Biomedical Sciences

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

BBS1001

Period 1
5 Sep 2016
28 Oct 2016

Print course description
ECTS credits:
7.0
Instruction language:
English
Fac. Health, Medicine and Life Sciences

Homeostasis and Organ Systems

Full course description

Knowledge and understanding of normal physiology of the organ systems and regulatory mechanisms will be used to go into more depth with disturbances of homeostasis. The groups will propose a RQ on a (selected) disturbance of homeostasis and design a computer-simulated experiment to test this hypothesis. Findings will be presented within the tutorial group setting. 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 gastro-intestinal system, the pulmonary and cardiovascular system and the urinary and renal system in the filtration, reabsorption, secretion and excretion of electrolytes and water and maintenance of the acid-base balance. The interaction and communication between these organs systems will also be studied. 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. Students will further work on academic writing skills, where the main aim of the assignment is: To write an introduction that leads to a research question (RQ) and define the required experimental aims to address this RQ. 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, in which the

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 mechanism
- 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
Bachelor Biomedical Sciences

- 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

**BBS1002**

**Period 2**
31 Oct 2016
23 Dec 2016

*Print course description*

**ECTS credits:**
7.0

**Instruction language:**
English

**Coordinator:**
F.R.M. Stassen

**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**

**Brain, Behavior and Movement**

**Full course description**

This unit will be dedicated to the capacity of animals to interpret, act and move within the environment they live in. Being able to integrate incoming information and to react to it properly, e.g. by changing its position, is an essential and distinctive feature of animal life. For humans, the capacity to filter incoming information, reasoning and responding adequately to environmental variation, and having the ability to move are all major aspects of being, whereas a disturbance at any of these levels is an important reason for psychological and/or medical intervention. As such,
adequate movement requires sensing, coordination, action generation and monitoring of the result of the action. This course will address all these features in order to understand and to be able to intervene in human cognitive and affective functioning as well as in movement capacity.

**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**

Full course description

We will follow three lines which will be linked to each other:

3. Ethical questions/problems around human reproduction and genetics.

We will start studying the first differentiation steps from gametogenesis via fertilization to the 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. 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. digestive system, genital system, heart, nervous system). Thereby concepts of cell-cell signalling, receptor ligand interaction, influence of hormones as mechanisms included in 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. In practical trainings students will compare the “normal” human anatomy to (pathological) variations originating from aberrant human development. In addition basic epigenetic mechanism will be shown and their implication in human development will be analysed. Existing parallels between embryonic development and cancer development during adult life will be shown exemplarily.

Chances, risks and ethical questions around human reproduction and development as in-vitro-fertilization, embryo selection, prenatal screening and increasing availability of genetic data 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 the lab techniques necessary. Actual knowledge on epigenetic mechanisms leads to a broader idea of heredity transmission. Students will be made aware of the resulting inter-generational responsibility in the course of the SoPhia academic project.

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
BBS1005

Period 5
10 Apr 2017
9 Jun 2017

Print course description

ECTS credits: 7.0
Instruction language: English
Coordinator: U. von Rango - Hilmes

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

Assessment methods:
Assignment, Attendance, Computertest, Final paper, Participation, Presentation

Keywords:
Gametogenesis - Blastocyst - Implantation

Fac. Health, Medicine and Life Sciences
Practicals The LEGO Bricks of Life

Full course description

This course will have 4 practical trainings:

1. Good laboratory practice (GLP)
Part 1: Safety regulations, environmental safety and standard materials in a lab (glassware, balance, pipets etc.). This part will include instructions about how to use standard lab materials.
Part 2: Students learn how to use various lab materials in more detail. This part will contain an interim test: Making your own calibration curve by spectrophotometry and Excel. Students have to show their ability to make a calibration curve. The slope of regression line and variation between duplicates will be checked. If students have values that are >10% deviant from the expected value, they will have to make a new calibration curve (immediate feedback). In this practical, simple bio-informatics will be
2. **Effect of pH on enzyme activity.**
Different buffers will be used to perform the test at various pH-conditions. The pH and preparation of these buffers will also be discussed and calculated as additional task in case 4 of course bbs1001. The calibration curve was already produced in practical 1, part 2.

3. **Virtual microscopy**
An introduction is provided how to fulfil the tasks in virtual microscopy training. This training deals with general histology, which shows how various cell types build organs.

4. **Introduction to the dissection Hall**
In the coming courses, human anatomy will be studied on real human bodies/ preparations. Students need to be introduced properly before they are allowed to join practical trainings in the dissection hall of Maastricht University.

**Course objectives**

You will have to prepare for all practicals. Your preparation will be checked, and you are only allowed to start the practical if your preparation is considered sufficient. All practical trainings will be evaluated by inspection of the lab-journal and specific questions in the final exam.
BBS1102

Period 2
31 Oct 2016
23 Dec 2016

Print course description

ECTS credits: 0.0

Instruction language: English

Coordinator: S. Heeneman

Fac. Health, Medicine and Life Sciences

Practicals Brain, Behavior and Movement

BBS1104

Period 4
6 Feb 2017
7 Apr 2017

Print course description

ECTS credits: 0.0

Instruction language: English

Coordinator: D.L.A. van den Hove

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 fetal 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 + Heart development**
Students will study the topography of the sexual organs and the heart in focusing on developmental aspects.

**Lab practical 1:** DNA isolation from buccal cells - Preparation buffers lab training 2 + 3.
DNA Isolation from their own buccal cells. DNA Concentration analysis (data used for a short Excel/SPSS task, buffer preparation

**Lab practical 2:** Analyzing the DNA concentration + PCR
Students will measure the DNA concentration of a given DNA and perform a PCR to amplify a sequence which may include a genetic variance

**Lab practical 3:** Restriction enzyme digestion, Gel electrophoresis (visualization of products)
Students will make a restriction analysis to find out if their DNA is mutated

**Practical 5** Computer - How to find and interpret online Epigenetics information
Students will be guided in find epigenetic information and will have the time to try for themselves to do so.

**Recommended reading**

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”)
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
Ross, Pawlina: Histology a text and atlas (6th)

### BBS1105

**Period 5**
10 Apr 2017
9 Jun 2017

[Print course description](#)

**ECTS credits:**
0.0

**Instruction language:**
English

**Coordinator:**
U. von Rango - Hilmes

**Teaching methods:**
Bachelor Biomedical Sciences

Assignment(s), Lecture(s), Work in subgroups, Skills, Training(s)

Assessment methods:
Final paper, 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

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 are introduced that can be used in all kinds of research problems encountered in Biomedical science.

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.

BBS1003

Period 3
Fac. Health, Medicine and Life Sciences

Critical Appraisal of Biomedical Publication

Full course description

Biomedical Sciences covers a broad range of different research approaches. This course on the critical appraisal of biomedical publications will teach you to recognise and value the diversity of study designs used in the field of biomedical research. The course uses a competency-based approach and will enable you to critically review research quality and methodology as they are used in daily practice. During this 4-week course, 5 learning classes will be covered aiming at development of a critical attitude towards biomedical publications. Four learning classes refer to critical appraisals of biomedical publications (CABPs) and one focuses on the critical appraisal of a measurement instrument (CAM). A strong collaborative approach is necessary to be able to argue and discuss research methodology. The course will specifically address three different types of studies; (i) observational research, (ii) randomized controlled trials (RCT) and (iii) experimental laboratory-based studies (i.e. cell and genetic studies).

Course objectives

- Introduction in cholesterol research
- Recognise and describe the empirical cycle in published biomedical articles
- Describe (and compute) frequency measures and risk indices often used in biomedical sciences
- Differentiate between regularly used research designs in biomedical sciences
- Argue/ value the quality aspects of research methodology and suggest alternatives and solutions to problems
- Review methodological aspects of scientific publications in relation to the topical results, the research question and statistics used
- Make supported decisions/ balanced choices when designing a biomedical study
- The students develop a critical attitude towards research methodology

Recommended reading

- A number of biomedical publications related to cholesterol
- Multiple quality checklists (STARD, CONSORT, RIPOSTE)
Bachelor Biomedical Sciences

- Literature around quality checklists
- Various books on research methodology Ranjit Kumar.
- Nursing research: generating and assessing evidence for nursing practice. 9th edition

BBS1006

**Period 6**
12 Jun 2017
7 Jul 2017

[Print course description]

**ECTS credits:**
3.0

**Instruction language:**
English

**Coordinators:**
T.J.H. Bovend’eerdt
M.C.J.M. van Dongen
B.A.J. Verhage

**Teaching methods:**
Assignment(s), Work in subgroups, Lecture(s), Presentations, Research, Skills, Training(s)

**Assessment methods:**
Assignment, Attendance, Final paper, Participation, Portfolio, Written exam

**Keywords:**
Critical appraisal, study design, research methodology, (non)experimental studies

Fac. Health, Medicine and Life Sciences

**CABP Assignment**

**Full course description**

Course BBS1006 is a 4-week course during which critical appraisals of biomedical publications (CABP – BBS1007) are the central theme. These CABPs are structured appraisals of methodological aspects of biomedical publications around the topic of cholesterol. Each publication is discussed and appraised in journal clubs and written assignments. The students are guided in increasing their level of understanding of each biomedical publication with the ultimate goal to value and argue the methodological quality aspects of these publications. Three CABPs are guided by tutors and performed in teams while the fourth CABP is performed individually and is part of the student’s final mark.

**Course objectives**

- Recognise and describe the empirical cycle in published biomedical articles
- Describe (and compute) frequency measures and risk indices often used in biomedical sciences
- Differentiate between regularly used research designs in biomedical sciences
- Argue/value the quality aspects of research methodology and suggest alternatives and solutions to problems
Review methodological aspects of scientific publications in relation to the topical results, the research question and statistics used
Make supported decisions/ balanced choices when designing a biomedical study
The students develop a critical attitude towards research methodology

Recommended reading

- A number of biomedical publications related to cholesterol
- Multiple quality checklists (STARD, CONSORT, RIPOSTE)
- Literature around quality checklists
- Various books on research methodology Ranjit Kumar.
- Nursing research: generating and assessing evidence for nursing practice. 9th edition

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**BBS1007**

**Period 6**
12 Jun 2017
7 Jul 2017

[Print course description](#)

**ECTS credits:**
2.0

**Instruction language:**
English

**Coordinator:**
T.J.H. Bovend'eerdt

**Teaching methods:**
Assignment(s), Work in subgroups, Lecture(s), Paper(s), Presentation(s), Research, Skills, Training(s)

**Assessment methods:**
Assignment, Attendance, Final paper, Participation, Portfolio, Presentation

**Keywords:**
Critical appraisal, study design, research methodology, (non)experimental studies

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**Fac. Health, Medicine and Life Sciences**

**Philosophy in Action I**

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**BBS1008**

**Year**
1 Sep 2016
31 Aug 2017

[Print course description](#)

**ECTS credits:**
Competence Communicator and Collaborator

Fac. Health, Medicine and Life Sciences
Competency Communicator and Collaborator

Full course description

The structure of the Bachelor Biomedical Sciences is based on the following four BIOMED competences:

1. Biomedical expert
2. Communicator and Collaborator
3. Investigator and Scholar
4. Professional and Organiser

The intended learning outcomes related to the BIOMED competence ‘Biomedical Experts’ are organised within the content of courses. The intended learning outcomes for the three other BIOMED competences will be addressed in course-overarching education.

