

Module des Wahlpflichtbereichs 3

Am Montag ganztags und am Dienstagvormittag finden an der UZH die Spezialvorlesungen und an der ETHZ die Konzeptkurse statt. Diese Vorlesungen ergänzen den Unterricht der Blockkurse im Fachstudium. Ausserdem werden im Wahlpflichtbereich 3 Seminare und Kurse in der vorlesungsfreien Zeit angeboten. Die folgende Zusammenstellung gibt eine Übersicht:

Übersicht Spezialvorlesungen im Herbstsemester 2023

BIO 214

Von Affenmenschen und Menschenaffen (Mo 10-12; 3 ECTS)

Elemente einer neuen Geschichte der Biologie und Anthropologie. An unterschiedlichen Stationen der neuzeitlichen Biologie und Anthropologie lernen Sie die grundlegenden Mechanismen der Wissensproduktion kennen: vom mittelalterlichen Glauben an hundsköpfige Erdrandsiedler bis zu den modernen Evolutionsmodellen. Unterrichtssprache Deutsch.

BIO 219

Evolution of human brain, cognition and language (Mo 12-14; 2 ECTS)

The module addresses human cognition from an evolutionary and functional perspective. The first component investigates the human brain in a comparative context, The second component investigates cognitive differences and similarities between humans and other animals, and introduces evolutionary models of brain and cognitive evolution with emphasis on cultural intelligence models. The final component of the module is dedicated to language, assesses the theories by Chomsky, Pinker, Tomasello and others, and discusses current models of language origins in human ancestors.

BIO 228

Evolutionary Medicine (Do 10-12; 2 ECTS)

Evolution had many inputs into shaping current human health and will continue to do so. Evolutionary medicine attempts among others to explain changes in morphology and genetics in long and short-term perspectives. The module addresses this latest trans disciplinary research with a specific focus on related key scientific publications as well as novel methods used.

BIO 242

Translational Cancer Research: New Technologies, Mouse Models and Clinical Approaches (Mo 13-15; 3 ECTS)

This course will illustrate the genetic and cellular complexity of cancers, providing an overview of current and emerging technologies that are used in basic, translational and clinical research to study and treat cancers. Several tumour types (liver, lung, breast, gynaecological) will serve as case studies.

BIO 243

Epigenetics (Mo 15-17, 3 ECTS)

This course will explore epigenetics, non-coding RNAs, and post-translational protein modifications – three areas of molecular biology that complement and extend our basic knowledge of the upward causation of life (i.e., DNA->m-RNA->Protein).

Cell fates and molecular mechanisms in different types of cells are orchestrated by transcription factors, chromatin changes, DNA methylation, noncoding RNAs, protein modifications, and other signals, whose dysregulation contributes strongly to human disease. These factors are currently the subject of intense research aimed at refining our understanding of the pathogenesis of these diseases and at developing new and more effective strategies for their treatment.

BIO 251

Cancer and the Immune System (Di 10-12; 3 ECTS)

This lecture series covers three topics that link the human immune system and cancer. First, we will explore how common viral and bacterial infections can cause cancer, either by promoting chronic inflammation of the infected organ or through direct cell-transforming events. The examples of tumor-promoting infectious agents to be discussed in detail include the bacterial pathogen *Helicobacter pylori* with its link to stomach cancer, and viruses of the hepatitis B and C, papilloma and Herpes families, which cause liver and cervical cancer and B-cell lymphoma, respectively. The second topic deals with the role of the tumor microenvironment in cancer progression and metastasis. A particular focus here will be on the contribution of specific immune cell compartments, chemokines and the tumor vasculature in both processes. Finally, we will explore the mechanisms that allow certain tumors to prevent anti-tumor immunity and will discuss new treatment strategies that aim to promote anti-tumor immune responses and tumor control.

