Modulbezeichnung:	**Algorithmische Bioinformatik (ALGBIOINF)** (Algorithmic Bioinformatics)	**5 ECTS**
Modulverantwortliche/r:	David B. Blumenthal	
Lehrende:	und Mitarbeiter/innen, David B. Blumenthal	

Startsemester: WS 2021/2022	Dauer: 1 Semester	Turnus: jährlich (WS)
Präsenzzeit: 60 Std.	Eigenstudium: 90 Std.	Sprache: Englisch

Lehrveranstaltungen:

Algorithmic Bioinformatics (WS 2021/2022, Vorlesung mit Übung, 4 SWS, David B. Blumenthal et al.)

Empfohlene Voraussetzungen:

Since the lecture will be accompanied by programming exercises in Python, prior knowledge of this programming language is recommended. For students without prior experience, a very brief introduction to Python will be provided in the first two exercise sessions.

Inhalt:

With the growing amount of readily available molecular profiling data, algorithms for analyzing these data are getting more and more important. This lecture provides a close-up view on a selection of these algorithms and introduces the biomedical problems which are addressed by them. In particular, the lecture will cover the following topics:

- A very brief introduction to molecular biology.
- Algorithms for global and local sequence alignment.
- Algorithms for de novo sequence assembly.
- Algorithms for secondary RNA structure prediction.
- Algorithms for exploratory omics data analysis.
- Algorithms for network alignment.
- Algorithms for disease mechanism mining in biological networks.

Lernziele und Kompetenzen:

Students will

- get familiar with the basics of molecular biology,
- acquire a thorough understanding of fundamental algorithms used in the field,
- learn how to use paradigms of algorithm design such as dynamic programming, local search, and ant colony optimization in concrete application scenarios,
- be able to reimplement the covered algorithms,
- be able to provide detailed, technical explanations of the covered algorithms.

Literatur:

Pointers to relevant papers will be provided throughout the lecture and be made available on StudOn (https://www.studon.fau.de/crs3922912.html). As optional accompanying literature, the following textbooks are recommended:

- Phillip Compeau & Pavel Pevzner: Bioinformatics Algorithms: An Active Learning Approach, Active Learning Publishers, 2018.
- Patrick Siarry (Ed.): Metaheuristics, Springer International Publishing, 2016.

Verwendbarkeit des Moduls / Einpassung in den Musterstudienplan:

Das Modul ist im Kontext der folgenden Studienfächer/Vertiefungsrichtungen verwendbar:

[1] **Artificial Intelligence (Master of Science)**
(Po-Vers. 2021s | TechFak | Artificial Intelligence (Master of Science) | Gesamtkonto | Nebenfach | Nebenfach Artificial Intelligence in Biomedical Engineering | Algorithmische Bioinformatik)

Dieses Modul ist daneben auch in den Studienfächern "Informatik (Master of Science)", "Medizintechnik (Master of Science)" verwendbar.

Studien-/Prüfungsleistungen:

Algorithmische Bioinformatik (Prüfungsnummer: 76781)
(englische Bezeichnung: Algorithmic Bioinformatics)

Prüfungsleistung, mündliche Prüfung, Dauer (in Minuten): 30
Anteil an der Berechnung der Modulnote: 100% Prüfungssprache: Deutsch oder Englisch

Erstablegung: WS 2021/2022, 1. Wdh.: SS 2022
1. Prüfer: David B. Blumenthal (100970)