The four competences will be monitored in part via a mentor system. Students build a portfolio which contains the documentation required to demonstrate progress in all competences. Typically, the BBSfolio contains reports on practicals, feedback on lab work and attitude, peer feedback on professional behaviour during tutorial groups and in teamwork activities, grades for end-of-course tests, presentations and feedback on presentations.

Course objectives

For the competence Communicator and Collaborator (C) the following four intended learning outcomes (ILO) for a B-BMS graduate have been defined:

C-ILO1. Adjusts communication written or oral, to specific global audience/readership and international setting
For year 1, the ILOs for this sub-competence are:

- Reports on methods, results and discussion sections according to current conventions.
- Prepares and delivers presentation(s) about biomedical topics in tutorials, practicals, etc.

C-ILO2. Communicates professionally with peers and staff originating from diverse cultural and disciplinary backgrounds
For year 1, the ILO for this sub-competence is:

- Interacts effectively in all educational settings

C-ILO3. Shows awareness of team roles and takes responsibly her/his position in a diversely composed international team
For year 1, the ILOs for this sub-competence are:

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

C-ILO4. Works effectively in an international and intercultural team

For year 1, the ILO for this sub-competence is:

- Is aware of cultural diversity and its impact on group dynamics and team processes

### BBS1020

Year
1 Sep 2016
31 Aug 2017

Print course description
ECTS credits:
10.0
Instruction language:
English
Coordinator:
J.M.E.M. Cosemans
Teaching methods:
Assignment(s), Work in subgroups, Paper(s), PBL, Presentation(s), Skills, Training(s)
Assessment methods:
Assignment, Attendance, Final paper, Participation, Portfolio, Presentation
Keywords:
Longitudinal tracks, communicator, collaborator, Portfolio, scientific report, presentation, multisource evaluation

### BBS1021

Year
1 Sep 2016
31 Aug 2017

Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:
Fac. Health, Medicine and Life Sciences

Intercultural Understanding

BBS1025

Year
1 Sep 2016
31 Aug 2017

Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:
J.M.E.M. Cosemans

Competence Professional and Organisor

Fac. Health, Medicine and Life Sciences

Competency Professional and Organizer

Full course description

The structure of the Bachelor Biomedical Sciences is based on the following four BIOMED competences:

- Biomedical expert
- Communicator and Collaborator
- Investigator and Scholar
- Professional and Organiser

The intended learning outcomes related to the BIOMED competence ‘Biomedical Experts’ are
organised within the content of courses. The intended learning outcomes for the three other BIOMED competences will be addressed in course-overarching education.

The four competences will be monitored in part via a mentor system. Students build a portfolio which contains the documentation required to demonstrate progress in all competences. Typically, the BBSfolio contains reports on practicals, feedback on lab work and attitude, peer feedback on professional behaviour during tutorial groups and in teamwork activities, grades for end-of-course tests, presentations and feedback on presentations.

**Course objectives**

**For the competence Professional and Organiser (P) the following four intended learning outcomes (ILO) for a B-BMS graduate have been defined:**

**P-ILO1.** Demonstrates appropriate interpersonal behaviour
For year 1, the ILO for this sub-competence is:

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

**P-ILO2.** Appreciates the conventions of scientific integrity and legal and ethical standards and operates accordingly
For year 1, the ILOs for this sub-competence are:

- Meets obligations in writing academic reports free of fraud and plagiarism
- Identifies personal biases and prejudices related to professional responsibilities

**P-ILO3.** Takes responsibility for her/his personal and academic development
For year 1, the ILOs for this sub-competence are:

- Accepts feedback; Critically reflects on his/her learning and academic development
- 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

**P-ILO4.** Organizes his/her work and study well
For year 1, the ILOs for this sub-competence are:

- Lists the principles of keeping a lab notebook
- Works according to principles of GLP
- Appreciates and applies relevant ICT to prepare documents and presentation. Appreciates the value of ICT in data processing and management
- Distributes workload throughout a course or project

**BBS1030**

**Year**
1 Sep 2016
31 Aug 2017

*Print course description*

**ECTS credits:**
10.0

**Instruction language:**
Bachelor Biomedical Sciences

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

Assessment methods:
Assignment, Attendance, Final paper, Participation, Portfolio, Presentation

Keywords:
Longitudinal tracks, professional, organiser, Portfolio, self-evaluation, lab skills, multisource evaluation

Fac. Health, Medicine and Life Sciences

GLP

BBS1031

Year
1 Sep 2016
31 Aug 2017

Print course description

ECTS credits:
0.0

Instruction language:
English
Coordinator:
J.M.E.M. Cosemans

BBS1032

Year
1 Sep 2016
31 Aug 2017

Print course description

ECTS credits:
0.0

Instruction language:
English
Coordinator:
Fac. Health, Medicine and Life Sciences

Lab Journal

BBS1033

Year
1 Sep 2016
31 Aug 2017

Print course description

ECTS credits:
0.0

Instruction language:
English

Coordinator:
J.M.E.M. Cosemans

Fac. Health, Medicine and Life Sciences

Scientific Integrity

BBS1034

Year
1 Sep 2016
31 Aug 2017

Print course description

ECTS credits:
0.0

Instruction language:
English

Coordinator:
J.M.E.M. Cosemans

Fac. Health, Medicine and Life Sciences

Professional Behavior

BBS1035
Fac. Health, Medicine and Life Sciences

**Personal Development**

**BBS1036**

Year
1 Sep 2016
31 Aug 2017

Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:
J.M.E.M. Cosemans

Major Molecular Life Sciences

Fac. Health, Medicine and Life Sciences

**Introduction into Fundamental Neurosciences**

Full course description

This study programma 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

**MLW2001**

Period 1
Fac. Health, Medicine and Life Sciences

**Metabolism and Activity**

**Full course description**

This study programma 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 ‘Dutch’ at the top of the website.

**MLW2002**

Period 2
31 Oct 2016
23 Dec 2016

**MLW2003**

Period 3
9 Jan 2017
3 Feb 2017

**Development and Differentiation**

**Full course description**

This study programma 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.
Fac. Health, Medicine and Life Sciences

**Attack and Defense**

**Full course description**

This study programma 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.

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**MLW2004**

Period 4
6 Feb 2017
7 Apr 2017

**Print course description**

ECTS credits:
10.0

Coordinator:
M.A. Dentener

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Fac. Health, Medicine and Life Sciences

**Gene-environment Interactions**

**Full course description**

This study programma 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.

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**MLW2005**

Period 5
10 Apr 2017
Fac. Health, Medicine and Life Sciences

Bio-electronics and Nanotechnology

Full course description

This study programma 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.

MLW2006

Period 6
12 Jun 2017
7 Jul 2017

Full course description

In this block, knowledge obtained during year 1 and year 2 and block 3.1 is integrated and translated into approaches to treat patients. This involves classical (symptom rather than mechanism based) approaches in which deregulated physiological processes are interfered with and more modern approaches in which the (drug) treatment is directed to selected molecular targets and individuals. In addition some diagnostic methods and imaging techniques are included in the program as a means to detect diseases and to choose and monitor treatments. Due to the limited time, the focus will mainly be on cardiovascular diseases and cancer. As a red line theory will be coupled to practical (clinical) applications. The block involves PBL cases, lectures, (computer and demo) practicals and interactive group assignments/presentations. The block consists of three themes. The first theme (pharmacotherapy of cardiovascular diseases) deals with how drugs can be used to interfere with the cardiovascular system and what one would like to and can achieve with this, the mechanisms of action of major drug classes are and how drugs can be developed for a defined target. The second
theme involves imaging techniques as MRI en fluorescence based (particularly confocal and two/multiphoton) microscopy. Next to theoretical principles, practical aspects and (diagnostic and research) applications are discussed. The third theme involves target directed therapies and molecular diagnostics in cancer therapy. This includes the principle behind and the mechanisms of drugs that are directed to specific targets in tumors as well as mechanisms by which tumors can obtain resistance to such drugs. In addition, the use of molecular diagnostics to select the treatment or molecular target is addressed as well as the fact that inter-individual (genetic) differences are important. Finally, a company visit allows introduction into the vision and strategies of companies to amongst others develop, test and market drugs.

Course objectives

Integration and translation of knowledge from previous years and blocks into diagnostic and therapeutic approaches. Specific aims The student acquires knowledge of mechanisms of actions of drugs The student acquires knowledge in approaches to develop drugs based on defined drug targets. The student understands the rationale of the pharmacotherapy of cardiovascular diseases and knows the mechanism of action of the major drug classes for these diseases. The student acquires knowledge regarding the rationale and mechanisms involved in target directed anti-tumor therapy. The student acquires knowledge regarding the influence of (DNA) variations between individuals on the effectiveness of drugs. The student understands at which intrinsic and extrinsic cellular levels tumors can become resistant to targeted therapies. The student acquires knowledge in the (molecular) technology in diagnostics and how molecular diagnostics can help to a better and more patient oriented and effective treatment. The student knows the difference between susceptibility genes and disease causing genes. The student understands how MRI images are made and what the basis of this technique is. The student understands the difference between T1, T2 and density weighed MRI images. The student acquires knowledge in the application of MRI in the detection and investigation of diseases. The student knows the technology that forms the basis of fluorescence confocal and two/multiphoton microscopy. The student learns how confocal and multiphoton microscopy can be used to study cellular processes and molecular diagnostics. Skills By giving presentations and writing a report the students will develop and sharpen their skills to work in a cooperative setting, develop a critical attitude to and interpret data and findings, reason and write scientifically.

