Bachelor Biomedical Sciences

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Major

Competence Biomedical Expert

Fac. Health, Medicine and Life Sciences

The LEGO Bricks of Life

Full course description

This course focuses on the question how biomolecules impact biology as a whole, up to the level of populations and processes as complex as evolution. The course starts with the study of the structures and functions of major biomolecules (nucleic acids, proteins, fats and sugars), and how these form the building bricks for organelles, cells, organs, and organisms. Special emphasis is placed on natural changes in DNA sequences that subsequently alter protein structure and function, and thereby affect the proper function of cells, organs, organisms and populations.

Course objectives

Intended Learning Outcomes (ILOs)

- ILO1 Define different forms of life
- ILO2 Explain evolutionary mechanisms of random events and selection pressure and their effects on protein evolution
- ILO3 Describe the macromolecules of life (nucleic acid, proteins, fats and sugars) and explain how their structure relates to their function
- ILO4 Explain how organelles (Golgi apparatus, mitochondria) contribute to cell homeostasis (structure-function relationships)
- ILO5 Demonstrate why the effects of random events may have a bigger impact in a bacterium than in a eukaryotic cell
- ILO6 Explain cellular communication and its role in the specialization of cells – a prerequisite for tissue formation
- ILO7 Explain how tissues form organs with specific function

Recommended reading

This is the link to Keylinks, our online reference list.

BBS1001
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:

Bachelor Biomedical Sciences

7.0
Instruction language:
English
Coordinator:

- S.G.J. van Breda

Teaching methods:
Assignment(s), Work in subgroups, Lecture(s), Paper(s), PBL, Research, Skills, Presentation(s), Training(s)
Assessment methods:
Assignment, Attendance, Final paper, Participation, Portfolio, Written exam
Keywords:
macromolecules DNA RNA protein cell structure and function basic genetics basic molecular biology evolution inheritance
Fac. Health, Medicine and Life Sciences

Homeostasis and Organ Systems

Full course description

In this course, the role of several major organ systems in the maintenance of homeostasis will be studied. The focus will be on the blood circulation, the heart and lungs, and the gastro-intestinal and renal systems. The interaction and communication between these organ systems will also be studied. The central theme is how important nutrients of life, for example oxygen and water, are distributed throughout the body and how regulatory systems such as the autonomic nervous system and hormones maintain steady oxygen and fluid levels and regulate movement of gases, water and wastes between compartments. Main physiological processes, such as digestion, uptake, filtration, reabsorption, secretion and excretion, as well as maintenance of the acid-base balance, will be discussed. The practical trainings will further guide understanding of normal structure and function of the organ systems, and are tailored to the learning objectives discussed in the tutorial groups. There are two practical trainings: spirometry and blood pressure measurements, and creatinine clearance measurement. In addition there will be anatomy and virtual microscopy sessions for the main organ systems. Insights from these sessions will be used in the tutorials. The tutorial groups will be planned in the first six weeks of the course. In the last two weeks of the course, students will work in small groups on the Academic project, where knowledge and understanding of normal physiology of the organ systems and regulatory mechanisms will be used to go into more depth by studying disturbances of homeostasis. The groups will propose a research question on a (selected) disturbance of homeostasis and design a computer-simulated experiment to test this hypothesis. Findings will be presented within a small group setting.

Course objectives

- B-ILO1: Describes the nutrients of life and how they enter the system
- B-ILO2: Describes the role of the circulation in transporting nutrients to the various organs and explain the various transport mechanismB-ILO2:
- B-ILO3: Explains how the structure of the cardiovascular and pulmonary systems enable and regulate gas exchange
- B-ILO4: Explains how the Bauplan of the gastro-intestinal tract facilitates passing of food through the body and to its accessory organs

- B-ILO5: Explains the role of the urinary and renal system in excretion and reabsorption of water and in maintaining the acid base balance and regulating blood pressure
- B-ILO6: Describes how communication between organ systems ensures homeostasis of the organisms

- C-ILO1: Adjusts communication written or oral, to specific global audience/readership and international setting
- C-ILO2: Communicates professionally with peers and staff originating from diverse cultural and disciplinary backgrounds
- C-ILO3: Shows awareness of team roles and takes responsibly her/his position in a diversely composed international team
- C-ILO4: Works effectively in an international and intercultural team

- I-ILO1: Summarizes and reflects on social, political, international and normative issues in the biomedical science
- I-ILO2: Understands the values of and is able to apply scientific method to obtain academic knowledge, understanding and insight
- I-ILO3: Has developed a critical approach to scientific knowledge
- I-ILO4: Designs and rationalizes an biomedical experiment

- P-ILO1: Summarizes and reflects on social, political, international and normative issues in the biomedical science
- P-ILO2: Understands the values of and is able to apply scientific method to obtain academic knowledge, understanding and insight
- P-ILO3: Has developed a critical approach to scientific knowledge
- P-ILO4: Designs and rationalizes an biomedical experiment

Recommended reading

This is the link to Keylinks, our online reference list.

BBS1002
Period 2
28 Oct 2024
20 Dec 2024
Print course description
ECTS credits:
7.0
Instruction language:
English
Coordinator:

- D. Neumann

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentation(s), Skills, Training(s)
Assessment methods:
Attendance, Computer test, Portfolio, Presentation, Written exam
Fac. Health, Medicine and Life Sciences

Bachelor Biomedical Sciences

Practicals Homeostasis and Organ Systems

BBS1102
Period 2
28 Oct 2024
20 Dec 2024
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- D. Neumann

Fac. Health, Medicine and Life Sciences

Brain, Behavior and Movement

Full course description

This course is dedicated to the human capacity to perceive, act and move within a constantly changing environment. Being able to integrate incoming information and to react to it properly, e.g. by changing position or by executing an action, is an essential and distinctive feature of all human and animal life. Adequate, adaptive movement requires sensing, coordination, action generation and monitoring the result of the action. This course addresses all of these features by looking into the organization of and communication within the brain, sensory perception, how we learn and memorize, experience stress, make decisions, and move.

Course objectives

- B-ILO1004.1. Relate body functions to the outline of the nervous system
- B-ILO1004.2. Describe how humans sense and control their position and movement in the environment
- B-ILO1004.3. Describe the control of goal-directed behavior
- B-ILO1004.4. Explain how neurotransmitters and hormones facilitate neuronal and neuromuscular communication
- B-ILO1004.5. Explain how variation in neural activation affects muscle forces
- B-ILO1004.6. Compute the force generated by a muscle-tendon complex given its morphology and its actual state
- B-ILO1004.7. Relate the function of a muscle to its position in a musculoskeletal system
- B-ILO1004.8. Explain the molecular, cellular and structural mechanisms underlying learning and memory formation
- B-ILO1004.9. Explain how the brain and body deals with exposure to acute and chronic stress and how this relates to fear and anxiety.

Recommended reading

This is the link to Keylinks, our online reference list.

Bachelor Biomedical Sciences

BBS1004
Period 4
3 Feb 2025
4 Apr 2025
Print course description
ECTS credits:
7.0
Instruction language:
English
Coordinator:

- N.K. Leibold

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentations, Skills
Assessment methods:
Attendance, Final paper, Participation, Portfolio, Presentation, Written exam
Keywords:
Neuroanatomy, Sensory systems, Movement, Muscles, Postural control, Neuromechanics, Behavior, cognition, affect
Fac. Health, Medicine and Life Sciences

Human Genetics, Reproduction and Prenatal Development

Full course description

During the BBS1005 course entitled “Human Genetics, Reproduction, and Prenatal Development” we will follow two lines that will be linked to each other:

1. Basic mechanisms of the cellular life cycle, cellular interaction, and human genetics
2. Mechanisms of human reproduction and embryonic development

We will start studying the first differentiation steps from gametogenesis via fertilization to very early embryonic development. This will be linked to the general concept of cell cycle regulation, cellular differentiation, and types of mutations, which may accompany these processes. In addition, gene regulation, epigenetics, and posttranslational mechanisms as key players in differentiation will be discussed. The students will learn about the general body plan (segmentation, symmetry, body axes, development of the extremities) and the development of different organ systems (e.g. the gut, limb, and heart). Thereby concepts of cell-cell signaling, receptor-ligand interaction, and the influence of hormones as mechanisms included in the development will be discussed. In addition, apoptosis as a mechanism included in forming of the body will be shown.

Students will be able to explain several disruptions during development and morphogenesis leading to congenital pathologies and disturbances in function. During the practical training, students will compare the “normal” human anatomy to (pathological) variations originating from aberrant human development.

There are many ethical questions around human reproduction and development as in-vitro-fertilization, embryo selection, prenatal screening, and increasing availability of genetic data. Their chances and risks will be discussed. In this context, students will learn about the possibilities to detect and treat a monogenic disease and will be able to train in associated laboratory techniques.

Students will be made aware of the resulting inter-generational responsibility in Philosophy in Action I (BBS1008). Details of cell cycle regulation and differentiation will deepen the knowledge of DNA (structure and replication), and RNA (transcription and translation) students acquired in BBS1001- “The LEGO bricks of life”.

Concerning the development of different organ systems, we will deepen the knowledge of anatomy and physiology, which students acquired in BBS1002 – “Basis Homeostasis and organ systems” and BBS1004 – “Brain Function, Behavior, and Motivation”.

Course objectives

- Describe how human reproduction works at the level of organ structure, function and regulation
- Describe prenatal human development from fertilisation to organogenesis
- Describe molecular mechanisms that govern proliferation and differentiation
- Explain the levels at which expression of genetic information works
- Produce a functioning expression construct by applying bioinformatics, recombinant DNA and biochemical technology

Recommended reading

This is the link to Keylinks, our online reference list.

BBS1005
Period 5
7 Apr 2025
6 Jun 2025
Print course description
ECTS credits:
7.0
Instruction language:
English
Coordinator:

- S.L.M. Steinbusch - Coort

Teaching methods:
Work in subgroups, Lecture(s), PBL, Presentation(s), Skills, Training(s)
Assessment methods:
Assignment, Attendance, Participation, Presentation, Written exam
Keywords:
Gametogenesis - Blastocyst - Implantation Mutations Cell-Cycle-Regulation Gene-Expression-Regulation Cell-Signaling Epigenetics Early_Body_Plan-Limb_Development Organogenesis MicroRNA
Fac. Health, Medicine and Life Sciences

Practicals Human Genetics, Reproduction

Full course description

Practical 1: Anatomy - Blastocyst development/Implantation/Early development

Students will learn about the development during week 1-4 of embryonic development. They will study how to judge the adequate development during foetal and embryonic period.

Practical 2: Anatomy - Body Plan + Gut

Students will study general aspects of the body plan and will have a special look on the macroscopy of the gut system.

