Specialisation in Plasma Physics

Students learn the theoretical background and the most important applications of Plasma Physics in laboratory as well as in astrophysics. It is included a practical course held at the IPP Garching. Students, who passed this module, are qualified to do research in the fields of theoretical or experimental Plasma Physics.

Module	***Energy Supply, Climate Change, Nuclear Fusion***
Code	72198
Instruction language	German or English
ECTS credits	4
Credit hours	2
Duration	1 semester
Cycle	Each winter semester
Coordinator	Dean of Physics Studies
Lecturer	Dr. Thomas Eich
Allocation to study programs	Physics M.Sc., elective module, 1st or 2nd semester Wirtschaftsphysik M.Sc., elective module, 1st - 3nd semester
Formal prerequisites	None
Recommended prerequisites	Introductory lectures in Physics (also as a minor subject)
Learning objectives	The course deals with central questions about the energy supply in Germany and the world. It focuses on fossil, nuclear and CO_2-free energy sources. Furthermore, the current energy policies and climate change are discussed. The possibility of using nuclear fusion as energy source will be discussed.
Syllabus	• Survey on energy supply and energy consumption in Germany and in the world • The concept of the individual energy balance sheet for course attendees • Survey on fossil energy forms: coal, gas, oil • Climate History and radiative forcing, near term projection of global warming • Natural cycles of CO_2 in the atmosphere, lithosphere and oceans • The physics of the Greenhouse effect • Consequences of CO_2-increase and international CO_2-reduction strategies • Near-term CO_2-free energy: wind, solar, nuclear fission power plants • Energy transformation in Germany and necessity for a power grid extension / smart grids • Consequences of a Nuclear Renaissance and proliferation risks • Current and future experiments in nuclear fusion research in Europe • Concept of Nuclear Fusion power plants and potential Fusion Energy • Climate-Engineering
Literature	http://www.weltderphysik.de/gebiete/technik/energie/

	E. Rebhan, Energiehandbuch T. Buhrke, Renewable Energy: Sustainable Energy Concepts for the Future, Wiley Klimawandel (S. Rahmstorf) Kernfusions-Forschung: Physik (H. Zohm)
Teaching and learning methods	Lecture with seminar (2 hours per week)
Workload	30 hours lecture (attendance time) 90 hours self-study Total: 120 hours
Assessment	Written or oral examination. A prerequisite for the participation in the examination is an ungraded course achievement. Form and scope of the examination and of the course achievement are determined and notified by the lecturer at the beginning of the course.
Examination	13090 Energy Supply and Nuclear Fusion Research
Grading procedure	The module grade is the examination grade.
Basis for	Specialisation in the field of Plasma Physics