Recommended reading

• Basic and Clinical Pharmacology, Betram Katzung, Susan Masters and Anthony Trevor, McGraw-Hill Medical; 12 edition (December 13, 2011) | ISBN: 0071764011 (available online via e-books, UM library). During the block, various references to journal articles will be given.

MLW3003

Period 3
9 Jan 2017
3 Feb 2017

Print course description
ECTS credits: 6.0
Instruction language: English
Fac. Health, Medicine and Life Sciences
Practicals Development and Differentiation

Full course description

This study programma 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.

MLW2103

Period 3
9 Jan 2017
3 Feb 2017

Print course description
ECTS credits:
0.0
Coordinator:
U. von Rango - Hilmes

Fac. Health, Medicine and Life Sciences
Practicals The Diseased Organism: Diagnosis and Therapy

Full course description

In this block, knowledge that is obtained during your study in year 1 and year 2 and block 3.1 will be integrated and translated into approaches to treat diseases/patients, particularly with drugs. This involves classical (often symptom rather than mechanism based) approaches in which deregulated physiological processes are interfered with (particularly in cardiovascular diseases) as well as more modern approaches in which the (drug) treatment is more directed to selected molecular targets and individuals (modern anti-tumor therapy). In addition a number of diagnostic methods and imaging techniques will be included in the program as a means to detect diseases and to choose and monitor a treatment method. Due to the limited time, the focus will mainly be on cardiovascular diseases and cancer.
**Course objectives**

- The student acquires knowledge of mechanisms of actions of drugs.
- The student acquires knowledge in approaches to develop drugs based on defined drug targets.
- The student understands the rationale of the pharmacotherapy of cardiovascular diseases and knows the mechanism of action of the major drug classes for these diseases.
- The student acquires knowledge regarding the rationale and mechanisms involved in target directed anti-tumor therapy.
- The student acquires knowledge regarding the influence of (DNA) variations between individuals on the effectiveness of drugs.
- The student understands at which intrinsic and extrinsic cellular levels tumors can become resistant to targeted therapies.
- The student acquires knowledge in the (molecular) technology in diagnostics and how molecular diagnostics can help to a better and more patient oriented and effective treatment.
- The student knows the difference between susceptibility genes and disease causing genes.
- The student understands how MRI images are made and what the basis of this technique is.
- The student understands the difference between T1, T2 and density weighed MRI images.
- The student acquires knowledge in the application of MRI in the detection and investigation of diseases.
- The student knows the technology that forms the basis of fluorescence confocal and two/multiphoton microscopy.
- The student learns how confocal and multiphoton microscopy can be used to study cellular processes and molecular diagnostics.

**Recommended reading**

For cardiovascular pharmacology and Cardiolab:
- Physiology handbooks like e.g. Guyton and Hall

For fluorescence and (fluorescence) microscopy:
- Molecular biology of the cell, B. Alberts et al, Garland Science
- For MRI:
  - For tumor pharmacology:

**MLW3103**

**Period 3**
9 Jan 2017
3 Feb 2017

**ECTS credits:**
0.0

**Instruction language:**
English

**Coordinator:**
Fac. Health, Medicine and Life Sciences

**Practicals Introduction into Fundamental Neurosciences**

**MLW2101**

Period 1  
5 Sep 2016  
28 Oct 2016

[Print course description](#)

**ECTS credits:**  
0.0

**Coordinator:**  
M.A. van Duinen

**Fac. Health, Medicine and Life Sciences**

**Practicals Attack and Defense**

**Full course description**

A practical course, matching the week’s theme, will be provided.

**Overview of practical trainings:**

1. Molecular identification of staph and strep. Students are acquainted with plasmid isolation, restriction enzymes, gel-electrophoreses, PCR and cycle-sequencing. A series of commensal bacterial strains will be analyzed to identify resistance genes S.
2. Quantification of microorganisms. This is a computer-assisted practical dealing with several assays and microbiological terms such as 1) Bacterial growth curve/log phase, 2) Turbidity/McFarland/nephelometer, 3) Colony formation/cfu, 4) Minimal Inhibitory Concentration/MIC, 5) Cytopathic effect/CPE, 5) Virus titer, 6) Plaque formation/pfu.
3. Commensal flora and antimicrobial resistance. Various bacterial species from cutaneous, mucosal and gastrointestinal commensal flora will be collected, cultured and identified by means of biochemical assays. In addition, resistance profiles will be determined.
4. Cytokine production and ELISA. Cytokine production is an important aspect of immunity and is a
tightly regulated process. The aim of this practical is to get familiar, both theoretically and practically, with the enzyme-linked immunosorbent assay (ELISA) to quantify different cytokines.

5. PBMC isolation and FACS analysis. Flow cytometry (FACS) is a powerful technique to characterize immune cells, quantify immune cell subsets. In this practical you will get more theoretical insight in flow cytometry and learn to analyze and interpret FACS data. Peripheral blood mononuclear cells (PBMC) are leukocytes with a non-segmented nucleus, which constitute a critical component of the immune system.

6. Immune cells and lymphoid organs. This concerns a computer-supported virtual microscopy practical that provides insight in: 1) cytology and histology of the immune system, 2) the most important features and biological function of the different immune cells, 3) composition and function of the secondary lymphoid tissues and organs and 4) the processes and regulation of the immune response.

Course objectives

Development of theoretical insight and practical skills in:

1. Microbiological technique such as methods of bacterial and virus detection, preparation of bacterial lysates, DNA isolation, rt-PCR and gel electrophoresis.
2. Immunological techniques such as PBMC isolation, FACS analysis, ELISA and microscopy of immuno organs and cells.

Communication on this scientific field:

1. Application and interpretation of obtained data by writing a report of the practical training cytokine ELISA.

MLW2104

Period 4
6 Feb 2017
7 Apr 2017

Print course description

ECTS credits:
0.0

Coordinators:
P.S. Beisser
M.A. Dentener

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

Assessment methods:
Assignment, Attendance, Participation

Fac. Health, Medicine and Life Sciences
Fac. Health, Medicine and Life Sciences
Practicals Gene-environment Reactions

MLW2105
Period 5
10 Apr 2017
9 Jun 2017

Print course description
ECTS credits: 0.0
Coordinator: H.C.R. Peeters

Fac. Health, Medicine and Life Sciences
Practicals Metabolism and Activity

MLW2102
Period 2
31 Oct 2016
23 Dec 2016

Print course description
ECTS credits: 0.0
Coordinator: G. Plasqui

Fac. Health, Medicine and Life Sciences
Multimorbiditeit in Obesitas

Full course description

The course ‘Obesity and its comorbidities’ is the final course in the bachelor Biomedical Sciences. In the past 2 years you have obtained in-depth knowledge on your own specialty of choice. This course is a joint course for all three specializations, being Movement Sciences, Biological Health Sciences and Molecular Life Sciences. In short, this course covers several major (patho)physiological disturbances in - and consequences of - obesity, from molecule to man. Emphasis will be on (disturbances in) inter-organ cross-talk in obesity, its detrimental health consequences, and potential intervention strategies.
Course objectives

Overall aim:
Integration and application of previously obtained knowledge on (1) metabolic homeostasis and the inter-organ relations required to maintain metabolic health and (2) to study metabolic dysregulation associated with obesity. By merging the 3 specializations - Molecular Life Sciences, Biological Health Sciences and Movement Sciences - this course also aims to (1) expand or apply previously obtained knowledge in neighboring disciplines and (2) stimulate interdisciplinary collaboration and communication.

Specific aims:
- Obtain knowledge on obesity and its comorbidities with emphasis on the metabolic consequences of obesity in middle-aged to elderly populations.
- Become familiar with the different definitions of the Metabolic Syndrome
- Become familiar with key signaling routes, cells, tissues and organs (adipose tissue, muscle, liver, the gastrointestinal system, the (cardio)vascular system and brain) that are involved in development and consequences of obesity and the metabolic syndrome
- Obtain insight in the mechanisms underlying disturbances in these processes
- Be able to understand how these aberrations at the cell and interorgan level translate into whole body complications.
- Obtain knowledge on the (clinical) consequences of the metabolic disturbances that underlie the metabolic syndrome
- Understand the mechanisms underlying the adaptive responses to interventions that focus on nutrition, physical activity, pharmacology or surgery
- Deepen, expand and communicate to peers, the knowledge that has been obtained in previous years and apply that in the context of obesity and the metabolic syndrome

Recommended reading


BMW3010
Period 4
**Major Biological Health Sciences**

**Fac. Health, Medicine and Life Sciences**

**Intermediar Metabolism**

**Full course description**

This study programma 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.

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**BGK2001**

**Period 1**

5 Sep 2016

28 Oct 2016

**Print course description**

**ECTS credits:**

10.0

**Coordinator:**

R.P. Mensink

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**Fac. Health, Medicine and Life Sciences**
Practicals Intermediar Metabolism

BGK2101

Period 1
5 Sep 2016
28 Oct 2016

Print course description
ECTS credits:
0.0
Coordinator:
R.P. Mensink

Fac. Health, Medicine and Life Sciences

Biological Control Systems

Full course description

This study programma 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 ‘Dutch’ at the top of the website

BGK2002

Period 2
31 Oct 2016
23 Dec 2016

Print course description
ECTS credits:
10.0
Coordinator:
J. Hoeks

Fac. Health, Medicine and Life Sciences

Practicals Control Systems

BGK2102

Period 2
31 Oct 2016
Fac. Health, Medicine and Life Sciences
Introduction into Pharmacology

Full course description
This study programma 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

BGK2003
Period 3
9 Jan 2017
3 Feb 2017

Print course description
ECTS credits: 5.0
Coordinator: P.M.H. Schifers
Assessment methods:
Assignment, Participation, Written exam

Fac. Health, Medicine and Life Sciences
Practicals Introduction into Pharmacology

Full course description
This study programma 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

BGK2103
Period 3
9 Jan 2017
3 Feb 2017
Fac. Health, Medicine and Life Sciences
Growth, Development and Aging

Full course description

This study programma 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.

BGK2004

Period 4
6 Feb 2017
7 Apr 2017

Print course description
ECTS credits: 10.0
Coordinator: G.J. Hageman

Fac. Health, Medicine and Life Sciences
Practicals Growth, Development and Aging

Full course description

This study programma 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.

