Module	***Biophysics: Fundamentals***
Code	71654
Instruction language	English
ECTS credits	6
Credit hours	6
Duration	1 semester
Cycle	Each winter semester
Coordinator	Prof. Jens Michaelis
Lecturer	Prof. Christof Gebhardt, Prof. Jens Michaelis, Prof. Kay Gottschalk
Allocation to study programmes	Physics M.Sc., elective module, 1st or 2nd semester Wirtschaftsphysik M.Sc., elective module, 1st – 3rd Semester
Formal prerequisites	None
Recommended prerequisites	Molecular Physics, Condensed Matter Physics
Learning objectives	Students who successfully passed this module • understand the basic concepts, ideas and methods of Biophysics • are able to describe biophysical phenomena with simple physical models
Syllabus	• Time and length scales in Biophysics • Brownian motion and diffusion, chemotaxis of bacteria • Physics at low Reynold's numbers • Structure and mechanics of cellular biomolecules, methods of structure determination • Polymer models for the description of biomolecules • Protein folding • Force spectroscopy • Fluorescence spectroscopy and microscopy • Electrostatics in Biophysics • Neurobiology
Literature	• Phillips, Kondev, Theriot: Physical Biology of the Cell, Garland Science • Howard: Mechanics of Motor Proteins and the Cytoskeleton, Sinauer • Berg: Random Walks in Biology, Princeton University Press • Lakowicz: Principles of Fluorescence Spectroscopy, Springer • Alberts: Molecular Biology of the Cell, Garland Science
Teaching and learning methods	*For students, who have already passed the Bachelor module "Soft Matter Physics and Biophysics":* • Fundamental Methods of Biophysics (Lecture, 2 hours per week) with exercises (1 hour per week), 2nd Semester half • Biophysics Lab I (2 hours per week) *For students, who did not pass the Bachelor module "Soft Matter Physics and Biophysics":*

	• Fundamental Methods of Biophysics for Physicists (lecture, 2 hours per week), 1st semester half • Fundamental Methods of Biophysics (lecture, 2 hours per week) with exercises (1 hour per week),), 2nd Semester half
Workload	*For students, who have already passed the Bachelor module "Soft Matter Physics and Biophysics":* 30 hours lecture (attendance time) 15 hours exercises (attendance time) 30 hours lab 105 hours self-study and exam preparation Total: 180 hours *For students, who did not pass the Bachelor module "Soft Matter Physics and Biophysics":* 60 hours lecture (attendance time) 15 hours exercises (attendance time) 105 hours self-study and exam preparation Total: 180 hours
Assessment	Written or oral examination. A prerequisite for the participation in the examination is an ungraded course achievement. Form and scope of the examination and of the course achievement are determined and notified by the lecturer at the beginning of the course.
Examination	12083 Biophysics: Fundamentals (precourse) 11951 Biophysics: Fundamentals
Grading procedure	The module grade is the examination grade.
Basis for	Modules *Biophysics: Gene Expression, Biophysics: Molecular Motors* or *Biophysics: Cellular Biophysics*