## Module description: Analysis 1

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| **Module Code** | t.BA.XXM2.AN1.26HS |
| **ECTS Credits** | 4 |
| **Language of Instruction/Examination** | German |
| **Organizational Unit** | IAMP |
| **Module Coordinator** | Lukas Lichtensteiger |
| **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<br><br>2 lecture lessons per semester week and class+ 2 weekly lab lessons per semester and half-class |
| **Module Description** | In this course, students learn the basic concepts of calculus of one real variable. |
| **Module Content** | **1. Concepts of differential and integral calculus**<br><br>• Derivative (tangent, curve discussion)<br>• Antiderivatives and areas for polynomials, fundamental theorem<br><br>**2. Sequences, series (with sums) and limits**<br><br>• Sequences (direct, recursive, arithmetic/geometric)<br>• Limit concept (calculation rules, limit of a function), continuity<br>• Series (arithmetic/geometric)<br><br>**3. Extension of differential calculus**<br><br>• Derivatives of elementary functions<br>• Derivative rules<br>• Curve discussion<br>• Fractional rational functions (poles, removable gaps in definition, asymptotes)<br>• Extreme value problems<br>• Newton method |
| **Prerequisite Knowledge** | Mathematik der technischen BM |

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| **Learning Objectives (Competencies)** | **Students...** | **Competencies** | **Taxonomies** |
|---|---|---|---|
| | calculate limits using symbolic methods. | F, M | K3 |
| | form recursion formulas using Newton's method | F, M | K3 |
| | carry out a curve discussion and calculate certain integrals of polynomial functions using the fundamental theorem. | M, F | K3 |
| | know the derivatives of elementary functions. | F, M | K1 |
| | understand the concept of a sequence and calculate values of sequences that are given explicitly or recursively. | F, M | K2, K3 |
| | understand the concepts of derivative and definite integral | F, M | K2 |
| | use the rules of differentiation, conduct a curve discussion and solve extreme value problems. | M, F | K2, K3 |
| | show the convergence of a sequence using the limit definition. | M, F | K3 |

**Performance Assessment**

| **End-of-module exam** | **Assessment** | **Length (min.)** | **Weighting** | **Social Form** | **Scenario/Format** |
|---|---|---|---|---|---|
| written exam | Grade | 90 | 80% | acc. to module agreement | |

| | **Assessment** | **Length (min.)** | **Weighting** | **Social Form** | **Scenario/Format** |
|---|---|---|---|---|---|
| Intermediate exam *written or oral* | Grade | | 20% | acc. to module agreement | |

| **Classroom Attendance Requirement** | None |
|---|---|
| **Learning material** | • Papula, L. Mathematik für Ingenieure und Naturwissenschaftler. Vieweg+Teubner. ISBN 978-3-658-05619-3. |
| **Comments** | During the first week of classes, a module agreement will be communicated which applies to all module courses and in which the exact number and scope of the graded assignments during the semester as well as the calculation method for the module grade are determined. |