

Module Handbook (<https://modhb.uni-kl.de/>)

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## Course MAT-81-11-K-7

Numerical Methods for PDE I (4V+2U, 9.0 LP)

### Course Type

SWS	Type	Course Form	CP (Effort)	Presence-Time / Self-Study
-	K	Lecture with exercise classes (V/U)	9.0 CP	186 h
4	V	Lecture		56 h
2	U	Exercise class (in small groups)		28 h
(4V+2U)			9.0 CP	84 h
				186 h

### Basedata

SWS	4V+2U
CP, Effort	9.0 CP = 270 h
Position of the semester	1 Sem. in SuSe
Level	[7] Master (Advanced)
Language	[EN] English
Lecturers	Klar, Axel, Prof. Dr. (PROF   DEPT: MAT) (/staff/18/) Pinnau, René, Prof. Dr. (PROF   DEPT: MAT) (/staff/27/) Simeon, Bernd, Prof. Dr. (PROF   DEPT: MAT) (/staff/34/) + further Lecturers of the department Mathematics
Area of study	[MAT-TEMA] Industrial Mathematics
Lifecycle-State	[NORM] Active

### Contents

Continuation of the courses **[MAT-80-11A-K-4]** (</mhb/courses/MAT-80-11A-K-4/>) and **[MAT-80-11B-K-4]** (</mhb/courses/MAT-80-11B-K-4/>). Numerical methods that deal with elliptic and parabolic differential equations will be discussed and analytically analyzed. In particular, the following topics will be covered:

- approximation methods for elliptic problems,
- theory of weak solutions,
- consistency, stability and convergence,

- approximation methods for parabolic problems.

## Literature

- D. Braess: Finite Elemente,
- A. Quarteroni, A. Valli: Numerical Approximation of PDEs,
- C. Grossmann, H.-G. Roos: Numerische Behandlung partieller Differentialgleichungen.

## Materials

Further literature will be announced in the lecture; Exercise material is provided.

## Registration

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

## Requirements for attendance (informal)

### Modules:

- [MAT-10-1-M-2] Fundamentals of Mathematics (M, 28.0 LP) (/mhb/modules/MAT-10-1-M-2/)
- [MAT-80-11A-M-4] Numerics of ODE (M, 4.5 LP) (/mhb/modules/MAT-80-11A-M-4/)
- [MAT-80-11B-M-4] Introduction to PDE (M, 4.5 LP) (/mhb/modules/MAT-80-11B-M-4/)

## Requirements for attendance (formal)

None

## References to Course [MAT-81-11-K-7]

Module	Name	Context
[MAT-81-11-M-7 (/mhb/modules/MAT-81-11-M-7/)]	Numerical Methods for Elliptic and Parabolic PDE	P: 4V+2U, 9.0 Obligatory LP