Module Name
Functional Genomics

Type of Module	**Module Code**
o Advanced Module	Functional Genomics

Identification Number	**Workload**	**Credit Points**	**Term**	**Offered Every**	**Start**	**Duration**
MN-B-SM (A 4)	360 h	12 CP	2nd term of studying	Summer term, 2nd half	Summer term only	7 weeks

1	**Course Types**	**Contact Time**	**Private Study**
	a) Lectures	26 h	50 h
	b) Practical/Lab	150 h	100 h
	c) Seminar	4 h	30 h

2 Module Objectives and Skills to be Acquired

Students who successfully completed this module

- have learned mechanisms of genome regulation in physiology and disease.
- have acquired experimental skills in state-of-the art methods in genomics and epigenomics, transcriptomics and proteomics 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 Module Content

Using real-life examples from the fields of chromatin biology, epigenetics, gene regulation, DNA repair, protein homeostasis, circadian rhythms and neuronal circuits of obesity, the students get introduced to the following omics methodologies:

- bisulfite sequencing, HiC, transcriptomics/ exome sequencing
- ChIP, CLIP, polysome profiling
- Illumina Sequencing, Nanopore sequencing, Sanger sequencing
- DNA microarray
- Genome editing and genetic engineering in different model systems, CRISPR-Cas9
- Genetic screening approaches
- Molecular Cloning
- Proteomics methods
- Machine learning, predicitve modelling, multi-omics data integration

4 Teaching Methods

- Lectures; Practical/Lab (Project work); Seminar; Guidance to independent research; Training on presentation techniques in oral and written form

5	**Prerequisites (for the Module)** Enrollment in the Master's of Science degree course "Genetics and Biology of Aging and Regeneration" or in the Master's degree course "Biochemistry" **Additional academic requirements** Previous attendance of the lecture module Principles of Molecular Genetics, Development and Aging
6	**Type of Examination** The final examination consists of two parts: One hour written examination on topics of lectures and seminars (50 % of the total module mark), oral presentation (20-30 min; 50 % of the total module mark)
7	**Credits Awarded** Regular and active participation; Each examination part at least "sufficient" (see appendix of the examination regulations for details)
8	**Compatibility with other Curricula*** Optional compulsory module in the Master's degree course "Biochemistry"
9	**Proportion of Final Grade** 12.0 %
10	**Module Coordinator** Dr. Stephanie Panier, phone: +49 (0)221 379 70 591, e-mail: panier@age.mpg.de
11	**Further Information** **Participating faculty**: Dr. S. Panier, Dr. S. Steculorum, Dr. I. Huppertz, Dr. V. Piano, Dr. J. Reznick, Dr. A. Stangherlin, Dr. P. Antczak, Dr. S. Pöpsel, Dr. D. Trentini Schmidt, Dr. Z. Frentz, Dr. H. Oda, Dr. A. Annibaldi, Dr. O. Leidecker **Literature:** Information about textbooks and other reading material will be given on the ILIAS representation of the course (https://www.ilias.uni-koeln.de/ilias/goto_uk_cat_2815610.html) **General time schedule:** Week 1 (Mon.-Fri.): Introduction to Functional Genomics (lectures), safety lecture and lab projects; Week 2-6 (Mon.-Fri.): Lectures, seminars and lab projects; 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:** May 26, 2025 at 14:00, MPI Age, Joseph-Stelzmann-Str. 9 b, 50931 Köln, seminar room 1 (ground floor) 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. **Written examination:** July 18, 2025, second/supplementary examination September 1, 2025; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.