

Module Name Molecular Pathology						
Identification Number	Workload	Credit Points	Term	Offered Every	Start	Duration
MN-BC-BSM06	360 h	12 CP	1 st or 2 nd term of studying	Winter term	Winter term only	7 weeks
1	Course Types		Contact Time	Private Study	Planned Group Size*	
	a) Lectures		20 h	75 h	max. 8	
	b) Practical/Lab		102 h	68 h	max. 8	
	c) Seminar		20 h	75 h	max. 8	
2	<p>Module Objectives and Skills to be Acquired</p> <p>Students who successfully completed this module</p> <ul style="list-style-type: none"> • have acquired detailed knowledge about the basics of molecular pathology diagnostics • are able to interpret the results of certain molecular analyses in the context of clinical patient data • know how to apply molecular technologies like extraction of nucleic acid, PCR and sequencing • have learned how to design and carry out small scientific projects related to the content of the module • have the ability to evaluate, interpret and report their experimental results • 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 molecular biology 					
3	<p>Module Content</p> <ul style="list-style-type: none"> • Background of molecular pathology diagnostics: general pathology, principles of molecular medicine and genetics, signal transduction, • Molecular basis of tumor development in lung and gynecological cancer, therapeutic approaches (personalized therapy, inhibition of immune checkpoints) • Microscopy: Histology, immunohistochemistry, fluorescence microscopy • Preanalytical methods: Workflow of samples, macro- and microdissection, extraction of nucleic acids, quantification and quality control, electrophoresis and fragment length analysis • Mutation analysis, wet lab part: Melting point analysis, real-time PCR and digital PCR, Sanger Sequencing, next generation sequencing • Evaluation of sequencing data, bioinformatics basics, pipeline set-up, variant calling and filtering, variant annotation according to HGVS guidelines, data interpretation and reporting • Analysis of gene fusion and amplification by next generation sequencing and fluorescence in situ hybridization • Testing for microsatellite instability • Detection of Human Papillomavirus and Helicobacter pylori from formalin-fixed tissues • Quality control in patient health care 					

4	<p>Teaching Methods</p> <p>Lectures (including Q&A); Practical work (including wet lab, data evaluation and microscopy); Seminar; Training on presentation techniques in oral and written form; Training on data evaluation and scientific writing</p>
5	<p>Prerequisites (for the Module)</p> <p>Enrollment in the Master's degree course "Biochemistry"</p> <p>Additional academic requirements</p> <p>Basic experimental expertise in molecular biology techniques</p>
6	<p>Type of Examination</p> <p>The final examination consists of three parts (type BC7): written examination on topics of lectures and the practical/lab part (60 min; 50% of the total module mark); oral presentation (20-30 min; 25% of the total module mark); written experimental protocols (25% of the total modular 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>Subject module "Human Genetics" in the Master's degree course "Genetics and Biology of Aging and Regeneration"</p>
9	<p>Proportion of Final Grade</p> <p>In the Master's degree course "Biochemistry": 10 % of the overall grade (see also appendix of the examination regulations)</p>
10	<p>Module Coordinator</p> <p>Prof. Dr. Sabine Merkelbach-Bruse, phone 478-6369, e-mail: sabine.merkelbach-bruse@uk-koeln.de</p>
11	<p>Further Information</p> <p>Participating faculty: Dr. Jana Fassunke, Dr. Carina Heydt, Dr. Michaela A. Ihle, , PD Dr.Dr. Udo Siebolts, Dr. Janna Siemanowski</p> <p>Literature:</p> <ul style="list-style-type: none"> • Original publications will be handed out at the introduction to the module <p>General time schedule: Week 1-5 (Mon.-Fri.): Lectures, practical/lab, preparation for seminar talk, protocol writing; Week 6 (Mon.-Fri.): Preparing the presentation; protocol writing Week 7 (Mon.-Fri.): Preparation for the written examination</p> <p>Note: The module contains hand-on laboratory work conducted by small groups of students or individually and is taught in course rooms and laboratories.</p> <p>Introduction to the module: 02.12.2024, 09:00, Lecture Hall Pathologie, Uniklinik Köln (further information/link will be sent to your Smail-Account)</p> <p>Written examination: January 31, 2025, second/supplementary examination March 7, 2025; the later date may vary if students and module coordinator agree. More details will be given at the beginning of the module.</p>

* 6 students from the Master's degree course "Biochemistry and Molecular Medicine".