Valid from 2024.HS

Module description: Mathematics 2

Module Code	t.BA.MIM.MA2.23HS
ECTS Credits	4
Language of Instruction/Examination	German
Organizational Unit	IAMP
Module Coordinator	Karl Reiner Lermer
Legal Framework	The module description is part of the legal basis in addition to the general academic regulations. It is binding. During the first week of the semester a written and communicated supplement can specify the module description in more detail.
Module Characteristic	Type 3a 2 lecture lessons per semester week and class+ 2 lab bi-weekly lessons per semester and half-class
Module Description	Advanced topics in linear algebra and analysis are covered. Topics are system of linear equations, linear mappings, matrices, real functions, sequences and series, differentiation and integration.
Module Content	• Advanced topics in linear algebra and analysis are covered. Topics are system of linear equations, linear mappings, matrices, real functions, sequences and series, differentiation and integration.
Prerequisite Knowledge	Mathematik 1

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Learning Objectives (Competences)

Students...	Competencies	Taxonomies
You acquire the mathematical tools needed in engineering subjects. You familiarise yourself with the mathematical way of thinking. You train your ability to think abstractly.	F, M	K2, K3
You can - recognize general vector spaces - apply the subspace criterion to identify vector spaces and affine subspaces. - define the terms linearly independent and linearly dependent and explain them using examples. - determine whether a set of vectors is a generating set or a basis. - explain the terms basis and dimension using examples. - determine bases of vector spaces. - determine the dimension of vector spaces. - set up and interpret parameter representations and coordinate equations of lines and planes.	F, M	K2, K3
You can - recognize linear systems of equations. - determine the solution sets of linear systems of equations. - determine the rank of a given matrix. - use suitable criteria (e.g. the rank criterion and the extended coefficient matrix) to assess how many solutions a system of linear equations has. - calculate with matrices (sum, product, transpose) You can interpret matrices as linear mappings. You can use the Gauss-Jordan method to - solve matrix equations - calculate inverses of matrices. You can set up normal equations and calculate regression lines from them.	F, M	K2, K3
You can - write down sequences and series in enumerative, explicit and recursive notation. - use suitable convergence criteria to assess whether an infinite sequence/series converges or diverges. - apply the limit value rules to calculate limit values.	M, F	K2, K3
You will be able to define and explain the continuity concept for real functions. You know the definitions and the characterizing properties of the - polynomial functions - trigonometric functions (sine, cosine, tangent) and their inverse functions, the arcus functions - exponential and logarithmic functions. You can apply the limit value rules to functions to determine limit values and pole positions. You can invert linear functions and determine their zeros. You can convert quadratic function equations into vertex form and determine vertices and zeros.	F, M	K2, K3
You can apply the sum, product, quotient and chain rules to calculate the derivatives of - polynomials - trigonometric functions - exponential and logarithmic functions - functions composed of these. You can apply the rule of the derivative of the inverse function to determine the derivative of arcus functions. You can determine stationary points, extrema and inflection points. You can set up the linearization of differentiable functions at any point.	M, F	K2, K3
You can calculate the antiderivatives of - polynomials - trigonometric functions - exponential and logarithmic functions - and the functions composed of these. You can calculate definite integrals and simple bounded areas.	F, M	K2, K3
You can apply the above	F, M	K3

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Performance Assessment

End-of-module exam	Assessment	Length (min.)	Weighting	Form
written exam	Grade	90	90	acc. to module agreement

Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
Regular Exams *for instance online tests*	Grade		10	acc. to module agreement

Classroom Attendance Requirement

None

Learning material

- depending on lecturer

Comments

Supplementary literature:
Gerald Teschl. Susanne Teschl. Mathematik für Informatiker. Band 1: Diskrete Mathematik und Lineare Algebra. 4. Aufl., Springer-Vieweg.
Gramlich, Günter M. (2014): Lineare Algebra. Eine Einführung. 4. Aufl. München: Carl Hanser Verlag.
Papula, Lothar (2017): Mathematische Formelsammlung. Für Ingenieure und Naturwissenschaftler. 12. Aufl. Wiesbaden: Springer Vieweg.