Surfaces and interfaces influence optical, electronic, and mechanical properties of materials. Thus they play an important role in many areas of material science, such as semiconductor technology, the development of new structural materials, or the field of catalysis.

To obtain a fundamental understanding of processes taking place at surfaces and interfaces, investigations on a microscopic level are necessary. It is nowadays possible to study interfaces and surfaces with atomic resolution both experimentally and theoretically.

In this course, we will give an overview of the relevance of surfaces and interfaces in materials science and the experimental and computational techniques to characterise them. We will discuss the relationship between the atomistic description of interfaces and surfaces, and the resulting macroscopic materials properties, especially electronic and mechanical properties.

The lectures will be complemented by exercises as well as hands-on classes on computational techniques. The course is intended for M. Sc. students. Successful completion including an oral exam will correspond to 6 credit points.

Keywords:
- interface/surface crystallography, relaxation/reconstruction
- adsorbates, defects, vacancies, impurities
- experimental methods: diffraction, scanning, microscopy, and spectroscopy
- theoretical methods: empirical concepts, electronic structure, atomistic simulation

Literature:
- A. Gross, Theoretical Surface Science: A Microscopic Perspective
- F. Bechstedt, Principles of Surface Physics
- J.M. Howe, Interfaces in materials

First lecture:
Monday, 2nd of April, at 10ct in NB 6/173

If you have further questions, please get in touch with Rebecca.Janisch@rub.de, Jutta.Rogal@rub.de or Thomas.Hammerschmidt@rub.de.