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| <b>Course Name</b>               | Inverse Problems   |
| <b>Contents and Objectives</b>   | <p><u>Content:</u></p> <ul style="list-style-type: none"> <li>• Mathematical characterization of inverse problems and applications</li> <li>• Hadamard's definition of well-posedness and the phenomenon of ill-posedness</li> <li>• Inverse problems as linear operator equations in Hilbert spaces</li> <li>• Singular value decomposition of compact operators and regularization approaches for ill-posed problems</li> <li>• Iterative methods</li> <li>• statistical inverse problems</li> </ul> <p><u>Objectives of the course:</u> Introduction to the mathematics of inverse problems, both from a theoretical perspective (using tools from functional analysis), but also covering numerical algorithms and applications. The students learn how to overcome the ill-posedness of a given problem by using an appropriate regularization method and incorporating given a priori information.</p> |
| <b>Teaching</b>                  | <p>This course consists of lectures and exercise classes.</p> <ul style="list-style-type: none"> <li>• Lecture: Inverse problems (4h/week)</li> <li>• Exercise class: Inverse problems (2h/week)</li> </ul> <p>This class can be taught remotely.</p>  |
| <b>Prerequisites</b>             | Basic notions of Functional Analysis   |
| <b>Verwendbarkeit des Moduls</b> | -  |
| <b>Examination</b>               | Oral exam (30 minutes)   |
| <b>Credits</b>                   | 8 ECTS points  |
| <b>Frequency</b>                 | This course is given at least every second year.   |
| <b>Workload</b>                  | The estimated total working time for this course is 240 hours.   |
| <b>Duration</b>                  | This course is given during one semester.  |