Practical 3: Anatomy - Sexual differentiation - virtual microscopy

Development of the gonads and differentiation of germ cells will be studied.

Practical 4: Anatomy sexual organs

Students will study the topography of the sexual organs in focusing on developmental aspects.

Practical 5: Development of the heart

Students will study the the heart in focusing on developmental aspects.

Lab practical 1: DNA isolation quality and PCF

Student will isolation of genomic DNA from buccal cells. Student will analyse the concentration of their DNA and perform a Polymerase Reaction (PCR) for Clade Marker M270.

Computer practical: Online Mendelian Inheritance in Man (OMIM) and NEBcutter

Student will learn how to browse and interpret OMIM entries and they will learn how to use NEBcutter for restriction enzyme analysis.

Lab practical 2: DNA visualization

Student will perform restriction enzyme digestion and will visualize the experimental products with gel electrophoresis

Recommended reading

Embryology S.F. Gilbert: Developmental Biology (10th & 11th ed.). Sinauer Ass., Sunderland, 2006/2011. W. J. Larsen: Human Embryology, 3rd/4th edition (2001/2008) Moore and Persaud “The developing human” 8th edition 2008, 9th edition 2012 Langmans medical embryology 11th / 12th edition 2008/2011 Carlson “Human embryology and developmental biology” 5th edition Elsevier Saunders Films embryonic development (available via ELEUM anatomical site under “Course Materials”) Physiology Silverthorn DU: Human Physiology, 5th ed., 2009, Prentice Hall, Pearson, San Francisco, USA ; ISBN-13 9780321559395 / 6th edition 2012 / ISBN 9780321798619 Alberts et al.: Molecular Biology of the Cell. 5th ed. 2007) Garland Science Macroscopic anatomy - atlases Prometheus: Atlas of human anatomy Sobotta: Atlas of human anatomy Virtual microscopy A.L. Kierszenbaum: Histology and Cell Biology, an Introduction to Pathology. Mosby, St. Louis, 2002; 3e editie 2011 / ISBN 9780323078429 Ross, Pawlina: Histology a text and atlas (6th) Lippincott Williams and Wilkins Molecular biology Lewine 3rd edition: Cells Alberts, 6th edition, Molecular

Bachelor Biomedical Sciences

Biology of the Cell Lodish, 7th edition, Molecular Cell Biology:

BBS1105
Period 5
7 Apr 2025
6 Jun 2025
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- S.L.M. Steinbusch - Coort

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Skills, Training(s), PBL
Assessment methods:
Written exam
Keywords:
early human development organogenesis virtual microscopy gross anatomy lab techniques - analysis of the genetic code find online information on the genetic code
Fac. Health, Medicine and Life Sciences

Threats and Defence Mechanisms

Full course description

In this course, different types of threats coming from outside the body, including injury, infections (bacterial, viral, parasitic) and toxins, are analyzed and integrated with the appropriate defence mechanisms. The most relevant entry sites with regard to these threats are the skin, the airways and the gastrointestinal tract. Different threats and different sites of entry (skin, lung, gut) require a diversity of defence mechanisms.

Hemostasis, inflammation and wound healing are the defence mechanisms against injury and bleeding. Physical, chemical and biological barriers, complement activation, inflammation, and phagocytosis form the first defence mechanisms against invading micro-organisms. Reactive oxygen species are formed by phagocytes to deal with micro-organisms. Also in response to air pollution and nanoparticles, reactive oxygen species are an important defence mechanism. A second line of defence, as well as memory for future threats, is provided by different T- or B-lymphocyte subsets and antibodies. Each of these responses need to be well controlled by homeostatic processes to downregulate the reaction once the threat is conquered. Furthermore, orchestration of all defence mechanisms in order to obtain the most effective response against each type of invading micro-organisms requires optimal communication between immune cells. Consequently, central themes in all defence mechanisms are intra- and intercellular communication and homeostatic responses.

Course objectives

1. Describe the mechanisms of haemostasis and thrombosis in injury and wound healing
2. Explain the pathogenesis of bacterial, viral and parasitic infections
3. Explain the innate immune responses, including recognition of damage and micro-organisms,

the inflammatory process and the role of complement, neutrophils, macrophages and NK cells
4. Explain the adaptive immune responses, including recognition of antigens by B and T cells, T and B cell activation, T helper subset differentiation, isotype switching and the effector function of T helper cells, antibodies and cytotoxic T cells
5. Explain defence against xenobiotics, including particulate matter and reactive oxygen species and antioxidants in toxicological defences
6. Explain the mechanisms underlying antibiotics and the threat of antibiotics resistance

Recommended reading

This is the link to Keylinks, our online reference list.

BBS2001
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
6.0
Instruction language:
English
Coordinator:

- R.R. Koenen

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, PBL, Presentations, Skills, Training(s)
Assessment methods:
Attendance, Participation, Written exam
Keywords:
Hemostasis Thrombosis Innate immune system Adaptive immune system Microbiology Bacteria Viruses Toxicology Antibiotics
Fac. Health, Medicine and Life Sciences

From Cradle to Grave: Development, Ageing and Disease

Full course description

This course is dedicated to post-natal development, ageing and development of (age related) disease. Aspects of the respiratory and musculoskeletal systems, as well as sexual development, motor development and brain maturation and cognitive development will be explained at the molecular, cellular and functional level. At the other side of the spectrum of ‘living’, human ageing and the associated functional decline of various systems will be illustrated. In addition, during the course risk factors (genetic, lifestyle, environment) that affect development, ageing and (ageing related) disease will be discussed. In parallel the SoPhiA longitudinal track will be teached during this period (BBS2008-part I). Sophia focuses on normative aspects of prevention of (later onset)) disease, which are linked to the content of the course BBS2002

Course objectives

B-ILO2002.1 Describe post-natal development

1. Describe physical growth (muscle and bone) and sexual maturation
2. Describe the effect of hormones on physical growth and sexual maturation
3. Describe the post-natal development of the organ systems such as lung and brain on cellular, structural and functional level

B-ILO2002.2 Describe the ageing process, explain its underlying biological mechanisms and functional consequences

1. Describe the evolutionary theories of ageing and use them to explain the ageing process
2. Describe maintenance and repair mechanisms and explain how homeostasis changes with ageing
3. Describe the hallmarks of ageing (molecular and cellular) and use them to explain the ageing process
4. Explain the functional consequences of ageing with respect to muscle and bone, brain, organ systems and immune system

B-ILO2002.3 Describe the pathogenesis and explain risk factors of specific age related diseases

1. Explain the interplay between stem cells, stress, ageing and disease such as cancer.
2. Describe age related diseases (such as neurodegenerative disease, lung disease, musculoskeletal decline) and explain the relationship with the hallmarks of ageing.
3. Explain risk factors of specific age related diseases
4. Explain potential interventions to support healthy ageing

B-ILO2002.4 Explain the effect of genetics, lifestyle and environmental factors in post-natal development, the ageing process and the pathogenesis of age related diseases

Recommended reading

This is the link to Keylinks, our online reference list.

BBS2002
Period 2
28 Oct 2024
20 Dec 2024
Print course description
ECTS credits:
6.0
Instruction language:
English
Coordinators:

- M.W. Nabben
- M.M.P.C. Donners

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentations, Skills, Training(s)

Bachelor Biomedical Sciences

Assessment methods:
Assignment, Attendance, Final paper, Participation, Presentation, Written exam, Computer test
Fac. Health, Medicine and Life Sciences

Human Intermediary Metabolism

Full course description

Fat, carbohydrates and proteins are major constituents of the human diet. These three macronutrients are ultimately converted or stored as energy by a wide variety of different metabolic pathways. First, the digestion, uptake, and transport of macronutrients from the intestinal tract to various organs and tissues will be addressed. This will include the enzymatic breakdown of macromolecules in the gastro-intestinal tract, and the transport and uptake of nutrients by various target organs. The nutrients also induce the secretion of signaling molecules: molecules secreted by one organ can modulate metabolism in another organ. Examples of such cross-talk between organs will be discussed. The nutrients will ultimately be used as a source of energy and key concepts of energy production in different tissues will be examined. In addition, methods and principles used to measure energy metabolism during rest and exercise will be discussed. Substrate metabolism also depends on factors like vitamins and minerals. The importance of these (co)-factors will be discussed especially by referring to the role of B-vitamins in amino acid and iron metabolism. Finally, it is clear that inter-individual variation in substrate metabolism exists. It will be highlighted how this variability is related to differences in body composition, sex, and genetic background. Ultimately, this knowledge is translated into dietary recommendations. Insight will be provided on how these recommendations are derived for different groups of people and if it is already possible to recommend personalized nutrition.

Course objectives

- To describe the digestion, uptake and transport of macronutrients and dietary fibres from the intestinal tract into the various organs and tissues To explain the cross-talk between the various organs and tissues in human substrate metabolism during the fasted and postprandial phase
- To apply principles of human energy and substrate metabolism during rest and exercise
- To integrate the role vitamins and micronutrients in human substrate metabolism
- To identify causes of inter-individual variation in human substrate metabolism
- To explain the basis for dietary recommendation

Recommended reading

This is the link to Keylinks, our online reference list.

BBS2041
Period 4
3 Feb 2025
4 Apr 2025
Print course description
ECTS credits:
6.0
Instruction language:

Bachelor Biomedical Sciences

English
Coordinator:

- M.K.C. Hesselink

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, PBL, Presentation(s), Research, Paper(s)
Assessment methods:
Attendance, Participation, Presentation, Written exam, Final paper
Keywords:
nutrition, physical activity, metabolism, energy expenditure, inter-individual variation, dietary recommendations
Fac. Health, Medicine and Life Sciences

Cell Signaling

Full course description

- B-ILO1 Define different cell-cell communication routes
- B-ILO2 Describe the functions of cell-derived signalling molecules
- B-ILO3 Explain the three major cellular signalling transduction mediators
- B-ILO4 Understand the consequences of alterations in external signalling molecules (nutrients, hormones, xenobiotics)
- B-ILO5 Define the integration and dynamics of different cell signalling pathways
- B-ILO6 Understand the application of recent biotechnology techniques in cell signalling research
- B-ILO7 Relate altered cell signalling to pathological development

Recommended reading

This is the link to Keylinks, our online reference list.