BGK2104

Period 4
6 Feb 2017
7 Apr 2017

Print course description
ECTS credits: 0.0
Coordinator: G.J. Hageman
Fac. Health, Medicine and Life Sciences

Defence Systems

BGK2005

Period 5
10 Apr 2017
9 Jun 2017

Print course description
ECTS credits:
10.0
Coordinator:
J. Plat

Fac. Health, Medicine and Life Sciences

Practicals Defence Systems

BGK2105

Period 5
10 Apr 2017
9 Jun 2017

Print course description
ECTS credits:
0.0
Coordinator:
J. Plat

Fac. Health, Medicine and Life Sciences

Practicals On Size and Life

Course objectives
Programme only available in Dutch

BGK2106
Fac. Health, Medicine and Life Sciences

**On Size and Life**

**Full course description**

This study programma 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.

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**BGK2006**

**Full course description**

Data from 31P-MRS measurements, from a PET-FDG measurement and breath samples will be analysed. The students will also perform (and undergo) a measurement of endothelial function where the influence of caffeine on endothelial function will be studied.

**Course objectives**

Students will learn what the outcome parameters of 31P-MRS-, and FDG-PET measurements are and how they are calculated. They will also get acquainted with the performance of breath analysis and will get insight in the possibilities to investigate endothelial function.
Recommended reading

• Blokbook ‘non-invasieve Metabolic Diagnostics’. • To search for review articles, students will use PubMed. Specific literature will be provided by E-readers.

BGK3003

Period 3
9 Jan 2017
3 Feb 2017

Print course description
ECTS credits:
6.0
Instruction language:
English
Coordinator:
V.B. Schrauwen - Hinderling
Teaching methods:
Lecture(s), PBL, Training(s)
Assessment methods:
Written exam
Keywords:
31P-Magnetic Resonance Spectroscopy, FDG-PET, MS, breath analysis, endothelial function

Fac. Health, Medicine and Life Sciences
Practicals Non-invasive Metabolic Diagnostics

Full course description

Data from 31P-MRS measurements, from a PET-FDG measurement and breath samples will be analysed. The students will also perform (and undergo) a measurement of endothelial function where the influence of caffeine on endothelial function will be studied.

Course objectives

Students will learn what the outcome parameters of 31P-MRS-, and FDG-PET measurements are and how they are calculated. They will also get acquainted with the performance of breath analysis and will get insight in the possibilities to investigate endothelial function.

Recommended reading

Practicum instructions on ELEUM

BGK3103

Period 3
9 Jan 2017
3 Feb 2017
Multimorbiditeit in Obesitas

Full course description

The course ‘Obesity and its comorbidities’ is the final course in the bachelor Biomedical Sciences. In the past 2 years you have obtained in-depth knowledge on your own specialty of choice. This course is a joint course for all three specializations, being Movement Sciences, Biological Health Sciences and Molecular Life Sciences. In short, this course covers several major (patho)physiological disturbances in - and consequences of - obesity, from molecule to man. Emphasis will be on (disturbances in) inter-organ cross-talk in obesity, its detrimental health consequences, and potential intervention strategies.

Course objectives

Overall aim:
Integration and application of previously obtained knowledge on (1) metabolic homeostasis and the inter-organ relations required to maintain metabolic health and (2) to study metabolic dysregulation associated with obesity. By merging the 3 specializations - Molecular Life Sciences, Biological Health Sciences and Movement Sciences - this course also aims to (1) expand or apply previously obtained knowledge in neighboring disciplines and (2) stimulate interdisciplinary collaboration and communication.

Specific aims:

- Obtain knowledge on obesity and its comorbidities with emphasis on the metabolic consequences of obesity in middle-aged to elderly populations.
- Become familiar with the different definitions of the Metabolic Syndrome
- Become familiar with key signaling routes, cells, tissues and organs (adipose tissue, muscle, liver, the gastrointestinal system, the (cardio)vascular system and brain) that are involved in development and consequences of obesity and the metabolic syndrome
- Obtain insight in the mechanisms underlying disturbances in these processes
- Be able to understand how these aberrations at the cell and interorgan level translate into whole body complications.
- Obtain knowledge on the (clinical) consequences of the metabolic disturbances that underlie the metabolic syndrome.
Understand the mechanisms underlying the adaptive responses to interventions that focus on nutrition, physical activity, pharmacology or surgery

Deepen, expand and communicate to peers, the knowledge that has been obtained in previous years and apply that in the context of obesity and the metabolic syndrome

Recommended reading


BMW3010

Period 4
6 Feb 2017
7 Apr 2017

Print course description

ECTS credits:
10.0

Instruction language:
English

Coordinators:
M.M.J. van Greevenbroek
G.H. Goossens

Teaching methods:
Assignment(s), Work in subgroups, Lecture(s), PBL, Presentation(s)

Assessment methods:
Assignment, Attendance, Presentation, Written exam

Keywords:
Obesity Organ crosstalk Exchange and integration of knowledge Insulin Adipokines Adipose tissue Muscle Liver Gut Musculoskeletal disease Macro- and Microvascular circulation
Major Human Movement Sciences

Fac. Health, Medicine and Life Sciences

Muscle Force

Full course description

This study programma 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.

BWE2001

Period 1
5 Sep 2016
28 Oct 2016

Print course description
ECTS credits:
10.0
Coordinator:
M.R. Drost

Fac. Health, Medicine and Life Sciences
Practicals Muscle Force

BWE2101

Period 1
5 Sep 2016
28 Oct 2016

Print course description
ECTS credits:
0.0
Coordinator:
M.R. Drost

Fac. Health, Medicine and Life Sciences
Neural Information Processing
Full course description

This study programma 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.

BWE2002

Period 2
31 Oct 2016
23 Dec 2016

Print course description

ECTS credits:
10.0

Coordinator:
J.J.M.E. Adam

Fac. Health, Medicine and Life Sciences
Practicals Neural Information Processing

Full course description

This study programma 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.

BWE2102

Period 2
31 Oct 2016
23 Dec 2016

Print course description

ECTS credits:
0.0

Coordinator:
J.J.M.E. Adam

Fac. Health, Medicine and Life Sciences
Balance and Movement

Full course description

This study programma is taught in Dutch. Hence, the programme information is only available in
BWE2003

Period 3
9 Jan 2017
3 Feb 2017

Print course description
ECTS credits:
5.0
Coordinator:
M.K.C. Hesselink

Fac. Health, Medicine and Life Sciences
Practicals Balance and Movement

Full course description

• Macroscopie ‘opstijgende/dalende banen en basale ganglia’ (coördinator: U.von Rango; Ulrike@vonrango.nl ; tel.881062): 2ku = ‘NEURO A (BANEN)’? • Op snijzaal worden de gewrichten van de onderste extremitéit bestudeerd en vergelijkingen worden gemaakt met de gewrichten van de bovenste extremiteit (zie ook blok 2.2). Daarnaast is er een herhalingsmoment t.a.v. de spieren van de onderste extremiteit (zie ook blok 2.1). Practica binnen traeject ‘Meten van bewegen’ • ‘TCMS’ (coördinator: Werner Mess; W.Mess@mumc.nl ; tel. 3877272): 2 ku • ‘2-D Kinematica: houdingscontrole’ (coördinator: Maarten Drost; Maarten.drost@maastrichtuniversity.nl ; tel. 881395) 2 ku Matlab practicum: coördinator? inhoud: optimization, signal processing Practicum: coördinator Kennet/Alessio Inhoud: digitale technieken (ADC; bemonstering via krachtenplatform-snelheid; numeriek; differentiëren &integreren)

BWE2103

Period 3
9 Jan 2017
3 Feb 2017

Print course description
ECTS credits:
0.0
Coordinator:
M.K.C. Hesselink
Teaching methods:
Skills
Assessment methods:
Attendance, Assignment
Full course description

1. Mitochondriële respiratie Coördinator: Dr. J. Hoeks tel. 81507, Email: j.hoeks@maastrichtuniversity.nl Door middel van dit practicum, in de vorm van een workshop en praktische instructies, krijgt de student kennis van de methodiek om mitochondriële respiratie te karakteriseren. 2. Lichaamssamenstelling Coordinator: Dr. Guy Plasgui Email: g.plasgui@maastrichtuniversity.nl Het energiemetabolisme van mens en dier wordt grotendeels bepaald door de lichaamssamenstelling. In dit practicum zal de student verschillende methodieken toepassen om de vetmassa en vet vrije massa te bepalen. Na afloop van het practicum heeft de student inzicht in de onderliggende theorieën van de methodieken, alsmede de variatie en validiteit. 3. Glucose en lactaatbepaling Coördinator: Prof. Dr. P. Schrauwen, tel. 81502, E-mail: p.schrauwen@maastrichtuniversity.nl In dit practicum worden de plasma monsters verkregen bij practicum 4 geanalyseerd voor meting van het glucose en lactaat (melkzuur) gehalte met een colorimetrische methode op een normale spectrofotometer. 4. Het meten van energiegebruik tijdens inspanning (projectopdracht) Coördinator: Dr. G.H. Goossens, tel. 81314 Email: g.goossens@maastrichtuniversity.nl Dit practicum bestaat uit twee onderdelen, die op verschillende dagen plaats zullen vinden. Tijdens het eerste deel van het practicum zullen studenten inzicht krijgen in de berekening van het substraatgebruik op basis van ruwe data (arbitraire eenheden) verkregen met indirecte calorimetrie. Op basis van de berekeningen, en met een vooraf bepaalde vraagstelling gerelateerd aan het effect van inspanning op het energie- en substraatgebruik, moeten de studenten een kort onderzoeksvoorstel schrijven. Tijdens het tweede deel van dit practicum kunnen vervolgens de benodigde metingen worden verricht.

