</td></tr>
<tr><td colspan="2">Course and study formats:</td><td colspan="5">Lecture, supported treatment of examples individually and in small groups; seminar-based project work</td></tr>
<tr><td colspan="2">Module coordinator:</td><td colspan="5">Ilya Tushy</td></tr>
</table>

*Continuation of **module TE 7**:*

Prerequisites:	None
Applicable degree program:	M.Eng. Sustainable Energy As a technical elective module in all specializations
Notes / Other:	This module is part of the technical elective modules. Each semester, at least four 5-credit courses are scheduled on an annual cycle, from which students must choose two courses in the Engineering track and one each in the Transition and Development tracks as required electives. The corresponding courses are regularly updated in terms of both content and methodology.

TE 7: Submodule 1	TE 7-1 Advanced Electrical Engineering Components II				
	TE 7-1 Fortschrittliche Komponenten der elektrischen Energietechnik II				
	Submodule code number		**Type of course**		Lecture
	SWS	4 SWS	**Workload (submodule)**		90 h
	Type of submodule	Required	**Of which**	**Attendance time**	60 h
	Planned group size	20		**Self-study**	30 h
TE 7: Module examination	Module examination				
	Modulprüfung				
	Examination number		**Scope of the exam**		See comments
	Examination format	Written exam or Poster development and presentation or Project-oriented term paper and presentation	**Exam preparation, Examination time**		60 h
	Graded exam	Yes			
	Comments on the module examination	Written exam (120 minutes) or Poster development and presentation (15 minutes) or Project-oriented term paper (approx. 4,000 words) & presentation (15 minutes). The module's qualification objective and curricular relevance can be represented or reflected through different courses, which may involve different forms of assessment. In light of the regularly updated course offerings in the area of technical elective modules (as noted under "Comments"), the examination format is determined by the specific course offered. To ensure equal treatment, the effort required to prepare for a written exam should be roughly equivalent to that required to prepare a term paper.			
	Updated on: DD.MM.YYYY				

<table>
<tr><td rowspan="8">Module TE 8</td><td colspan="5">Advanced Electrical Engineering Systems II</td></tr>
<tr><td colspan="5">Komplexe elektrotechnische Systeme in der Energietechnik II</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required elective</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">5 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">4 SWS</td></tr>
<tr><td>Phase of study</td><td>1st or 2nd semester</td><td colspan="2">Workload (total)</td><td>150 h</td></tr>
<tr><td>Semester offered</td><td>Every fall semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>90 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">Students analyze and evaluate complex electrical engineering systems using advanced engineering methods. They are able to develop concepts for sophisticated energy technology applications in which the challenge arises from the interaction of their individual components. You will thus acquire a high level of expertise in a specialized field of electrical energy technology relevant to sustainable energy systems. Together with the module Complex Electrical Engineering Systems in Energy Technology I, which is different in terms of subject matter, they may broaden their expertise in the field of complex electrical engineering systems.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students master advanced methods for the qualitative and quantitative analysis and evaluation of systems in the field of electrical power engineering. In doing so, they build on the relevant engineering fundamentals in order to deal with complex systems, such as in electrical grid planning or the grid integration of electrical systems under changing boundary conditions, appropriately at a high scientific level. Students assess existing or proposed systems in terms of their feasibility and suitability for purpose and develop technically robust solutions for energy system-oriented tasks in the field of electrical engineering.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">Students are able to acquire sophisticated engineering methods and apply them to problems that cannot be dealt with adequately or only roughly using simpler approaches.
They decide on the choice of method after assessing the complexity of the task and, if necessary, use advanced mathematics or numerical methods. If required by the subject under consideration, students can adapt and further develop these methods so that they can also be applied to previously unknown problems.</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="4">Students make use of the freedom of choice when attending the courses for the energy technology specialization in order to develop their professional profile according to their professional interests, abilities and inclinations.</td></tr>
<tr><td colspan="2">Course and study formats:</td><td colspan="4">Lecture, guided work on examples individually and in small groups; seminar-based project work</td></tr>
<tr><td colspan="2">Module coordinator:</td><td colspan="4">Ilya Tushy</td></tr>
</table>

*Continuation of **module TE 8**:*

Prerequisites:	None
Applicable degree program:	M.Eng. Sustainable Energy As a technical elective module in all specializations
Notes / Other:	This module is part of the technical elective modules. Each semester, at least four 5-credit courses are scheduled on an annual cycle, from which students must choose two courses in the Engineering track and one each in the Transition and Development tracks as required electives. The corresponding courses are regularly updated in terms of both content and methodology.

<table>
<tr><td rowspan="5">TE 8: Submodule 1</td><td colspan="5">TE 8-1 Advanced Electrical Engineering Systems II</td></tr>
<tr><td colspan="5">TE 8-1 Komplexe elektrotechnische Systeme in der Energietechnik II</td></tr>
<tr><td>Submodule code number</td><td></td><td colspan="2">Type of course</td><td>Lecture</td></tr>
<tr><td>SWS</td><td>4 SWS</td><td colspan="2">Workload (submodule)</td><td>90 h</td></tr>
<tr><td>Type of submodule</td><td>Required</td><td rowspan="2">Of which</td><td>Attendance time</td><td>60 h</td></tr>
<tr><td>Planned group size</td><td>20</td><td>Self-study</td><td>30 h</td></tr>
<tr><td rowspan="6">TE 8: Module examination</td><td colspan="5">Module examination</td></tr>
<tr><td colspan="5">Modulprüfung</td></tr>
<tr><td>Examination number</td><td></td><td colspan="2">Scope of the exam</td><td>See comments</td></tr>
<tr><td>Examination format</td><td>Written exam
or
Poster development and presentation
or
Project-oriented term paper and presentation</td><td colspan="2" rowspan="2">Exam preparation, Examination time</td><td rowspan="2">60 h</td></tr>
<tr><td>Graded exam</td><td>Yes</td></tr>
<tr><td>Comments on the module examination</td><td colspan="4">Written exam (120 minutes)
or
Poster development and presentation (15 minutes)
or
Project-oriented term paper (approx. 4,000 words) & presentation (15 minutes).
The module’s qualification objective and curricular relevance can be represented or reflected through different courses, which may involve different forms of assessment. In light of the regularly updated course offerings in the area of technical elective modules (as noted under "Comments"), the examination format is determined by the specific course offered. To ensure equal treatment, the effort required to prepare for a written exam should be roughly equivalent to that required to prepare a term paper.</td></tr>
<tr><td colspan="5">Updated on: DD.MM.YYYY</td></tr>
</table>

