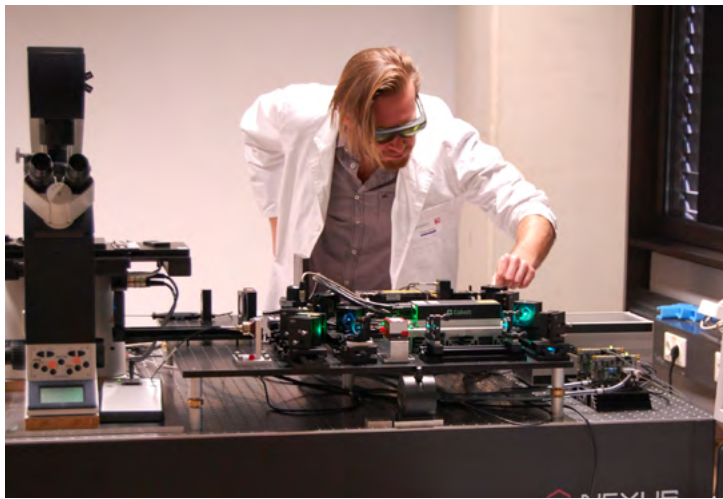


Elite Certificate

Biological Physics

*Certificate programme in the framework of
the Elite Network of Bavaria.*





Enjoy learning and working in a stimulating and open environment. We offer a diverse array of courses, ranging from lectures and lab courses to research projects abroad.

Interdisciplinary science at its best.

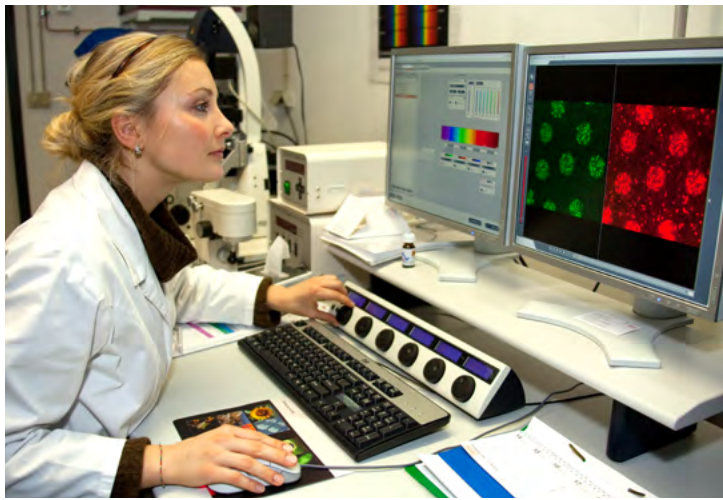
Are you interested in top-level research and training in a field of science that is relevant to both technology and society? Are you interested in topical problems at the interface of biology and physics? If so, the Elite Programme Biological Physics is the right choice for you: Earn an official certificate within the framework of the Elite Network of Bavaria in parallel to your regular MSc programme in Molecular Biology/Biochemistry or Physics. Take part in a fully integrated international, interdisciplinary, and research-oriented programme with a unique study format. A special mentoring concept and courses tailored to fit your specific expertise provide an exciting opportunity to shape your profile in a growing and interdisciplinary field of research.



Interdisciplinary education at the forefront of research is our mission. The Elite Programme provides the chance to study topical problems at the interface of biology and physics in distinct courses in small groups.

A unique programme for exceptional students.

The Elite Programme Biological Physics provides the unique chance to supplement the MSc programmes in Biology/Biochemistry or Physics with cutting-edge interdisciplinary expertise. It is designed to bring together students from the various disciplines, to foster their collaboration, and to allow for deep insights into current topics at the forefront of research. The Elite Programme is geared to those students who have what it takes to study additional subjects parallel to their regular MSc courses. At the same time, the workload is carefully tailored and sufficiently spread out over time so as not to overburden you. It is meant to guide your scientific education from the MSc level to the early phase of a doctoral project. To complement your scientific education, the Elite Programme also includes a number of essential soft-skill seminars, e.g. public speaking and scientific writing, that will support shaping your profile.



After special introductory modules to catch up on the basics of the complementary discipline, students from biology and physics learn and work together. Individual courses can be chosen to match your personal interests.

Attractive career perspectives.

