

Module No.	Title of Module
10-MAT-MPAN2	Advanced Analysis II
Recommended for	3rd semester of Int. Master Program Math. Phys.
Duration	1 Semester
Frequency	Every Winter Semester biannually
Course types	(1) Lecture „ Partial Differential Equations II" (4 SWS) = 60 h in class + 90 h individual studies = 150 h (2) Seminar „ Partial Differential Equations II" (2 SWS) = 30 h in class + 120 h individual studies = 150 h
Workload	10 LP = 300 h
Aims	The Students master the contents of the specialisation area Partial Differential Equations. They are able to represent and explain their knowledge on concepts and terms in oral and written form as well as to apply it on definite problems; to solve typical model problems on their own and to justify their approach.
Contents	Crucial contents belong to one of the 3 specialisation areas of modern theory of non-linear PDE: a) PED and fluid mechanics, or b) Variational calculus, or c) PDE and materials To a) belong e.g.: Systems of equations of Navier-Stokes and Euler, Vlasov-Poisson, Boltzmann equation To b) belong e.g.: Direct and indirect methods, Quasiconvexity. Regulation Theory, Gamma-Convergence To c) belong e.g.: Non-linear Elasticity, Homogenisation, Inverse Problems, Ginzburg-Landau The courses are held in English. Study and examinations are to be completed in English.
Prerequisites	None
Literature	M. Giaquinta, S. Hildebrandt; Calculus of Variations, Springer 2004; A. Majda-A. Bertozzi, Vorticity and Incompressible Flow, CUP 2001; G.W. Milton, The Theory of Composites, CUP 2002, online 2009; L. Saint-Raymond, Hydrodynamic Limits of the Boltzmann Equation, Springer 2009; R. Teman, Navier-Stokes equation, AMS 2000; L. Simon, Geometric Measure Theory, Tsinghua Lectures, Stanford Univ. 2014; M. Struwe, Variational Methods, Springer 1990
Examinations	Oral exam of 25 min Oral lecture (60 min.) + written report (4 weeks).
Requirements	attendance at lecture „Advanced Analysis II “ (4 SWS) participation in seminar „Advanced Analysis II “ (2 SWS)