

## Module Handbook

TUK MODHB Homepage

# Course MAT-81-20-K-7

PDE based Multiscale Problems and Numerical Approaches for their Solution (2V, 4.5 LP)

## Course Type

SWS	Type	Course Form	CP (Effort)	Presence-Time / Self-Study	
2	V	Lecture	4.5 CP	28 h	107 h
(2V)			4.5 CP	28 h	107 h

## Basedata

SWS	2V
CP, Effort	4.5 CP = 135 h
Position of the semester	1 Sem. irreg.
Level	[7] Master (Advanced)
Language	[EN] English
Lecturers	Klar, Axel, Prof. Dr. (PROF   DEPT: MAT) Pinnau, René, Prof. Dr. (PROF   DEPT: MAT) + further Lecturers of the department Mathematics
Area of study	[MAT-TEMA] Industrial Mathematics
Additional informations	<a href="#">Informations about the course</a>
Lifecycle-State	[NORM] Active

## Contents

Introduction to PDE based multiscale problems and to approaches for their treatment. Special attention will be given to the following topics:

- homogenisation of elliptic equations with oscillating coefficients,
- classification of multiscale problems,
- advanced numerical algorithms for PDEs and systems of PDEs with oscillating coefficients (including multiscale finite element method, multiscale finite volume method, heterogeneous multiscale method, subgrid approach),
- numerical approaches for stochastic elliptic PDE.

## Literature

The literature will be announced in the lecture.

## Requirements for attendance (informal)

Knowledge from the module [MAT-81-11-M-7] is useful, but not necessarily required.

### Modules:

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

## Requirements for attendance (formal)

None

## References to Course [MAT-81-20-K-7]

Module	Name	Context	
[MAT-81-20-M-7]	PDE based Multiscale Problems and Numerical Approaches for their Solution	P: Obligatory	2V, 4.5 LP