The demand for interdisciplinary solutions to our societies' challenges is ever increasing. Our constant quest for clean energy resources or novel health care strategies are just two prominent examples. Addressing problems of such complexity often requires skills from several scientific disciplines. The Elite Programme Biological Physics aims to respond to this challenge by providing optimal training for an ever changing job market.

Our official programme certificate supplements your regular MSc degree and reflects your broad scientific expertise and skills. Whether you are applying for jobs in technical industries, life-science companies, IT enterprises, consulting companies, research centres, universities, or sustainability departments – with the Elite Programme's certificate your application will stand out from the crowd.

Module overview

Concepts of Physics or Concepts of Biology

Advanced concepts and current topics in Biological Physics

Choose 5 lectures, at least two from each area.

Area A

- Biofluid simulations
- Quantifying the mechanics of living cells on several length scales
- Prokaryotic organelle biogenesis and magneto-chemotactic mobility
- Quantifying transport and binding events in living organisms
- Principles of transport and self-organization in living systems
- Prokaryotic organelle biogenesis and magneto-chemotactic mobility

Area B

- Energy transport in biological and synthetic light-harvesting systems
- Single-molecule techniques
- Excitations in light-harvesting systems
- Molecular biology techniques: from basic science to applied genetics
- Computer modeling of biomolecular processes
- Visualization of cell organelles: dynamics and ultrastructure

Interdisciplinary Practical Course

Choose 6 experiments, at least one from each area.

Area A

- Cellular force measurements with magnetic and optical tweezers
- Quantifying the binding kinetics of peripheral membrane proteins
- Phase separation on biomimetic membranes

Area B

- Quantifying molecular distances and dynamic interactions
- Measuring diffusive transport of macromolecules in biomimetic fluids
- Fluorescence lifetime and annihilation processes in pigment-protein complexes

Area C

- Fluorescence staining of cellular structures using genetic engineering
- Imaging mitotic spindle assembly in vitro
- High-resolution imaging of cellular structures via electron microscopy

Area D

- Modeling dynamic systems with Master equations and kinetic Monte Carlo simulations
- Computer simulations of cell mechanics
- Simulation and analysis of prototypical self-organization processes
- Energy transfer in light-harvesting systems

Biological Physics Retreat

Scientific Communication - your choice of seminars, e.g. on public speaking

Research project with external project - a stay abroad is encouraged and supported

Total

50 ECTS



An individualized programme, short communication ways, and excellent relationships between supervisors and students create an atmosphere where studying is both an intellectual challenge and a personal joy.



At the University of Bayreuth, you will find a range of opportunities for international exchange and focused research.

Interested? Here we go!

Admission to the Elite Programme Biological Physics is a two-step process: First, submission of application documents and possibly second, an interview with the selection committee. Applicants with a final grade of 1.9 or better for their BSc or who can demonstrate they are in the top 20% of their class are invited for a personal interview with three professors of the Elite Study Programme.

New students enter the programme in the winter semester.

There are two application rounds each year: one in June and one in August.

For further details, please visit our website:

www.biophys.enb.uni-bayreuth.de

The University of Bayreuth.

The University of Bayreuth is currently rated among the top young universities according to the Times Higher Education global ranking "150 under 50". This ranking focuses on the top 150 universities worldwide which were founded less than 50 years ago. As a medium-sized campus university, we place less emphasis on growth and more on ensuring the highest quality of our infrastructure. In so doing, the University of Bayreuth focuses on specific areas of emphasis in the various disciplines and on developing a range of interdisciplinary links that ensure it a place among the best universities internationally. Physics and Molecular Biology have a long-standing tradition in Bayreuth.



UNIVERSITÄT
BAYREUTH

ENB Program Biological Physics
University of Bayreuth
c/o Theoretische Physik IV
Universitätsstr. 30
95447 Bayreuth

Programme Coordinators

Prof. Dr. Stephan Kümmel (Chairman)
Phone: +49 (0) 921 / 55-3220

Prof. Dr. Matthias Weiss
Phone: +49 (0) 921 / 55-2500

Prof. Dr. Benedikt Westermann
Phone: +49 (0) 921 / 55-4300

E-mail: enb.biophys@uni-bayreuth.de
www: biophys.enb.uni-bayreuth.de