

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 <sup>th</sup> 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"> <li>• Electromagnetic wave propagation (frequency ranges, propagation)</li> <li>• Waveguides and modes (theory/simulation)</li> <li>• S-parameters and network analyzer, including multi-port</li> <li>• Power measurement up to the highest frequencies</li> <li>• Frequency measurement up to the highest frequencies</li> <li>• Time domain measurements</li> <li>• Effects of electromagnetic radiation on humans</li> </ul>

- 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