

## Hessen International Summer University 2024 – Course Syllabus

<https://isu.h-da.de/>

# Sustainable and Climate-Friendly Societies: Energy Policy, Management and Engineering

### CLASS HOURS

Consult program schedule on the website.

### ACADEMIC DIRECTORS

- Professor Dr. Dominik Düber, Darmstadt University of Applied Sciences
- Professor Dr. Matthew Turner, Purdue University

### GUEST LECTURER:

Niklas Hayek, M.Sc., consultant in the international development sector

## 1) INFORMATION ON THE COURSE CONTENT

### COURSE DESCRIPTION

The course offers a comprehensive exploration of fostering climate-friendly transitions within societies. It initiates with an in-depth analysis of the United Nations' Sustainable Development Goals (SDGs) as a foundational framework and subsequently delves into the pivotal role of energy (SDG 7) in driving sustainable societal transformations. This exploration spans across global contexts, encompassing transformation strategies for both the global south and the global north and discussing matters of justice and fairness in north-south-relationships.

The course intricately examines the interconnections between energy, water (SDG 6), food (SDG 2), and climate change (SDG 13), establishing a comprehensive understanding of their interdependent relationship within the transformation process. Emphasizing the significance of technical solutions, the course aims to equip students with essential knowledge pertinent to power and energy systems, particularly focusing on electrical energy systems. This includes an in-depth exploration of topics such as power generation, electric grids, system operation and control, and the integration of renewable energy sources.

Moreover, it illuminates the governance structures prevalent at various political levels, commencing from international entities like the UN Framework Convention on Climate Change (UNFCCC) and global climate partnerships, progressing through state alliances such as the European Union, and extending down to the national and local levels. Students gain insights into the multifaceted dimensions of governance necessary for orchestrating societal transformations, fostering a nuanced understanding of change mechanisms across different scales, from the global policy landscape to transformational endeavours within local cities.

### LEARNING OBJECTIVES

By the end of this course students will be able to:

1. describe solutions for sustainable and climate-friendly societies in developed as well as in developing countries.

2. analyse the concept of Planetary Boundaries and explain the guardrails it entails for sustainable development.
3. give a comprehensive overview of renewable energy as a means for sustainable transformation and climate-friendly societies.
4. describe the theory of development cooperation, and sustainable development.
5. apply basic principles of sustainability to engineering and development projects.
6. apply basic principles of sustainability at different political levels, i.e. international cooperation, national policies and the transformation of cities.
7. identify linkages and interdependences between the energy sector and other relevant sectors.
8. describe the operation of electrical power systems in terms of generation, transmission, end use, and operational performance.
9. demonstrate awareness of emergent technologies and industry practices to improve environmental sustainability as well as the importance of safety and reliability in power system operation.
10. communicate using the technical language and concepts specific to electric power system technologies and operation in order to engage in informed discussion and collaborate within the field.
11. understand the global dimension of welfare production and related justice issues.

## COURSE MATERIALS

Slides and script on the online learning platform Moodle.

## TENTATIVE CLASS SCHEDULE

Class hours virtual: 12 contact hours

Class hours on-site: 90 contact hours

Self-study (virtual & on-site; including virtual group work): 100 contact hours

Total: 202

(1 contact hour = 45 minutes)

<i>Date</i>	<i>Topic</i>	<i>Location</i>
May 2024	Virtual pre-arrival meeting	Online
Late May/early June 2024	Introduction to sustainable development and development cooperation	Online
Late May/early June 2024	Affordable and clean energy for all	Online
Late May/early June 2024	Energy and the nexus with water, food, health, and climate change	Online
Late May/early June 2024	Achieving a just energy transition	Online
June 27, 2024	Arrival in Darmstadt	Darmstadt
June 28, 2024	Welcome session, city tour, campus tour, welcome dinner	Darmstadt
June 29, 2024	Intercultural training	Darmstadt
June 30, 2024	Traveling to Berlin	
July 01, 2024	Company visits Berlin: Morning: Discussion round with a member of parliament (confirmed) Afternoon: to be determined	Berlin
July 02, 2024	Company visits Berlin:	Berlin

	Morning: to be determined Afternoon: to be determined	
July 03, 2024	Free time in Berlin	Berlin
July 04, 2024	Traveling back to Darmstadt	
July 05, 2024	Seminar: Electrical Engineering 101	Darmstadt
July 08, 2024	Company visit: to be determined	
July 09, 2024	Seminar: Energy Justice	Darmstadt
July 10, 2024	Seminar: Electrical Power System Technology	Darmstadt
July 12, 2024	Seminar: Energy & Sustainable Governance	Darmstadt
July 15, 2024	Company visit: to be determined	
July 16, 2024	Seminar: Power System Operation	Darmstadt
July 17, 2024	Seminar: Basics and Case Studies in the Role of Cities in Sustainable Transformation	Darmstadt
July 18, 2024	Seminar: Case Studies on the Future of Electric Power Technologies and Infrastructure	Darmstadt
July 19, 2024	Seminar: Final Presentations	Darmstadt
July 20, 2024	Departure from Darmstadt	

## EXCURSIONS

The following excursions are planned, but not confirmed. Please note that all excursions are subject to change:

- Federal Foreign Office or Federal Ministry for Economic Affairs and Climate Action
- Agora Energiewende (Think tank "Agora Energy Transition")
- German Institute of Urban Affairs
- Germanwatch (NGO)
- GIZ: German Development Cooperation
- Electric City Ruesselsheim (company visit Opel car manufacturer & city administration project on electric vehicle charging infrastructure)

## 2) INFORMATION ON CLASS PARTICIPATION, ASSIGNMENTS AND EXAMS

### ASSIGNMENTS

Active participation and group work on a regular basis.

### EXAMS

Group presentation of a project assignment and answering questions related to the project work.

### PRACTICE MATERIALS

Online manuscripts to be prepared and distributed among the participants via Moodle (online learning system).

### PROFESSIONALISM & CLASS PARTICIPATION

Students are expected to attend the classes and dedicate 1-2 hours a day for preparation through reading and self-study. The participation and self-study will enable the students to answer questions, lead discussions and to contribute with own ideas and opinions.

### MISSED CLASSES

No more than 10% of the contact hours can be missed for successful completion of the course module. If students miss a lecture or tutorial it is their own responsibility to obtain information on the topics. In the event of sickness, a medical certificate must be presented to the program coordinator.

## 3) INFORMATION ON GRADING AND ECTS

### ACADEMIC STANDARDS

Upon successful completion, 9 ECTS will be awarded for the class.

According to the rules of ECTS, one credit is equivalent to 25-30 hours student workload.

### GRADING SCALE

Percentage	Grade		Description
90-100%	15 points	1.0	very good: an outstanding achievement
	14 points		
	13 points	1.3	
80-90%	12 points	1.7	good: an achievement substantially above average requirements
	11 points	2.0	
	10 points	2.3	
70-80%	9 points	2.7	satisfactory: an achievement which corresponds to average requirements
	8 points	3.0	
	7 points	3.3	
60-70%	6 points	3.7	sufficient: an achievement which barely meets the requirements
	5 points	4.0	
0-60%	4 points	5.0	not sufficient / failed: an achievement which does not meet the requirements
	3 points		
	2 points		
	1 point		
	0 points		

This course description was issued on November 20, 2023. The program is subject to change.