BWE2104
Period 4
6 Feb 2017
7 Apr 2017

Print course description
ECTS credits:
0.0
Coordinator:
P.A.J. Schrauwen
Teaching methods:
Skills
Assessment methods:
Attendance, Assignment

Fac. Health, Medicine and Life Sciences
Energy Sources

Full course description

This study programma is taught in Dutch. Hence, the programme information is only available in Dutch.
BWE2004

Period 4
6 Feb 2017
7 Apr 2017

Print course description
ECTS credits:
10.0
Coordinator:
P.A.J. Schrauwen

Fac. Health, Medicine and Life Sciences
Practicals Co-ordinated Actions

Full course description

This study programma 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

BWE2105

Period 5
10 Apr 2017
9 Jun 2017

Print course description
ECTS credits:
0.0
Coordinator:
J.J.M.E. Adam

Fac. Health, Medicine and Life Sciences
Co-ordinated Actions

Full course description

This study programma 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
Fac. Health, Medicine and Life Sciences

Performance

Full course description

Bewegen wordt vaak geassocieerd met prestatie. Prestatie speelt niet alleen een rol in sport, muziek of kinderen in ontwikkeling maar is ook een belangrijke factor in het dagelijks functioneren. Tijdens arbeid wordt een prestatie van een medewerker verwacht en vanuit revalidatieperspectief worden bijvoorbeeld patiënten met chronische pijn geleerd goed te kunnen presteren ondanks pijnklachten. Wie veilig de straat wil oversteken moet in staat zijn om binnen de tijd dat het voetgangerslicht op groen staat de overkant te bereiken. Prestatie wordt bepaald door de verhouding tussen iemands capaciteit om te presteren en de uiteindelijke uitvoering van de opdracht. In dit blok zullen studenten in projectvorm werken aan situaties waarbij prestatie gemeten wordt en cruciaal is. Daarbij wordt onderzocht wat capaciteitsbepalende factoren zijn, belemmerend dan wel bevorderend, en wat de factoren zijn die de prestatie karakteriseren (belasting vs. belastbaarheid). Prestatie hangt af van een goede afstemming tussen vereisten voor kracht, energie en coördinatie maar ook het gedrag en motivatie. Inzicht in de relatieve bijdrage van de verschillende subsystemen is daarbij essentieel. Nieuwe concepten die in dit blok geïntroduceerd zullen worden zijn, efficiëntie van bewegen en van energiegeneratie, vermogensbalans en pacing, neuromechanica van het bewegen en modulatoren van beweeggedrag.

Course objectives

- beschikt over voldoende kennis om bewegingsprestatie te kunnen evalueren vanuit een breed en geïntegreerd perspectief en is in staat om prestatie te relateren aan de bouw en functie van fysiologische subsystemen (e.g. spier-skeletstelsel, centraal- en perifeer zenuwstelsel en cardiopulmonaire systeem);
- heeft inzicht in de wijze waarop prestatie beïnvloed word door leeftijd, geslacht, vermoeidheid, blessures, pijn, motivatie, angst, trainingsstatus en ziekte.

Toepassen van kennis en inzicht

- kan op basis van een brede probleemstelling een bewegingswetenschappelijke hypothese formuleren;
- kan een experiment bedenken om een hypothese te toetsen;
- kan een meetprotocol opstellen;
- is in staat de volgende, praktische vaardigheden volgens professionele standaard uit te voeren:
Bachelor Biomedical Sciences

Inspanningstesten, Dynamometrie metingen voor krachtsevaluaties, 3D bewegingsanalyse en Inverse Dynamica, Oppervlakte EMG metingen, Activiteitenmonitoring voor ADL metingen, veelgebruikte klinische prestatie maten (Borg schaal etc.);
- heeft basiskennis van analoge en digitale meetsignalen.

Oordeelsvorming en Communicatie

- is in staat om kritisch verschillende prestatiematen te beoordelen;
- staat kritisch tegenover onderzoek door haar/hemzelf dan wel door anderen uitgevoerd;
- kan een samenhangend, onderbouwd verslag over haar/zijn werk schrijven;
- beschikt over methodologische en statistische vaardigheden om wetenschappelijke literatuur kritisch te kunnen beoordelen;
- kan haar/zijn onderzoekresultaten aan een breed publiek presenteren;
- kan goed samenwerken met medestudenten.

Recommended reading

Mc Ardle WD; Katch FI and Katch VL. Exercise Physiology. 2014

BWE2006

Period 6
12 Jun 2017
7 Jul 2017

Print course description

ECTS credits:
5.0

Coordinator:
I.P.J. Huijnen

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Research

Assessment methods:
Assignment, Attendance, Final paper, Participation, Presentation

Keywords:
Prestatie Experiment Projectmatig werken Kritisch

Fac. Health, Medicine and Life Sciences

Movement Disorders

Full course description

Movement disorders may be caused by disease, trauma and/or degeneration. However, their consequences are not limited to the sensorimotor system, nor does treatment lead to full recovery in all cases. Loss of function often has invisible consequences. The emphasis in unit BWE3003 (Movement Disorders) is less on what a specific impairment (e.g. stroke, spinal cord injury etc) IS, but more on the consequences impairments may have on the level of functioning and participation of a person. This implies a more generic approach of the topic of Movement Disorders. Students will become acquainted with the major aspects of the International Classification of Functioning, Disability
and Health (ICF) model, the presence or absence of relations between function loss on the one hand and level of activity and participation on the other hand, and how insight in these relations may be elucidated using measures and measurements. Students will learn that, although full recovery of function may not be possible, a person's level of activity and participation may still improve strongly. Topics like “Disease is not equal to health minus impairment”, compensation, reorganisation, and use of aids will be covered, next to, for example, “effects of speed of injury/lesion”, age and patients’ perspective on (treatment) outcome. Identification, critical (and logical) reasoning, and reflection by students are key elements within unit BWE3003 (Movement Disorders).

Course objectives

Knowledge and insight
The bachelor student

- has reached an adequate level regarding knowledge of and insight in the neuromuscular / sensorimotor system
- has acquired adequate knowledge of and insight in the ICF model
- has acquired knowledge of the presence or absence of relationships between the 3 main levels of the ICF
- has acquired knowledge about measuring instruments targeting the 3 main levels of the ICF
- has general insight in the societal relevance of movement disorders, at the 3 main levels of the ICF, in various subpopulations.

Application of knowledge and insight gained
The bachelor student

- is able to apply knowledge of and insight in the neuromuscular / sensorimotor system, acquired during prior teaching units, in the understanding of basic mechanisms underlying common movement disorders
- is able to identify relationships between common movement disorders on the one hand, and possible consequences of such disorders at the level of activity and participation on the other hand.

Judgement
The bachelor student

- is able to adequately choose measurement instruments, targeting one or more levels of the ICF, appropriate to the underlying movement disorder problem and question
- is able to (generally) interpret data mentioned above.

Communication
The bachelor student

- is able to concisely convey to his/her fellow students the data/information gathered as well as the interpretation of these data, using a short presentation
- Is able to (individually) write a short report covering the analysis (at the 3 levels of the ICF) of a specific movement disorder problem (case).

Learning skills
The bachelor student

has the ability to analyse novel movement disorder-related problems analogous to the ones presented in teaching unit BWE3003, and to make a well-founded suggestion for appropriate measurement instruments.
Recommended reading

Practicals Movement Disorders

Full course description

Practical session 1: "Painful / stiff joints"

The aim of this practical is to acquaint the student with systematic observation, hands-on measurement and analysis of movement deviating from normal movement. The observations and measurements will mainly focus on ICF function level. Possible implications of impairments on the quality of skill performance will be addressed. Logical reasoning is the central theme in this practical, i.e. combining (basic) knowledge acquired earlier (e.g. anatomy, kinesiology, (neuro-)physiology, biomechanics, etc) with the (simple and more complex) movement disorder problems presented during this practical session.

Practical session 2: "Activity and participation: A different perspective on the same reality"

will be at the centre of attention. Also, students will be asked to critically evaluate how (effects of) these problems at function level, activity level and/or participation level may be quantified. viewed from the patient’s perspectiveHemiparesis is a phenomenon that frequently occurs in stroke. These conditions will be mimicked using constraints. The aim of this practical is to let the student experience, first-hand, what kind of problems patients with a physical impairment, i.e. stroke, may encounter during their daily activities and participation in society. Physical and non-physical problems,

Course objectives

Practical 1:

What do I see? And: Why?

- How do my observations relate to pathology? And: Why? Or: Why not?
- How can I measure movement phenomena that are invisible to the eye?
- How do my observations relate to results of objective measures? What are the differences? What are the common factors? What kind of information is still missing? And: Why?
- How does the environment influence movement performance?

Practical 2:

Main levels of the ICF) encountered during the assignment. all the students will

- identify and
- systematically document specific problems (at

See also the general aims of this course.
Fac. Health, Medicine and Life Sciences

Multimorbiditeit in Obesitas

Full course description

The course ‘Obesity and its comorbidities’ is the final course in the bachelor Biomedical Sciences. In the past 2 years you have obtained in-depth knowledge on your own specialty of choice. This course is a joint course for all three specializations, being Movement Sciences, Biological Health Sciences and Molecular Life Sciences. In short, this course covers several major (patho)physiological disturbances in - and consequences of - obesity, from molecule to man. Emphasis will be on (disturbances in) inter-organ cross-talk in obesity, its detrimental health consequences, and potential intervention strategies

Course objectives

Overall aim:
Integration and application of previously obtained knowledge on (1) metabolic homeostasis and the inter-organ relations required to maintain metabolic health and (2) to study metabolic dysregulation associated with obesity. By merging the 3 specializations – Molecular Life Sciences, Biological Health Sciences and Movement Sciences - this course also aims to (1) expand or apply previously obtained knowledge in neighboring disciplines and (2) stimulate interdisciplinary collaboration and communication.

Specific aims:
- Obtain knowledge on obesity and its comorbidities with emphasis on the metabolic consequences of obesity in middle-aged to elderly populations.
- Become familiar with the different definitions of the Metabolic Syndrome
- Become familiar with key signaling routes, cells, tissues and organs (adipose tissue, muscle, liver, the gastrointestinal system, the (cardio)vascular system and brain) that are involved in development and consequences of obesity and the metabolic syndrome
- Obtain insight in the mechanisms underlying disturbances in these processes
- Be able to understand how these aberrations at the cell and interorgan level translate into whole body complications.
- Obtain knowledge on the (clinical) consequences of the metabolic disturbances that underlie the
metabolic syndrome
• Understand the mechanisms underlying the adaptive responses to interventions that focus on nutrition, physical activity, pharmacology or surgery
• Deepen, expand and communicate to peers, the knowledge that has been obtained in previous years and apply that in the context of obesity and the metabolic syndrome

**Recommended reading**

Coursebook ‘Obesity and its comorbidities’ with:
• Background information and introduction to the problem
• Overview of the course goals
• Description of assignments
• Cases
• Literature references (to be accessed via EleUM - Reference List)

Main Textbook
This e-book is also accessible via Reference list on EleUM: Open e-book in reference list - click to request separate items (bottom of the page) – click on the Volume (1 or 2) you want to access – click on URL: Full text.
Other relevant Textbooks
• Arthur C. Guyton & John E. Hall, Textbook of medical physiology. 11th ed Elsevier

Note: These “Other relevant textbooks” are just examples of recent textbooks, which partly cover the main issues studied in this course. You might as well like to work from other texts. For more recent and up-to-date information, you are supposed to study the papers referred to at the cases.
Academic Skills

