

<b>Module description: Analysis 3</b>	
<b>Module Code</b>	t.BA.XXM5.AN3.19HS
<b>ECTS Credits</b>	4
<b>Language of Instruction/Examination</b>	German
<b>Organizational Unit</b>	ICP
<b>Module Coordinator</b>	Christoph Kirsch
<b>Legal Framework</b>	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.
<b>Module Characteristic</b>	Type 3a  2 lecture lessons per semester week and class+ 2 lab bi-weekly lessons per semester and half-class
<b>Module Description</b>	The main topic of this module is the differential and integral calculus of generally vector-valued functions of several real variables. In addition, students are introduced to the (continuous) Fourier transform and learn about autonomous systems of ordinary differential equations.
<b>Module Content</b>	<p><b>(Continuous) Fourier transform</b></p> <ul style="list-style-type: none"> <li>• definitions, tables</li> <li>• Fourier series for periodic functions</li> </ul> <p><b>Functions of several variables</b></p> <ul style="list-style-type: none"> <li>• definition and visualization</li> <li>• continuity, differentiability</li> <li>• partial derivatives, differential operators</li> <li>• integral calculus, coordinate transforms</li> <li>• divergence theorem, Stokes' theorem, balance equations, scalar potentials for gradient fields</li> </ul> <p><b>Ordinary differential equations</b></p> <ul style="list-style-type: none"> <li>• slope field and integral curves of ordinary differential equations</li> <li>• autonomous systems of ordinary differential equations</li> </ul>
<b>Prerequisite Knowledge</b>	Information for incoming exchange students: This module is based on academic concepts and skills acquired in the following modules: XXM4.AN1, XXM4.AN2, XXM5.LA1, XXM5.LA2. Please check thoroughly if you have knowledge in these topics.

## Module description: Analysis 3

Learning Objectives (Competences)	Students...	Competencies	Taxonomies											
	You know properties such as continuity and differentiability of functions of several variables, and you can visualize these functions appropriately.	F, M	K2, K3											
	You can rewrite arbitrary higher order ordinary differential equations as systems of first order ordinary differential equations.	M, F	K2, K3											
	You can formulate balance equations for the state variables of a physical system using the divergence theorem, and you can compute scalar potentials for gradient fields using Stokes' theorem.	F, M	K2, K3											
	You can compute partial derivatives of functions. You know the calculation rules for the differential operators gradient, divergence and curl and you can use them on examples.	M, F	K2, K3											
	You can analyze autonomous systems of ordinary differential equations.	F, M	K2, K3											
	You can compute Fourier transforms of functions in both directions with the help of tables. You can calculate Fourier series of periodic functions.	F, M	K2, K3											
	You know the slope field of a first order ordinary differential equation, and you can derive qualitative properties of the integral curves from it.	F, M	K2, K3											
	You know various definitions of the (continuous) Fourier transform, and you can work with tables of Fourier transform pairs.	F, M	K2, K3											
	You can integrate functions of several variables over general domains, and you can transform such integrals into arbitrary coordinates.	M, F	K2, K3											
<b>Performance Assessment</b>	<table border="1"> <thead> <tr> <th data-bbox="485 1207 732 1285">End-of-module exam</th> <th data-bbox="732 1207 895 1285">Assessment</th> <th data-bbox="895 1207 1058 1285">Length (min.)</th> <th data-bbox="1058 1207 1171 1285">Weighting</th> <th data-bbox="1171 1207 1461 1285">Form</th> </tr> </thead> <tbody> <tr> <td data-bbox="485 1285 732 1366">written exam</td> <td data-bbox="732 1285 895 1366">Grade</td> <td data-bbox="895 1285 1058 1366">90</td> <td data-bbox="1058 1285 1171 1366">80</td> <td data-bbox="1171 1285 1461 1366">acc. to module agreement</td> </tr> </tbody> </table>				End-of-module exam	Assessment	Length (min.)	Weighting	Form	written exam	Grade	90	80	acc. to module agreement
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	Grade		20	acc. to module agreement										
<b>Classroom Attendance Requirement</b>	None													
<b>Learning material</b>														
<b>Comments</b>	At least one graded assignment during the semester. Number and weighting of graded assignments equal among all lecturers.													