Module title		SM Code
Applied Microwaves		**AMW**
Module lecturer	**Faculty**	
Prof. Dr. Susanne Hipp	Electrical Engineering and Information Technology	
Module language	**Number of SWS / WSH**	**ETCS credits**
English	4 SWS / WSH	5
Teaching format		
50% Seminar-based teaching and 50% practical training		

Semester according to the study plan	
1st, 2nd semester (Master)	
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

- Beamforming
- (Automotive) Radar
- MW (5G)
- Wave propagation / Radio Channel
- Numerical simulation (MoM, T (TLM), F, Raytracing)
- Lab: Electromagnetic Simulation

Learning objective: Professional competence

After successfully completing this module, students will be able to

- know different applications of microwave theory and their use in every-day life (1)

- understand principles of selected topics in depth, such as applying beam forming to radar applications and future 5G antenna arrays (2)

- apply numerical simulation methods to microwave problems and identify an appropriate method for the specified issue (2)

- solve problems of current technology by combining the basics of electromagnetics and advanced strategies from adjacent courses (3)

Literature

Recommended reading

Radar

- Skolnik, M. (2008). *Radar Handbook* (Third Edition). The McGraw-Hill

- Winner et al. (2016). *Handbook of Driver Assistance Systems*. Springer

Beamforming

- Balanis, C. A. (2005). *Antenna theory*. John Wiley & Sons

Numeric Simulation

- Swanson, D. G. Jr., & Hoefer, W. J. R. (2003). *Microwave Circuit Modeling Using Electromagnetic Field Simulation*. Artech House

5G

- Morais, D. H. (2020). *Key 5G Physical Layer Technologies*. Springer

Wave propagation

- Gustrau, F. (2019). *Hochfrequenztechnik*. Hanser

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