BBS2042
Period 4
3 Feb 2025
4 Apr 2025
Print course description
ECTS credits:
6.0
Instruction language:
English
Coordinator:

- N.L. Reynaert

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentations, Training(s), Working visit(s)
Assessment methods:
Assignment, Attendance, Final paper, Participation, Written exam
Keywords:

Bachelor Biomedical Sciences

Cellular communication routes Signal transduction Pathological development Recent biotechnology techniques
Fac. Health, Medicine and Life Sciences

Biorhythms in Homeostasis

Full course description

The ability to maintain homeostasis is a prerequisite for life in general. Embedded in homeostatic control lays rhythmic control which help to maintain body and cellular function, but are also important to adjust the human body to rhythms that are enforced on us by nature, of which day and night is the best-known example. Next to these environmental factors, also other external stimuli threaten homeostasis of the human body.

During this course, the knowledge gained from the first-year course "Homeostasis and organ systems" (BBS1002) will be refreshed and extended. The basic principles of hormonal, neural and other regulation systems will be studied around the overarching theme of body weight regulation. The regulation of body weight starts at the level of the nucleus and cell, where gene transcription is regulated by the molecular clock, leading to rhythmicity in gene expression patterns. At the organ level, hormones, including adipokines are secreted to regulate metabolic processes that are involved in the maintenance of body weight. At a macro level, body weight is also regulated by patterns of physical activity, food intake and energy homeostasis (supply and demand). A complicating factor in body weight regulation in humans are societal, cultural and environmental factors that also affect body weight, and these environmental factors may be exposed on us in a rhythmic manner too. Students will learn the basics of the regulation factors in the form of six cases, supported by one lecture per theme. An important part of the course consists of applying knowledge in projects, around four different themes. In every theme, approximately 8 students will work together. The product of the project teams is two-fold: a scientific report and the formulation and presentation of a dissemination strategy (podcast, movie, poster…) for peers and stakeholders (patients, industrial partners, lay people, health professionals etc.).

Course objectives

- B-ILO1 Understands the concept of regulatory systems and how positive and negative feedback systems function in maintaining homeostasis
- B-ILO2 Understands the concept of rhythmicity at different levels (molecular, circadian, seasonal) and how this affects regulatory systems
- B-ILO3 Integrates short- and long-term regulatory systems and rhythmicity into body weight regulation
- B-ILO4 Argues how challenges to the control system result in dysregulation and adaptation to a new set-point which can be modulated by interventions (pharmaca, lifestyle)
- B-ILO5 Discusses how external cues challenge the regulatory system
- B-ILO6 Applies acquired knowledge of control systems in a predefined scenario and translates this into advice to stakeholder/intended population

Recommended reading

This is the link to Keylinks, our online reference list.

Bachelor Biomedical Sciences

BBS2051
Period 5
7 Apr 2025
6 Jun 2025
Print course description
ECTS credits:
6.0
Instruction language:
English
Coordinator:

- M. Buitinga

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentations, Training(s)
Assessment methods:
Assignment, Attendance, Participation, Presentation, Written exam
Fac. Health, Medicine and Life Sciences

Neuromuscular Control of Movement

Full course description

The course neuromuscular control of human movement seeks to understand how muscles, sense organs, motor pattern generators, and brain interact to produce coordinated movement. Applications of this field include ameliorating human health problems, e.g., restoration of movement following brain or spinal cord injury and prosthetic design. Additionally, understanding the remarkable performance that humans can achieve in sports. Conceptually, the key element of neuromuscular control is the emergent cooperation of the neural system (sensors and CNS) and the biomechanical system (muscles and bones). A key goal is dynamic tuning of all systems to create stable and effective locomotor behavior in a continuous interaction with the environment.

In this course specific aspects of human movement (e.g. walking, running, jumping) are addressed to elucidate the basic principles underlying neuromuscular control. Proper execution of an intended task requires a complex intermuscular coordination, involving both neuronal sensing of movement and neuronal control of the muscular motors. Topics that will be addressed in the course are: neural pathways involved in human movement, structure and function of the musculoskeletal system, control schemes for upright stance, but also stable and efficient walking and running. Furthermore, the course will address how knowledge on neuromuscular control can help to understand the limitations that certain patient groups experience and to improve performance via motor learning strategies and external aids. Such knowledge is of vital importance for biomedical scientists that want to contribute to (para) medical disciplines like neurology, orthopedics, physical therapy, sports medicine or rehabilitation medicine.

The course is an introduction into the neuromuscular control of human posture and movement. It requires a basic understanding of the anatomical structures and functional units of the neuromuscular skeletal system, which has been addressed in BBS1004 Brain and Movement. The course also includes statistics, which is an extension to the statistical skills developed in courses BBS1003 and BBS2001.

Course objectives

- To describe the neural structures and pathways involved in human posture and movement B-ILO1
- To describe the functional units of the musculoskeletal system B-ILO2
- To apply mechanical principles to solve human movement problems B-ILO3
- To explain how central nervous system, sense organs and musculoskeletal systems work together to produce coordinated movement B-ILO4
- To interpret human movement in terms of: B-ILO5
  Effects of pathology on locomotion, e.g. stroke and prostheses
  Economy and stability
- To apply the principles of neural control and mechanics in a selected field (project) B-ILO6

Recommended reading

This is the link to Keylinks, our online reference list.

BBS2052
Period 5
7 Apr 2025
6 Jun 2025
Print course description
ECTS credits:
6.0
Instruction language:
English
Coordinator:

- C. McCrum

Teaching methods:
Assignment(s), Work in subgroups, Lecture(s), PBL, Presentations
Assessment methods:
Assignment, Written exam
Fac. Health, Medicine and Life Sciences

Systems Biology

Full course description

With the progress of genome sequencing and other -omics technologies, a wealth of multi-level data on the molecular nature of biological systems is being generated. Systems biology is a new approach to biological and biomedical research based on a more holistic perspective and relying on the use of mathematical and computational tools, complementing experiments in the lab. In biomedical science, ‘omics’ approaches have changed several paradigms, in particular, the use of single biomarkers in diagnostics and prognostics is shifting to the use of biomarker signatures, and the integration of different ‘omics’ data.

In this course, some basic knowledge and tools used in ‘systems biology’ will be taught including pathway and network analysis, metabolic modeling, and patient subtyping. The approaches will be applied to study the detailed molecular mechanisms affected in breast cancer patients.

Course objectives

- Understand the added value of systems biology in biomedical research
- Describe how systems biology can help improve healthcare (in terms of better diagnosis, improved prognosis and personalized treatment)
- Use and process the relevant experimental datasets and information sources to solve problems/answer research questions with systems biology approaches
- Select the correct computational methods and tools to answer biomedical research questions using systems biology approaches

Recommended reading

This is the link to Keylinks, our online reference list.

BBS2061
Period 6
9 Jun 2025
4 Jul 2025
Print course description
ECTS credits:
5.0
Instruction language:
English
Coordinator:

- M. Summer - Kutmon

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, PBL, Presentations, Research, Skills, Training(s)
Assessment methods:
Assignment, Attendance, Final paper, Participation, Presentation
Keywords:
SYSTEM BIOLOGY BREAST CANCER BIOLOGICAL PATHWAYS METABOLIC PATHWAYS MOLECULAR NETWORKS CLASSIFICATION PROGNOSIS DRUG RESPONSE DATA ANALYSIS
Fac. Health, Medicine and Life Sciences

Allometry

Full course description

In a strict sense, the term 'allometry' originally referred to the scaling relationship between the size of a body part and the size of the body as a whole. More broadly, allometry is concerned with biological scaling relationships in general, including morphological traits (e.g. the relationship between brain size and body size), physiological traits (e.g. the relationship between metabolic rate and body size) or even ecological traits (e.g. the relationship between body size and territory size). Indeed, allometric relationships can be described for almost any pair of co-varying biological measurements. For biomedical sciences, such allometric relations (or the deviation thereof) have huge implications for the extrapolation of study data from cells to animals to humans, for example in the field of drug development. In addition, allometry is used to assess or correct for the influence of the variable body size within human study populations.
The course will begin with a general introduction on the influence of body size. Next, specific

examples will be studied to gain a broader understanding of the topic. Examples of allometric relations in biomedical sciences we will study during the PBLs and lectures are skeletal dimensions, cardiac function, energy metabolism, thermoregulation, movement efficiency and pharmacokinetics. Allometric relations within the student population will be determined during the practicals body composition, electrocardiography, gait transition and pharmacokinetics/ pharmacodynamics. In addition, students will collaborate in a project where they explore a variety of topics related to the influence of animal/ body size.

Course objectives

B-ILO1001.1
To understand the nature of allometric scaling laws

B-ILO1001.2
Explain how body size affects body structure

B-ILO1001.3
Explain how body size affects (energy) metabolism

B-ILO1001.4
Know the implications of allometric scaling for biomedical research: how to extrapolate from mouse to man

B-ILO1001.5
Demonstrate taking allometric scaling into account in human studies: how to correct for body size

Recommended reading

This is the link to Keylinks, our online reference list.

BBS2062
Period 6
9 Jun 2025
4 Jul 2025
Print course description
ECTS credits:
5.0
Instruction language:
English
Coordinators:

- S. Verheule
- M.M.J. Caron

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Skills
Assessment methods:
Assignment, Attendance, Presentation, Written exam
Keywords:
Body size Anatomical structure Organ function Metabolism Pharmacokinetics Animal research Clinical studies

Bachelor Biomedical Sciences

Fac. Health, Medicine and Life Sciences

Sensorimotor Behaviour and Neuroplasticity

Full course description

Given the importance of human movement in many aspects of daily life, and arm-hand movements in particular, it is crucial to understand how the brain converts sensory information into goal-directed motor actions. This course provides an in-depth treatment of brain-movement relationships, focusing on sensorimotor transformations that underlie arm reaching and how it can adapt to changing circumstances. Adaptations in movements under changing circumstances are covered with the concept of neuroplasticity, the notion that the brain is dynamic by rewiring itself contingent on task demands and new experiences. Finally, this course invites the students to link the acquired knowledge on sensorimotor transformations with the exciting, surging field of brain-computer interfaces (BCI), which allow compensation for lost motor function, for instance in people suffering from spinal cord injury or stroke.

Course objectives

- Explain sensorimotor transformations underlying arm reaching
- Evaluate the effects of target visibility manipulations on the speed and accuracy of aimed hand movements
- Explain determinants and mechanisms of neuroplasticity associated with motor learning
- Describe basic principles and applications of Brain-Computer Interfaces (BCI)

Recommended reading

This is the link to Keylinks, our online reference list.

BBS2063
Period 6
9 Jun 2025
4 Jul 2025
Print course description
ECTS credits:
5.0
Instruction language:
English
Coordinator:

- J.M.N. Essers

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentations, Research
Assessment methods:
Assignment, Attendance, Final paper, Participation
Keywords:
hand-arm function - sensorimotor control - perception-action coupling - neuroplasticity - brain-computer interfaces

Competence Investigator and Scholar

Fac. Health, Medicine and Life Sciences

Introduction to Statistical Methods for Data Analysis

Full course description

In this course, statistical methods that can be used in all kinds of research problems encountered in Biomedical science are introduced.

