Computational Biology

Module title: Computational Biology
Credits: 6
Responsible person: Brock, Oliver
Office: MAR 5-1
Contact person: Mabrouk, Mahmoud
Display language: Englisch
E-mail address: lehre@robotics.tu-berlin.de

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

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Type</th>
<th>Number</th>
<th>Cycle</th>
<th>SWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computational Biology</td>
<td>VL</td>
<td>0433 L 410</td>
<td>WS</td>
<td>2</td>
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<td>Computational Biology</td>
<td>UE</td>
<td>0433 L 411</td>
<td>WS</td>
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Workload and Credit Points

<table>
<thead>
<tr>
<th>Computational Biology (Vorlesung)</th>
<th>Multiplier</th>
<th>Hours</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation and review</td>
<td>15.0</td>
<td>2.0h</td>
<td>30.0h</td>
</tr>
<tr>
<td>Presence in lectures</td>
<td>15.0</td>
<td>2.0h</td>
<td>30.0h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>60.0h</td>
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<table>
<thead>
<tr>
<th>Computational Biology (Übung)</th>
<th>Multiplier</th>
<th>Hours</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Assignments</td>
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<td>60.0h</td>
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<tr>
<td>Presence in exercises</td>
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<td>30.0h</td>
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<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>Course-independent workload</th>
<th>Multiplier</th>
<th>Hours</th>
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<td>Exam preparation</td>
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<td>30.0h</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>30.0h</td>
</tr>
</tbody>
</table>

The Workload of the module sums up to 180.0 Hours. Therefor 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: Portfolio examination
100 points in total
Language: English
Duration of the Module
This module can be completed in one semester.

Maximum Number of Participants
The maximum capacity of students is 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

<table>
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<tr>
<th>Recommended literature:</th>
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Assigned Degree Programs
This module is used in the following modulelists:

Computer Engineering (Master of Science)
StuPO 2015
Modulisten der Semester: WS 2017/18 SS 2018 WS 2018/19

Computer Science (Informatik) (Master of Science)
StuPO 2015
Modulisten der Semester: WS 2017/18 SS 2018 WS 2018/19

Elektrotechnik (Master of Science)
StuPO 2015
Modulisten der Semester: WS 2017/18 SS 2018 WS 2018/19

Informatik (Master of Science)
MSc Informatik PO 2013
Modulisten der Semester: WS 2017/18 SS 2018 WS 2018/19

Technische Informatik (Master of Science)
StuPO 2013
Modulisten der Semester: WS 2017/18 SS 2018 WS 2018/19

Wirtschaftsinformatik / Information Systems Management (Master of Science)
StuPO 2013
Modulisten der Semester: WS 2017/18 SS 2018 WS 2018/19

Wirtschaftsingenieurwesen (Master of Science)
StuPO 2015
Modulisten der Semester: WS 2017/18 SS 2018 WS 2018/19

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