BIO 257

DNA Metabolism and Cancer (Mo 10-12; 3 ECTS)

DNA of all living organisms is under constant assault by endogenous and exogenous damaging agents. In order to protect their genomes, cells have evolved complex mechanisms that protect them from the deleterious action of these agents, ranging from specific DNA repair pathways, DNA damage tolerance and cell cycle checkpoints to modulation of gene expression. A failure of one or more of these mechanisms increases genome instability, and can lead to disease, cancer and ageing. In this course, the students will gain theoretical knowledge about the cellular mechanisms required to protect genome integrity and avoid malignant transformation. Focusing on defined cancer models, the students will also learn how to identify and study different stages of tumorigenesis, and how the tumor microenvironment contributes to this process. This theoretical course can be complemented by the experimental block course BIO 246 (spring term)

BIO 297

Social Behaviour of Bacteria (Mo 16-18; 3 ECTS)

The view of bacteria as solitary life forms has strong roots in the tradition of culturing bacteria as suspensions in liquid media. In their natural environments, however, bacteria form surface-associated, structured and co-operative consortia, referred to as biofilms. In this lecture two aspects of prokaryotic social behaviour, namely biofilm formation and cell-to-cell communication, are presented and existing links between these two social phenomena are discussed.

This lecture complements the block course BIO 284 "Systemic Microbiology" and is offered as a master course in the Microbiology Curriculum of UZH and ETHZ.

BIO 333

Comparative Physiology und Pharmacology of Sleep (Mo 12-13; 1 ECTS)

A better understanding of mechanisms and function(s) of sleep result from physiological and pharmacological findings, including behaviour and genetics in a broad diversity of creatures (from humans to *Drosophila*) and the application of new techniques. Basic principles and new developments will be discussed.

BIO 336

From DNA to Diversity: the Evolution of Multicellular Organisms (Mo 10-12; 2 ECTS)

A lot has been written about how the fittest organism is selected during evolution. But how is the fittest organism made? In this module, we discuss the developmental mechanisms underlying the evolution of the various body-plans. By comparing the evolution of essential developmental control genes we can investigate the molecular mechanisms leading to animal diversity.

Instead of a written final exam, participants present a selected topic to their peers.

BIO 344

Development of the Nervous System (Mo 8-10, 3 ECTS)

The lecture will cover molecular and cellular processes underlying the development of the nervous system. After an introduction to structure and function of the nervous system, we will discuss neurogenesis, cell death, cell migration and differentiation, axon guidance and synapse formation. The importance of these processes in the context of developmental diseases will be discussed. *Basic knowledge in neurobiology is required, e.g. successful completion of BIO143 or equivalent lecture. This lecture is offered together with ETHZ.*

BIO 348

Concepts of Modern Genetics (Mo 12:30-14:00 [ETH Hönggerberg], Di 7:45-9:30 [Unirchel] and homework; 6 ECTS)

This course focuses on the concepts of modern genetics and genomics. The topics include principles of classical and molecular genetics, analysis of developmental processes, gene mapping, reverse genetics, epigenetics and RNA interference.

This module is required for participants of the experimental block course BIO 323, but it addresses also those students who wish to take only the lecture. In this module, presence during lectures, tests, and additional home work are required. Time input is on average about six hours per week. Lectures are in English. This course is offered together with ETHZ, 551-0309-00L, registration via ETHZ (see link VVZ).

BIO 390

Introduction to Bioinformatics (Di 8-10; 3 ECTS)

The handling and analysis of biological data using computational methods has become an essential part in most areas of biology. In this lecture, students will be introduced to uses of bioinformatics tools and in different topics, such as molecular resources and databases, standards and ontologies, sequence and high-performance genome analysis, biological networks, molecular dynamics, proteomics, evolutionary biology and gene regulation. *Prerequisites: Introductory molecular biology (BIO111 or similar) BIO123 Quantitative and molecular systems biology.*

BIO 416

Microscopy (Di 10-12, 3 ECTS)

Microscopy is central in research and diagnosis. The basic theoretical background of light- and electron microscopy will be discussed, as well as practical applications ranging from normal imaging to high resolution and intravital imaging. Concepts of image processing relevant to microscopy are part of the lecture.

