

Title of module

Advanced Practical in the Focal Point Program:
 "Molecular Medicine" VZ: 185881
"Cellular quality control pathways in health and disease"

Credit points

7.5
(of 15)

Available in semester(s)

2

Hours per week

9

Compact course

Lecturer(s)

Prof. K. F. Winklhofer and teaching assistants

Teaching methods

A five-week all-day practical lab course with a compulsory seminar presentation.
Please note: A second Advanced Practical will have to be performed in the same semester to earn the full complement of 15 credits

Evaluation of learning progress

Active participation, feedback during independently performed experiments, project discussions with the supervisor

Mode of examination

Assessment of experimental skills during the practical (50%), a written project report (40%), and a seminar presentation of experimental results (10%).

Learning objectives

Cellular quality control and stress response mechanism are essential to maintain cellular functions and homeostasis under intrinsic and extrinsic stress conditions. In this context, the ubiquitin-proteasome system, autophagy, the chaperone network and organellar stress response pathways play an important role. An imbalance in these pathways is associated with various diseases, such as neurodegenerative, immunological, metabolic diseases and cancer. The students will learn how to analyze signaling pathways implicated in cellular quality control by different techniques.

Soft skills

Team work and time management.
Professional presentation and interpretation of data.
Improvement of communication skills and scientific writing.

Contents of module

Topics:

ER and mitochondrial unfolded protein response

Heat shock response

Ubiquitin-proteasome system

Autophagy, mitophagy

NF- κ B pathway

Nrf2 pathway

Methods:

Cultivation and transfection of mammalian cells

Cell death and viability assays

Real time PCR

Western Blotting

Reporter gene assays

Immunofluorescence

Confocal microscopy