Title of module	Modular Advanced Practical and Seminar in the Focal Point Programme "Molecular Medicine", VZ: 185780, 183781 **" Analysis of protein ubiquitination"**

Credit points	4	***Available in semester(s)***	1
Hours per week	5.25	***Compact course***	☒

Lecturer(s)	Prof. K. F. Winklhofer and teaching assistants
Teaching methods	Two-week advanced laboratory course with an intergrated seminar, one of four lab courses to be completed in the first term
Evaluation of learning progress	Active participation in the laboratory tasks and seminar, feedback during the experiment
Mode of examination	Assessment of active and successful participation in the practical (50%) and a written project report (50%)
Learning objectives	Ubiquitination is a highly versatile posttranslational modification regulating fundamental cellular processes, such as protein and organelle turnover, protein trafficking, DNA repair, endocytosis, signaling pathways, and cell cycle progression. Ubiquitin can be attached to substrate proteins as a single moiety or as polymeric chain. Polyubiquitin chains can adopt different conformations depending on the type of ubiquitin linkage, reminiscent of a code. The students will learn state-of-the-art techniques to analyze protein ubiquitination and the mode of ubiquitin linkage in cellular models.
Soft skills	Ability to work in a research team. Identification and formulation of scientific questions. Improvement of communication skills and scientific writing.

Contents of module	**Topics:** Gene transfer into mammalian cells Protein-protein interactions Mechanism of ubiquitination: E1, E2, and E3 enzymes Different modes of ubiquitination Functional consequences of ubiquitination **Methods:** Cultivation and transfection of mammalian cells Cell lysis by detergents Immunoprecipitation of proteins Separation of proteins by SDS polyacriylamide gel electrophoresis Western blotting