Course program and reading list
Semester 1 Year 2021

School: Efi Arazi School of Computer Science M.Sc.

Algorithms in Computational Biology

Lecturer:
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Teaching Assistant:
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Course No.: 3571  Course Type: Elective  Weekly Hours: 3  Credit: 3

Course Requirements:
Final Exam

Group Code: 211357101

Language: English

Prerequisites
**Course Description**

**Sequence alignment:**
- Dynamic programming algorithms for global and local pairwise sequence alignment
- Heuristics for saving time and space implemented in the BLAST algorithm
- Scoring functions for alignment

**Probabilistic models:**
- Markov models and hidden Markov models (HMMs)
- Inference algorithms in HMMs – forward / backward / Viterbi
- The Baum Welch algorithm for learning parameters of the HMM
- The Expectation-Maximization (EM) algorithm

**Phylogenetic Inference:**
- Maximum Parsimony
- Probabilistic substitution models
- Distance-based phylogenetic reconstruction

**Course Goals**
The course introduces classical problems and algorithms in computational biology. It connects concepts in theoretical computer science with practical problems in biological research.

**Grading**
• 40% homework assignments (5 assignments total)
• 60% final exam

Learning Outcomes
• Dynamic programming algorithms for sequence alignment
• Hidden Markov Models (HMMs)
• Algorithms for phylogenetic inference

Lecturer Office Hours
Thursday, 17:00 (or by e-mail appointment) via Zoom

Reading List
   http://books.google.co.il/books/about/Biological_sequence_analysis.html?id=R5P2GIvJvigC&redir_esc=y

   http://www.sinauer.com/infering-phylogenies.html