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**Modulbezeichnung: Molecular Biology (MolBio)** **20 ECTS**  
 (Molecular Biology)

Modulverantwortliche/r: Christian Koch

Lehrende: Christian Koch, Benedikt Schmid, Yves Muller, Andreas Burkovski, Ruth Stadler, Lars Nitschke

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Startsemester: WS 2021/2022

Dauer: 2 semester

Turnus: jährlich (WS)

Präsenzzeit: 330 Std.

Eigenstudium: 270 Std.

Sprache: Englisch

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### Lehrveranstaltungen:

Please note: all parts of the compulsory elective module **Molecular Biology** have to be attended (attendance in lab courses is compulsory)!

#### **Integrated course, combining lectures seminar and experimental work (in total: 20 SWS):**

Integrated course, combining lectures seminar and experimental work (in total: 20 SWS!). Topics include:

A1: Recombinant proteins

A2: Techniques in molecular genetics

A3: Plant molecular biology

A4: Structural biology

Wahlpflichtmodul Molekularbiologie Molbiol (WS 2021/2022, Vorlesung mit Übung, Benedikt Schmid et al.)

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### Inhalt:

- A1: Recombinant DNA Polymerases are overproduced, purified, and biochemically characterized. Recombinant epitope-tagged eukaryotic transcription factors are purified by immunoprecipitation and detected with various antibodies. Lectures/seminars cover methods of recombinant protein expression, antibody detection, polymerase chain reaction, differences between pro- and eukaryotic gene expression. Modern chromatographic and analytical techniques used in protein purification.
- A2: Handling of plasmid DNA, ligation, bacterial transformation, purification of genomic DNA and RNA from animal cells, transfection of animal cell lines, GFP reporters, Fluorescence activated cell sorting, genetic fingerprinting. Lectures/seminars cover these techniques.
- A3: Plant molecular biology: Detection of reporter genes in transgenic tobacco, immunological localization of a protein in *Plantago major*, transient expression of a reporter gene in onion and tobacco, fluorescence microscopy and confocal laser scanning microscopy. Lectures and seminars cover methods of plant gene technology, agrobacterium-mediated plant transformation, detection of genes, RNA and proteins, importance of genetically engineered plants in science and industry.
- A4: Structural biology: Protein structure determination. Major steps in protein X-ray crystallography will be performed including protein crystallization, symmetry and analysis of electron density maps, phase determination using molecular replacement, refinement and validation of the structural model. The course starts with an UNIX/LINUX introduction, the operating system used by the computer programs. Lectures and seminars cover in detail all steps of the X-ray structure determination process and highlight the application spectrum of this technique.

### Lernziele und Kompetenzen:

The students are capable ...

- to understand the fundamentals of selected topics in molecular biology
- to utilize the modern experimental techniques in molecular genetics
- to determine protein structures using X-ray crystallography
- to prepare and to characterize of different samples (depending on chosen lab course) using appropriate experimental techniques and methods
- to interpret and to critically summarize experimental results in written form (lab report)
- to judge and to discuss in oral form their research results in the field of drug discovery in comparison to recent publications
- to work in smaller research teams (team ability)

### Literatur:

Watson Baker et al: "Molecular biology of the gene" (Pearson International)

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### Verwendbarkeit des Moduls / Einpassung in den Musterstudienplan:

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

#### [1] **Molecular Science (Master of Science): ab 1. Semester**

(Po-Vers. 2020w | NatFak | Molecular Science (Master of Science) | Compulsory elective module | Molecular Biology  
| Molecular Biology)

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### Studien-/Prüfungsleistungen:

Molecular Biology (Prüfungsnummer: 65551)

Prüfungsleistung, Klausur, Dauer (in Minuten): 90

Anteil an der Berechnung der Modulnote: 100%

weitere Erläuterungen:

W90(PL): Written examination (90 minutes) or alternative examination according to FAU Corona Statutes!

Prüfungssprache: Englisch

Erstablegung: SS 2022, 1. Wdh.: WS 2022/2023

1. Prüfer: Christian Koch

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### Organisatorisches:

Please note:

- Students have to register for the module (check registration period on MeinCampus)!
- Registration/further information via StudOn!

### Bemerkungen:

The module **Molecular Biology** can be chosen as an compulsory elective module for M.Sc. Molecular Life Science