Technology
Arts Sciences
TH Köln

Course Manual AMA

Applied Matheamtics

Version: 1 | Last Change: 05.09.2019 09:37 | Draft: 0 | Status: vom verantwortlichen Dozent freigegeben

General information

Long name	Applied Matheamtics
Approving CModule	AMA_MaMT
Responsible	Prof. Dr. Stefan Grünvogel Professor Fakultät IME
Valid from	summer semester 2021
Level	Master
Semester in the year	summer semester
Duration	Semester
Hours in self-study	78
ECTS	5
Professors	Prof. Dr. Stefan Grünvogel Professor Fakultät IME
Requirements	The classical topics in engineering mathematics: - analysis of one and several variables (differentiation, intergration, Taylor) - linear algebra (general vector spaces, linear mappings, matrices, vectors, norm, scalar product)
Language	German, English if necessary
Separate final exam	Yes

Literature

- Solomin: Numerical Algorithms, CRC Press
- Chapra,Canale: Numerical Methods for Engineers, McGraw-Hill
- Quarteroni, Saleri, Gervasio: Scientific Computing with MATHLAB and Octave, Springer
- Dahmen, Reusken: Numerik für Ingenieure und Naturwissenschaftler, Springer
- Deuflhard, Hohmann: Numerische Mathematik 1, de Gruyter

Final exam

Details	In a team of a maximum of two students, a complex media technology problem is to be dealt with in the form of a project that requires at least the knowledge conveyed in the seminar part of the course in order to be solved. The project result is to be provided in the form of a written report in the form of a scientific elaboration. Mathematical description of a complex media technology problem which requires at least the knowledge conveyed in the seminar part of the course in order to be solved. Analysis of the problem and selection of a solution methode based on this. Selection of a software system or implementation of a corresponding algorithmic solution method. Written documentation and critical evaluation of the results. Explanation of the individual work steps
Minimum standard	The elaboration meets minimum scientific standards. A sufficient literature search is proven. There are only a few errors in the use of the correct mathematical notation in the elaboration. The selection of the numerical solution method for the task is justified and adequate. Results for the task are generated. A critical analysis of the achieved results is presented.

Exam Type	EN schriftlicher Ergebnisbericht

− Lecture / Exercises

Learning goals

Goal type	Description
Knowledge	Knowledge of numerical mathematics is taught according to the Flipped Classroom concept. Topcis: Numerics and error analysis Solving linear equations (direct, iterative) eigen vectors singular value decomposition solving nonlinear equations nonlinear least-squares optimization methods interpolation intergration and differentiation numerical software

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Seminar	3
Tutorial (voluntary)	0

Special requirements

none

Accompanying material	Literature online and in book form
Separate exam	Yes

Separate exam

Exam Type	EN Fachgespräch (Interview) zu besonderen Fragestellungen (Szenario, Projektaufgabe, Lieraturrecherche)
Details	Conceptual questions on the respective topics must be answered independently and justified before the course (Flipped Classroom). Alternative or complementary: Creating a learning portfolio
Minimum standard	A sufficient occupation with the contents of the respective course must be proven which leads to the knowledge and a rough understanding of the basic concepts and methods.

− Lecture / Exercises

Learning goals

Goal type	Description
Skills	Mathematical description of a complex media technology problem which requires at least the knowledge conveyed in the seminar part of the course in order to be solved. Analysis of the problem and selection of a solution methode based on this. Selection of a software system or implementation of a corresponding algorithmic solution method. Written documentation and critical evaluation of the results. Explanation of the individual work steps

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Project	1
Tutorial (voluntary)	0

Special requirements

Seminar successfully completed

Accompanying material	Literature for the Lehveranstaltung (online, book form) online curses
Separate exam	No