

Module title	SM Code	
Radio Frequency Engineering	HFT	
Module lecturer	Faculty	
Prof. Dr. Susanne Hipp	Electrical Engineering and Information Technology	
Module language	Number of SWS / WSH	ETCS credits
English / German	4 SWS / WSH	5
Teaching format		
Seminar-based teaching with 10-15% practical component and practical experiments		

Semester according to the study plan	
6 th semester (Bachelor)	
Attendance/classroom hours	Additional independent study
56 hours	Preparation and follow-up work: 62 hours Exam preparation: 32 hours
Type of examination / Requirements for the award of the credit points	
Written exam: 90 minutes	

Teaching content
<ul style="list-style-type: none"> • Electromagnetic wave propagation (frequency ranges, propagation) • Waveguides and modes (theory/simulation) • S-parameters and network analyzer, including multi-port • Power measurement up to the highest frequencies • Frequency measurement up to the highest frequencies • Time domain measurements • Effects of electromagnetic radiation on humans

- Resonators and filters
- Theory and simulation of advanced antenna designs and their applications

In a practical exercise, students will learn the following skills for designing an antenna:

- Design and layout
- Fabrication
- Measurement of resonance and antenna pattern

Learning objective: Professional competence

After successfully completing this module, students will be able to

- name wave propagation boundary conditions with regard to frequency range (1)
- list methods for measuring power and frequency as well as measurement methods in the time domain (1)
- list waveguide types and resonators/filters (1) and design common line types (2)
- specify the properties of antennas (1)
- assess the effect of radiation on humans (2)
- calculate and simulate RF lines and antennas (3)
- carry out, record (2) and evaluate (3) measurements in high-frequency transmission technology
- select high-frequency components, conductors and antennas based on given tasks (2)

Literature

Recommended reading

- Detlefsen, J., & Siart, U. (2012). *Grundlagen der Hochfrequenztechnik*. Oldenbourg-Verlag

see also "Fields", "Waves", "Electrical wiring"

The numbers in brackets indicate the levels to be achieved: (1)-know | (2)-can | (3)-understand and apply