



# Computational Biology

**Module title:**

Computational Biology

**Credits:**

6

**Responsible person:**

Brock, Oliver

**Office:**

MAR 5-1

**Contact person:**

Mabrouk, Mahmoud

**Website:**<http://www.robotics.tu-berlin.de/menue/teaching/>**Display language:**

Englisch

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## Learning Outcomes

The module conveys the necessary background knowledge in molecular and cell biology for students to conduct research in the area of computational structural biology. Special emphasis is given to topics in the intersection of computer science and molecular biology. The course introduces relevant algorithms and concepts from computational biology, computer science, robotics, optimization, etc.

## Content

Search and optimization, molecular biology, DNA, RNA, protein structure prediction, dynamic programming, cellular biology, statistics, probabilistic models, bioinformatics, genomics, proteomics, protein folding, protein motion, protein docking, protein design, robotics motion planning.

## Module Components

Course Name	Type	Number	Cycle	SWS
Computational Biology	VL	0433 L 410	WS	2
Computational Biology	UE	0433 L 411	WS	2

## Workload and Credit Points

Computational Biology (Vorlesung)	Multiplier	Hours	Total
Preparation and review	15.0	2.0h	30.0h
Presence in lectures	15.0	2.0h	30.0h
			60.0h
Computational Biology (Übung)	Multiplier	Hours	Total
Assignments	15.0	4.0h	60.0h
Presence in exercises	15.0	2.0h	30.0h
			90.0h
Course-independent workload	Multiplier	Hours	Total
Exam preparation	1.0	30.0h	30.0h
			30.0h

The Workload of the module sums up to 180.0 Hours. Therefore the module contains 6 Credits.

## Description of Teaching and Learning Methods

The course consists of lectures and applied programming exercises.

## Requirements for participation and examination

### Desirable prerequisites for participation in the courses:

No prior knowledge of biology is needed.  
Python or C++ knowledge is required!

Bachelor degree in relevant field of study; Bachelor students in 7th semester of "Technische Informatik" can register after consultation with the professor.

### Mandatory requirements for the module test application:

*No information*

## Module completion

**Grading:**

graded

**Type of exam:**

100 points in total

**Language:**

English

**Grading scale:**

Note:	1.0	1.3	1.7	2.0	2.3	2.7	3.0	3.3	3.7	4.0
Punkte:	95.0	90.0	85.0	80.0	75.0	70.0	65.0	60.0	55.0	50.0

Test elements	Categorie	Points	Duration/Extent
(Deliverable assessment) 5 Assignments	practical	50	1-5 pages of text and code per assignment
(Examination) Written Exam	written	50	75

**Duration of the Module**

This module can be completed in 1 semesters.

**Maximum Number of Participants**

This module is limited to maximum capacity of 40

**Registration Procedures**

See <http://www.robotics.tu-berlin.de/menue/teaching/>

Registration for the exam in compliance with the regulations; further information is provided in the lecture.

**Recommended reading, Lecture notes****Lecture notes:**

*unavailable*

**Electronical lecture notes :**

*unavailable*

**Recommended literature:**

Amit Kessel, Nir Ben-Tal. Introduction to Proteins: Structure, Function, and Motion, 2011.  
 Market Zvelebil, Jeremy O. Baum. Understanding Bioinformatics. Taylor & Francis Ltd., 2008.  
 Tamar Schlick. Molecular Modeling and Simulation: An Interdisciplinary Guide Springer, 2010.

**Assigned Degree Programs**

This module is used in the following module lists:

**Computer Engineering (Master of Science)**

StuPO 2015

Modullisten der Semester: WS 2017/18

**Computer Science (Informatik) (Master of Science)**

StuPO 2015

Modullisten der Semester: WS 2017/18

**Elektrotechnik (Master of Science)**

StuPO 2015

Modullisten der Semester: WS 2017/18

**Informatik (Master of Science)**

MSc Informatik PO 2013

Modullisten der Semester: WS 2017/18

**Technische Informatik (Master of Science)**

StuPO 2013

Modullisten der Semester: WS 2017/18

**Wirtschaftsinformatik / Information Systems Management (Master of Science)**

StuPO 2013

Modullisten der Semester: WS 2017/18

**Wirtschaftsingenieurwesen (Master of Science)**

StuPO 2015

Modullisten der Semester: WS 2017/18

Master students in Computer Science StO/PO 2010/ Focus Intelligent Systems  
 Master students in Computer Science StO/PO 2016 / Focus Cognitive Systems  
 Master students in Computer Engineering / Focus Information Systems  
 Master students in Computer Engineering StO/PO 2014:  
 Focus Cognitive Systems and Robotics, Computer Science  
 Focus Information Systems, Computer Science

**Miscellaneous**

*No information*