TECHNISCHE UNIVERSITÄT KAISERSLAUTERN

Module Handbook

TUK MODHB Homapage

Module MAT-64-15-M-7

High-Dimensional Integration (M, 4.5 LP, AUSL)

Module Identification

Module Number	Module Name	CP (Effort)
MAT-64-15-M-7	*High-Dimensional Integration*	4.5 CP (135 h)

Basedata

CP, Effort	4.5 CP = 135 h
Position of the semester	1 Sem. irreg.
Level	[7] Master (Advanced)
Language	[EN] English
Module Manager	Ritter, Klaus, Prof. Dr. (PROF | DEPT: MAT)
Lecturers	Ritter, Klaus, Prof. Dr. (PROF | DEPT: MAT)
Area of study	[MAT-SPAS] Analysis and Stochastics
Reference course of study	[MAT-88.105-SG] M.Sc. Mathematics
Livecycle-State	[AUSL] Phase-out period

Notice

The course for this module was offered for the last time in the summer semester 2019. The module has been replaced by the module **[MAT-64-16-M-7]** *"High-Dimensional Integration: Function Spaces, Algorithms, and Complexity"*.

Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
2V+1U	**MAT-64-15-K-7**	P	-	PL1	4.5	irreg.

- About **[MAT-64-15-K-7]**: Title: "High-Dimensional Integration"; Presence-Time: 42 h; Self-Study: 93 h

Examination achievement PL1

- Form of examination: **oral examination (20-30 Min.)**
- Examination Frequency: each semester
- Examination number: 86248 ("High-Dimensional Integration")

Evaluation of grades

The grade of the module examination is also the module grade.

Contents

From [MAT-64-15-K-7] High-Dimensional Integration:

Algorithms and Complexity of high and infinite-dimensional integration problems:

- Monte Carlo Method,
- discrepancy of point sequences and quasi Monte Carlo Method,
- randomisation,
- lower error bound and complexity of continuous problems,
- curse of dimension,
- quadrature problems for stochastic differential equations.

Competencies / intended learning achievements

Upon successful completion of this module, the students know and understand the basic principles of the construction and analysis of algorithms for high-dimensional integration. They can apply the algorithms to solve practical problems, and they can critically analyze the possibilities and limitations of those. They understand how to develop important results and methods of complexity theory of continuous problems. They understand proofs presented in the lecture and are able to reproduce and explain them.

By solving the given exercises, they have gained a precise and independent handling of the terms, propositions and methods of the lecture. In addition, they have learned to apply the methods to new problems, analyze them and develop solution strategies independently or by team work.

Literature

From [MAT-64-15-K-7] High-Dimensional Integration:

- E. Novak, H. Wozniakowski: Tractability of Multivariate Problems, Vol. I-III.

Registration

Registration for the exercise classes via the online administration system URM (https://urm.mathematik.uni-kl.de).

Requirements for attendance of the module (informal)

Knowledge on stochastic differential equations is useful but not necessarily required.

Modules:

- [MAT-10-1-M-2] Fundamentals of Mathematics (M, 28.0 LP)
- [MAT-14-11-M-3] Introduction to Numerical Methods (M, 9.0 LP)
- [MAT-14-14-M-3] Stochastic Methods (M, 9.0 LP)
- [MAT-60-11-M-4] Probability Theory (M, 9.0 LP)

Requirements for attendance of the module (formal)

None

References to Module / Module Number [MAT-64-15-M-7]

Module-Pool	Name
[MAT-70-MPOOL-7]	Specialisation Stochastic Analysis (M.Sc.)
[MAT-AM-MPOOL-7]	Applied Mathematics (Advanced Modules M.Sc.)
[MAT-RM-MPOOL-7]	Pure Mathematics (Advanced Modules M.Sc.)