PHYS-447	Reactor technology
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	Prasser Horst-Michael				
Cursus		Sem.	Туре	Language of	English
Ingphys		MA1, MA3	Opt.	teaching Credits	Linglish
Nuclear engineering		MA1	Obl.		4 Winter Fall
Physicien		MA1, MA3	Opt.	Session Semester	
				Exam	Oral
				Workload	120h
				Weeks	14
				Hours	3 weekly

# Summary

Reactor core cooling, power limits and technological consequences due to fuel, cladding and coolant properties, main principles of reactor and power plant design including auxiliary systems are explained. System technology of most important thermal and fast reactor types is introduced.

#### Content

- Fuel rod, LWR fuel elements
- Temperature field in fuel rod
- Reactor core, design
- Flux and heat source distribution, cooling channel
- Single-phase convective heat transfer, axial temperature profiles
- Boiling crisis and DNB ratio
- Pressurized water reactors, design
- Primary circuit design
- Steam generator heat transfer, steam generator types
- Boiling water reactors
- Reactor design
- LWR power plant technology, main and auxiliary systems
- Breeding and transmutation, purpose of generation IV systems
- Properties of different coolants and technological consequences

- Introduction into gas-cooled reactors, heavy water moderated reactors, sodium and led cooled fast reactors, molten salt reactors, accelerator driven systems

### **Learning Outcomes**

By the end of the course, the student must be able to:

- Assess / Evaluate the performance of reactor types
- Systematize reactor system components
- Formulate safety requirements for reactor systems

# Transversal skills

- Access and evaluate appropriate sources of information.
- · Collect data.

### **Teaching methods**



2 weekly

1 weekly

Courses Exercises

Number of positions

Lectures, numerical exercises

# Assessment methods

oral exam