Advanced Engineering Mathematics					**AR-101**	
Rota		**Duration**	**Semester**	**SWS**	**Credit Points**	**Workload**
annually WS		1 Semester	1st (Semester)	5 SWS	6	180 h

1	**Modul Structure**					
	Course (Abbreviation)		**Type/ SWS**	**Presence**	**Self Study**	**Credit Points**
	a) Advanced Engineering Mathematics (AEM)		Lecture/ 3 SWS	35 h	85 h	4
	b) Advanced Engineering Mathematics (AEM)		Tutorial/ 2 SWS	25 h	35 h	2
2	**Language** English					
3	**Content**					

The subjects are chosen from

1. Linear Algebra: Vector spaces, matrices and equation systems, linear maps, Jordan-, LU-, QR-, and singular value decomposition, numerical aspects.
2. Differential Equation: Linear systems, differential equations with constant coefficients.
3. Laplace-Transform and Fourier Series
4. Differential Calculus with several variables: Derivatives, inverse and implicit functions, Taylor expansion and extreme values.
5. Stability of Differential Equations: Theorems of Ljapunov and Poincaré-Ljapunov.
6. Variational Calculus

Literature:

- Bajpai, Avinash C. , Mathematics for engineers and scientists
- Meyer, R.M., Essential mathematics for applied fields
- Lancaster, P., Tismenetsky, M., The theory of matrices
- Lang, S., Linear algebra
- Slides

4	**Competencies**
	The course gives an introduction to fundamental mathematical techniques used in almost every course. Attention is given to the underlying mathematical structure.
5	**Examination Requirements**
	The final exam will be a written (2 hours) exam.
6	**Formality of Examination**
	☒ Module Finals ☐ Accumulated Grade
7	**Module Requirements (Prerequisites)**
8	**Allocation to Curriculum:**
	Mandatory Course Program: Automation & Robotics
9	**Responsibility/ Lecturer**
	Dean of the Mathematics department/ Lecturers of the Mathematics department