

# Biophysical Chemistry

Master Chemie, Master Life Science, Master Nanoscience  
Winter Semester 2018/2019

## Instructors:

Dr. Guinevere Mathies      Office: Z 736    Phone: 2013    [guinevere.mathies@uni-konstanz.de](mailto:guinevere.mathies@uni-konstanz.de)

Prof. Dr. Karin Hauser      Office: L 1001    Phone: 5356    [karin.hauser@uni-konstanz.de](mailto:karin.hauser@uni-konstanz.de)

## Teaching Assistants:

Christian Scheibe      Office: L 1101    Phone: 3002    [christian.scheibe@uni-konstanz.de](mailto:christian.scheibe@uni-konstanz.de)

Ho-Wah Siu      Office: L 1123    Phone: 5174    [ho-wah.siu@uni-konstanz.de](mailto:ho-wah.siu@uni-konstanz.de)

## Course info in ILIAS

Information about the course, including course materials, problem sets, and announcements can be found in ILIAS.

## Course overview

The course will focus on the application of concepts and techniques from Physical Chemistry to practical problems in Life Science. The first part of the course will cover spectroscopic techniques that can provide information on structure and dynamics of biological systems. The second part of the course will focus on thermodynamic concepts and kinetics to describe biological macromolecules. Applications in current research fields will be presented.

## Assignments

Problem sets are released one week before each tutorial session. Solutions will be discussed in these tutorial sessions. Make sure to have your own set of solutions prepared beforehand! During the course, the students will be asked to read a number of recent research papers, which will also be discussed in the tutorial sessions.

## Final grade

The final grade for the course will be based on a 30-min oral exam.

## Study Material

The biophysical part of the course is largely covered in the text book "Molecules of Life" by Kuriyan, Konforti, and Wemmer. Miscellaneous study material will be posted in ILIAS.

## Credits

The credit for the course is 6 ECTS. The course can be extended with an additional 6 ECTS by doing a research internship (4-5 weeks full-time) in one of the biophysical chemistry groups: Drescher, Hauser, Kovermann, Mathies, Peter, Zumbusch.

## Course Schedule – Winter Semester 2018-2019

### Part 1: Guinevere Mathies / Christian Scheibe

	Topic	Date, Time	Room
Lecture 1	Practicalities, Intro Structural Biology, Fourier Transformations, Spin	Wed. Oct. 24, 10:00-11:30	Z1003
Tutorial 1		Mon. Oct. 29, 13:30-15:00	L829
Lecture 2	Magnetic Resonance, Solution NMR,	Wed. Oct. 31, 10:00-11:30	Z1003
Tutorial 2		Mon. Nov. 5, 13:30-15:00	L829
Lecture 3	Magic-angle spinning NMR, X-ray Diffraction	Wed. Nov. 7, 10:00-11:30	Z1003
Tutorial 3		Mon. Nov. 12, 13:30-15:00	L829
Lecture 4	X-ray Diffraction, Eigenvalues and Eigenvectors	Wed. Nov. 14, 10:00-11:30	Z1003
Tutorial 4		Mon. Nov. 19, 13:30-15:00	L829
Lecture 5	Cryo-electron Microscopy, Interaction of (Bio)Molecules and Light, Absorption, Fluorescence, and Phosphorescence	Wed. Nov. 21, 10:00-11:30	Z1003
Tutorial 5		Mon. Nov. 26, 13:30-15:00	L829
Lecture 6	Fluorescence Microscopy, Diffusion and Transport	Wed. Nov. 28, 10:00-11:30	Z1003
Tutorial 6		Mon. Dec. 3 13:30-15:00	L829
Lecture 7	Fluorescence Correlation Spectroscopy, Super-resolution Techniques	Wed. Dec. 5, 10:00-11:30	Z1003
Tutorial 7		Mon. Dec. 10, 13:30-15:00	L829

### Part 2: Karin Hauser / Ho-Wah Siu

Lecture 8	Molecular Interactions	Wed. Dec. 12, 10:00-11:30	Z1003
Tutorial 8		Mon. Dec. 17, 13:30-15:00	L829
Lecture 9	Energy and Entropy	Wed. Dec. 19, 10:00-11:30	Z1003
Tutorial 9		Mon. Jan. 7, 13:30-15:00	L829
Lecture 10	Bioenergetics and Driving Forces	Wed. Jan. 9, 10:00-11:30	Z1003
Tutorial 10		Mon. Jan. 14, 13:30-15:00	L829
Lecture 11	Membrane Transport	Wed. Jan. 16, 10:00-11:30	Z1003
Tutorial 11		Mon. Jan. 21, 13:30-15:00	L829
Lecture 12	Molecular Recognition	Wed. Jan. 23, 10:00-11:30	Z1003
Tutorial 12		Mon. Jan. 28, 13:30-15:00	L829
Lecture 13	Concepts of Statistical Thermodynamics	Wed. Jan. 30, 10:00-11:30	Z1003
Tutorial 13		Mon. Feb. 4 13:30-15:00	L829
Lecture 14	Kinetics and Rates of Molecular Processes	Wed. Feb. 6, 10:00-11:30	Z1003
Tutorial 14		Mon. Feb. 11, 13:30-15:00	L829