Module DDM 4201 – Numerical Methods in CAD

1	**Module Number**	**Study Programme**	**Semester**	**Offered in**	**Duration**	**Module Type**	**Workload (h)**	**ECTS Points**
	4201	DDM	1	☒WS ☐SS	1 Semester	Compulsory	120	4

2	**Courses**	**Teaching and Learning Forms**	**Contact Time**		**Self-Study Time**	**Language**
			(SWS)	**(h)**	**(h)**	English
	a) CAE Methods and Algorithms	Lecture	2	30	60	
	b) Numerical Mathematics	Lecture	2	30		

3 **Learning Outcomes and Competences**

Once the module has been successfully completed, the students can …

Knowledge and Understanding

- Understand the basics of mathematical concepts within the framework of the topics in section 4
- Have advanced knowledge of engineering mathematics and numerical methods in particular
- Understand the relevance of mathematics for mechanical engineering

Use, Application and Generation of Knowledge

- Apply mathematical concepts within the framework of the topics in section 4
- Decide whether a solution is plausible or not
- Analyse advanced problems of mechanical engineering and work out mathematical solutions

Communication and Cooperation

- Make use of the knowledge, abilities and competences in order to evaluate a given application problem
- Communicate within a team to work out a solution to a given problem

Scientific Self-Conception/ Professionalism

- Justify a solution methodically
- Assess their abilities in comparison to their fellow students

4 **Contents**

- Advanced topics of matrix calculus
- Analysis of functions of several variables (especially optimisation)
- Iterative methods for solving linear equation systems
- Power series, Taylor series, Fourier series
- Nonlinear equations and nonlinear equation systems
- Numerical methods for initial value problems of ordinary differential equations

5 **Participation Requirements**

Compulsory: Mathematics from the bachelor studies

6 **Examination Forms and Prerequisites for Awarding ECTS Points**

Written examination (90 mins); graded

7 **Further Use of Module**

Compulsory module for DMM studies

8 **Module Manager and Full-Time Lecturer**

Prof. Dr. rer. nat. Axel Stahl

9	**Literature** • Lecture notes (provided for download) • Koch-Stämpfle, Mathematik für das Ingenieurstudium, Hanser Verlag • Mohr, Numerische Methoden in der Technik, Grenzwert Verlag • Weller, Numerische Mathematik für Ingenieure, Vieweg Verlag • O'Neil, Advanced Engineering Mathematics, Cengage Learning • Kreyszig, Advanced Engineering Mathematics, Wiley
10	**Last Updated** 02.04.2019