Partial differential equations

Module name	*Partial Differential Equations*
Abbreviation	***M-PDG***
Course	*Partial differential equations*
Person(s) responsible for the module	*Prof. Dr Jürgen Frikel*
Lecturer	*Prof. Dr Jürgen Frikel, Prof. Dr Stefan Körkel*
Recommended prerequisites	*B-AN1,2; Analysis 1,2; B-LA1,2: Linear Algebra 1,2;* *B-GDG: Ordinary Differential Equations;* *B-NM1: Numerical Mathematics 1*
Learning objectives	• *Knowledge of formulations of important problems and questions by means of partial differential equations* • *Ability to classify partial differential equations* • *Knowledge of methods for the analysis and solution of important partial differential equations* • *Ability to discretise partial differential equations and knowledge of simple numerical solution methods*
Content	• *Basic definitions and type classification* • *Overview of important partial differential equations* • *Method of characteristics for solving partial differential equations of 1st order* • *Analysis and solution of classical partial differential equations (e.g. transport equation, wave equation, heat conduction equation, Laplace and Poisson equation)* • *Application of Fourier series for the solution of partial differential equations* • *Solution by means of separation of variables* • *Variation methods* • *Introduction to the numerics of partial differential equations (finite differences, finite elements)*
Literature	• *Arend, W., Urban, K.: Partial Differential Equations, Spektrum, 2010* • *Jeffrey, A.: Applied Partial Differential Equations, An Introduction, Academic Press, 2003* • *Strampp, W.: Selected Chapters of Higher Mathematics Walter Strampp, Vector Analysis, Special Functions, Partial Differential Equations, Springer Vieweg, 2014* • *Tveito, A., Winther, R.: Introduction to partial differential equations, A numerical approach, Springer, 2002*