Fac. Health, Medicine and Life Sciences

Methods and Statistics II

Full course description

This study programma 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

BMW2001

Period 1
5 Sep 2016
28 Oct 2016

Print course description
ECTS credits: 3.0
Coordinator: A.W. Ambergen

Fac. Health, Medicine and Life Sciences

Practicals Methods and Statistics II

Full course description

This study programma 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

BMW2101

Period 1
5 Sep 2016
28 Oct 2016

Print course description
ECTS credits: 0.0
Coordinator: A.W. Ambergen
Fac. Health, Medicine and Life Sciences

Methods and Statistics III

Full course description

This study programma 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

BMW2002

Period 2
31 Oct 2016
3 Feb 2017

Print course description
ECTS credits:
2.0
Coordinator:
A.W. Ambergen

Fac. Health, Medicine and Life Sciences
Practicals Methods and Statistics III

Full course description

This study programma 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

BMW2102

Period 2
31 Oct 2016
3 Feb 2017

Print course description
ECTS credits:
0.0
Coordinator:
A.W. Ambergen

Fac. Health, Medicine and Life Sciences
Academic Thinking II

Full course description

Academic Thinking II offers a deeper introduction into the status of biomedical knowledge. There are at least two important reasons to actively reflect upon the status of biomedical knowledge. First, there are conflicting ideas and theories in biomedicine. This generates questions on which scientific criteria we use to judge between them. Second, there are societal discussions on the utility of, and the trust in biomedical knowledge and the people who produce it. We will enable students to participate in discussions on the merits of science. To that end, we will enable students to wield notions such as evidence, paradigm, expertise, integrity, and problem definition in context. In order to provide context to these notions, we will use examples drawn from the biomedical realm which have a clear scientific and societal component.

We will start with the credibility of scientific knowledge. Is scientific knowledge true? What does it mean to say such a thing, and which criteria exist to assess it? How can we separate scientific knowledge from non-scientific knowledge? [Philosophy of science; sociology of science]. Subsequently, we will move into the normative operation of scientific practice – or, phrased differently, with proper science. Central themes are scientific integrity and the dynamics surrounding scientific promises and expectations. Where does proper science end and sloppy science begin? What is good science – who decides – and how can we distinguish it from the rest? [Research ethics; sociology of science].

The trajectory will end with a book project. In their analysis of a book, they are expected to mobilise the acquired philosophical, sociological and ethical expertise.

Course objectives

You will have knowledge and understanding of Science philosophical and science theoretical positions, as well as of the history and foundation of the credibility of science;
You can apply this knowledge to explain his or her own world view and contrast or confront it with other views of science and scientific practice which have arisen in the history of science and society;
You can reason within frames of basic and general science philosophical and science theoretical reasoning;
You can assess science philosophical problems critically and provide arguments for said assessment;
You can position science theoretical and science political issues (within the broader realm of the biomedical sciences) in a wider societal perspective.

Recommended reading

### Bachelor Biomedical Sciences

**ECTS credits:** 2.0  
**Coordinator:** B. Penders  
**Teaching methods:** Assignment(s), Work in subgroups, Lecture(s), Paper(s)  
**Assessment methods:** Assignment, Attendance, Final paper, Participation  
**Keywords:** Philosophy of science; sociology of science; research ethics; research integrity

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### Fac. Health, Medicine and Life Sciences

#### Academic Thinking III

**Full course description**

This study programma 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.

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### BMW3011

**Period 4**  
6 Feb 2017  
7 Apr 2017  
**Instruction language:** English  
**Coordinator:** G.M.W.R. de Wert

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### Fac. Health, Medicine and Life Sciences

#### Bioinformatics and Systems Biology

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### MLW2007

**Period 4**  
6 Feb 2017
The Bioinformatics and Systems biology trajectory implements the Biomedical Sciences bachelor's programme final aims to “Onderzoeksgegevens te analyseren met behulp van moderne computertechnieken, inclusief bioinformatica”. The kind of research data here, is the modern research data resulting from genomics, proteomics, and metabolomics experiments, the biological foundations of movement. For example, the recent 2014 paper "Fatty acid-inducible ANGPTL4 governs lipid metabolic response to exercise" (doi:10.1073/pnas.1400889111) by researchers into movement sciences at our university discusses biological pathways. For example, it mentions the biological function of the gene ANGPTL4. This course consists of lectures to provide you with sufficient background into analyzing data presented in such research papers (“onderzoeksgegevens analyseren”) is, and particularly what the leading analysis methods in biology are.

In a series of practicals you will perform such analyses using a variety of computational methods (“computertechnieken”) as used in bioinformatics. It builds upon biological knowledge that you have
obtained in blocks in the first and second year. This block book outlines the various biological domains (from genomics, proteomics, to metabolomics) for which data analysis and bioinformatics is covered, prepended with a general lecture and practical about biological databases. Which databases provide information relevant to experiments you perform in your BMW curriculum is a recurrent theme, however. This book provides a schedule of topics for your track and a description of the individual topics, including suggested literature that you are expected to study.

**Course objectives**

The detailed learning goals are given in the "toetsplan".

**Recommended reading**

Literature is provided in the block book.

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**BWE2007**

**Period 4**

6 Feb 2017

9 Jun 2017

[Print course description](#)

**ECTS credits:**

3.0

**Coordinator:**

E.L. Willighagen

**Teaching methods:**

Lecture(s), Skills

**Assessment methods:**

Attendance, Computer test, Participation, Presentation, Written exam

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**Thesis**

**Fac. Health, Medicine and Life Sciences**

**Thesis**

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**BMW3030**

**Period 5**

10 Apr 2017

9 Jun 2017

[Print course description](#)

**ECTS credits:**

18.0
The block "diseased cells" (8 weeks) has as central theme cancer and the underlying complex molecular pathways. It aims to integrate morphology (histology), molecular pathophysiology and cell biology. Cancer is primarily an environmental disease with about 90% of cases attributed to environmental factors (not inherited genetically) and only about 10% due to genetics (inherited genetically). Common environmental factors that contribute to cancer death include tobacco, diet, infections, radiation and environmental pollutants. Cancer comprises biological capabilities of the cell acquired during the multistep development of human tumors. These so called "hallmarks" include sustaining proliferative signaling, evading growth suppressors, resisting cell death, enabling replicative immortality, inducing angiogenesis, and activating invasion and metastasis. Underlying these hallmarks are genome instability, which generates the genetic diversity that expedites their acquisition, and inflammation, which fosters multiple hallmark functions. In the block BMW3001 cases are presented that illustrate these "hallmarks of cancer", multistep development and impact of environmental factors. The practicals focus on the cell cycle, visualization of a virus causal related to cancer and genome instability. In a written report the student will design his own knock out mouse to study a monogenic disease.
Course objectives

Main objectives (insight in) - Cell types and their normal grow and adaption reactions - Normal cell cycle, cellular differentiation and disturb intercellular communication - Basic genetic concepts and progression models for cancer - Grading and staging of tumors - Processes of apoptosis and necrosis - Processes of invasion and metastasis - Angiogenesis and hypoxia - Immunology of tumors - Mechanisms of cell damage - Morphologic cellular reactions during persistent stress - Model systems (transgenic and knock-out Mouse models) - Viral carcinogenesis i.e. HPV - Genetic alterations during carcinogenesis - Genetic predisposition for cancer - Impact of nutrition on cancer - Mechanisms for acute and chronic inflammation - Composition of extracellular matrix during wound healing - Wound healing, stem cells, repair and regeneration (skin, liver) Practicals - Tackling the kinetics of the cell cycle - Protocol development and "hands on experiment" for (F)ISH and immunocytochemistry for the visualization of HPV and chromosomal aneusomy - Imaging of FISH and image analysis (imageJ basic) Written report - Design your own knock-out mouse model

BMW3001

Period 1
5 Sep 2016
28 Oct 2016

Print course description
ECTS credits: 12.0
Instruction language: English
Coordinator: A.H.N. Hopman
Teaching methods: Assignment(s), Lecture(s), Paper(s), PBL, Skills
Assessment methods: Assignment, Attendance, Final paper, Participation, Presentation, Written exam
Keywords: Cancer, hall marks of cancer, cell cycle, apoptosis, oncogenes, tumorsuppressor genes, angiogenesis, histology, metatasis, HPV, inflammation, stem cells, immunology, inter- and intracellular communication

Fac. Health, Medicine and Life Sciences
Practicals Diseased Cells

BMW3101

Period 1
5 Sep 2016
28 Oct 2016
Fac. Health, Medicine and Life Sciences

Molecular Nutrition

Full course description

Molecular nutrition is one of the most rapidly developing fields in nutritional science. Nutrition provides the building blocks of cells, tissues and finally our complete body. In addition, it provides fuel to construct and sustain our body. In fact, nutrients actively regulate the molecular processes that enable us to be what we are. Our knowledge about the active role that nutrients play on the molecular level has increased tremendously in the past few years. In some cases, nutrients exert an indirect effect, such as the induction of insulin release by glucose. In many cases, nutrients also directly influence the levels of rate-limiting metabolites. They directly interact with transcription factors and thus regulate the activity of genes, in particular of genes involved in metabolic processes. Knowledge about molecular activities of nutrients enables us to deliberately influence the metabolism through nutrient intake and thus to prevent disease or to improve physical and mental performance. At the same time, the border between medical drugs, pharmaceuticals, and bioactive nutrients, i.e. nutraceuticals, begins to fade.

This course provides insight knowledge on various ways by which nutrients can influence molecular processes in the body. In addition, different molecular strategies are addressed, which are currently applied to improve or sustain human health by making use of nutrients. Finally, students will be trained to adopt a critical attitude towards health claims of nutrients and to make evidence-based judgements with respect to those claims.

Special themes:

1. Nutritional epigenetics
2. Transcription factors/Orphan nutrient receptors
3. Gut-brain axis in food intake regulation
4. Vitamins, more than antioxidants
5. Bioactive food components, functional foods
6. Personalized nutrition and nutraceuticals
7. Nutrigenetics, gene-diet interaction

Course objectives

In detail, each student will have:

- Knowledge on the molecular processes underlying epigenetic influences of nutrition
- Understanding of the activity of transcription factors and the way by which nutrients influence the activity of transcription factors
- Knowledge on the roles of vitamins as essential regulators of gene expression
- Insight into the importance of the gut and the gut flora for food intake regulation and on body
weight
- Understanding of the strategies aimed at preserving or improving human health with specific nutrients
- Understanding of modern genetic methods applied to detect genetic variation associated with nutrition-related traits/disorders
- Knowledge on the societal developments regarding personalized nutrition
- Insight into health claim regulations.