BIO 437

Human Adaptation (Di 10-12, 3 ECTS)

Humans have to adapt to various factors such as the environment, disease load or culture. Human body morphology and genetics thus undergoes a permanent evolution. The aim of this lecture series is to address the whole range of influencing factors and the subsequent adaptations in humans. A particular focus is laid on physiological and pathological processes.

BIO 438

Methods in Human Bioarcheology (Di 8-10, 3 ECTS)

This course covers basic knowledge, which is necessary for an in-depth analyses of human osseous remains, both from an archaeological and biological perspective. This includes a.o. anatomical identifications, imaging techniques, pathological diagnoses as well as the value of bone for morphological, functional and molecular interpretations, e.g. information on individual life histories as well practical exercises.

BIO 615

Virology: Principles of Molecular Biology, Pathogenesis, and Control of Human Viruses (Mo 8–10, 3 ECTS)

Goal of the lecture series is to discuss the molecular biology, pathogenesis and control of human viruses. Topics of the lectures are (i) a brief introduction into human virology (classification, structures, genomes replication strategies of DNA and RNA viruses (ii) detailed molecular biology of the life cycles of viruses (iii) Basic principles of infection, transmission, tropism of human viruses (iv)) Biology of individual pathogenic human viruses, including influenza, HIV, Herpes, Polio, hepatitis viruses, and prions. (v) Viral strategies for the evasion of the natural and adaptive immune system (vi) Epidemiology and evolution of viruses (vii) Vaccines and antiviral compounds. *Exam: 17.1.2024, 14-15; BIO 615 is strongly recommended for participation in BIO 372, either antecedent or concomitantly*

BIO 632

Introductory course in flow cytometry (31.10.-2.11., 9-18, 1 ECTS)

The course delivers a systematic introduction to the flow cytometry through series of lectures combined with hands-on sessions. The basic concepts covered include fluorescence, fluorochrome structure and spectral features, instrument layout and detection of fluorescence, controls in flow cytometry, data structure and visualization and principles of manual data analysis. The hands-on session focuses on immunophenotyping.

Further information: <http://www.cytometry.uzh.ch/en/index-fcf/Education>

Registration via Homepage: <https://www.cytometry.uzh.ch/en/index-fcf/Education/Bio-632-Introductory-Course.html>

BME 311

Animal experimentation and alternative methods in biomedical research (Di 17:30-19:30, 3 ECTS)

In research, it is crucial to find the right methods to answer scientific questions. In this lecture, we will take a closer look at methods and models that are often used in biomedical research. Our focus here is on animal experiments and alternatives to these like 3D cell culture or in silico approaches. The quality of science (study design, transferability, validity, scientific rigor, open science) and science ethics issues (animal ethics, biomedical ethics, 3Rs and animal welfare) will also be discussed. *Only MSc*

BME 316

Glycosylation (Mo 13-15, 3 ECTS)

The course provides an in-depth coverage of the biology of glycosylation in all domains of life. Focus is set on the structures and functions of glycans in health and disease. The role of glycosylation in protein folding and trafficking, in pathogen recognition, in diseases such as inherited disorders and cancer will be discussed. Model organisms and analytical methods will also be presented.

Solid background in molecular and cell biology

BME 317

Metabolism and Nutrition (Mo 15-17, 3 ECTS)

After an introduction into the concepts of metabolism and nutrition, the subsequent topics will be energy metabolism, role of macronutrients in energy homeostasis, the metabolic challenges of pregnancy and lactation, of growth, physical exercise and of ageing, and specific nutrient requirements of the brain. Further, the control of energy metabolism by the brain (homeostatic and hedonic systems) and the periphery will be discussed. Finally, dysmetabolic situations and their influence on the cardiovascular system and in cancer cachexia will be discussed. The course format will be based on 1-h lectures (based on the Textbook: *Nutrition and Metabolism* edited by Susan A. Lanham-New, Ian A. Macdonald, Helen M. Roche) and 1-h journal clubs presented by students on the corresponding topic using recent literature.