The focus is on statistical concepts and techniques that play a role in summarizing and describing observed variables and relationships between variables, as well as generalizing the results for a larger group than the observed group. The first theme of this course is to summarize the observed data. The second theme is the testing concept. The third theme pertains to various basic statistical techniques that are used to analyse observed data.

Some best practice statistical methods will be introduced and are considered as standard methods to deal with the above stated questions.

Course objectives

Important learning goals in this course are:

- Knowledge of descriptive statistics (including frequency, average, median, standard deviation, cross-classified table among others).
- Knowledge of the principles of inferential statistics, such as population distribution, sample distribution, sampling distribution, central limit theorem, hypothesis testing, p-value, and confidence interval.
- Knowledge of the basic principles and concepts of elementary statistical techniques (including t-test, chi-square test, and simple linear regression).
- Knowledge of the differences and similarities between the various basic techniques (such as a t-test and simple linear regression).
- Ability to perform a simple test (t-test, chi-square test) with SPSS.
- Ability to perform a simple linear regression analysis with SPSS.
- Ability to interpret adequately the results of the learned statistical analysis in view of the research question and, in doing so, to provide critical comments.

Recommended reading

This is the link to Keylinks, our online reference list.

BBS1003
Period 3
6 Jan 2025
31 Jan 2025
Print course description
ECTS credits:
5.0

Bachelor Biomedical Sciences

Instruction language:
English
Coordinator:

- S. Vanbelle

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, PBL, Presentation(s), Skills
Assessment methods:
Assignment, Written exam
Keywords:
descriptive, Inferential statistics, t-test, chi-square test, simple linear regression, SPSS
Fac. Health, Medicine and Life Sciences

Philosophy in Action I

Full course description

Students will be made aware of the ethical aspects of the possibility to manage reproduction. In addition they will discuss the need to reliable handle the increasing availability of genetic data and the knowledge of genetic and epigenetic mechanisms.

In week 1 students will be introduced to ethics, its role in science and its role in the context of reproductive genetics. In addition, the planning of the symposium and the work on assignment A will be introduced.

During week 1-3 students read scientific and ethical literature one one key, preselected topic, and create a rough draft of the ethical analysis. They can use the Q&A session in week 3 to overcome problems. During week 4 students finalise the analysis and present as a group in a symposium (=Assignment A see below).

In week 5 students will be introduced into the topics of science in society, the context of scientific inquiry regarding e.g. the increasing availability of genetic data. In addition, assignment B (writing assignment see below) will be explained. Students will write a brief reflection on their experiences in the symposium/debate.

During week 6-8 Students will collect questions for discussion meetings taking place in week 6 and work on assignment B. Students have to submit the assignment at the end of week 7.

Groups may rotate/switch/trade assigned topics.

Course objectives

We will work towards attaining the following competence; to be able to summarize and reflect on social, political, international and ethical issues in biomedical science.

Recommended reading

This is the link to Keylinks, our online reference list.

Bachelor Biomedical Sciences

BBS1008
Period 5
7 Apr 2025
6 Jun 2025
Print course description
ECTS credits:
2.0
Instruction language:
English
Coordinator:

- B. Penders

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentation(s)
Assessment methods:
Assignment, Attendance, Participation
Fac. Health, Medicine and Life Sciences

Critical Appraisal of Biomedical Publication

Full course description

Biomedical Sciences covers a broad range of different research approaches and study designs. Results from these studies are reported in articles published in a wide range of journals. Information from these articles is vital for the progression of science. However, a critical view on biomedical publications is necessary to maintain the required level of scientific quality. The design of a study by using the empirical cycle, and the way the study design and results are reported are the main items of the course Critical Appraisal of Biomedical Publications (BBS1006). This course will teach students to recognise and value the diversity of study designs and to critically appraise how results of these studies are reported. The course uses a competency-based approach and will enable students to critically review research quality and methodology as they are used in daily practice. This is done by means of lectures, team-based learning sessions and journal clubs. During this 4-week course students are trained to make so-called critical appraisals of biomedical publications (CABPs) reports. One CABP report will serve as a practice run and will be discussed according to provided feedback. Individual CABP skills will be assessed via an oral examination during the last Journal club session. Since research not only involves correct reporting but also hands-on skills, a lab-skill test and a calculation test will be conducted during the BBS1006 course period. These tests will be assessed but do not count for the BBS1006 course itself. Success in BBS1006 requires a strong collaborative approach to critically assess biomedical publications and research methodology. BBS1006 is assessed with an exam at the end of the course in Testvision using questions that measure critical thinking application and knowledge of concepts involved of the learned CABP process.

Course objectives

- Recognise and describe the empirical cycle in published biomedical articles
- Gain knowledge on the technical aspects of a biomedical publication

- Argue/ value the quality aspects of a biomedical publication with respect to hypothesis, introduction, study design, research methodology, results reporting, results discussion and conclusions.

- Suggest alternatives and solutions related to flaws in publications

- Make supported decisions/ balanced choices when designing a biomedical study

- The students develop a critical attitude towards research methodology

Recommended reading

This is the link to Keylinks, our online reference list.

BBS1006
Period 6
9 Jun 2025
4 Jul 2025
Print course description
ECTS credits:
5.0
Instruction language:
English
Coordinator:

- M.A. Dentener

Teaching methods:
Assignment(s), Work in subgroups, Lecture(s), Presentations, Research, Skills, Training(s)
Assessment methods:
Assignment, Attendance, Participation, Written exam, Oral exam
Keywords:
Critical appraisal, study design, research methodology, (non)experimental studies
Fac. Health, Medicine and Life Sciences

Non-invasive Techniques in Biomedical Research

Full course description

Imaging is a crucial step to visualize and conceptualize important processes in health and disease on various scales, ranging from molecular detail, via cellular and tissue level, towards animal and patient. In this 4-weeks course various invasive and non-invasive imaging techniques, frequently used in both research and clinic, will be introduced and discussed. These techniques are advanced optical microscopy, MS Imaging, MRI/MRS, PET/CT, and Breath/faeces analysis.

Combining lectures, practicals, and dedicated tutorials, in the first two weeks all the mentioned imaging methods will be introduced in general terms. After these two weeks, the group will be divided over five topics (MRI/MRS; PET/CT; MSI; B/F analysis; and Optical Microscopy). The topic

will, within this group, be discussed in more detail. During weeks 1 to 4 the students will work on writing an Imfolio individually, containing up-to-date information on the practicals of each week.

While each group during the last 2 weeks will go into details on one topic only, the general line of imaging methods will come back in the final assignment. Subgroups (e.g., half the tutor groups) will work on the assignment from the start of the block. They will defend their (group) assignment at the end of the block in to other sub groups. Both defense and asking questions to other sub groups will be graded, including self-assessment.

Course objectives

B-ILO-1: Students learn the difference between various non-invasive imaging techniques.

B-ILO-2: Students can select and apply the best (combination of) methods to a specific question in ether clinical or research setting.

B-ILO-3: Students can deal with complex data in a practical setting.

B-ILO-4: Students have in-depth knowledge on one of the following techniques:

- Optical Microscopy
- Mass Spectroscopic Imaging
- MRI/MRS
- PET/CT
- Breath and Faeces analysis

Recommended reading

This is the link to Keylinks, our online reference list.

BBS2003
Period 3
6 Jan 2025
31 Jan 2025
Print course description
ECTS credits:
5.0
Instruction language:
English
Coordinators:

- L.J. Dubois
- B.D. Balluff

Teaching methods:
Assignment(s), Work in subgroups, Lecture(s), Paper(s), PBL, Presentations, Skills
Assessment methods:
Assignment, Attendance, Portfolio, Presentation, Participation
Keywords:
Non-invasive and invasive imaging Biomedical research Medical research
Fac. Health, Medicine and Life Sciences

Statistics: Linear and Logistic Regression and Repeated Measures Analysis

Full course description

In this course the statistical techniques linear regression, logistic regression, and analysis of repeated measurements are introduced. With these techniques a broad range of statistical analyses of biomedical data can be conducted.

Course objectives

Goals:

Linear regression analysis, logistic regression analysis, analysis of repeated measurements. The student learns the most important concepts associated with these techniques. The student is able to apply these techniques with the statistical package SPSS on real biomedical data and can interpret the obtained results.

Concepts:

dependent variable, independent variable, intercept, slope, standard error, t-test for coefficient, t-value, p-value, confidence interval for coefficient, continuous and categorical independent variables, dummy variables, F-test for set of independent variables, residuals, residual plot, histogram of residuals, normal probability plot, interaction, R-square, sum of squares, multiple comparisons, Bonferroni adjustment, relation between regression analysis and independent-samples t-test or Pearson correlation coefficient, dichotomous dependent variable, risk, relative risk, odds, odds ratio, confidence interval for odds ratio, relation between relative risk and odds ratio, different sources for correlated data, linear mixed model analysis, fixed effect variable, random effect variable, random intercept model, interpretation of fixed effects parameters, variance of random intercepts, variance of residuals, intra-class correlation (ICC).

Recommended reading

This is the link to Keylinks, our online reference list.

BBS2007
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
3.0
Instruction language:
English
Coordinator:

- B. Winkens

Teaching methods:

Bachelor Biomedical Sciences

Lecture(s), Training(s), Skills
Assessment methods:
Attendance, Written exam
Keywords:
Linear regression, logistic regression, analysis of repeated measurements.
Fac. Health, Medicine and Life Sciences

Philosophy in Action II

Full course description

Sophia II is taught in two separate trajectories, one in autumn and one in spring.

In the first part of the Sophia II trajectory, students will be made aware of and analyze the ethical aspects of both predictive genetic testing for (future) diseases and the trend to emphasize ‘personal and parental responsibility for health’.

In the second part of the Sophia II trajectory, students will venture into the philosophy and the sociology of science. Both of these disciplines study science, its processes, its object, its culture and its inhabitants not unlike science itself studies a multitude of natural or social objects. Over the course of the Sophia trajectory ‘Credibility in and of science’, students will encounter a number of (probably) familiar and (possibly) less familiar ways to think about what science is and does, and how it is related to society at large.

Combined, the two parts of Sophia II will offer students the capacity to
critically reflect on social, political, international and normative issues in biomedical science and critically reflect on the nature of science itself.

The mark is calculated as the average of the mark for the course part I and course part II [50% each], in which part I requires attendance at the symposium, a passing grade for the presentation and reflection and a sufficient score for the group paper. Part II requires attendance in group discussion meetings and its grade is derived from the pod-cast mark (85%) and the group reflection (15%).

