

Module Number	Module Name	Resp. Lecturer
3.3	Biophysical Methods	Prof. Petra Schwille

**Content and qualification aim:**

The terrific progress in biosciences has been made not least thanks to the steady development of new analytical methods of which by far the most originate in physics or physical chemistry. The compulsory module “Biophysical Methods” presents the most important (bio-)physical methods and techniques and gives topical examples for their applications in an accompanying seminar. A block practical at the end of the semester focuses on modern single-molecule techniques.

**Content of the lecture:** Basics of physical measurements, Methods for the determination of macromolecular structures, Methods for the analysis of molecular dynamics and interactions, Imaging methods in cell biology, Mechanical methods (measurements of force, rheology), Electro-physiological methods, Modern technologies (biochips, single-molecule techniques)

**Type of course:**

The module „Biophysical Methods“ is offered as a 2-hour lecture and a 2-hour literature seminar weekly. The literature seminar aims the deepening of the knowledge acquired during the lecture. The literature seminar serves to provide topical examples of how the techniques dealt with in the lecture are applied to biological questions in order to emphasise the relevance of the methods. The practical is intended to give an insight into the concrete working steps of selected techniques.

**Requirements for study:**

Successful participation in the course “Principles of Biophysics” or in a comparable introductory course on the fundamentals of biophysics.

**Practical use of the module:**

Method-based lecture on biophysics intended to give a comprehensive overview of the most common techniques and their physical fundamentals. Of use for all biological and biotechnological courses of study, especially as a theoretical foundation to laboratory practicals focusing the technology (microscopy, spectroscopy).

**Requirements for the award of credits:**

The credit-points can be awarded, if the module examination is successfully passed. The module examination consists in:

- an oral admission colloquy for the determination of the student’s theoretical understanding of the subject,
- an oral presentation (30 +15 minutes)
- and a lab record/protocol.

**Credits**

**and grades:** For the module 5 credit-points can be acquired. The module grade is composed of the grades of the examinations:

- 2/3: oral admission colloquy (1/3) and oral presentation (2/3)
- 1/3: lab record/protocol

**Frequency of the course:** The module is offered every academic year in winter semester (in the third semester of the Master programme).

**Workload:** The workload is 150 working hours (attendance at the lecture and literature seminar, preparation, learning for the course, presentation, preparation of the protocol).

**Duration of the module:** Courses last one semester

**Literature:**

- T. Furukawa, "Biological Imaging and Sensing"
- J. Pawley, "Handbook of Confocal Microscopy"
- E. de Hoffmann, V. Stroobant, "Mass Spectrometry"
- T. Basche, W.E. Moerner M. Orrit, "Single Molecule Optical Detection, Imaging, and Spectroscopy"
- P. Nelson, "Biological Physics"
- R. Cotterill, "Biophysics"
- R. Glaser, "The Physical Basis of Biochemistry"
- C.R.Cantor, P.R. Schimmel, "Biophysical Chemistry"