## M4452 - Integrative Topics in Microbiology

### Coordinator (responsible lecturer)
Prof. Dr. Michael Feldbrügge (feldbrue@hhu.de)

### Status:
04.02.2019

### Lecturers
Prof. Dr. Axmann, Prof. Dr. Bott, Dr. Eisenhut, Prof. Dr. Feldbrügge
Prof. Dr. Frunzke, Dr. Gould, Prof. Dr. Hegemann, Prof. Dr. Jaeger, Dr.
Nowack, Prof. Dr. Schaal, Prof. Dr. Schmitt, Prof. Dr. Zurbriggen

### Semester:
1.- 2.

### Contacts and organization
Dr. Eva Nowack (e.nowack@hhu.de)

### Mode:
optional compulsory course

### Workload
420 h

### Credit points
14 CP

### Contact time
225 h

### Self-study
195 h

### Course components
<table>
<thead>
<tr>
<th>Practical course:</th>
<th>18 SWS</th>
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<tbody>
<tr>
<td>Lectures:</td>
<td>2 SWS</td>
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### Frequency
- each winter-term

### Group size
16

### Duration
1 semester

### Learning outcomes/skills
Students have learned the concepts and methods of modern microbial science and are capable of using them. They have adopted genetic, molecular biological and biochemical techniques and can apply these techniques independently. Students are familiar with the major scientific equipment and are capable of using the instruments precisely and independently.

### Forms of teaching
Lectures, practicals

### Content

**Lectures:**

- **Microbial cell biology:**
  Cell biology of eukaryotic microorganisms - Filamentous fungi - RNA biology - Membrane trafficking - From endosymbionts to cellular organelles - Cyanobacteria

- **Microbial pathogenicity:**
  Chlamydia - Bacterial and fungal pathogens - Plant microbe interactions - Virology and splicing - Bacteriophages

- **Microbial biotechnology:**
  Corynebacterium biology and applied sciences - Bacterial biotechnology and lipases - Lov domain proteins: bacterial sensing and signalling - Heterologous protein expression in fungi - Structural biology and protein expression in *E. coli* – Cyanobacteria – Synthetic Biology

**Practical course:**
The practical course will cover modern methods in molecular biology:
- e.g. DNA - and RNA isolation methods, fluorescence microscopy, gel-electrophoresis, PCR;
- and biochemistry:
  e.g. immuno-localization and purification of proteins, analysis of enzyme kinetics and regulatory properties of proteins.

The practical course will consist of research projects in the laboratories of the participating...
lecturers. The laboratory can be chosen according to the student’s interest. The methods to be learned will depend on the research project.

**Eligibility**
- **Formal:** Admission to Master program
- **Content-related:** Students must be familiar with elementary molecular microbiological and biochemical techniques and the basics of gene regulation and signal transduction.

**Examination types**
Learning portfolio consisting of:
1. Knowledge base (70% of final grade): oral examination on the contents of lectures and the background of practicals
2. Documentation (30% of final grade): protocol or oral presentation (analysis and discussion of the experiments)

**Requirements for the award of credit points for this course**
1. Passing the knowledge test
2. Participating regularly and actively in the practical course
3. Delivering a report that meets the minimum standards of scientific documentation

**Relevant for following study programs/major**
- M.Sc. Biologie

- Major:
  - Synthetic Biology and Biotechnology
  - Molecular Ecology and Evolution
  - Physiology and Development
  - Structural Biology

**Compatibility with other curricula**
- M. Sc. Biochemie

**Significance of the mark for the overall grade**
The mark given will contribute to the final grade in proper relation to its credits.

**M.Sc. Biologie 14/72 CP (2-years program)**

**Course language**
- German
- English
- German and English
- German, English on demand

**Additional information**

The practical course will be done as an independent research project (6 weeks) in the laboratory of one of the participating lecturers. The laboratory can be chosen according to the student’s interest and the timing is flexible. However, note that the practical part can only be started after the lecture series is completed.

From summer semester 2019 students can only choose one “Integrative Topics in ….” module.