Course objectives

I-ILO1: Summarize and reflect on social, political, international and normative issues in biomedical science

Recommended reading

This is the link to Keylinks, our online reference list.

BBS2008
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
3.0

Bachelor Biomedical Sciences

Instruction language:
English
Coordinator:

- G.M.W.R. de Wert

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Paper(s), Research
Assessment methods:
Assignment, Final paper
Fac. Health, Medicine and Life Sciences

The Core of Biomedical Sciences

Full course description

During this course, students get the opportunity to work in one of a research lab of the Maastricht University and MUMC+. This part of the course is dedicated to learning basic principles, opportunities and challenges of techniques/methods/skills that will contribute to the development towards an investigator. For 6 weeks, the students will be immersed in a research environment where they will have the opportunity to interact with research teams and learn from expert in various fields of the biomedical area (e.g. oncology, cardiovascular, neurosciences, metabolism, bioinformatics, genetics, imaging).

Students will work in groups of 5 students, and will learn step-by-step to work with these techniques/methods/skills; and how to explain to their peers the best standard operating procedures. Students will also attend workshops on video editing and at the end of the course a skills clip demonstrating the technique practiced will be presented.The course offers a wide variety of research topics and techniques that the students can select, including (list non-exhaustive): mass spectrometry imaging (MSI); Light microscopy; Magnetic resonance imaging (MRI); electromyography; glucose analysis; blood pressure measurement; western blots; PCR; FISH combined to confocal imaging. Some projects are also dedicated to Data analysis.

Course objectives

Competence Investigator

- I-ILO1. Write a critical reflection on a scientific theme from an ethical and societal perspectives
- I-ILO2. Writes a clear standard operating procedure with explicitly deduced hypotheses, an appropriate study design
- I-ILO3. Explain the basic principles of the techniques learnt
- I-ILO4. Review the current opportunities and limitations of the technique(s)
- Describe the opportunities of the technique(s)
- Describe the technological limitations to the technique(s)
- Describe the main challenges for translation towards clinical practice (if applicable)

Competence Biomedical Expert

Students determine their own ILOs related to the competence Biomedical Expert at the beginning of the course and in discussion with the Practical project supervisor.

Competence Communicator

- C-ILO1. Designs and produces a skills clip for peers (writes scenario and script, records, edits and publishes a skills clip collaboratively) - about her/his work with persons with different backgrounds.
- C-ILO2. Provides effective feedback to peers on their contribution to the group activity (during the lab work), and the quality of the skills clips (on design, structure and content)
- C-ILO3. Cooperates with peers to design a protocol and answer a specific research question

Competence Professional

- P-ILO1. Behaves in a respectful, professional and reliable manner in practical trainings, internships and group work
- P-ILO2. Accepts responsibility for his/her own professional performance and is prepared to accept standards of accountability
- P-ILO3. Organises his/her work and study well

BBS3004
Period 4
3 Feb 2025
4 Apr 2025
Print course description
ECTS credits:
6.0
Instruction language:
English
Coordinators:

- E. Cuypers
- D. Kapsokalyvas

Teaching methods:
Assignment(s), Work in subgroups, Research, Skills
Assessment methods:
Assignment, Attendance, Participation, Presentation, Final paper
Keywords:
research project, group
Fac. Health, Medicine and Life Sciences

Philosophy in Action III

Full course description

The course ‘Sociology and Philosophy in Action III, Books and Letters’ challenges students to understand science philosophical and sociologic positions, as well as multiple views of science and the relationship between science and society, to apply this knowledge to explain or contrast these different views through a twofold process of first familiarising oneself with a subset of them and subsequently use these positions to participate in ongoing scientific debates.
To this end, students will read, in full, an approved book drawn from the philosophy, sociology or history of science and translate its conceptual apparatus to a scientific debate of their own selection. This will allow them to synthesize conceptual understanding of biomedical science with actual scientific problems or public dilemmas and constructively participate in scientific exchanges.

Bachelor Biomedical Sciences

As part of the course, students will receive instructions in the form of lectures and meetings to help them review the relevant literature, draft their own contributions, review peer contributions, work with reviews of their own work and compile all elements in a portfolio. The course will be assessed through two written assignments. The book review counts towards 40% and the portfolio of letters and reviews counts towards 60% of the grade.

Course objectives

Detailed learning objectives are listed in the coursebook:

1. You will have knowledge and understanding of science philosophical positions, as well as of multiple conceptualisations of science and the relationship between science and society;
2. You can apply this knowledge to explain or contrast or confront one view of science and scientific practice with others, as they populate science and society;
3. You can assess science philosophical problems critically and provide arguments for said assessment;
4. You can position science theoretical and science political issues (within the broader realm of the biomedical sciences) in a wider societal perspective.
5. You can synthesize conceptual understanding of biomedical science with actual scientific problems or public dilemma's.
6. You can translate conceptual understanding from its source [book project] to real-world problems [the letter project].
7. You can actively and constructively participate in scientific exchanges.

BBS3007
Period 4
3 Feb 2025
4 Apr 2025
Print course description
ECTS credits:
2.0
Instruction language:
English
Coordinators:

- C.T. Ghergu
- T.A. Griffin

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Paper(s)
Assessment methods:
Assignment, Portfolio

Competence Communicator and Collaborator

Fac. Health, Medicine and Life Sciences

Communication and Cooperation (MSF) I

Full course description

This course is part of the Communicator and Collaborator competence, which is a longitudinal trajectory that spans the whole study year. In all eight-week courses, students are being assessed and receive feedback from their tutor and peers on their communicative and collaborative skills in the tutorial groups or the academic project groups. An electronic multisource feedback form on ePASS is used for this purpose. Among others, quality of expression, contribution to the group process, collegiality and attitude as a team member are assessed. Obtained scores are combined at the end of the of year (see assessment plan BBS1023-BBS1035 C-P-MSF for details). Next to receiving feedback from their tutors and peers, students provide feedback to fellow students and perform self-assessments.

Course objectives

C-ILO3. Shows awareness of team roles and takes responsibly her/his position in a diversely composed international team

1. Takes responsibility for team processes and team performance
2. Demonstrates an open mind to input of others
3. Accepts feedback, and is able to provide constructive feedback to others

BBS1023
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- S.E. Köhler

Teaching methods:
PBL, Work in subgroups
Assessment methods:
Observation, Portfolio
Keywords:
multisource feedback from on ePASS
Fac. Health, Medicine and Life Sciences

Scientific Writing I including Endnote

BBS1027
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
4.0

Bachelor Biomedical Sciences

Instruction language:
English
Coordinator:

- M.G. Compeer

Fac. Health, Medicine and Life Sciences

Presenting I

Full course description

Students have to present a learning goal during a tutorial in a PowerPoint presentation or on the Whiteboard in front of the group. They have to collect feedback from a tutor on that individual oral presentation during one of the following courses: BBS1002, BBS1004 or BBS1005 using the ePASS Presentation form. Students, who participate in the Social Impact project (SIP) can also use one of the presentations during that project to collect feedback. In that case, they have to invite their coach to provide the feedback on ePASS.

Course objectives

C-ILO-1

- Adjusts communication written or oral, to specific global audience/readership and international setting.
- Prepares and delivers presentation(s) on biomedical topics in tutorial groups, project meetings.

BBS1028
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinator:

- S.E. Köhler

Teaching methods:
Presentations
Assessment methods:
Presentation, Portfolio
Fac. Health, Medicine and Life Sciences

Diversity I

BBS1029
Year

Bachelor Biomedical Sciences

1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinator:

- L.J. Dubois

Fac. Health, Medicine and Life Sciences

Communication and Cooperation (MSF) II

Full course description

This course is part of the Communicator and Collaborator competence, which is a longitudinal trajectory that spans the whole study year. In all eight-week courses and in a selection of the four-week courses, students are being assessed and receive feedback from their tutor and peers on their communicative and collaborative skills in the tutorial groups or the academic project groups. An electronic multisource feedback form on ePASS is used for this purpose. Among others, quality of expression, contribution to the group process, collegiality and attitude as a team member is assessed. Obtained scores are combined at the end of the of year (see assessment plan of the C-competence for details). Next to receiving feedback from tutors and peers, students provide feedback to fellow students and perform self-assessments.

Course objectives

C-ILO3. Shows awareness of team roles and takes responsibly her/his position in a diversely composed international team

1. Takes responsibility for team processes and team performance
2. Demonstrates an open mind to input of others
3. Accepts feedback, and is able to provide constructive feedback to others

BBS2012
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- S.E. Köhler

Teaching methods:
Work in subgroups, PBL

Bachelor Biomedical Sciences

Assessment methods:
Portfolio, Observation
Keywords:
multisource feedback form on ePASS
Fac. Health, Medicine and Life Sciences

Diversity II

BBS2017
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinators:

- S.E. Köhler
- L.J. Dubois

Fac. Health, Medicine and Life Sciences

Scientific Writing II

BBS2018
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
3.0
Instruction language:
English
Fac. Health, Medicine and Life Sciences

Presenting II

Full course description

The presentation course includes a mandatory presentation training for which students need to prepare. In addition, the course includes the collection of feedback forms to specific presentations. More information can be found in the assessment plan.

Course objectives

1. to get personal and specific feedback during the training on the student's individual presentation skills and challenges
2. to grow confidence for delivering professional presentations through the training and through

the additional feedback moments.

BBS2019
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
2.0
Instruction language:
English
Teaching methods:
Presentations, Training(s)
Assessment methods:
Attendance, Presentation

Competence Professional and Organisor

Fac. Health, Medicine and Life Sciences

Professional Behaviour (MSF) I

Full course description

This course is part of the Professional and Organizer competence, which is a longitudinal trajectory that spans the whole study year. In all eight-week courses, students are being assessed and receive feedback from their tutor and peers on their professional behavior and organization skills in the tutorial groups or the academic project groups. An electronic multisource feedback form on ePASS is used for this purpose. Among others, attendance, being on time, (professional) behavior in group processes and openness to feedback from others is assessed. Obtained scores are combined at the end of the of year (see assessment plan BBS1023-BBS1035 C-P-MSF for details). Next to receiving feedback from tutors and peers, students provide feedback to fellow students and perform self-assessments.

