Protein Prediction I for Computer Scientists

Introduction to lecture and exercise
May 4th, Summer Term 2017
Burkhard Rost & Lothar Richter
Lecture and exercise

- [link](https://www.rostlab.org/teaching/ss17/pp1cs)
- Announcements, slides and videos
- **Lecture** Tuesdays (10:00-11:30 am) and Thursdays (10:00 – 11:30 am)
- Room MW 1801 (Mechanical Engineering)
- **Exercise** Thursdays 12:30 – 14.00 pm
  
  Room Hörsaal 3 (MI 00.06.011, Lecture hall 3) and MW2250 on Tuesday 13-15

- **Register** for the lecture and exam in TUM online
Exercise

- Exercise wiki
  
  https://i12r-studfilesrv.informatik.tu-muenchen.de/sose17/pp4cs1/index.php/Main_Page
# Exercise – Topics and Schedule

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<thead>
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<th>Slot</th>
<th>Thursday</th>
<th>Tuesday</th>
<th>Topic</th>
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<tr>
<td>1</td>
<td>May 4(^{th})</td>
<td>May 9(^{th})</td>
<td>Structure of the Exercise / Biological Background</td>
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<td>2</td>
<td>May 11(^{th})</td>
<td>May 18(^{th})</td>
<td>Biological background</td>
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<td>3</td>
<td>May 18(^{th})</td>
<td>May 23(^{rd})</td>
<td>Protein structures</td>
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<td>4</td>
<td>Jun 1(^{st})</td>
<td>Jun 6(^{th})</td>
<td>Resources for Biological Information / Formats</td>
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<td>5</td>
<td>Jun 8(^{th})</td>
<td>Jun 13(^{th})</td>
<td>Alignments</td>
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<td>Jun 22(^{nd})</td>
<td>Jun 27(^{th})</td>
<td>Machine Learning incl. Tricks / Secondary Structure Prediction</td>
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<td>7</td>
<td>Jun 29(^{th})</td>
<td>Jul 4(^{th})</td>
<td>Homology Modeling / Prediction of Other Protein Features</td>
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<td>Jul 6(^{th})</td>
<td>Jul 12(^{th})</td>
<td>Wrap Up – Questions</td>
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<td><strong>WED</strong></td>
<td><strong>Jul 12(^{th})</strong></td>
<td><strong>EXAM</strong></td>
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Exercise - organization

- Not mandatory, **not graded**. *However, the exercise will help to follow the lecture and to do well in the exam!*

- Before each exercise session, **prepare** the announced topics and exercises (see schedule)

- Ask questions, discuss topic during exercise session

- *You can only ask questions during the exercise or lecture time!*

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Exercise

- **Keywords:** Terms that you need to understand to follow the lecture

- **Sources:** Suggested literature (textbooks, web pages, articles)

- **Exercise:** Questions and Hands-on tasks
Aspects of Biology I

- Units and Dimensions:
  - Molecular mass
  - Amount of substance
  - Spatial dimensions: Atomic bonds, molecule diameter, cell sizes, specimens

- Morphology – Cellular Structure:
  - prokaryotic vs eukaryotic cell
  - cell compartments and their functions
Aspects of Biology II

- (Bio-)Macromolecule classes, building blocks and physiological function
  - Carbohydrates (sugars)
  - Lipids
  - Nucleic acids
  - Proteins
Aspects of Biology III

- Genetics:
  - Dogma of Molecular Biology
  - Replication, Transcription, Translation
  - Definition(s) of a gene
  - Gene structure
  - Genetic Code
  - Inheritance and Mutations
  - Gene regulation
Aspects of Biology IV

- Metabolism / Physiology
  - Anabolism/Katabolism
  - Balance vs equilibrium
  - Steady state
  - House keeping
  - Constitutive vs facultative
  - Enzymes, Co-Factors and prosthetic group
  - Catalysis
Aspects of Biology V

- Proteins
  - Functions
  - Building blocks and synthesis steps
  - Structure levels (primary, secondary, tertiary, quarternary)
  - Important protein classes
  - Experimental methods
  - Digital information resources
Exercise – example keywords

Biological background

- Archaea, bacteria, prokaryotes, eukaryotes, virus
- Prokaryotic, eukaryotic cell
- DNA, genes, RNA, genetic code
- Proteins
- Protein sequence
- Proteome, genome