Application of knowledge and understanding:
Each student will be able to:

- Define nutrients that can have a healthy effect or a rather unfavorable effect
- Make a prediction about the foreseen impact of molecular nutrition in the near future
- Design experiments to assess the influence of a nutrient or dietary component on health.

Interpretation:
Each student will be able to:

- Judge from available data (or the lack of relevant data) whether a health claim is justified
- Extract relevant information on molecular nutrition from the scientific literature.

Communication:
Each student will be able to:

- Give an oral presentation on an executed research project for fellow students
- Answer the questions asked during or after such an oral presentation
- Actively ask critical questions during the presentations of fellow students.

Learning abilities:
Each student will acquire skills in:

- Searching for and critical reading of scientific publications
- Providing feedback to the tutorial group and practicing scientific discussions with fellow students.

Recommended reading

Needed as basic knowledge: Molecular Biology of the Cell by Bruce Alberts.

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**BMW3002**

**Period 1**
5 Sep 2016
28 Oct 2016

[Print course description]

**ECTS credits:**
12.0

**Instruction language:**
English

**Coordinator:**
E.C.M. Mariman

**Teaching methods:**
Assignment(s), Work in subgroups, Lecture(s), PBL, Presentation(s), Skills
Fac. Health, Medicine and Life Sciences

Practicals Molecular Nutrition

Full course description

This course has four practicals on different topics, in line with the themes of the course. Needed are basic skills for standard molecular biology experiments.

Epigenetic influences. Methylation is one of the biological ways in which the expression activity of genes can be regulated and modified. Methylation can be influenced by nutrition, for instance by the food component folic acid. During the practical you will perform a chemical method by which the level of methylation in DNA can be estimated. This practical is related to Theme 1. Epigenetic influences

No practical guidelines are provided in advance, but a protocol has to be designed during the practical.

Nutrition and PPAR stimulation in vitro. In the practical Nutrition and PPAR stimulation in vitro, you will measure the induction of target genes by the PPARg transcription factor via nutrients acting as PPARg ligands. As an extra challenge, you will have to design your own research protocol. The practical is related to Themes 2 and 3.

Fat accumulation in liver cells. PPARs and other nuclear receptors are involved in the regulation of the metabolism. One of the effects is the storage of lipids in liver cells. The rate of storage depends on the PPAR ligand, meaning the nutrient entering a cell. Incubating liver cells with different ligands you will visualize those effects, and have to provide a biochemical explanation. This practical ‘Fat accumulation in liver cells’ relates to Themes 3 and 6.

Genetic variation and predisposition to obesity. Everybody is different due to the enormous variation in the human genome. Scientists try to find out which genes carry variations influencing nutrition-related traits and disorders. During the practical ‘Genetic variation and predisposition to obesity’ you will test whether genetic variations in two genes predispose to the development of obesity. It relates to Theme 7.

Course objectives

Practicals will give you background insight on how experiments can be used to investigate and solve key questions related to Molecular Nutrition

BMW3102

Period 1
5 Sep 2016
28 Oct 2016
Fac. Health, Medicine and Life Sciences

Training

Full course description

The main aim of this course is to gain insight into the structural, metabolic, and functional adaptations to regular physical activity, or exercise training. Over the past decades, it has been well established that regular physical activity represents one of the key factors for leading a healthy life. Physical activity, or exercise training, results in a range of structural and metabolic adaptations, improving exercise capacity and leading to increased functional performance. In this course, the adaptive response of the human body to regular exercise training will be studied from the whole-body down to the molecular level, including the mechanisms underlying these adaptations and the different factors affecting the training response (i.e. type of training, nutrition, etc.). With exercise inducing important health benefits, students will become familiar with more general exercise effects (i.e. in healthy or trained subjects), as well as exercise as a therapeutic means for several pathologic conditions. While the focus will be on skeletal muscle, various other organ systems are also involved in the adaptation to exercise training and are, as such, topic of study. Finally, the effect of physical inactivity will also be studied, such as seen during bed rest or immobilization. Additional lectures on specific topics (e.g. rehabilitation in children, overtraining) will also be provided. Apart from cases (problem based learning) and lectures, students will work in small student teams (appr. 6 students) on a project in which they will design and implement a 5 wk training program. In several practicals before and after completion of the training program, the adaptations to the training will be determined.

Course objectives

Knowledge and comprehension
At the end of the course the student should posses:

1. Knowledge on principles and terminology of general exercise physiology
2. Knowledge on different training modalities
3. Knowledge on structural, metabolic, and functional adaptive responses to these different training modalities (from whole-body to cellular level)
4. Insight in the mechanisms underlying the adaptive response to regular exercise (including molecular pathways)
5. Knowledge on the role of nutrition in supporting and/or augmenting the training response
6. Insight in how to adjust different training modalities to balance exercise intensity and workload
with exercise capacity such as in more compromised populations

**Applying knowledge**

At the end of the course, students should be capable of applying the above-mentioned knowledge:

1. To define a specific training program to induce a specific adaptive response.
2. To assess the structural, metabolic, and functional adaptations to exercise training.
3. To explain how the adaptive response to a certain exercise program is accomplished.

**Interpretation**

At the end of the course the student should be capable of:

1. Interpreting results from the practicals: analyze and evaluate experimental data to determine
the adaptive response to a specific exercise training program
2. Selecting the training program and the appropriate methodology to assess training effects
based on the desired adaptive response

**Communication**

At the end of the course the student should be able:

1. Writing a well structured, concise and well argued report on the findings from the practicals.

**Overall**

At the end of the course the student should be capable of:

1. Independently measuring, interpreting, and reporting the effects of a training program
2. Performing/supervising a specific training program
3. Setting up a short study design to evaluate the adaptive response to an exercise training program

The following end terms apply: A4, A5, A6, B3, C1, D1, E2.
Fac. Health, Medicine and Life Sciences
Clinical Nutrition

Full course description

The module Clinical Nutrition aims to provide a thorough grounding in all aspects of clinical nutrition and focuses on nutrition and its application in prevention and disease management. Clinical nutrition not only assesses deficiency states, but can be used to improve health by optimizing food selection and nutrition supplementation needs. This course is designed to recall knowledge of the function of macronutrients in the body and to learn how the ingestion of combined macronutrients affects overall metabolism as well as disease risk and recovery. Food intake regulation by hormones and psychologic factors in health and disease will be highlighted. This course reviews the array of assessment tools used in clinical nutrition practice including methodology, application, implications, strengths and limitations. A clinical and laboratory assessment allows the opportunity to develop an individualized therapeutic program. Practical nutritional applications including both dietary therapies and supplements directed at optimizing nutritional status are reviewed in detail. Specific nutrition intervention including diet, vitamins, minerals, essential fatty acids, fibers and amino acids are explored for a variety of diseases commonly encountered in clinical practice. The biochemistry of each intervention is discussed for a full understanding of how to integrate nutrition therapy into patient care. During this course attention goes to various ways by which nutrition can be applied; oral nutrition and suppletions, tube feeding, parenteral nutrition. You will learn when to apply these different nutritional interventions and the pros and cons of the different feeding techniques. Further there will be extensive attention for the composition of nutrition and the altered needs caused by disease in different pathologic situations. Finally you will be trained in the possibilities to perform research in the field of clinical nutrition and the interpretation of the literature.

Course objectives

- At the end of this course, the student has an improved level of knowledge and understanding
- The student increases his/her understanding on homeostatic and non-homeostatic regulation of food intake
- The student increases his/her knowledge about food intake and macronutrient metabolism in health and disease
- The student increases his/her understanding on the role of nutrients in pathophysiologic processes in the human body
- The student increases his/her knowledge about normal digestion and absorption
- The student increases his/her understanding on the influence of several disturbing factors on digestion and metabolism of nutrition
- The student has insight in altered nutritional needs during disease (metabolic stress, cachexia, protein-energy malnutrition, trauma, burn wounds, systemic inflammation, intensive care patients, chronic disease (COPD, oncology, kidney disease) gastrointestinal disease
- The student has insight in consequences of malnutrition on the course of disease and recovery
- The student has knowledge about factors influencing food intake (satiety mechanisms, medication, cerebral infarct, dementia, dysphagia, depression)
- The student has knowledge about possibilities to fulfill the altered nutritional needs during disease using nutritional support therapy; suppletions, tube feeding (nasal, gastrostomia, jejunostomia), parenteral nutrition
- The student has insight in pros and cons of nothing by mouth
The student has insight in therapeutic possibilities of nutrition (probiotics, fibers, immunomodulation) Application of knowledge and understanding

The student is able to use the acquired knowledge to assess nutritional status

The student is able to use the acquired knowledge to set up a plan for route and composition of nutrition for a (critically) ill patient. Interpretation

The student is able to critically read and interpret scientific publications concerning studies on clinical nutrition. Communication

The student has the capacity to give an oral presentation about a scientific publication for his/her fellow students

The student can answer the questions that are asked during or after such an oral presentation

The student is able to actively ask critical questions during the presentations of fellow students

The student is able to participate in a fictive multidisciplinary discussion about nutritional status and nutritional interventions in a critically ill patient (the project)

**BMW3004**

**Period 2**
31 Oct 2016
23 Dec 2016

[Print course description](#)

**ECTS credits:**
12.0

**Instruction language:**
English

**Coordinator:**
D.A. van Waardenburg

**Teaching methods:**
Assignment(s), Work in subgroups, Lecture(s), PBL, Presentation(s), Skills, Working visit(s), Paper(s)

**Assessment methods:**
Assignment, Attendance, Participation, Written exam, Final paper

**Keywords:**
Food intake and regulation; macronutrients and metabolism; Normal and disturbed digestion; Nutritional status; Cachexia and malnutrition; Nutritional support strategies; oral suppletion; tube feeding; parenteral nutrition; functional food