Course objectives

P-ILO1. Demonstrates appropriate interpersonal behaviour

- Behaves in a respectful, professional and reliable manner in PBL groups, practical trainings and group work

P-ILO-4. Organizes his/her work and study well

- Distributes workload throughout a course or project

BBS1035
Year
1 Sep 2024
31 Aug 2025
Print course description

Bachelor Biomedical Sciences

ECTS credits:
3.0
Instruction language:
English
Coordinator:

- S.E. Köhler

Teaching methods:
Work in subgroups, PBL
Assessment methods:
Attendance, Observation, Portfolio
Keywords:
multisource feedback form on ePASS
Fac. Health, Medicine and Life Sciences

Professional Development I

Full course description

Students compile an electronic portfolio, which among others contains feedback on performance and professional behaviour during tutorial groups, peer feedback on lab work, feedback on scientific writing assignments, grades for end-of-course tests, feedback on presentations, career reports, self evaluations, reflections and learning goals.
Students use the portfolio to monitor and steer their professional development. Throughout the year guidance is provided to the student by a mentor. At the end of the academic year the portfolio is assessed by the portfolio assessment committee.

Course objectives

P-ILO3 Takes responsibility for her/his personal and academic development:

1. Accepts feedback; Critically reflects on his/her learning and academic development
2. Formulates SMART learning goals –with help of mentor - in order to take adequate action with a view to raising her/his competencies up to the desired level

BBS1039
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
3.0
Instruction language:
English
Coordinator:

- L.J. Dubois

Teaching methods:
Work in subgroups, Assignment(s)

Bachelor Biomedical Sciences

Assessment methods:
Portfolio
Keywords:
Portfolio, professional development
Fac. Health, Medicine and Life Sciences

Laboratory Practice I

BBS1042
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
2.0
Instruction language:
English
Coordinator:

- H.E. Popeijus

Fac. Health, Medicine and Life Sciences

Practical Skills (Exam)

BBS1043
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinator:

- H.E. Popeijus

Fac. Health, Medicine and Life Sciences

Calculation Test

BBS1044
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinator:

Bachelor Biomedical Sciences

- H.E. Popeijus

Fac. Health, Medicine and Life Sciences

Laboratory Practice II

Course objectives

P-ILO4. Organizes his/her work and study well

1. Keeps a well-structured lab notebook

BBS2030
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
2.0
Instruction language:
English
Coordinator:

- H.E. Popeijus

Teaching methods:
Skills
Assessment methods:
Attendance, Observation
Keywords:
GLP, labbuddy
Fac. Health, Medicine and Life Sciences

Professional Behaviour (MSF) II

Full course description

This course is part of the Professional and Organizer competence, which is a longitudinal trajectory that spans the whole study year. In all eight-week courses and in a selection of the four-week courses, students are being assessed and receive feedback from their tutor and peers on their professional behavior and organization skills in the tutorial groups or the academic project groups. An electronic multisource feedback form on ePASS is used for this purpose. Among others, attendance, being on time, (professional) behavior in group processes and openness to feedback from others is assessed. Obtained scores are combined at the end of the of year (see assessment plan of the P-competence for details). Next to receiving feedback from tutors and peers, students provide feedback to fellow students and perform self-assessments.

Course objectives

P-ILO1. Demonstrates appropriate interpersonal behaviour

- Behaves in a respectful, professional and reliable manner in PBL groups, practical trainings and group work

P-ILO-4. Organizes his/her work and study well

- Distributes workload throughout a course or project

BBS2031
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- S.E. Köhler

Teaching methods:
Work in subgroups, PBL
Assessment methods:
Observation, Attendance, Portfolio
Keywords:
multisource feedback form on ePASS
Fac. Health, Medicine and Life Sciences

Professional Development II

Full course description

Students compile an electronic portfolio, which among others contains feedback on performance and professional behaviour during tutorial groups, peer feedback on lab work, feedback on scientific writing assignments, grades for end-of-course tests, feedback on presentations, career reports, self evaluations, reflections and learning goals.
Students use the portfolio to monitor and steer their professional development. Throughout the year guidance is provided to the student by a mentor. At the end of the academic year the portfolio is assessed by the portfolio assessment committee.

Course objectives

P-ILO3. Takes responsibility for her/his personal and academic development:

1. Accepts feedback; Critically reflects on personal values and priorities with minor help of mentor and develops strategies to promote personal growth
2. Formulates SMART learning goals – with minor help of mentor - in order to take adequate action with a view to raising her/his competencies up to the desired level
3. Chooses electives, minor courses and bachelor thesis subject based on future career plans

BBS2032

Bachelor Biomedical Sciences

Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- L.J. Dubois

Teaching methods:
Work in subgroups, Assignment(s)
Assessment methods:
Portfolio
Keywords:
Portfolio, professional development
Fac. Health, Medicine and Life Sciences

Professional Development III

Full course description

Students compile an electronic portfolio, which among others contains feedback on performance and professional behaviour during tutorial groups, peer feedback on lab work, feedback on scientific writing assignments, grades for end-of-course tests, feedback on presentations, career reports, self evaluations, reflections and learning goals.
Students use the portfolio to monitor and steer their professional development. Throughout the year guidance is provided to the student by a mentor. At the end of the academic year the portfolio is assessed by the portfolio assessment committee.

Course objectives

P-ILO-3: Takes responsibility for her/his personal and academic development

1. Reflects on strengths and weaknesses in his/her own professional performance and, in that way, can guide his/her own learning process and accepts responsibility for his/her own professional growth, aiming to engage in lifelong development (as a biomedical scientist).
2. Formulates SMART learning goals – independently - in order to take adequate action with a view to raising her/his competencies up to the desired level
3. Makes a well-considered career choice that matches her/his own capabilities

BBS3051
Year
1 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
2.0
Instruction language:

Bachelor Biomedical Sciences

English
Coordinator:

- L.J. Dubois

Teaching methods:
Work in subgroups, Assignment(s)
Assessment methods:
Observation, Portfolio
Keywords:
Portfolio, professional development

Integrated Competencies Biomedical Sciences

Fac. Health, Medicine and Life Sciences

Defence

Full course description

Twelve weeks are dedicated to the internship and to writing the bachelor’s thesis in the bachelor’s phase of the Biomedical Sciences programme. The internship focuses on becoming acquainted with research, meaning that the student gains experience in performing biomedical scientific research, preferably within an existing study. This (sub-)study is the basis for the written product, known as the bachelor's thesis. After submission of the thesis, the student is defending the thesis in an oral inquiry ('Defence'). The internship, the thesis and the defence are graded.

An internship within FHML (Faculty of Health, Medicine and Life Sciences) or MUMC+ (Maastricht University Medical Centre Plus) is considered an internal internship; any other internship is considered an external internship. The term 'FHML’ is used in the rest of this document to indicate both FHML and MUMC+ for the sake of brevity. An internship within FHML is supervised by the 'faculty supervisor’ i.e. the ‘first assessor’ (examiner). This supervisor must meet the requirements as stated in the exam regulations. Besides the faculty supervisor, there can be one or more daily supervisors. For internships outside FHML, a student has one or more external supervisors besides the faculty supervisor. The thesis will be assessed by the faculty supervisor and by an independent second assessor. The internship coordinator for the Bachelor Biomedical Sciences is the first contact person for the student for questions concerning the preparation and content of an internal or external internship. The coordinator will provide information on the internship by means of a lecture: the possibilities and impossibilities, the procedure, the conditions, etc.

Course objectives

B-ILOs: Biomedical expert (as required for chosen topic).C-ILO1: Adjusts communication written or oral, to specific global audience/readership and international setting.C-ILO2: Communicates professionally with peers and staff originating from diverse cultural and disciplinary backgrounds.I-ILO3: Has developed a critical approach to scientific knowledge.I-ILO4: Designs and rationalizes a biomedical experiment.P-ILO1: Demonstrates professional interpersonal behaviour.P-ILO4: Can justify and design a biomedical experiment.

BBS3008

Bachelor Biomedical Sciences

Period 5
7 Apr 2025
6 Jun 2025
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- D. Neumann

Teaching methods:
Presentations
Assessment methods:
Oral exam
Fac. Health, Medicine and Life Sciences

Internship

Full course description

Twelve weeks are dedicated to the internship and to writing the bachelor’s thesis in the bachelor’s phase of the Biomedical Sciences programme. The internship focuses on becoming acquainted with research, meaning that the student gains experience in performing biomedical scientific research, preferably within an existing study. This (sub-)study is the basis for the written product, known as the bachelor's thesis. After submission of the thesis, the student is defending the thesis in an oral inquiry ('Defence'). The internship, the thesis and the defence are graded.

An internship within FHML (Faculty of Health, Medicine and Life Sciences) or MUMC+ (Maastricht University Medical Centre Plus) is considered an internal internship; any other internship is considered an external internship. The term 'FHML’ is used in the rest of this document to indicate both FHML and MUMC+ for the sake of brevity. An internship within FHML is supervised by the 'faculty supervisor’ i.e. the ‘first assessor’ (examiner). This supervisor must meet the requirements as stated in the exam regulations. Besides the faculty supervisor, there can be one or more daily supervisors. For internships outside FHML, a student has one or more external supervisors besides the faculty supervisor. The thesis will be assessed by the faculty supervisor and by an independent second assessor. The internship coordinator for the Bachelor Biomedical Sciences is the first contact person for the student for questions concerning the preparation and content of an internal or external internship. The coordinator will provide information on the internship by means of a lecture: the possibilities and impossibilities, the procedure, the conditions, etc.

Course objectives

C-ILO3: Shows awareness of team roles and takes responsibly her/his position in a diversely composedinternational teamI-ILO3: Has developed a critical approach to scientific knowledgeI-ILO4: Designs and rationalizes a biomedical experiment.P-ILO1: Demonstrates professional interpersonal behaviour.P-ILO2: Appreciates the conventions of scientific integrity and legal and ethical standards and operatesaccordingly.P-ILO3: Organises his/her work and study wellP-ILO4: Can justify and design a biomedical experiment

Bachelor Biomedical Sciences

BBS3005
Period 5
7 Apr 2025
6 Jun 2025
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- D. Neumann

Teaching methods:
Work in subgroups, Research
Assessment methods:
Assignment, Observation, Participation
Fac. Health, Medicine and Life Sciences

Thesis

Full course description

Twelve weeks are dedicated to the internship and to writing the bachelor's thesis in the bachelor's phase of the Biomedical Sciences programme. The internship focuses on becoming acquainted with research, meaning that the student gains experience in performing biomedical scientific research, preferably within an existing study. This (sub-)study is the basis for the written product, known as the bachelor's thesis. After submission of the thesis, the student is defending the thesis in an oral inquiry ('Defence'). The internship, the thesis and the defence are graded.

