UNIVERSITÄT BIELEFELD

Module Guide
24-B-AN3 Analysis 3

Fakultät für Mathematik

Version dated Dec 12, 2025

This module guide reflects the current state and is subject to change. Up-to-date information and the latest version of this document can be found online via the page

https://ekvv.uni-bielefeld.de/sinfo/publ/modul/533061628

The current and valid provisions in the module guide are binding and further specify the subject-related regulations (German "FsB") published in the Official Announcements of Bielefeld University.

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24-B-AN3 Analysis 3

Faculty

Fakultät für Mathematik

Person responsible for module

Herr Prof. Dr. Moritz Kaßmann

Regular cycle (beginning)

Every winter semester

Credit points

10 Credit points

Competencies

Non-official translation of the module descriptions. Only the German version is legally binding.

Students are able to present the problems of volume measurement and integration in higher dimensions in a technically correct manner. They are able to implement intuitive geometric concepts - such as length and volume - in analysis and thus make them computationally accessible. Students develop an understanding of the fundamental principles of measurement and integration theory, which enables them to carry out mathematical proofs in this area independently. They can handle multidimensional integrals correctly and acquire basic knowledge and skills which they can apply in in-depth courses on functional analysis, probability theory, numerics and partial differential equations. They are confident in applying the methods of measure and integration theory and can successfully transfer these to new problems.

In the tutorials, students demonstrate the acquisition of competences in the technologies of measure and integration theory, the ability to apply the methods and conduct proofs under supervision, presentation and communication skills as well as perseverance as basic mathematical competences.
Understanding of the relationships and concepts, the ability to carry out proofs independently and confidence in applying the methods to new problems is demonstrated in the final exam.

Content of teaching

- Introduction to the General Concept of Measure and Integral
- Construction of measures, in particular Lebesgue measure and Lebesgue integration
- Convergence theorems, Lp spaces, product measures, Fubini's theorem
- Integration in Rn, transformation theorem,
- Gauss's theorem.

Recommended previous knowledge

Basic competences in Analysis and Linear Algebra (24-B-MG1, 24-B-MG2)

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Necessary requirements

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Explanation regarding the elements of the module

This module cannot be studied in combination with module 24-B-MI-5 or 24-B-MI.

Module structure: 1 SL, 1 bPr [1]

Courses

Title	Type	Regular cycle	Workload [5]	LP[2]
Analysis 3	lecture	WiSe	60 h (60 + 0)	2 [Pr]
Tutorials for Analysis 3	exercise	WiSe	90 h (30 + 60)	3 [SL]

Study requirements

Allocated examiner	Workload	LP[2]
Teaching staff of the course **Tutorials for Analysis 3 (exercise)** *Regular completion of the exercises, each with a recognisable solution approach, as well as participation in the exercise groups for the module's lecture. As a rule, participation in the exercise group includes presenting solutions to exercises twice after being asked to do so as well as regular contributions to the scientific discussion in the exercise group, for example in the form of comments and questions on the proposed solutions presented. The organiser may replace some of the exercises with face-to-face exercises.*	see above	see above

Examinations

Allocated examiner	Type	Weighting	Workload	LP[2]

Teaching staff of the course **Analysis 3 (lecture)** *The (e-)portfolio is passed if* *- a sufficient number of correctly solved exercises, which are completed as part of the study requirements , are demonstrated, usually by at least 50% of the points achievable in the semester for solving the exercises, and* *- a final exam in the form of a final written exam (usually 90 min) or a final oral exam (usually 30 min) is passed. The final exam relates to the content of the lecture and the tutorial and is used for assessment.* *An electronic written examination at a distance is not permitted as a final exam.*	e-Portfolio mit mündlicher Abschlussprüfung o. e-Portfolio mit schriftlicher Abschlussprüfung o. Portfolio mit mündlicher Abschlussprüfung o. Portfolio mit schriftlicher Abschlussprüfung	1	150h	5

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Legend

1	The module structure displays the required number of study requirements and examinations.
2	LP is the short form for credit points.
3	The figures in this column are the specialist semesters in which it is recommended to start the module. Depending on the individual study schedule, entirely different courses of study are possible and advisable.
4	Explanations on mandatory option: "Obligation" means: This module is mandatory for the course of the studies; "Optional obligation" means: This module belongs to a number of modules available for selection under certain circumstances. This is more precisely regulated by the "Subject-related regulations" (see navigation).
5	Workload (contact time + self-study)
SoSe	Summer semester
WiSe	Winter semester
SL	study requirement
Pr	Examination
bPr	Number of examinations with grades
uPr	Number of examinations without grades