

## Module Handbook

TUK MODHB Homepage

# Course MAT-00-031-K-1

Higher Mathematics; Differential Equations (for Engineering Students) (2V+1U, 4.0 LP)

## Course Type

SWS	Type	Course Form	CP (Effort)	Presence-Time / Self-Study
-	K	Lecture with exercise classes (V/U)	4.0 CP	78 h
2	V	Lecture		28 h
1	U	Exercise class (in small groups)		14 h
(2V+1U)			4.0 CP	42 h 78 h

## Basedata

SWS	2V+1U
CP, Effort	4.0 CP = 120 h
Position of the semester	1 Sem. in WiSe
Level	[1] Bachelor (General)
Language	[DE] German
Lecturers	The Lecturers of the department Mathematics
Area of study	[MAT-Service] Mathematics for other Departments
Lifecycle-State	[NORM] Active

## Possible Study achievement

- Verification of study performance: **proof of successful participation in the exercise classes (ungraded)**
- Details of the examination (type, duration, criteria) will be announced at the beginning of the course.

## Contents

Basic concepts for the treatment of ordinary and partial differential equations:

A. Ordinary differential equations:

- first-order differential equations: existence and uniqueness, first-order autonomous differential equations, separation approach, variation of constants, explicitly solvable cases, initial value problems;
- linear differential equations: homogeneous linear systems, matrix-exponential function, variation of constants, differential equations of nth order.

B. Partial differential equations:

- classification and well-posedness of 2nd order partial differential equations;
- wave equation, Poisson's equation, Fourier transform;
- solution methods: separation approach, Fourier transformation.

C. Numerical solution of differential equations:

- single step method (implicit/explicit);
- Runge-Kutta method;
- step size control.

## Registration

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

## Requirements for attendance (informal)

Modules:

- [MAT-00-01-M-1] Higher Mathematics I (M, 8.0 LP)
- [MAT-00-02-M-1] Higher Mathematics II (M, 8.0 LP)

## Requirements for attendance (formal)

None

## References to Course [MAT-00-031-K-1]

Module	Name	Context	
[BI-BSCBI-018-M-4]	Höhere Mathematik für Bauingenieure III - Differentialgleichungen	P: Obligatory	2V+1U, 4.0 LP
[MAT-00-03A-M-1]	Higher Mathematics: Vector Analysis and Differential Equations (for Engineering Students)	P: Obligatory	2V+1U, 4.0 LP
[MAT-00-03C-M-1]	Higher Mathematics: Differential Equations and Numerics (for Engineering Students)	P: Obligatory	2V+1U, 4.0 LP