An internship within FHML (Faculty of Health, Medicine and Life Sciences) or MUMC+ (Maastricht University Medical Centre Plus) is considered an internal internship; any other internship is considered an external internship. The term 'FHML' is used in the rest of this document to indicate both FHML and MUMC+ for the sake of brevity. An internship within FHML is supervised by the 'faculty supervisor' i.e. the 'first assessor' (examiner). This supervisor must meet the requirements as stated in the exam regulations. Besides the faculty supervisor, there can be one or more daily supervisors. For internships outside FHML, a student has one or more external supervisors besides the faculty supervisor. The thesis will be assessed by the faculty supervisor and by an independent second assessor. The internship coordinator for the Bachelor Biomedical Sciences is the first contact person for the student for questions concerning the preparation and content of an internal or external internship. The coordinator will provide information on the internship by means of a lecture: the possibilities and impossibilities, the procedure, the conditions, etc.

Course objectives

B-ILOs: Biomedical expert (as required for chosen topic)

C-ILO1: Adjusts communication written or oral, to specific global audience/readership and international setting

I-ILO4: Can justify and design a biomedical experiment

Bachelor Biomedical Sciences

P-ILO4: Organizes his/her work and study well

BBS3006
Period 5
7 Apr 2025
6 Jun 2025
Print course description
ECTS credits:
20.0
Instruction language:
English
Coordinator:

- D. Neumann

Teaching methods:
Paper(s)
Assessment methods:
Final paper
Minor

Minor

Fac. Health, Medicine and Life Sciences

Diet, Nutrition and Health

Full course description

General information

It is generally acknowledged that nutrition plays an important role in an optimal development and maintaining health throughout the life course. As such, optimal nutrition not only plays an important role in disease prevention but also in disease management. Current nutritional guidelines mainly focus on obesity, cardiovascular disease and type 2 diabetes. However, increasing experimental and clinical evidence suggests that nutrition can also be considered a modifiable factor to prevent the onset and progression of other chronic diseases, such as Alzheimers, COPD, macular degeneration, non-alcoholic fatty liver disease, Irritable Bowel Syndrome and intestinal bowel diseases. Therefore, the main aim of the minor Nutrition is to study the role of (personalized) nutrition in the prevention and treatment of chronic diseases.

Tutorials, lectures and journal clubs

Within the course, a variety of 5 different areas will be discussed for 1-2 weeks each. These areas include the brain, intestines, liver, lungs and eyes and will cover a variety of different diseases including amongst others Alzheimers, macular degeneration, non-alcoholic fatty liver disease, COPD, lung cancer, celiac disease, Irritable Bowel Syndrome and intestinal bowel disease. The different areas will be covered in multiple lectures and will be further discussed using typical problem-based learning cases. Additionally, for each area a scientific paper will be discussed during a journal club.

Academic project

During the course, students will work in groups on an academic project, which will be guided by an experienced researcher. In this project, students will be asked to develop and follow either a diet low in gluten or a diet high in fiber. Each group will prepare a “making of”-movie about their experiences preparing and following the diet. Before and after the diet, students will measure several parameters which are related to the topics discussed in the PBL cases; i.e. cognition, bowel complaints, blood pressure etc. Once the measurements have been completed, results for each diet group will be combined, and each group of students will write a scientific report and give a presentation during the mini-symposium.

Practical

Next to the academic project, students will also learn how the role of nutrition in chronic disease can be investigated in an experimental setting. Students will perform a cell-culture experiment in the lab. C2C12 myoblasts will be cultured and stimulated with a nutritional component. After three days, students come back to the lab and measure the activity of a specific reporter in the cells to assess the effect of the nutritional component.

Visiting a nutritional company

Translating the concepts of basic nutritional science is necessary for the production of advanced clinical nutrition products. The Nutricia Research Centre in Utrecht is a company that builds bridges between science and food. Students will visit the centre in Utrecht not only to get insight on how nutritional products are being developed, but also to see an example where they could work after finishing biomedical sciences.

Assessment

Students will pass the course in case of 100% attendance, a pass for the academic project and the practical report and a sufficient mark on the final written exam.

Recommended reading

This is the link to Keylinks, our online reference list.

BBS3013
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
12.0
Instruction language:
English
Teaching methods:
Lecture(s), Work in subgroups, Paper(s), PBL, Presentation(s), Research, Skills, Working visit(s)
Assessment methods:
Assignment, Attendance, Presentation, Written exam
Fac. Health, Medicine and Life Sciences

Immune Responses in Health and Disease

Full course description

The immune system is a remarkable natural system that is proving to be of great inspiration to scientists, medical staff and students. It is ubiquitous in present life. This course provides a detailed study of the functioning of the immune system. Students acquire insights into the molecular and cellular interactions and functioning of the immune system in normal conditions. Topics include the development of immune cells, humoral and cell-mediated immunity, and tolerance. During the past decades, evidence has mounted that many (chronic) diseases are characterized by an imbalance of the immune system. Moreover, we are challenged by complex situations where it is demonstrated that the immune system plays a crucial role. Therefore, the role of the immune system in a variety of diseases and complex situations (e.g. cancer, autoimmunity, neurodegenerative diseases, microbial defense, transplantation and vaccination) will be studied in an integrated way during the project week and integration assignment.

This course provides a detailed study of the function of the immune system and previous/basic knowledge of the immune system is assumed/recommended for this course.

Course objectives

ILO3014.1 Explain the structure and function of lymphoid organs and the development of leucocytes:

1. Describe and draw lymphoid organs and relate the structure of lymphoid organs to their function.
2. Explain the development of innate immune cells.
3. Explain the development and maturation of adaptive immune cells.
4. Explain the migration pathways of leucocytes in the body (during homeostasis and disease/infection).

ILO3014.2 Analyze the activation and downregulation of innate and adaptive immune responses:

1. Compare the innate and the adaptive immune system during sterile and non-sterile inflammation.
2. Explain the genetic base and diversity of MHC molecules and their role in disease.
3. Examine the immune regulation mechanisms of the immune system.

ILO 3014.3 Explain the roles of immune cells in the innate and adaptive immune systems in health:

1. Explain in time (4D), order, and function
2. Gender diversity and aging
3. Influence of nutrition/environment

ILO 3014.4 Understand and present the immune processes underlying immune relatedpathophysiology:

1. Hypersensitivity (incl allergy and autoimmunity)

2. Immunodeficiency
3. Cancer

ILO 3014.5 Understand and present strategies to modulate immune responses to improve human health:

1. Design a plan to translate an invention from research to clinical application.

ILO 3014.6 Explain techniques commonly used to investigate the phenotype and functionof cells in immune responses:

1. Students know the basic principles and applications of serological and cellular immune tests and can correctly analyze and interpret the results.
2. Students understand the selection and application of practical immunological approaches to conduct an investigation.

Recommended reading

This is the link to Keylinks, our online reference list.

BBS3014
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
12.0
Instruction language:
English
Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentations, Skills
Assessment methods:
Assignment, Attendance, Final paper, Participation, Presentation, Written exam
Keywords:
Development of immune system Humoral and cell-mediated immunity Tolerance Immune-related conditions Immunological therapies
Fac. Health, Medicine and Life Sciences

Neurosciences and Control

Recommended reading

This is the link to Keylinks, our online reference list.

BBS3015
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
12.0

Bachelor Biomedical Sciences

Instruction language:
English
Coordinator:

- M. Mané Damas

Fac. Health, Medicine and Life Sciences

Pharmacological Interventions

Recommended reading

This is the link to Keylinks, our online reference list.

BBS3016
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
12.0
Instruction language:
English
Fac. Health, Medicine and Life Sciences

Physical Activity and Health

Full course description

Physical activity and health are linked inseparably. If you want to improve health, prevent disease, or reduce symptoms by changing behavior, physical activity is often the way to go. Different types of physical activity and physical exercise training each have their own impact on our physical fitness. So, each desired goal requires a specific training program.

In this minor you will apply knowledge about the impact of physical activity to design an intervention to improve the health of a specific target group. The challenge is to discover which physical activity and training leads to the desired effect in your chosen target group, as well as which characteristics you should take into account, like age, baseline physical fitness, nutritional status, personal characteristics, and context.

Throughout the minor, student groups will design an intervention plan based on the knowledge and experience they gain from lectures and tutorials. Experts in the field will illustrate the important aspects in interactive lectures, which also includes time for Q&A about the project. Student groups shortly describe their intervention plans and can ask questions to the expert for the further development of their intervention. In addition to the lectures and tutorials, students will learn how to measure physical activity and cardiorespiratory fitness during practicals about cardiopulmonary exercise testing and activity monitoring.

Course objectives

In this minor you will have a close look into the relationship of physical activity and health, applied to feasible and effective interventions to promote health. To this end, you will learn primarily how physical activity affects your health, and which factors to consider when putting this into practice. Students will:

- Understand the physical activity dimensions: frequency, intensity, time, and type; ranging from inactivity to exercise
- Identify causes of inter-individual variation in human performance
- Design a physical activity/physical exercise training program adequate for the goal chosen in patients with a chronic disease
- Be able to select an adequate assessment method of physical fitness for a given population and research question
- Be able to select an adequate physical activity monitoring method using the strengths and weaknesses of the main types of physical activity monitoring
- Be able to account for dietary status while designing a PA program
- Understand the personal characteristics that should be taken into account when designing a PA program.

Recommended reading

This is the link to Keylinks, our online reference list.

BBS3023
Period 2
28 Oct 2024
20 Dec 2024
Print course description
ECTS credits:
12.0
Instruction language:
English
Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentations, Skills
Assessment methods:
Assignment, Final paper, Written exam
Keywords:
physical activity, assessment methods, training modalities, Health, process evaluation, adherence, Behavior
Fac. Health, Medicine and Life Sciences

Infection and Immunity

Full course description

While pathogenic microorganisms cause infections and evoke pro-inflammatory immune responses, billions of commensal microorganisms live in symbiosis with their host. This raises various intriguing questions on the delicate interactions between the immune system and the plethora of microorganisms that we as a host encounter. How can our (mucosal) immune system maintain

peace with trillions of commensal microbes, while keeping pathogens at bay? What is the role of the commensals in providing protection against pathogens and in training our immune system? What are the immunological health consequences of loss of microbial biodiversity? How do pathogens evolve to evade our immune system and cause disease? Which options do we currently have to treat or prevent infectious diseases and what are potential future personalized treatment strategies?

In this course these bi-directional host-microbe interactions during homeostasis and infection will be analysed and compared.

Basic challenges (cases) will be alternated by convince-the-expert meetings during which various host-microbe interactions will be discussed with experts in the fields of immunology, microbiology and infectious diseases. In addition you will be working on an academic group project in which the gained knowledge will be applied to develop a future solution to tackle microbe-mediated diseases. The results of the academic project will be presented during a final symposium at the end of the course.

Within this course there will also be several skills trainings to study. This includes a training on mucosal immunological tissues. Moreover, you will have the opportunity to design and conduct your own intervention study to modify your own oral microbiome.

