

# QBio102: Biomolecules

**Module Responsible:**

Dr. Sabine Metzger

**Version:**

02/01/2021

**Module Organizer:**

Dr. Sabine Metzger

**Type:**

Compulsory

**Lecturer:**

Dr. Sabine Metzger, Jun.-Prof. Dr. Ingrid Span

**Total Working Time**

270 h

**Credit Points**

9 CP

**Contact Time**

105 h

**Self Study**

165 h

**Duration**

1 Semester

**Course Components**

Lecture: 3 SWS

Exercise: 2 SWS

Lab Rotation: 2 SWS

**Group Size**

P: 40

P: 20

P: 20

**Frequency**

Every Winter Semester

**Learning Competencies:**

The students can explain the basic principles of inorganic and organic chemistry and the fundamental properties of biomolecules. They also will be able to understand the nature of elements, atoms, and compounds. They will be able to explain the different chemical reactions, the structure and function of the building blocks of life.

The acquired skills in chemical and biochemical theories will enable the students to apply these methods to the experiments in the practical part. The students can perform basic procedures in the lab and operate scientific instruments. They will be able to produce solutions and samples of adequate quality for different experimental methods and to acquire experimental data of sufficient quality and quantity. In addition, they can properly plot, analyse, and interpret the experimental results. The students will also possess the ability to assess the significance, precision, and accuracy of the results.

**Content:**

- Important Biological Elements
- Atom
  - Electron, Proton, Neutron
  - Orbitals
- Chemical Bonds
- Chemical Reactions
- Chemical Equilibrium
- Acid Base Reactions
- Redox Reactions
  - Oxidation Number
  - Redox Systems
  - Redox Pairs
  - Nernst Equation
- Carbon Based Life and Molecules

- Alkanes
- Alcohols
- Amines
- Radikale Substitution
- Nucleophile Substitution
- Eliminierungsreaktionen
- Aldehyde and Ketones
- Biomolecules
  - Sugars
  - Nucleic Acids
    - DNA
    - RNA
  - Peptides
    - Proteins
  - Fatty Acids
- Structures of Macromolecules
  - DNA Double Helix
  - RNA Structures
  - Proteins
    - Primary
    - Secondary
    - Tertiary

**Conditions of Participation:**

Enrolled in Quantitative Biology

**Examination:**

Learning portfolio consisting of

- Written exams based on the content of the lectures (60% of the final grade)
- Exercises (20% of the final grade)
- Protocol (20% of the final grade)

**Prerequisites for Awarding Credits for this Module:**

- Passing Exercises (50% of Exercise Sheets)
- Passing Written Exam
- Successful Participation in the Lab Course

**Factor for the Overall Grade:**

The grade is weighted according to the credit points (CP) in the overall grade.

**Language:**

English

**Literature:**

An Introduction to Chemistry for Biology Students (George Sackheim)

Molecular Biology of the Cell (Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter)

**Further Information:**