**Fac. Health, Medicine and Life Sciences**

**Practicals Clinical Nutrition**

**Full course description**

This course contains 4 practical trainings intended to clarify aspects of clinical nutrition. • Assessment of nutritional status; to measure is to know. The influence of nutritional status on the course of disease is essential. Accurate measurement of individual nutritional status is required in clinical practice. It is important to guarantee a good nutritional status in healthy and sick persons. Unfortunately there is no golden standard for measuring body composition or nutritional status. This practical training reviews the array of assessment tools used in clinical nutrition practice including methodology, application,
implications, strengths and limitations. Nutritional status assessment allows the health care provider the opportunity to develop an individualized therapeutic program. In this training the students learn to understand the options of choices available to evaluate nutritional status. Students will measure their anthropometric parameters (weight, height, skinfold and circumference measurements), bioelectric impedance and handgrip strength. The data derived in this training will be used for evaluation of nutritional status and will also be used in the practical training energy balance part 1. • Energy balance part 1; the healthy situation In this practical training the interplay between food intake, physical activity, body weight and body composition is studied by means of computer simulation. During the days before the practicals you will have to collect some data at home. It is expected that you register your food intake and physical activity during 3 days (see for details the practical instruction). • Energy balance part 2; disease In this workshop you will learn to recognize disease related factors that influence energy balance and factors contributing to an inadequate energy supply in critically ill patients. You will learn how to calculate nutritional requirements in patients. Presence during the practical training is obligatory. Only under compelling circumstances it is allowed to exchange with somebody of the other group. In any case, consult the supervisor in advance. Presence is confirmed by signing the registration form. Make sure that you sign this form during the training! A report needs to be handed in for the practicals; Assessment of nutritional status and Energy balance part 1 and 2. Reports have to comply to the standard rules unless stated otherwise. Reports need to score a satisfactory grade. There is only one chance to correct an insufficient report. Questions regarding the practical trainings may be part of the exam. Journal Club Scientific articles will be discussed plenary. The articles will be available through ELEUM. Carefully read the article and prepare yourself by answering the following questions: * What was the research question? * How did the research group experimentally try to get an answer to that question? * Have the data been presented in a clear way using tables and figures? * What can be concluded from the figures and tables? * Were the conclusions in line with the experimental findings? In addition you are expected to ask two critical questions about the article to one of the other students during the meeting. Vise versa you will be asked two questions by one of your colleagues. Project – multidisciplinary meeting of clinical nutrition The integration of the different aspects of the achieved knowledge regarding metabolism and nutrition will be aimed for in a parallel project assignment. In this assignment the students will elaborate, in small groups of 2-3 persons, on the nutritional treatment of a critically ill patient on the intensive care unit. These small groups separately will use a web-based case-based discussion in which several key questions must be answered and discussed before the next step in the disease history can be continued. In the end the answers to the questions will form the report of the subgroup. At the end of the block the students will discuss the treatment decisions in a real-time multidisciplinary meeting using a role-model scenario (surgeon, intensivist, dietician). This project will be introduced at the beginning of the block with an introductory lecture.

**BMW3104**

**Period 2**
31 Oct 2016
23 Dec 2016

**Print course description**

**ECTS credits:**
0.0

**Instruction language:**
English

**Coordinator:**
D.A. van Waardenburg

**Teaching methods:**
Motor Learning

Full course description

Motor learning focuses on the understanding of the acquisition and modification of movements that are relatively permanent improvements in performance as a result of practice. The purpose of this module on motor learning is to provide students the knowledge, skills and understanding of the concept of motor learning, both on a behavioural as well as on a neuroscientific level. During this module basic knowledge will be provided that can be applied to any field of interest, for example: motor learning in healthy subjects, athletes, disabled people or an ageing population. The basis of this module’s approach is that motor learning is the result of an interaction between the person, the skill and the environment. Variables from within these three factors influence motor learning and a solid understanding of these variables is necessary to optimise motor learning and interventions that aim to enhance performance, whether in sports, neurological rehabilitation or any other application of motor learning. Motor learning by definition is a process, not a state, and this process is accompanied by changes on a behavioural and neural level. Insight will be provided into these changes and into the techniques and methods to investigate this.

Course objectives

The student has knowledge and understanding of:

- relevant theories and perspectives of motor control and motor learning
- the influences of practice conditions on motor learning
- concepts and practices related to enhancing motor skills (motor learning)
- the neurophysiological basis of motor learning and recovery of function
- the role of personal factors that modulate motor learning
- the characteristics of the motor learning process
- the importance of cognitive factors on motor learning
- the mechanisms underlying motor learning
- the relation between behavioural and neurophysiological changes

The student can apply knowledge and understanding:

- of the influences of practice conditions to learning any motor skill
- of concepts and practices related to enhancing motor skills to learning any motor skill
- of the role of personal factors on learning any motor skill
- of the characteristics of the motor learning process on learning any motor skill
- and can devise his/her own motor learning paradigm and argue his/her choices for the practice protocol
- and can obtain a critical understanding and the ability to apply scientific knowledge from motor learning for personal fitness, healthy lifestyles, sport, teaching and/or therapeutic rehabilitation
- and can measure and analyse motor learning
- from previous modules (e.g. neural processing, human anatomy, coordination, performance etc) to motor learning
Making judgements  
The student:

- Can gather and interpret relevant information to design an effective motor learning paradigm
- Can be critical to the research literature and fellow students and be able to argue their choice
- Can gather data and interpret and analyse data from measurements

Communication
The student:

- Can collaborate with fellow students to develop a motor learning paradigm, execute, analyse and report this
- Is able to report his/her knowledge and insights, conclusions, motives and arguments in a clear manner to a public of knowledgeable peers and teaching staff
- Can produce a scientific document in collaboration with fellow students
- Can produce an individual scientific document in which the student presents ideas, problems and solutions

Learning skills
The student:

- Can apply his/her critical view to fellow students’ work
- Can apply his/her skills to study further with a high level of autonomy

Recommended reading

### BMW3005

**Period 2**
31 Oct 2016
23 Dec 2016

[Print course description]

**ECTS credits:**
12.0

**Instruction language:**
English

**Coordinator:**
T.J.H. Bovend'eerdt

**Teaching methods:**
Assignment(s), Work in subgroups, Lecture(s), Paper(s), PBL, Presentation(s), Research, Skills

**Assessment methods:**
Assignment, Attendance, Final paper, Portfolio, Presentation, Written exam

**Keywords:**
Fac. Health, Medicine and Life Sciences

Practicals Motor Learning

Full course description

This is the practical of course BMW3005. During this course the students execute a learning experiment over a period of 5-6 weeks. The students perform this experiment in teams and are as a group responsible for the design, execution, analyses and presentations of the study.

Course objectives

This practical is the application of all the goals described in BMW3005.

Recommended reading


BMW3105

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<td>31 Oct 2016</td>
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Print course description

ECTS credits: 0.0

Instruction language: English

Coordinator: T.J.H. Bovend’eerdt

Teaching methods: Assignment(s), Work in subgroups, Paper(s), Presentation(s), Research

Assessment methods: Final paper, Presentation

Keywords: Motor learning, motor control, motor skills, learning experiment, perception-action, neuroplasticity
Fac. Health, Medicine and Life Sciences

Chronic Inflammatory Diseases

Full course description

During this elective Minor course of 8 weeks, students will get acquainted with experimental research in the context of complex chronic inflammatory diseases, like Chronic Obstructive Pulmonary Disease (COPD) and the Metabolic Syndrome. Inter-organ crosstalk and pathophysiology of complex diseases as well as inter/intra-cellular communication are the main focus of the course. The course consists of 4 modules of 2 weeks: - Module 1: Gut - Module 2: Lungs - Module 3: Adipose tissue - Module 4: Muscle

Every module starts with an introduction lecture to give an overview of principles and theories related to the central theme of that specific module. In each module, the students will work in small groups on a specific assignment that are directly related to ongoing research projects, supported by the research groups of the Departments of Respiratory Medicine, General Surgery, and/or Human Biology. Special emphasizes will be on the practical education assignments in order to teach the students both general and specific laboratory skills and techniques. The results of these practical assignments will be analyzed by the students themselves and written down in a practical report. In addition, every module includes a research seminar by a senior researcher, presenting state-of-the-art research linked to the central theme. A Journal club will be organized to practice critical reading and evaluation of a recent research paper. A final concept mapping assignment will be used as a wrap-up. By combining the practical assignments with critical evaluating of the obtained experimental results, listening to lectures by experts, group discussions and self- study, the students will learn the basis of experimental research within the domain of Life Sciences.

Course objectives

1. Students get acquainted with scientific research within the domain of Molecular Life Sciences while operationalizing using the knowledge and skills obtained during the bachelor phase of their BMW training.
2. More specifically, students learn how to adequately select and use research methods and techniques within the domain of Molecular Life Sciences. At the same time, students will have to plan and execute their own learning and ensure quality control of their own experimental work.
3. Students learn how to report their own results coherently and scientifically, both in oral and written form. These reports will be framed presented in the context of within the current scientific literature that which will be critically evaluated by the students.

BMW3006

Period 2
31 Oct 2016
23 Dec 2016

Print course description

ECTS credits:
12.0

Instruction language:
English

Coordinators:
Fac. Health, Medicine and Life Sciences

**Research Methods in Neuroscience and Toxicology**

**Full course description**

During this elective course of 8 weeks, students will get acquainted with experimental molecular biological, biochemical and immunological research. General concepts and strategies for the design of experiments are the main focus of the course. The students will work in small groups on several assignments that are directly related to ongoing translational research projects of the Departments of Neurosciences and Toxicology. Special emphasis will be on the practical education assignments in order to teach the students molecular laboratory skills and techniques. Results of these practical assignments will be analyzed by the students themselves and then presented to their peers in small workgroups.

By combining the practical assignments with studying independently, listening to lectures by experts and critical evaluating of the obtained experimental results, the students will learn the basis of experimental research within Life Sciences.

**Course objectives**

1. Students get acquainted with scientific research within the domain of Molecular Life Sciences while using the knowledge and skills obtained during the bachelor phase of their BMW training.

2. More specifically, students learn how to adequately select and use research methods and techniques within the domain of Molecular Life Sciences. At the same time, students will have to plan and execute their own learning and ensure quality control of their own experimental work.

3. Students learn how to report their results coherently and scientifically, both in oral and written form. These reports will be presented in the context of current scientific literature which will be critically evaluated by the students.
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[Print course description](#)

**ECTS credits:**
12.0

**Instruction language:**
English

**Coordinators:**
M.R. Losen
A.W. Boots

**Teaching methods:**
Work in subgroups, Lecture(s), Paper(s), PBL, Presentation(s), Research, Skills

**Assessment methods:**
Assignment, Attendance, Written exam

**Keywords:**
Neurosciences, Toxicology, immunology, designing your own experiments, small workgroups, presenting own results