Course objectives

- To evaluate future solutions to treat and prevent deleterious infections and microbiome-mediated diseases
- To compare current strategies for the therapeutic treatment of infections by targeting the microbe or supporting the immune system
- To analyze the processes by which the immune system in response to an infection leads to pathology, and the consequences of failing to control infection
- To distinguish how the host's immune system discriminates between various microbes, and commensal vs. pathogenic bacteria
- To examine what determines microbial virulence and how commensals can turn into pathogens
- To understand the various microbial ecosystems in the human body and explain their role in maintaining human health and to analyze the link between lost microbial exposure and the rise in non-communicable/communicable diseases.

Recommended reading

This is the link to Keylinks, our online reference list.

BBS3024
Period 2
28 Oct 2024
20 Dec 2024
Print course description
ECTS credits:
12.0
Instruction language:
English
Coordinator:

- J. Penders

Bachelor Biomedical Sciences

Teaching methods:
Assignment(s), Work in subgroups, Lecture(s), PBL, Presentation(s), Research, Skills
Assessment methods:
Presentation, Written exam
Keywords:
Mucosal Immunology, Microbiome, Host-Microbe interactions, Innate immune system, Adaptive immune system, Microbiology, Bacteria, Antimicrobial therapy, Fecal Microbiota Transplantation, Vaccination, Virulence
Fac. Health, Medicine and Life Sciences

Omics Technologies and Their Analysis

Full course description

This course takes you on a journey through the varied landscape of -omics technologies and their applications. We discuss genomics screening methods, both focusing on detection of genetic variants and their association to diseases or other phenotypes, as well as transcriptomics detection of gene expression levels and their changes. Then we turn our attention to proteomics screening technologies, to determine protein abundances. Thereafter, metabolomics is discussed, to detect metabolites and determine their abundances. Finally, we touch upon the integration of the various methods and approaches. For the genomics part of the course, we mainly focus on the application of next-generation sequencing (genome, exome, and RNA sequencing). For proteomics, we discuss separation methods (gel electrophoresis, chromatography) and the most used technology for detection, mass spectrometry. Quantitative proteomics, as well as the combination with imaging technologies, are discussed. For metabolomics, next to gas and liquid chromatography and MS techniques, we discuss nucleic magnetic resonance (NMR) as a frequently used method. For all omics applications included in the course, we discuss sample preparation, quality control, the technology and equipment used, the data generated, its analytical processing, analysis and the interpretation of results. Besides specific omics, the course pays some attention to experimental design of omics-driven research. Also, various biomedical applications are explored. Furthermore, a number of wet-lab and computer practicals illustrate how to prepare samples, analyse them in the lab, process the generated data, and use online resources to interpret the findings. Also, in this course critical evaluation of published findings is taken into account. In addition, a group project has the application of the various omics methods to a dedicated biomedical domain as its core focus. A regular week features two one-hour lectures, one PBL tutorial, either a journal club or an experimental design discussion, a (wet-lab or computer) practical, and a meeting of the project group. Assessment consists of (i) a group presentation of the project work; (ii) a final exam with a number of open questions on the omics discussed as well as their application.

Recommended reading

This is the link to Keylinks, our online reference list.

BBS3025
Period 2
28 Oct 2024
20 Dec 2024
Print course description
ECTS credits:
12.0

Bachelor Biomedical Sciences

Instruction language:
English
Teaching methods:
Work in subgroups, Lecture(s), PBL, Presentation(s), Skills
Assessment methods:
Attendance, Participation, Presentation, Written exam
Keywords:
genomics transcriptomics proteomics metabolomics next-generation sequencing (NGS) chromatography (GC, LC) mass spectrometry (MS, MS-MS) nuclear magnetic resonance (NMR)
Fac. Health, Medicine and Life Sciences

Environmental Sustainability and Human Health

Full course description

Epidemiological studies have linked several environmental pollutants to increased risks of developing (chronic) diseases in humans. For instance, increased levels of particulate air pollution during lifetime are associated to higher risks of developing asthma, but also lung cancer. Moreover, higher levels of heavy metals such as lead or pesticides, ingested through e.g. contaminated food, can increase the risk of developing neurodegenerative disease like Parkinson's and Alzheimer's disease in later life. Identifying these toxicological risks and subsequently to manage these is crucial for human health. This minor course will focus on understanding the influences and impact of environmental factors on humans. The course core concept is based on the risk governance framework wherein the main focus will be on the research information and needs within this framework.

Course objectives

The course will cover 5 main topics that will support the understanding of this framework:

1. Basic understanding of the principles of toxicology: What is toxicity, how can we classify different compounds (e.g. PFAS, PCB's, PAH's) for e.g. carcinogenicity, how are we exposed (Environment-effect chain), what is the dose response relationship etc.
2. Understanding of different study designs to assess toxicity and the differences and (dis)advantages if comparing human epidemiology, animal and in vitro (cellular: 2D/3D models, non-cellular) studies.
3. (NMR, MS and ESR/EPR spectroscopy). For most techniques a side-visit to see the analytical techniques will be included. Theoretical and practical insight into different analytical tools used in toxicology research, namely electrophoresis (gel-, affinity-, capillary- and immuno-electrophoresis) and spectroscopy
4. Data-analysis and applications of (toxico)genomics and in-silico studies to assess toxicity, including a computer practical where students will be able to work on their own data-set for a specific compound
5. Understanding of the risk governance framework for risk assessment and management of (complex) risks, with air pollution as an example.

Practical skills:
Practical performing ESR/EPR spectroscopy and computer practical for analysis of toxicogenomics

datasets, as well as site-visits for demonstration of the analytical techniques on-site. You will conduct you own Toxicogenomics project, thereby working on actual research data comprising human demographic and exposure data as well as high-dimensional transcriptomics data derived from human blood cells. The aim of the project is to decipher the molecular impact of environmental pollutants on human health. Therefore, you will apply fundamental bioinformatics and statistics approaches to identify genes and pathways which may contribute to the chain of events connecting environmental exposure to increased risk of chronic diseases. Moreover, the results will be interpreted with respect to improving our understanding of the pathogenesis of environmentally-induced diseases, identifying at-risk populations, and potentially discovering of pre-clinical markers of disease related to environmental exposures

Recommended reading

This is the link to Keylinks, our online reference list.

BBS3026
Period 2
28 Oct 2024
20 Dec 2024
Print course description
ECTS credits:
12.0
Instruction language:
English
Teaching methods:
Assignment(s), Work in subgroups, Lecture(s), Paper(s), PBL, Presentations, Research, Skills, Training(s), Working visit(s)
Assessment methods:
Assignment, Attendance, Final paper, Participation, Presentation
Keywords:
environmental, health, risk governance framework, analytical techniques, bioinformatics, chromatography, mass spectrometry
Fac. Health, Medicine and Life Sciences

Critical Review of a Biomedical Intervention

Full course description

In this final 4-week course of the minor program, students will write a systematic literature review of a biomedical intervention that is based on the knowledge obtained in the trajectory followed during the first two minor courses. Reviews will be written in small groups of 4 students to focus on one concisely formulated research question (RQ) related to the biomedical intervention route of their interest. Each student will work on their individual sub-RQ within the review as well as contribute to the general parts of the writing product.

In this final 4-week course of the minor program, students will write a systematic literature review of a biomedical intervention that is either pharmacological, nutritional or physical based on the knowledge obtained in the trajectory followed during the first two minor courses. Reviews will be written in small groups of 3 to 4 students from the same minor background to focus on one concisely formulated research question related to the biomedical intervention route of their interest.

Course objectives

Applying academic skills to write a systematic literature review on a self-chosen biomedical intervention

Recommended reading

This is the link to Keylinks, our online reference list.

BBS3003
Period 3
6 Jan 2025
31 Jan 2025
Print course description
ECTS credits:
6.0
Instruction language:
English
Coordinators:

- A.W. Boots
- E.M.J.M. Schillings

Teaching methods:
Assignment(s), Lecture(s), Paper(s), Research
Assessment methods:
Assignment, Final paper
Keywords:
academic writing systematic review
Fac. Health, Medicine and Life Sciences

FIA Jaar 2 (Basisvariant)

Full course description

This study programme is taught in Dutch. Hence, the programme information is only available in Dutch. If you would like to read the Dutch programme information, please choose 'NL' at the top of the website

GZW2260
Period 1
30 Sep 2024
1 Nov 2024
Print course description
ECTS credits:
3.0
Instruction language:
Dutch
Coordinator:

- E.S. Raap

Educatieve Minor

Fac. Health, Medicine and Life Sciences

Vakdidactiek

Full course description

This study programme is taught in Dutch. Hence, the programme information is only available in Dutch. If you would like to read the Dutch programme information, please choose ‘NL’ at the top of the website.

EDM3005
Period 1
2 Sep 2024
28 Feb 2025
Print course description
ECTS credits:
5.0
Instruction language:
Dutch
Coordinators:

- M.A. Dentener
- J.M.G. Reijnders

Fac. Health, Medicine and Life Sciences

Plantfysiologie en Ecologie

Full course description

This study programme is taught in Dutch. Hence, the programme information is only available in Dutch. If you would like to read the Dutch programme information, please choose ‘NL’ at the top of the website.

EDM3006
Period 1
2 Sep 2024
28 Feb 2025
Print course description
ECTS credits:
5.0
Instruction language:
Dutch
Coordinators:

- M.A. Dentener
- J.M.G. Reijnders

Introductie en Werkplekleren I

Full course description

This study programme is taught in Dutch. Hence, the programme information is only available in Dutch. If you would like to read the Dutch programme information, please choose ‘NL’ at the top of the website.

EDM3011
Period 1
2 Sep 2024
28 Feb 2025
Print course description
ECTS credits:
9.0
Instruction language:
Dutch
Coordinators:

- M.A. Dentener
- J.M.G. Reijnders

Fac. Health, Medicine and Life Sciences

Pedagogisch Didactisch Traject

Full course description

This study programme is taught in Dutch. Hence, the programme information is only available in Dutch. If you would like to read the Dutch programme information, please choose ‘NL’ at the top of the website.

EDM3022
Period 1
2 Sep 2024
31 Aug 2025
Print course description
ECTS credits:
16.0
Instruction language:
Dutch
Coordinators:

- M.A. Dentener
- J.M.G. Reijnders

Fac. Health, Medicine and Life Sciences

Werkplekleren II

Full course description

This study programme is taught in Dutch. Hence, the programme information is only available in Dutch. If you would like to read the Dutch programme information, please choose ‘NL’ at the top of the website.

EDM3001
Period 4
3 Feb 2025
4 Apr 2025
Print course description
ECTS credits:
5.0
Instruction language:
Dutch
Coordinators:

- M.A. Dentener
- J.M.G. Reijnders