

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 a) Lectures b) Practical/Lab c) Seminar		Contact Time 20 h 102 h 20 h	Private Study 75 h 68 h 75 h	Planned Group Size* max. 8 max. 8 max. 8	
2	Module Objectives and Skills to be Acquired Students who successfully completed this module <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	Module Content <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	Teaching Methods 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
5	Prerequisites (for the Module) Enrollment in the Master's degree course "Biochemistry" Additional academic requirements Basic experimental expertise in molecular biology techniques
6	Type of Examination The final examination consists of three parts (type BC57): 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)
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 Subject module "Human Genetics" in the Master's degree course "Genetics and Biology of Aging and Regeneration"
9	Proportion of Final Grade In the Master's degree course "Biochemistry": 10 % of the overall grade (see also appendix of the examination regulations)
10	Module Coordinator Prof. Dr. Sabine Merkelbach-Bruse, phone 478-6369, e-mail: sabine.merkelbach-bruse@uk-koeln.de
11	Further Information Participating faculty: Dr. Christina Alidousty , Dr. Jana Fassunke, Dr. Carina Heydt, Dr. Michaela A. Ihle, Dr. Roberto Pappesch , PD Dr.Dr. Udo Siebolts, Dr. Janna Siemanowski Literature: <ul style="list-style-type: none"> Original publications will be handed out at the introduction to the module 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 Note: The module contains hand-on laboratory work conducted by small groups of students or individually and is taught in course rooms and laboratories.

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