Valid from 2024.HS

Module description: Mathematics 1

Module Code	t.BA.MIM.MA1.23HS
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	The basics of discrete mathematics and linear algebra are covered.
Module Content	• Subject areas are sets, logic, numbers, relations, functions, vector calculation, vector geometry.
Prerequisite Knowledge	Mathematics of the vocational baccalaureate.

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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.	M, F	K2, K3
You are familiar with the basics of set theory and the rules of set algebra. You are able to calculate averages, unions, complements, power sets, partitions and Cartesian products and visualise them with the help of diagrams.	F, M	K2, K3
You can - define the number systems of the natural, whole, rational, real and complex numbers and perform calculations in them. - calculate modulo and perform division with remainder. - apply Euclid's algorithm to calculate the ggT. - apply Heron's algorithm to approximate roots. - understand and make recursive definitions. - determine maxima, minima, suprema and infima. - create and perform calculations using the sum and product sign.	F, M	K2, K3
You can - interpret and create statements and predicates with conjunctors and quantifiers. - Interpret and make truth tables. - apply the rules of predicate logic to prove logical equivalences.	M, F	K2, K3
You can - decide whether a relation is reflexive, transitive, symmetrical, antisymmetrical or asymmetrical. - Interpret relations with sets, arrow diagrams and tables. - decide whether a relation is an equivalence relation. - determine the equivalence classes of equivalence relations and interpret them as partitions. - add and multiply residue classes in Z modulo m. - perform calculations with modular arithmetic. - determine multiplicative inverses. - decide and justify whether a relation is pre-order, semi-order, strict order or total order. - decide and justify whether a relation is a function. - decide and justify whether a function is surjective, injective or bijective. - determine whether a function is invertible and determine the inverse. - perform the concatenation of functions.	M, F	K2, K3
You can - decide whether sets are vector spaces. - define and explain n-tuple spaces and polynomial spaces and their vector space operations. - form linear combinations - determine the span. - apply the subspace criteria. - prove linear independence. - Identify generating end systems. - identify and determine bases. - determine the dimension. - calculate component vectors. - identify abstract vector spaces with tuple spaces.	F, M	K2, K3

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Performance Assessment

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

Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
written exam	Grade		0	acc. to module agreement
Frequent tests *for instance online quiz*	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.