SUSTAINABLE ENERGY SYSTEMS **Interdisciplinary programme from departments of MECHANICAL ENGINEERING and NATURAL SCIENCES** **BACHELOR LEVEL** **(required language level B2)** **Subject to change /status March 2022**	**Description**	**Lecturer**	**CP / ECTS**	**Term (Semester)**
LECTURE: **Intodruction to modelling and simulation**	Types of numerical models, scientific computing, programming of simple models in Matlab	Mr Herráez	5	fall (5)
LECTURE: **Simulation of energy systems**	Modelling, simulation and analisys of local energy systems with producers, consumers and prosumers	Ms Pechmann	5	fall (5)
LECTURE: **Energy storage**	Storage of thermal, chemical, electrical and kinetic energy, as well as potential energy. Fuel cell and hydrogen storage.	Mr Illing	5	fall (5)
LECTURE: **Wind turbines**	Design of wind turbines and wind farms, aerodynamics, structural dynamics, wind ressource and site assesment	Mr Herráez	3	spring (4)
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 Energy**	Solar resource, design of solar thermal systems, performance analysis	Mr Herráez	2,5	spring (4)
LECTURE: **Photovoltaics**	Physical principles of the use of photovoltaic energy, components of photovoltaic installations, design of photovoltaics systems	Mr. Herráez	2,5	spring (4)
LECTURE: **Sustainable Production**	Globalization and climate change, production systems and production management systems, requirements for sustainable production	Mrs Pechmann	5	spring (4)
LECTURE: **Thermal Power Plants**	Types of Thermal Power Plants, heat sources, power machines, efficiency, emissions, power density	Mr. Jakiel	5	spring (6)
LECTURE: **Energy Process Technology**	Optimization of energy-relevant process, analysis of thermodynamics, chemical and biological aspects	Mr Paul	5	spring (6)
LECTURE: **Process modelling and energy optimization**	Modeling of chemical and environmental processes, commercial process simulators, development and optimization of energy processes	Mr Steinigeweg	3	spring (6)
LECTURE: **Sustainable energy generation**	Energy supply chains and their technical, enviromental and economic dimensions	Mr. Paul	2	spring (6)
LECTURE: **Laboratory Course Wind Energy**	The theory of the lecture Wind Turbines will be applied to perform and evaluate different experiments in the field of wind energy.	Mr Herráez	2	spring
LECTURE: **Laboratory Course Solar Engery**	The theory of the lectures Solar Thermal Energy and Photovoltaics will be applied to perform and evaluate different experiments in the field of solar energy.	Mr Herráez	2	spring
PROJECT: **Technical Project**	Technical Project (wide range of topics possible)	Mr Herráez and others	5	fall and spring
PROJECT: **Sustainable energy project**	Technical Project (focus on sustainable energy)	Mr Herráez and others	7	fall and spring