Titel des Moduls:	**Genetics and Developmental Biology**		
	Orientierungsmodul (M.Sc.)		OM-02
Modulverantwortlicher:		**Fachbereich(e):**	
Baumeister, Ralf		**Genetik und Molekularbiologie**	
Typ:	Wahlpflichtmodul	**Fachsemester:**	1
Moduldauer:	1 Semester, Block	**ECTS:**	9
Turnus:	Wintersemester	**Workload:**	270 h
Empfohlene Voraussetzung:		**Zwingende Voraussetzung:**	
Verwendbarkeit:	M.Sc. Biology, Major Genetics and Developmental Biology		
Lehrende:	Aichinger, Ernst / Baumeister, Ralf / Driever, Wolfgang / Eimer, Stefan / Hess, Wolfgang / Laux, Thomas / Maier, Wolfgang / Neubüser, Annette / N.N. / Onichtchouk, Daria / Pyrowolakis, Giorgos / Schulze, Ekkehard / Seifert, Mark		

Veranstaltungstitel	**Lehrform**	**ECTS**	**SWS**	**Workload [h]**
Molecular Genetics and Development	Lecture	3	2	90 h
Classical and Molecular Genetics	Exercises	6	4	180 h

Lernziele / Lernergebnisse	Students are able to: • explain the mechanisms of prokaryotic and eukaryotic replication and transcription, can use their knowledge to design and clone prokaryotic and eukaryotic expression vectors and are able to monitor gene expression experimentally in whole animals and through quantitative PCR • explain how genome organization and epigenetic phenomena affect development, adaptation and evolution • describe main principles of stem cell regulation in plants and animals. • describe major mechanisms of signal transduction in plants and animals and study and dissect signalling pathways experimentally • explain mechanisms of pattern formation in development and of organogenesis and study such mechanisms by using transgenic animals and forward and reverse genetic methods
Studienleistung	• Regular participation in (at least 80% of) lectures and practical course • presentation of exercise-related literaturewritten reports of the exercises
Prüfungsleistung & Benotung	Written examination at the end of the module on the contents of the lecture.
Literatur	• Watson: Molecular Biology of the Gene • Lewin: Genes • Gilbert: Developmental Biology

Veranstaltungstitel:	**Molecular Genetics and Development**	
Lehrform:	Lecture	
Modul:	Orientierungsmodul „Genetics and Developmental Biology	OM-02
Verwendbarkeit:	Orientierungsmodul „Genetics and Developmental Biology“	

Lehrsprache:	English	**Teilnehmerzahl:**	50
Moduldauer:	1 Semester, Block	**Fachsemester:**	1
Angebots-häufigkeit:	Nur im Wintersemester		

SWS / LVS	Präsenzstudium	Selbststudium	Workload Summe
2	28 h	62 h	90 h

Inhalte	The lecture series covers general concepts of cellular and organismal control mechanisms at an advanced level including: • DNA replication and organization • transcription in pro- and eukaryotes, regulation of transcription • posttranscriptional modifications • translation • epigenetics, maternal inheritance • genome organization, mobile elements, organelle genomes • homologous recombination and genome evolution • stem cells, pattern formation, signal transduction • molecular evolution
Lehrmethoden und Medien	lecture, discussion media: PowerPoint presentations, chalkboard illustrations
Lernziele / Lernergebnisse	Students are able to: • explain the mechanisms of prokaryotic and eukaryotic replication and transcription, as well as the organization of the participating protein complexes. • describe major epigenetic phenomena like imprinting and maternal effect. • define reverse genetics, and to understand and design reverse genetic experiments. • explain how genome rearrangements allow organismal evolution. • describe main principles of stem cell regulation in plants and animals. • describe major mechanisms of signal transduction in plants. • explain mechanisms of pattern formation in development and of organogenesis.
Studienleistung	Regular (at least 80%) participation in lecture
Prüfungsleistung & Benotung	Written examination at the end of the module on the contents of lecture
Literatur	• Watson: Molecular Biology of the Gene; • Lewin: Genes • Gilbert: Developmental Biology

Modulhandbuch M.Sc. Biologie Orientierungsmodule

Veranstaltungstitel:	**Classical and Molecular Genetics**	
Lehrform:	Übung	
Modul:	Orientierungsmodul „Genetics and Developmental Biology	OM-02
Verwendbarkeit:	Orientierungsmodul „Genetics and Developmental Biology“	

Lehrsprache:	deutsch / english	**Teilnehmerzahl:**	4x 12-13
Moduldauer:	1 Semester, Block	**Fachsemester:**	1
Angebots-häufigkeit:	Nur im Wintersemester		

SWS / LVS	Präsenzstudium	Selbststudium	Workload Summe
4	63 h	117 h	180 h

Inhalte	The exercises will enable students to design and perform complex experiments in genetics and developmental biology. They will learn a wide array of up-to-date technologies including • molecular cloning • RNA isolation from animal tissue • reverse transcription • quantitative and semi-quantitative PCR (including primer design) • Mendelian and molecular genetics including phenotypic analysis • imaging from light to electron microscopy • interaction studies • protein expression • cellular signaling studies during organogenesis in model systems • use of model organisms • use of model organisms as disease models. • bioinformatical analysis of DNA sequences and proteins
Lehrmethoden	supervised practical work in groups of two. media: chalkboard/whiteboard, PowerPoint presentations, shared access to bioinformatics tools
Lernziele / Lernergebnisse	The students are able to: • design and conduct basic molecular cloning experiments • explore the possible functions of genes and proteins bioinformatically • dissect genetic hierarchies and epistatic relationships • explain how genotype and phenotype are linked and can be explored by forward and reverse genetic analysis • follow experimentally how cell signaling events (Notch, EGF, etc.) are used by an organism to generate pattern and organs • use transgenic animals to visualize and study animal development • visualize gene transcription and translation in whole animals • monitor gene expression through quantitaive PCR
Studienleistung	• Regular (at least 80%) participation in the exercises • written reports of the exercises • presentation of a representative publication from an area covered by the exercises
Prüfungsleistung & Benotung	None

Literatur	• Watson: Molecular Biology of the Gene; • Lewin: Genes • Gilbert: Developmental Biology