

MSc 'Animal Biology and Biomedical Sciences'

1st Semester

All lectures are compulsory!

Name of module	Lecture Biodiversity, Behaviour and Evolution	1101
No. of semester	1	
Lecturers	Ottmar Distl, Heike Hadrys, Heike Pröhl, Ute Radespiel, Ariel Rodriguez, Bernd Schierwater, Sabine Schmidt, Marina Scheumann, Ursula Siebert, Oliver Keuling	
Kind of course/SWS	lecture (4 SWS), seminar (1 SWS)	
Study performance	Regular attendance, oral presentation	
Exam performance	Examined oral presentation and written exam (30:70), both need to be passed successfully	
ECTS-CP	6	
Study targets: the students will learn...		
• what kind of major research topics are currently addressed in the field of biodiversity, behaviour and evolution • to understand patterns and processes in ecology and evolutionary biology • how to present research approaches in the field of biodiversity, behaviour and evolution • how to evaluate and critically discuss controversial concepts in the field of biodiversity, behaviour and evolution		
Course contents:		
• Biodiversity, definitions and scales • Natural selection – mutation – selection – adaptation- stochastics • Phylogenetic trees, cladistics vs. phylogenetic systematics • Speciation and species concepts • Phylogeography and conservation genetics: current approaches • Biogeography • Geographical variation of behaviour • Distribution in space and time: from individuals to metapopulations • Evolution and ecology of species assemblages • Macro- and microevolution • Hox-genes (Bauplan, Ground Patterns) • Biodiversity, adaptation and evolution of selected animal groups (amphibians, bats, primates; including ethical aspects of the use of primates in biomedical research) • Sensory ecology and communication • Cognitive ethology • Behavioural ecology and conservation		
Admissions requirements/recommended previous knowledge: : Bachelor of Biology or equivalent Campbell or Purves: Biologie; Wehner/Gehring: Zoologie; Alcock: Verhaltensbiologie; Krebs/Davies: Einführung in die Verhaltensökologie; Begon/Harper/Townsend: Ökologie		
Basic Literature: Avise: Phylogeography; Bekoff/Allen/Burghardt: The cognitive animal; Bradbury/Vehrencamp: Principles of Animal Communication; Campbell, Fuentes, Mackinnon, Panger, Bearder: Primates in Perspective; Duellman/Trueb: Biology of Amphibians; Fleagle: Primate Adaptation and Evolution, Franckham: Conservation Genetics; Freeman & Herron: Evolutionary Analysis; Kunz, Fenton: Bat Ecology; Jamieson: Reproductive Biology and Phylogeny of Anura; Neuweiler: Biology of Bats; Pianka: Evolutionary Ecology, Primack: Essentials of Conservation Biology, Rosenzweig, Breedlove, Watson: Biological Psychology; Ridley: Evolution, Sullivan BK: Amphibian Biology, Social Behaviour		
Didactic aids:		
powerpoint presentations of lecturers (lecture) and students (seminar), animated graphics, video film sequences, group discussions, hand-outs		
Exam requirements: Power-Point seminar presentation and written exam		
Time and effort involved in studying (in hours): 180		
1. Presence during studies 52,5 h		
2. Self-study 127,5 h		

