Module title		SM Code
Mathematics 3		**MA3**
Module lecturer	**Faculty**	
N.N. (Prof. Dr. Ralf Lenz?)	Electrical Engineering and Information Technology	
Module language	**Number of SWS / WSH**	**ETCS credits**
English	4 SWS / WSH	5
Teaching format		
Seminar-based teaching with approx. 20% practical component		

Semester according to the study plan	
3rd semester	
Attendance/classroom hours	**Additional independent study**
56 hours	Preparation and follow-up work: 94 hours
Type of examination / Requirements for the award of the credit points	
Written exam: 90 minutes	

Teaching content

- Fourier series: oscillations and periodic functions, Fourier analysis
- Fourier transform: Fourier integral, Fourier transform, Discrete Fourier transform
- Laplace transform: Laplace transform, Inverse Laplace transform, transformation rules, application to differential equations
- Fundamentals of vector analysis: scalar and vector fields, gradient, divergence and rotation, line integrals, surface integrals

Learning objective: Professional competence

After successfully completing this module, students will be able to

- explain basic concepts, definitions, and examples of Fourier analysis, Fourier and Laplace transforms, and vector analysis (1)
- determine Fourier series, Fourier integrals, and discrete Fourier transforms for simple functions (2)
- confidently use the transformation rules for Laplace transforms (2);
- correctly calculate important quantities in vector analysis (2)
- to use Fourier and Laplace transforms to transfer problems from the time domain to the spectral domain (3)
- the Laplace transform to solve linear differential equations (3)
- analyze simple networks using Laplace transforms (3)
- interpret important quantities of vector analysis in an application-oriented manner (3)

Literature

Recommended reading

- Meyberg, Vachenauer: Higher Mathematics 2, 2005
- Stewart, J.: Calculus, Cengage Learning Services, 2015
- Weber, H.: Laplace Transform, Teubner, 2007
- Westermann, Th.: Mathematics for Engineers, Springer, 2011

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