

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

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Course MAT-81-38-K-7

Uncertainty Quantification (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) (/staff/18/) + further Lecturers of the department Mathematics
Area of study	[MAT-TEMA] Industrial Mathematics
Additional informations	Informations about the course (https://www.mathematik.uni-kl.de/techno/lehre/)
Lifecycle-State	[NORM] Active

Contents

- introduction: prototypical models,
- basic concepts from probability and approximation theory: random vectors, orthogonal polynomials,
- representation of random inputs: independent and correlated random inputs, Karhunen-Loève expansion,
- propagation of random inputs: (Multilevel) Monte-Carlo methods, stochastic Galerkin methods, stochastic collocation.

Literature

- R.C. Smith: Uncertainty Quantification,
- R. Abgrall, S. Mishra: Uncertainty Quantification for Hyperbolic Conservation Laws.

Materials

Further literature will be announced in the lecture.

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-14-11-M-3] Introduction to Numerical Methods (M, 9.0 LP) (/mhb/modules/MAT-14-11-M-3/)
- [MAT-14-14-M-3] Stochastic Methods (M, 9.0 LP) (/mhb/modules/MAT-14-14-M-3/)
- [MAT-80-11B-M-4] Introduction to PDE (M, 4.5 LP) (/mhb/modules/MAT-80-11B-M-4/)

Courses

- [MAT-12-25-K-3] Introduction to Ordinary Differential Equations (2V+1U, 4.5 LP) (/mhb/courses/MAT-12-25-K-3/)

Requirements for attendance (formal)

None

References to Course [MAT-81-38-K-7]

Module	Name	Context
[MAT-81-38-M-7 (/mhb/modules/MAT-81-38-M-7/)]	Uncertainty Quantification	P: Obligatory 2V, 4.5 LP