

Molecular Genetics								
Identification number		Workload	Credit points	Term of studying	Frequency of occurrence	Duration		
MN-B-SM (G 1)		360 h	12 CP	1 st or 2 nd term of studying	Summer term, 1 st half	7 weeks		
1	Type of lessons <ul style="list-style-type: none"> a) Lectures b) Practical/Lab c) Seminar 		Contact times	Self-study times	Intended group size*			
			20 h	40 h	max. 8			
			150 h	118 h	max. 2			
			8 h	24 h	max. 8			
2	Aims of the module and acquired skills <p>Students who successfully completed this module ...</p> <ul style="list-style-type: none"> • have acquired detailed knowledge of molecular genetics, the function of RNA-binding proteins and the different steps of eukaryotic gene expression, including pre-mRNA processing, RNA export, translation and RNA degradation. • have acquired experimental skills in state-of-the art methods in molecular biology and can independently design and perform small scientific projects related to the topics 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 <ul style="list-style-type: none"> • Analysis of co- and post-transcriptional steps of human gene expression, with focus on regulation conferred by RNA-binding proteins • Applying recombinant DNA technologies, e.g. cloning, DNA preparation, etc. • Cell culture using immortalized human cell lines, transfection of plasmid DNA, expression of gene products (RNA/protein) and stable cell line generation • Functional characterization of RNA-binding proteins by siRNA-mediated knockdown and complementation assays • Extraction of nucleic acid and protein samples from cultured cells • Analysis of abundance and sub-cellular localization of proteins using immunofluorescence and western blotting • Techniques for monitoring alternative splicing and RNA degradation (RT-PCR, etc.) • Basic workflows for producing, analyzing and interpreting high-throughput RNA-sequencing data (focus on differential gene expression analysis, alternative splicing, isoform switches) • Addressing and solving scientific problems 							
4	Teaching/Learning methods <ul style="list-style-type: none"> • Lectures; Practical/Lab (Project work); Seminar; Guidance to independent research; Training on presentation techniques in oral and written form 							
5	Requirements for participation <p>Enrollment in the Master's degree course "Biological Sciences" or in the Master's degree course "Biochemistry"</p>							

6	Type of module examinations The final examination consists of two parts: Two hours written examination about topics of the lectures and the practical/lab part (70 % of the total module mark) and oral presentation (30 % of the total module mark)
7	Requisites for the allocation of credits Regular and active participation; Passed seminar paper (= short protocol in the form of a research paper about the project work); Each examination part at least "sufficient" (see appendix of the examination regulations for details)
8	Compatibility with other Curricula Biological subject module in the Master´s degree course "Biochemistry"
9	Significance of the module mark for the overall grade In the Master´s degree course "Biological Sciences": 15 % of the overall grade (see also appendix of the examination regulations)
10	Module coordinator Prof. Dr. Niels Gehring, phone 470-3873, e-mail: ngehring@uni-koeln.de
11	Additional information Subject module of the Master´s degree course "Biological Sciences", Specialization: (G) Molecular and Developmental Genetics Participating faculty: Prof. Dr. N. Gehring, Prof. Dr. D. Mörsdorf, Dr. G. Praefcke, Dr. V. Boehm Literature: <ul style="list-style-type: none"> 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 1-6 (Mon.-Fri.): Lectures, Practical/Lab (Project work); (daily from approximately 9 a.m. to 5 p.m. including lunch break, times may vary depending on project's tasks) as well as preparation for the seminar talk (held at the end of week 6); Week 7 (Mon.-Thu.): Preparation for the written examination Note: The module contains hand-on laboratory work conducted individually or by small groups of students and is taught mainly in course rooms. The module does contain computer-based practicals/research as a minor component. Introduction to the module: April 12, 2021 at 9 a.m., Center for Molecular Biosciences (COMB), seminar room 0.46 (ground floor) or online (in this case, further information/link will be sent to your Small-Account); for preparation to the module before this introduction see ILIAS link under literature. Written examination: May 31, 2021, second/supplementary examination August 06, 2021; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.

* 6 students from the Master´s degree course "Biological Sciences" and 2 students from the Master´s degree course "Biochemistry".

Corona note! Depending on the Corona situation during the summer term, practical work may be skipped either totally or in part. In this case, some or all practical parts will be replaced by adequate alternatives so that (i) the workload and (ii) the principle content of the modules remained unchanged.