Protein Trafficking in the Endomembrane System

<table>
<thead>
<tr>
<th>Identification number</th>
<th>Workload</th>
<th>Credit points</th>
<th>Term of studying</th>
<th>Frequency of occurrence</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>MN-B-SM (GP 1)</td>
<td>360 h</td>
<td>12 CP</td>
<td>1st or 2nd term of studying</td>
<td>Winter term, 2nd half</td>
<td>7 weeks</td>
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</tbody>
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1 Type of lessons
   a) Lectures
   b) Practical/Lab
   c) Seminar

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<tr>
<th>Contact times</th>
<th>Self-study times</th>
<th>Intended group size</th>
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<tbody>
<tr>
<td>16 h</td>
<td>32 h</td>
<td>max. 5</td>
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<tr>
<td>155 h</td>
<td>129 h</td>
<td>max. 2</td>
</tr>
<tr>
<td>4 h</td>
<td>24 h</td>
<td>max. 2</td>
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2 Aims of the module and acquired skills

Students who successfully completed this module …

- have acquired detailed knowledge about the major protein trafficking pathways in eukaryotic cells, molecular factors of intracellular sorting machineries and their interplay with membrane lipids and the cytoskeleton.
- have acquired experimental skills in state-of-the art methods of cell biology, biochemistry and biophysics and can independently carry out small scientific projects related to the topic of the module.
- have learned how to present research results in oral and written form and to critically discuss scientific publications related to the topic of the module on a professional level.
- are able to transfer skills acquired in this module to other fields of biology.

3 Contents of the module

- Intracellular trafficking routes and their regulation in different model organisms (human, mouse, yeast, plants)
- Analysis of post-translationally modified proteins, SDS-PAGE electrophoresis and Western blotting
- Protein purification using column chromatography
- Recombinant protein expression
- Synthesis and analysis of membrane-active peptides
- Analysis of protein-protein, protein-lipid and peptide/lipid interactions
- Surface Plasmon resonance
- Gene knockdown
- Isolation of primary cells from transgenic animals
- Culture and transfection of animal, human and plant cells
- Cell-viability assays
- Separation and purification of membrane compartments by differential centrifugation
- Site-directed mutagenesis
- Inducible expression systems
- Immunofluorescence
- Laser confocal scanning microscopy

Explanatory note: The above list comprises techniques used in the participating groups in the context of this module. The exact content for each student will depend on the research project.
4 **Teaching/Learning methods**
   - Lectures; Practical/Lab (Project work); Seminar; Guidance to independent research; Training on presentation techniques in oral and written form

5 **Requirements for participation**
   Enrollment in the Master’s degree course “Biological Sciences”

6 **Type of module examinations**
   The final examination consists of three parts: Two hours written examination about topics of the lectures and the practical/lab part (50% of the total module mark), oral presentation (25% of the total module mark) and seminar paper (25% of the total module mark)

7 **Requisites for the allocation of credits**
   Regular and active participation;
   Each examination part at least “sufficient” (see appendix of the examination regulations for details)

8 **Compatibility with other Curricula**
   None

9 **Significance of the module mark for the overall grade**
   15% of the overall grade (see also appendix of the examination regulations)

10 **Module coordinator**
    Prof. Dr. Burkhard Becker, phone 470-7022, e-mail: b.becker@uni-koeln.de

11 **Additional information**
   **Subject module** of the Master’s degree course “Biological Sciences”,
   **Focus of research:** (G) Genetics and Cell Biology; (P) Molecular Plant Sciences
   **Participating faculty:** Prof. Dr. B. Becker, Dr. M. Plomann, Dr. S. Schellmann
   **Literature:**
   **General time schedule:** Week 1-6 (Mon.-Fri.): Lectures, practical/lab, writing seminar paper and preparation for the seminar talk (held at the end of week 6); Week 7 (Mon.-Fri.): Preparation for the written examination
   **Note:** The module contains hand-on laboratory work conducted individually and is taught in research laboratories. The module does not contain computer-based practicals/research as a main component.
   **Introduction to the module:** December 02, 2019 at 9.15 a.m., Cologne Biocenter, room 0.013 (ground floor)
   **Written examination:** January 31, 2020, second/supplementary examination March 20, 2020; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.