Name of module	Lecture in Cell, Developmental and Neurobiology	1201
No. of semester	1	
Lecturers	Karl-Heinz Esser, Felix Felmy, Manuela Gernert, Klaus Jung, Sabine Leonhard-Marek, Hassan Y. Naim, Markus Rothermel, Miloš Stanojlović, Imke Steffen, Michael Stern, Maren von-Köckritz-Blickwede	
Kind of course/SWS	lecture 4 SWS, tutorial 1 SWS	
Achievements in studies	Regular attendance	
Exam performance	written exam (100%)	
ECTS-CP	6	
Study targets: Development of capability to analyze and explain cellular processes at the molecular level		
Course contents: Biochemistry, early secretory pathway, protein glycosylation and folding, vesicular transport, mechanisms of cell death Molecular basis of development, cell biology of neurons and glia, developmental biology of the nervous system, neurophysiology, physiology of autonomous and enteric nervous system, neuropharmacology Acoustic communication and echolocation of mammals, neuromodulation, learning, modern methods in neurobiology, bioinformatics		
Admissions requirements/recommended previous knowledge: Bachelor of Biology		
Basic Literature: Alberts et al. Molecular Biology of the Cell, 4th Edition, Garland Science, Wolpert et al., Principles of Development, Spektrum Verlag Knobil E, Neill JD eds. The Physiology of Reproduction. 2nd Edition Vol1 New York Raven Press Heldmaier G, Neuweiler G, 2003, Vergleichende Tierphysiologie Aktories K, Förstermann U, Hofmann FB, Starke K (2004) Allgemeine und spezielle Pharmakologie und Toxikologie. Elsevier Kandel, Schwarz & Jessel, Principles of Neural Science 4th Edition, McGraw-Hill Publishers Engelhardt et al. (2015) Physiologie der Haustiere, 5. Aufl., Enke Verlag, Reece (2015) Dukes' physiology of domestic animals 13th Ed. Wiley Blackwell.		
Didactic aids: powerpoint presentations of lecturers, video film sequences, hand-outs		
Exam requirements: Extensive knowledge in aspects of modern biomedical research		
Time and effort involved in studying (in hours): 180 1. Presence during studies 52.5 h 2. Self-study 127.5h		

Name of Module	Lecture Infection Biology	1301
No. of semester	1	
Lecturers	Mathias Boelke, <u>Bernd Lepenies</u> , Asisa Volz, Martin Ludlow, Jochen Meens, Peter Valentin-Weigand, Birgit Strommenger	
Kind of course/SWS	Lecture/4 SWS + Tutorial/1 SWS	
Achievements in studies	regular attendance	
Exam performance	Written exam (100%)	
ECTS-CP	6	
Study target Biology of pathogens, mechanism of pathogen-host-interaction, epidemiology		
Course contents: Basics of infection immunology Biology of pathogen microorganism and parasits Virulenz factors and pathomechanism Molecular epidemiology		
Admissions requirements/recommended previous knowledge: Basic knowledge of microbiology and protozoology		
Basic Literature:: Madigan, Martinko, Brock: Mikrobiologie; Schlegel: Allgemeine Mikrobiologie; Wehner, Gehring: Zoologie Begleitende Literatur: Hacker, Heesemann: Molekulare Infektionsbiologie; Schnieder (Hrg): Veterinärmedizinische Parasitologie; Modrow, Falke, Truyen: Molekulare Virologie		
Didactic Aids: Powerpoint presentation		
Exam requirements: Extensive knowledge in aspects of study targets		
Time and effort involved in studying (in hours): 180 1. Presence during studies 52.5 h 2. Self-study 127.5h		

