SUSTAINABLE ENERGY SYSTEMS **Interdisciplinary programme from departments of MECHANICAL ENGINEERING and NATURAL SCIENCES BACHELOR LEVEL** **(required language level B2)**	**Description**	**Lecturer**	**CP / ECTS**	**Term (Semester)**
LECTURE: **Energy Systems Simulation** **Prerequisites: basic knowledge of programming. Only open to limited no. of students, students of the Renewable Energy Program will be prioritized**	Modelling, simulation and analisys of local energy systems with producers, consumers and prosumers	**Ms Pechmann**	**5**	**fall**
LECTURE: **Energy Storage and Fuel Cells**, **only open to limited no. of students, students of the Renewable Energy Program will be prioritized**	Storage of thermal, chemical, electrical and kinetic energy, as well as potential energy. Fuel cell and hydrogen storage.	**Mr Illing**	**5**	**fall**
LECTURE: **Wind Energy**	Design of wind turbines and wind farms, aerodynamics, structural dynamics, wind ressource and site assesment. Including hands-on experiments! Basic knowledge of fluid dynamics needed.	**Mr. Herráez**	**5**	**fall**
PROJECT: **Wind challenge**	Design and production of a small wind turbine in cooperation with a group of students from different backgrounds for participating in an international wind energy contest.	**Mr. Herráez**	**2**	**fall and spring**
LECTURE**: Solar Thermal and Geothermal Energy**	Solar resource, design of solar thermal systems, performance analysis. Including hands-on experiments! Basic knowledge of thermodynamics needed.	**Mr Herráez**	**5**	**fall**
LECTURE: **Photovoltaics**	Physical principles of the use of photovoltaic energy, components of photovoltaic installations, design of photovoltaics systems. Including hands-on experiments. Basic knowledge of electrotechnics needed.	**Mr. Herráez**	**5**	**fall**
LECTURE: **Sustainable Production** **Prerequisites: Basic knowledge of programming. Only open for limited no. of students**	Globalization and climate change, production systems and production management systems, requirements for sustainable production	**Mrs Pechmann**	**5**	**spring**
LECTURE: **Thermal Power Plants**	Types and applications, renewable heat sources, cycle processes, optimization strategies for efficiency and power output, main machinery and apparatuses, new technologies and applications; simulation of power plant processes using commercial software. Prerequisites: Basic knowledge of thermodynamics.	**Mr. Jakiel**	**5**	**fall**
LECTURE: **Process Modelling**	Students will learn how to set up a process simulator usign the Aspen Engineering Suite as an example. They learn to analyze existing technical processes from teh perspective of process modeling. Components of a simulatiaon model and functions of a process simulator are discussed. Students will learn how to create a process model and implement it in a simulation software. They apply teh created model for process analysis. In the practical part, students will carry out the work independently on an example from industry.	**Mr. Steinigeweg**	**5**	**fall**

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LECTURE: **Biomass**	Biomass types and their origins, photosynthesis and its efficiency, lignocellulose biomass, lipid biomass, carbohydrate biomass, bio refineries, biomass as a solid fuel, charcoal, the C,H,O triangle, gasification and hydrogenation, biogas, 1st and 2nd generation liquid fuels, Fischer-Tropsch and related processes, bio-mass use and land use, carbon dioxide impact of biomass use, food vs. fuel. Lecturer: Rüsch gen. Klaas	**Mr. Rüsch gen. Klaas**	**5**	**fall**
TECHNICAL PROJECT: Wind and Solar Energy	Project details need to discusssed with the coordinator	**Mr. Herráez**	**5**	**fall and spring**
TECHNICAL PROJECT: Process Engineering	Project details need to discusssed with the coordinator	**Mr. Illing**	**5**	**fall and spring**
TECHNICAL PROJECT: Turbomachines and Energy Technology	Project details need to discusssed with the coordinator	**Mr. Jakiel**	**5**	**fall and spring**
TECHNICAL PROJECT: Biotechnology	Project details need to discusssed with the coordinator	**Mr. De Vries**	**5**	**fall and spring**
CERTIFICATE PROGRAM: Renewable Energy Certificate Program	Different courses worth 30 ECTS in a special certificate program. Places are limited to 10 students! All information can be found on our website: **https://www.hs-emden-leer.de/en/university-of-applied-sciences/organization/departments-a-z/international-office/international-students/exchange-students-erasmus/new-certificate-program-renewable-energy**	**Mr. Herráez**	**30**	**fall**