Energy

Energy	
Offered by	Applied Physics and Science Education, Chemical Engineering & Chemistry and MechanicalEngineering
Language	English
Primarily interesting for	All students, but most relevant for students with background in APSE,CEC, ME, IE&IS Pre-knowledge: Secondary School/Physics
Prerequisites	-
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Remark	Note that this coherent package is being phased out. You can still complete this package but keep in mind that the course Physics of new energy (3DEX0) is taught for the last time in 2022-2023 and assessed for the last time in 2023-2024.

Content and composition

The energy transition is already taking place, but it is only beginning: although the installed capacity of wind turbines and solar panels is growing fast, it still does not even meet 5% of the global energy demand. In addition to the challenges of successfully implementing renewables on the necessary scale, the mismatch between supply and demand needs to be taken into account, because of the intermittent character of cleaner energy sources, such as wind and solar. Therefore, a successful energy transition must satisfy also the challenge of energy storage. This course package gives you the opportunity to learn about the state-of-the art in the field of renewable energy technologies and to explore the several technological challenges which need to be met when we really aim at a successful energy transition. The course package consists of two courses. The first one addresses the physics challenges of energy conversion and storage by means of lectures and hands-on activities focused on the principles of thermodynamics. The second course provides the chemical principles at the basis of chemically reacting flows.

Course code	Course name	Level classification
3DEX0	Physics of new energy (last taught in 2022-2023, last assessed in 2023-2024)	1
4BC00	Chemically reacting flows	3

Course description

Physics of new energy (3DEX0) (last taught in 2022-2023, last assessed in 2023-2024)
This course covers fundamentals of thermodynamics and of conversion-storage processes applied to renewable energy systems. Topics include analysis of energy conversion in thermomechanical, electrochemical and photoelectric processes in existing and future power systems, with emphasis on efficiency, present status and potential. Focus sessions, following the fundamentals of thermodynamics, include: electricity generation from photovoltaics and wind energy; hydrogen and solar fuel productions, fuel cells and battery storage. These focus sessions consists of lectures by highly renown experts, hands-on activities and assignments.

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Chemically reacting flows (4BC00)

Chemically reacting flows play an important role in energy systems such as engines, gas turbines and boilers. The fundamental physical and chemical processes and the models that describe them, are introduced and subsequently used to analyse energy and combustion systems. This knowledge and these skills are essential for the design of systems that convert future sustainable fuels into energy in a clean and efficient way. This course presents also mathematical models meant to describe and analyse the above mentioned processes.