<table>
<tr><td rowspan="8">Module TH</td><td colspan="5">Master’s Thesis</td></tr>
<tr><td colspan="5">Master Thesis</td></tr>
<tr><td colspan="2">Module type</td><td colspan="3">Required</td></tr>
<tr><td colspan="2">Module identification number</td><td colspan="3"></td></tr>
<tr><td colspan="2">Credit points (CP)</td><td colspan="3">30 CP</td></tr>
<tr><td colspan="2">Semester hours per week (SWS)</td><td colspan="3">2 SWS</td></tr>
<tr><td>Phase of study</td><td>3rd semester</td><td colspan="2">Workload (total)</td><td>900 h</td></tr>
<tr><td>Semester offered</td><td>Every semester</td><td rowspan="2">Of which</td><td>Attendance time</td><td>30 h</td></tr>
<tr><td>Duration</td><td>One semester</td><td>Self-study</td><td>870 h</td></tr>
<tr><td colspan="2">Qualification objective:</td><td colspan="4">Students are able to develop a research question on a topic, work on it using suitable methods, and present their results in an appropriate written form. Students write a master's thesis. The topic of the thesis lies in the core area of the teaching and research content of the degree program. It must be worked on using suitable scientific and scholarly methods, including independent research and analysis.</td></tr>
<tr><td colspan="2">Subject-specific competence:</td><td colspan="4">Students have the ability to familiarize themselves independently with an academic subject area and demonstrate in-depth specialist knowledge in this area. They have knowledge of the professional relevance and the professional evaluation standards to be applied when designing a research paper of this size. They can plan and carry out their own work competently in this respect. In the accompanying master's colloquium, they gain knowledge of areas of application and fields of practice in transformation research and are thus able to reflect on and evaluate the significance and effectiveness of their own research. This also enables them to develop and consolidate their professional visions and goals with regard to a research career.</td></tr>
<tr><td colspan="2">Methodological competence:</td><td colspan="4">Students are able to independently research, evaluate and process relevant specialist literature. They can apply the methods learned in the master's degree program appropriately. This includes the appropriate written presentation of the research question, approach and results. They work independently on a complex research question and transfer the theoretical and methodological knowledge acquired during their studies to a specific area of application.</td></tr>
<tr><td colspan="2">Social and personal competence:</td><td colspan="4">Students can organize a longer work and research process independently and with perseverance.</td></tr>
<tr><td colspan="2">Course and study formats:</td><td colspan="4">Master’s thesis</td></tr>
<tr><td colspan="2">Module coordinator:</td><td colspan="4">Pao-Yu Oei</td></tr>
<tr><td colspan="2">Prerequisites:</td><td colspan="4">None</td></tr>
<tr><td colspan="2">Applicable degree program:</td><td colspan="4">M.Eng. Sustainable Energy</td></tr>
<tr><td colspan="2">Notes / Other:</td><td colspan="4">n/a</td></tr>
</table>

<table>
<tr><td rowspan="6">TH: Submodule 1</td><td colspan="5">TH-1 Master’s Thesis</td></tr>
<tr><td colspan="5">TH-1 Master Thesis</td></tr>
<tr><td>Submodule code number</td><td></td><td colspan="2">Type of course</td><td>Colloquium</td></tr>
<tr><td>SWS</td><td>2 SWS</td><td colspan="2">Workload (submodule)</td><td>60 h</td></tr>
<tr><td>Type of submodule</td><td>Required</td><td rowspan="2">Of which</td><td>Attendance time</td><td>30 h</td></tr>
<tr><td>Planned group size</td><td>10 (Transition & Engineering)
20 (Development)</td><td>Self-study</td><td>30 h</td></tr>
<tr><td rowspan="8">TH: Module examination</td><td colspan="5">Module examination</td></tr>
<tr><td colspan="5">Modulprüfung</td></tr>
<tr><td>Examination number
Master’s thesis:</td><td></td><td colspan="2" rowspan="2">Scope of the exam</td><td rowspan="2">See comments</td></tr>
<tr><td>Examination number
Disputation:</td><td></td></tr>
<tr><td rowspan="2">Examination format</td><td>Master’s thesis</td><td colspan="2" rowspan="2">Exam preparation,
Examination time</td><td rowspan="2">840 h</td></tr>
<tr><td>Disputation</td></tr>
<tr><td>Graded exam?</td><td>Yes</td></tr>
<tr><td>Comments on the module examination</td><td colspan="4">Master's thesis (8,000 words) and defense (30-minute presentation and 45-minute discussion)</td></tr>
<tr><td colspan="6">Updated on: DD.MM.YYYY</td></tr>
</table>