

Module Name RNA Biology and Gene Regulation						
Type of Module ○ Advanced Module				Module Code RNA Biology and Gene Regulation		
Identification Number MN-B-SM (G 1)	Workload 360 h	Credit Points 12 CP	Term 2 nd term of studying	Offered Every Summer term, 1 st half	Start Summer term only	Duration 7 weeks
1	Course Types a) Lectures b) Practical/Lab c) Seminar		Contact Time 20 h 150 h 8 h		Private Study 40 h 118 h 24 h	
2	Module Objectives and Skills to be Acquired Students who successfully completed this module <ul style="list-style-type: none"> • have acquired detailed knowledge of RNA biology, the function of RNA-binding proteins and the different steps of eukaryotic gene expression, including regulation of 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	Module Content <ul style="list-style-type: none"> • Project planning • Analysis of co- and post-transcriptional steps of human gene expression, with focus on regulation conferred by RNA-binding or RNA biology-related proteins • Evaluation of potential protein-protein interactions involving the analysis of published structural information or the prediction via computational approaches such as AlphaFold. • Applying recombinant DNA technologies, e.g. cloning, DNA preparation, etc. • Cell culture using cancer or immortalized human cell lines, transfection of plasmid DNA, expression of gene products (RNA/protein) and stable cell line generation • Functional characterization of RNA biology-related proteins by knockdown, knockout or degran-induced protein depletion • Extraction of nucleic acid and protein samples from cultured cells • Analysis of abundance and sub-cellular localization of proteins using immunofluorescence and/or 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 • Addressing and solving scientific problems 					

3	<p>Module Content (continued)</p> <p><i>Explanatory note:</i> The list above comprises state-of-the art molecular methods with emphasis on RNA biology that are commonly used in the field of molecular cell biology. Every student participating in this module will apply a subset of it. The exact content will depend on the research project the student will work on.</p>
4	<p>Teaching Methods</p> <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	<p>Prerequisites (for the Module)</p> <p>Enrollment in the Master's of Science degree course "Genetics and Biology of Aging and Regeneration" or in the Master's degree course "Biochemistry"</p> <p>Additional academic requirements</p> <p>The RNA-related lessons of the lecture "Principles of Molecular Genetics, Development and Aging (A/D/G)" are a prerequisite for the theoretical and practical work in the module and the exam. These are provided via ILIAS for self-study.</p> <p>For Students of Master "Genetics and Biology of Aging and Regeneration": Previous attendance of the lecture module "Principles of Molecular Genetics, Development and Aging (A/D/G)".</p>
6	<p>Type of Examination</p> <p>The final examination consists of two parts: One hour written examination on topics of lectures, seminars and the practical/lab part (50 % of the total module mark), oral presentation (20-30 min; 50 % of the total module mark)</p>
7	<p>Credits Awarded</p> <p>Regular and active participation; Each examination part at least "sufficient" (see appendix of the examination regulations for details)</p>
8	<p>Compatibility with other Curricula*</p> <p>Optional compulsory module in the Master's degree course "Biochemistry"</p>
9	<p>Proportion of Final Grade</p> <p>12.0 %</p>
10	<p>Module Coordinator</p> <p>Prof. Dr. Niels Gehring, phone 470 3873, e-mail: ngehring@uni-koeln.de</p>

11	<p>Further Information</p> <p>Participating faculty: Prof. Dr. N. Gehring, Dr. V. Boehm</p> <p>Literature:</p> <ul style="list-style-type: none">• Information on recommended textbooks and other reading material will be given on the ILIAS representation of the course <p>General time schedule: Week 1-6 (Mon.-Fri.): Lectures, Practical/Lab (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.-Fri.): Preparation for the written examination</p> <p>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.</p> <p>Introduction to the module: April 13, 2026 at 10:00 a.m., Center for Molecular Biosciences (COMB, Zülpicher Str. 47a), seminar room 0.01 (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.</p> <p>Written examination: June 05, 2026, second/supplementary examination August 14, 2026; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.</p>
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