

| <b>Module Name</b><br>Peptides as therapeutics: synthesis, analytical methods and biological applications |  |                      |   |                      |                            |                 |
|---|--|----------------------|---|----------------------|----------------------------|-----------------|
| <b>Identification Number</b>  | <b>Workload</b>  | <b>Credit Points</b> | <b>Term</b>   | <b>Offered Every</b> | <b>Start</b>               | <b>Duration</b> |
| MN-BC-BSM13   | 360 h  | 12 CP                | 1 <sup>st</sup> or 2 <sup>nd</sup> term of studying | Winter term          | Winter term only           | 7 weeks         |
| <b>1</b>  | <b>Course Types</b>  |                      | <b>Contact Time</b>                                 | <b>Private Study</b> | <b>Planned Group Size*</b> |                 |
|   | a) Lectures  |                      | 25 h  | 50 h                 | max. 10                    |                 |
|   | b) Practical/Lab   |                      | 154 h   | 103 h                | max. 2                     |                 |
|   | c) Seminar   |                      | 4 h   | 24 h                 | max. 4                     |                 |
| <b>2</b>  | <b>Module Objectives and Skills to be Acquired</b>   |                      |   |                      |                            |                 |
|   | Students who successfully completed this module  |                      |   |                      |                            |                 |
|   | <ul style="list-style-type: none"> <li>• have a general understanding about the recent developments in the field of peptide science including synthetic and analytical methodologies, biology of peptides and the application of peptides and peptide conjugates in technological context.</li> <li>• have acquired working skills to tackle the synthesis of peptides and peptide libraries, to apply deconvolution techniques, and to investigate peptide sequence and structure by biophysical methods. Gain further insights into data-dependent (DDA) and independent (DIA) acquisition methods.</li> <li>• have acquired working skills to use biochemical sample preparation and liquid-chromatography (LC) methods, to run samples on high resolution LC-mass spectrometry (MS) instruments, and to analyze and interpret the generated data bioinformatically.</li> <li>• can independently carry out small scientific projects related to the topic of the module.</li> <li>• 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.</li> <li>• are able to transfer the skills acquired in this module to other fields of biochemistry.</li> </ul> |                      |   |                      |                            |                 |
| <b>3</b>  | <b>Module Content</b>  |                      |   |                      |                            |                 |
|   | <ul style="list-style-type: none"> <li>• Synthesis of peptides and proteins (i.e. solid phase peptide synthesis, native chemical ligation, Staudinger ligation, etc.)</li> <li>• Peptide modifications (i.e. mimetics, labeling strategies, cyclic peptides)</li> <li>• Peptide libraries and arrays, deconvolution</li> <li>• Analytical methods (size exclusion and reversed phase chromatography, mass spectrometry (quadrupole Orbitrap MS and ion mobility Tims-TOF MS), Edman degradation, fluorescence techniques, CD spectroscopy)</li> <li>• Antimicrobial peptides, peptide hormones, cell-penetrating peptides, peptide targeting sequences</li> <li>• Peptides in technological fields, e.g. as pharmaceuticals, cosmeceuticals, or agriculture and nutrition, with a specific focus on peptide therapeutics</li> </ul>  |                      |   |                      |                            |                 |
| <b>4</b>  | <b>Teaching Methods</b>  |                      |   |                      |                            |                 |
|   | Lectures; Practical/Lab (Project work); Seminar; Computer exercises, Guidance to independent research; Training on presentation techniques in oral and written form  |                      |   |                      |                            |                 |
| <b>5</b>  | <b>Prerequisites (for the Module)</b>  |                      |   |                      |                            |                 |
|   | Enrollment in the Master´s degree course “Biological Sciences”, in the Master´s degree course “Biochemistry and Molecular Medicine” or in the Master´s degree course “Chemistry”   |                      |   |                      |                            |                 |

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| <b>6</b>  | <p><b>Type of Examination</b></p> <p>The final examination consists of two parts (Type BC2): written examination on topics of lectures, seminars and the practical/lab part (60 min; 70 % of the total module mark) oral report (30 % of the total module mark)</p>  |
| <b>7</b>  | <p><b>Credits Awarded</b></p> <p>Regular and active participation<br/>Each examination part at least "sufficient" (see appendix of the examination regulations for details)</p>  |
| <b>8</b>  | <p><b>Compatibility with other Curricula*</b></p> <p>Subject module in the Master's degree course "Biochemical Sciences", combined advanced and experimental module in the Master's degree course "Chemistry"</p>  |
| <b>9</b>  | <p><b>Proportion of Final Grade</b></p> <p>In the Master's degree course "Biochemistry and Molecular Medicine": 10 % of the overall grade (see also appendix of the examination regulations)</p>   |
| <b>10</b> | <p><b>Module Coordinator</b></p> <p>Prof. Dr. Ines Neundorf, phone 470-8847, e-mail: ines.neundorf@uni-koeln.de</p>  |
| <b>11</b> | <p><b>Further Information</b></p> <p><b>Participating faculty:</b> Prof. Dr. I. Neundorf, Department of Chemistry; Prof. Dr. Marcus Krüger, Department of Biology</p> <p><b>Literature:</b></p> <ul style="list-style-type: none"> <li>• Information about textbooks and other reading material will be given on the ILIAS representation of the course.</li> </ul> <p><b>General time schedule:</b> Week 1-6 (Mon.-Fri.): Lectures, practical/lab, preparation for the seminar talk (topic and date will be arranged individually); Week 7 (Mon.-Fri.): Preparation for the written examination</p> <p><b>Note:</b> The module contains hand-on laboratory work conducted by small groups of students and individually and is taught in course rooms and research laboratories. The module does not contain computer-based practicals/ research as a main component.</p> <p><b>Introduction to the module:</b> December 02, 2024 at 8:30 a.m., seminar room 1<sup>st</sup> floor, Zülpicher Str. 47a (building 301, COMB) or online (in this case, further information/link will be sent to your Smail-Account) for preparation to the module before this introduction see ILIAS link under literature.</p> <p><b>Oral or written examination:</b> January 31, 2025, second/supplementary examination March 07, 2025; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.</p> |

\* 8 students from the Master's degree course "Biochemistry" and 4 students from the Master's degree course "Chemistry".