BME 322

Molecular and Cellular Neurobiology (Mo 13-15, 3 ECTS)

This lecture gives insight into the molecular and cellular bases of neurotransmission and signal transduction in the CNS, including sensory neurons (retina, olfactory epithelium), beyond the basic concepts covered in the "Grundstudium" (BIO143). The main topics include the structure and function of ion channels and receptors, the biochemical basis of synaptic neurotransmission, the functional properties of neurons and glial cells, and the principles of intra- and extracellular signal transduction. *Prerequisite: basic knowledge in Neurobiology (BIO 143 or equivalent) recommended: Physiologie & Anatomie I & II, other modules of interest: BIO 344, BIO 343, BME 302.*

BME 324

Basics in Human Toxicology (Mo 15-17, 2 ECTS)

Introduction, sub-disciplines in toxicology; routes of exposure and dose-response relationship; quality of toxic effects; toxicokinetics, xenobiotic metabolism; basic principles of risk assessment and evaluation; chemical carcinogenesis; toxic effects of selected compounds: pesticides, metals, polyhalogenated hydrocarbons, solvents, inhalation toxins, tobacco toxins; hormonal disruptors; natural compounds.

Prerequisites: a solid background in biochemistry and basic knowledge in organic chemistry

245-503

Geschlecht und Biologie (Do 10-12; 3 ECTS)

In der Vorlesung wird zunächst auf biologische Grundlagen der Sexualität eingegangen (Fortpflanzungsarten, Genetik, Geschlechtsdifferenzierung, Reproduktionsphysiologie). Danach werden ultimate und proximate Aspekte der Sexualität adressiert (Evolutionbiologie von Geschlechtsunterschieden und Lebenszyklusstrategien). Der Fokus liegt dabei auf Säugetieren, im speziellen auf Primaten. Eine Zusammenschau aus Primatologie, Anthropologie und Psychologie wird die Vorlesung abrunden (Sozialstrukturen der Primaten, Evolutionbiologie menschlichen Verhaltens, evolutionär-psychologische Aspekte). *Die Vorlesung stellt im Rahmen des Master-Nebenfachs "Gender Studies" ein Pflichtmodul dar. Die Vorlesung ist auch für Studierende mit wenigen Biologiekenntnissen geeignet. Unterrichtssprache Deutsch.*

Weitere Module, die im WP 3 angerechnet werden können:

BIO 412: Introductory Course in Laboratory Animal Science, nur MSc (LTK Modul 1) (irregular, 2 ECTS)

BIO 609: Introduction to UNIX/Linux and Bash Scripting, nur MSc (HS, 1 day; 1 ECTS)

BIO 610: Next-Generation Sequencing for Model and Non-Model Species, nur MSc (HS, 2 days; 1 ECTS)

BIO 617: Principles of Biosafety in Medical and Biological Research (Jan und July, 2 days; 1 ECTS)

BIO 629: Advanced Course in Flow Cytometry (January, 4 days, 1 ECTS)

BIO 632: Introductory Course in Flow Cytometry (Oct.-Nov., 3 days, 1 ECTS)

BIO 708: Gene Therapy from bench to bedside - Theory (Febr., 4 Tage; 2 ECTS)

BME 321: Design of Experiments, (3 days in Febr., 1 ECTS)

BME 410: Scientific Writing and Publishing, nur Biomedicine MSc (HS, Mo 16-18, 4 ECTS)

CHE 324: Chemistry of Metals in Life Processes (FS, Mo 13-15, Di / Mi 12-13, 4 ECTS)

CHE 717: Perspektiven in forensischen Wissenschaften (HS, Do 16-17:30, 2 ECTS)

ETH 227-0917: Computational Psychiatry (6 days in September; 3 ECTS)

Stand: 11.08.2023

Alle Informationen, immer auf dem neuesten Stand, finden sich auch im

Vorlesungsverzeichnis: <https://studentservices.uzh.ch/uzh/anonym/vvz/index.html>