Course Specifications

Valid as from the academic year 2016-2017

Molecular Biological Analysis (O000020)

Course size
 Credits 5.0  Study time 150 h  Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2016-2017

A (semester 2)
- lecture 30.0 h
- practicum 15.0 h
- excursion 2.5 h
- seminar: practical PC room classes 12.5 h

Lecturers in academic year 2016-2017

Radwanska, Magdalena  CA10  lecturer-in-charge
Magez, Stefan  CA10  co-lecturer

Offered in the following programmes in 2016-2017

<table>
<thead>
<tr>
<th>Programme</th>
<th>crdts</th>
<th>offering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor of Science in Food Technology</td>
<td>5</td>
<td>A</td>
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<tr>
<td>Joint Section Bachelor of Science in Environmental Technology, Food Technology and Molecular Biotechnology</td>
<td>5</td>
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<tr>
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<td>5</td>
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Teaching languages

English

Keywords

DNA/ RNA Purification, Restriction Enzymes, Sanger Sequencing and Next Generation Sequencing, Hybridization, Micro-arrays, PCR, Quantitative PCR, Cloning in Prokaryotic Vectors, Expression Library Screening, Protein Expression and Analysis, Antibody Based Protein Analysis, Primer Design, Sequence Alignments, Database Searches, Gene Prediction and Annotation.

Position of the course

The Molecular and Biological Analysis explains and illustrates approaches, techniques, and tools used in modern molecular biology while dealing with nucleic acids and proteins. This course builds on the knowledge gained by the students in the Living World 1 and 2.

Contents

1. General Aims and Applications of Molecular Biological Analysis.
2. DNA/RNA Analytic Techniques and Applications (Disease Diagnostics, Personalised Medicine and Therapy, ‘Omics’ analysis, Forensic Analysis).
3. DNA/RNA Purification and Analysis (Restriction Enzyme Analysis, Variable Number Tandem Repeat Analysis, DNA Electrophoresis, Hybridization, Sequencing, Single Nucleotide Polymorphism).
4. DNA Amplification (Polymerase Chain Reaction (PCR), Quantitative Real-Time PCR, LAMP amplification).
5. Prokaryotic Expression Vectors.
8. Protein Sequence Analysis and Applications.

(Approved)
10. Immunological Analytic Techniques and Applications (Disease Diagnostics).
11. Enzyme Immunoassays, Immunoblotting, Fluorescence and Radioimmunoassay,
    Biosensor Assay to Measure Intermolecular Interactions.
12. Basic bio-informatics: Pairwise and Multiple Sequence Alignments, Homology,
    Database Similarity Searching, BLAST, FASTA, Motif Detection, Gene Prediction and
    Annotation. In silico Translation, Restriction, Mutation Detection, and Primer Design.

**Initial competences**
Knowledge and understanding of the structure and function of the genetic material and
proteins is required as well as cellular and microbial function. Competences acquired in
the Living World 1 and 2 are essential.

**Final competences**
Students have a basic understanding of the principles of molecular biological analysis
and know when and how to apply a certain technique while dealing with nucleic acids
and proteins. The course gives a comprehensive overview of applications in various
fields of Biology, Medicine, and Applied Biotechnology.

**Conditions for credit contract**
Access to this course unit via a credit contract is determined after successful competences
assessment.

**Conditions for exam contract**
This course unit cannot be taken via an exam contract.

**Teaching methods**
Excursion, lecture, practicum, seminar: practical PC room classes

**Learning materials and price**
PowerPoint slides, movies, and handouts of practical exercises are available as
learning materials.

**References**
From Genes to Genomes. Concepts and applications of DNA technology. Eds. Jeremy

**Course content-related study coaching**

**Evaluation methods**
end-of-term evaluation and continuous assessment

**Examination methods in case of periodic evaluation during the first examination period**
Written examination with open questions

**Examination methods in case of periodic evaluation during the second examination period**

**Examination methods in case of permanent evaluation**
Skills test, report

**Possibilities of retake in case of permanent evaluation**
examination during the second examination period is possible in modified form

**Extra information on the examination methods**
Participation in the practical and laboratory exercises and excursions is mandatory in
order to pass the course, as well as the submission of a practical course report.

**Calculation of the examination mark**
Written exam with open questions. 80%
Practical laboratory exercises. 10%
Report from the practical laboratory exercises. 10%

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