Name of Modul	Data management and study design	1401
No. of semester	1	
Lecturers	Lothar Kreienbrock, Fritjof Freise	
Type of course/SWS	lecture (2 SWS), practical course 2 (SWS)	
Achievements in studies	regular attendance, exercises	
Exam performance	written exam (100%)	
ECTS-CP	4	
Study target: Students should be able to relate a biological research project to a mathematical context, design corresponding data structures and conduct analyses using a linear model		
Course contents: • Components Good Clinical and Good Laboratory Practice • Data management and documentation • Planning of animal experiments • Typing of study designs • Regression analysis • analysis of variance • Cross-over studies • Survival studies • sample size calculations		
Admission requirements/recommended previous knowledge: good knowledge of the basics of biometry and epidemiology as taught for example in the bachelor studies and contained for example in the following text books. – Köhler, W., Schachtel, G. und Voleske, P. (2002) Biostatistik. Einführung in die Biometrie für Biologen und Agrarwissenschaftler (3. Aufl.) – Lorenz, R. (1996) Grundbegriffe der Biometrie (4. Aufl.). Fischer, Stuttgart. In addition, proficiency in the use of data processing systems in Windows facilities is required (Windows XP, Word, Excel).		
Basic Literature: • EMEA, CVMP (2001). Guideline on Statistical Principles for Veterinary Clinical Trials • Friedman, LM, Furberg, CD, DeMets, DL (1998). Fundamentals of Clinical Trials. Third Edition. Springer-Verlag, New York. • Pocock, SJ (1983). Clinical Trials. A Practical Approach. John Wiley & Sons Ltd.,Chichester. • Schumacher, M, Schulgen, G (2002). Methodik klinischer Studien: Methodische Grundlagen der Planung, Durchführung und Auswertung. Springer-Verlag, Berlin - Heidelberg.		
Didactic aids: powerpoint presentations of lecturers (lecture) and students (seminar), animated graphics, video film sequences, group discussions, hand-outs		
Exam requirements: powerpoint seminar presentation All presentations used in the lecture are made available to students as handouts as well as in electronic form. In addition, the learning contents of the lecture is reinforced in practical courses. These practical courses are defined as “small projects” and students have to work on these projects independently under the guidance of the lecturer using electronic data processing instruments in the course room		
Time and effort involved in studying (in hours): 120 1. Presence during studies 42 h 2. Self-study 78 h		

Name of module	Animal welfare and planning of animal experimentation	1402
No. of semester	1	
Lecturers	Bernhard Hiebl, Bettina Seeger, Peter Kunzmann, Maren von Köckritz-Blickwede, Katja Branitzki-Heinemann, Michael Stern	
Kind of course/SWS	lecture (1 SWS), seminar (2 SWS), workshop (3 SWS)	
Achievements in studies	regular attendance especially in practical exercises	
Exam performance	Formulate and present an application for an animal experiment	
ECTS-CP	6	
Study targets: The students learn to plan animal experiments according to animal welfare regulations, learn and discuss ethical aspects and alternatives to animal use.		
Course contents: • Biology and husbandry of laboratory animals • Microbiology and disease • Health hazards and safe practises in the animal house • Design and conduct of animal experiments • Alternatives to animal use • Ethical aspects and legislation • Analysis of scientific literature • Application for animal experiments according to animal welfare regulations • Visit of experimental animal labs (e. g. RIZ-FI, DPZ Göttingen) • Biosafety during animal experimentation		
Admissions requirements/recommended previous knowledge: - none -		
Basic Literature: • German Animal Protection Law • Van Zutphen, L.F.M., et al: Principles of Laboratory Animal Science; Elsevier 2001		
Didactic aids: PowerPoint presentations, video film sequences, hand-outs, course manual		
Exam requirements: Deepen knowledge in lecture and practical contents		
Time and effort involved in studying (in hours): 180		
1. Presence during studies 80 h		
2. Self-study 100 h		

*All students have the possibility to attend an additional hands-on course to receive an international accepted certificate for carrying out and directing animal experiments in Europe recommended by *Federation of European Laboratory Animal Science Association (FELEASA Category B)*. To attend the course the respective supervisor of the student need to send a written declaration of indispensability to Mr. Prof. Hiebl.

Name of module	Key qualifications	1403
No. of semester	1	
Lecturers	Gerd Breves, Peter Kunzmann Lecturers of the Graduate School	
Kind of course/SWS	lecture (1 SWS), seminar (2 SWS)	
Achievements in studies	regular attendance especially in seminar presentation	
Exam performance	Oral presentation (100%)	
ECTS-CP	2	
Study targets:		
Course contents: • Science theories • Good Laboratory practice • Bioethics • Biological safety • Scientific writing and presentation, poster design		
Admissions requirements/recommended previous knowledge: - none -		
Basic Literature: DFG-Richtlinien zur guten wissenschaftlichen Praxis, GLP, Handouts		
Didactic aids: PowerPoint presentations, handouts		
Exam requirements: Deepen knowledge in lecture and practical contents		
Time and effort involved in studying (in hours): 60 1. Presence during studies 20 h 2. Self-study 80 h		