GEW-MC06 Geophysical Inversion and Data Analysis	Number of credit points (LP): 12
Module type (mandatory or elective module)	Core module
Contents and qualification objectives of the module	**Contents** Fundamentals of discrete (non)linear inversion theory. Problem definition and presentation of different solution concepts, estimation of uncertainties, experiment design, gradient methods, directed and undirected search methods. Implementation of inversion tasks for typical geophysical problems using synthetic and real data sets, causes, quantification and reduction of uncertainties in inversion results. Introduction to data analytics strategies, processing of inversion results using statistical approaches and machine learning algorithms. **Qualification goals** Students - understand the relationship between instrumental recordings of an experiment, a physical model and the model parameters to be derived from it by (non-) linear inversion techniques - understand the non-ambiguity of the inversion problem - describe, analyze, and evaluate uncertainties in results when implementing inversion tasks. - learn techniques for further processing and interpretation of inversion results - deepen their understanding of basic data analytics techniques - acquire the ability to use algorithms and working methods of multivariate statistics and machine learning to understand processes at different length and time scales
Module examination (number, form, scope)	One exam of the following forms: Written exam, 90-120 minutes Term paper, 20-25 pages Oral exam, 30-45 minutes
Self-learning time (in time hours)	240

Events (teaching forms)	Contact time (in semester hours)	Secondary examination (number, form, scope)		Partial module examination accompanying the course (number, form, scope)
		For the completion of the module	For admission to the module examination	
Lecture and exercise (lecture and exercise)	2V+2T	-	-	-
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Frequency	Winter semester and summer Semester (over two semesters, start Winter semester)
Prerequisite for participation in the module	None
Teaching unit(s)	Geosciences