

Biomedical Sciences

First year courses

Biomedical Sciences Year 1

Fac. Health, Medicine and Life Sciences

Mechanisms in Health and Disease

Full course description

1. Course summary: This theoretical course aims to provide knowledge and understanding of contemporary methods necessary for the experimental approach to research on the molecular mechanisms of health and disease. These topics are approached from various disciplinary angles (i.e. molecular genetics, embryology/developmental biology, immunology, oncology, cardiology, neurology), so as to give students insight into ongoing health-related and (pre)clinical research projects within UM and UH. 2. Content: The course consists of four two-week modules (i.e. eight weeks in total). The students are divided into tutorial groups of eight to ten students. Module topics

- Predisposition: genetic (linkage analysis, SNPs, mouse models)/environmental (nutrition, diet, drugs). Chronic diseases such as diabetes, cancer, Alzheimer and asthma are presented in terms of genetic and environmental factors that influence their induction and progression. Experimental models and methods that make it possible to study those genetic and environmental factors are presented and discussed. Students read research papers, and discuss and evaluate them. They also give a lecture to their fellow students on a particular topic.
- Gene regulation: research and disease (transcription, (post) translation, epigenetics)
- Defective signalling in ischemia and hypoxia (cell signalling, molecular cross-talk, cellular effects)
- Systemic communication and interaction: function (homeostasis) and failure (disease) (regulation proliferation, apoptosis, inter- and intra-tissue communication, cell adhesion, interaction)

3. Skills training Presentation skills: Each group of students must prepare a presentation on a relevant topic in English, to be presented to other students.

Course objectives

2. Objectives (Applying) knowledge and understanding of

- o Detailed knowledge of the molecular processes involved in the regulation of gene expression (transcription, (post)translation, epigenetics)
- o Broad knowledge and understanding of the genetic and environmental factors (nutrition, medication) that play a role in the predisposition to disease, as well as methodologies for studying them (linkage analysis, SNPs, mouse models)
- o Broad knowledge and understanding of the molecular and cellular processes involved in homeostasis, cell-cell communication, signal transduction, cell proliferation and cell death, and methodologies for studying them
- o Knowledge of laboratory animal models for biomedical research

Forming an opinion

- o Critical evaluation of scientific publications (hypothesis, problem definition, research approach, interpretation of results, conclusions, limitations)

Communication

- o Experience with oral presentations and written reports for specific assignments
- o Active participation in academic discussions

Learning skills

- o Experience with Problem-Based Learning

Recommended reading

Basic Immunology: Functions and Disorders of the Immune System by Abul K. Abbas

BMS1001

Period 1

12 Sep 2016

21 Oct 2016

[Print course description](#)

ECTS credits:

9.0

Instruction language:

English

Coordinator:

[T.M.C.M. de Kok](#)

Teaching methods:

Assignment(s), Work in subgroups, Lecture(s), PBL, Presentation(s)

Assessment methods:

Assignment, Written exam

Keywords:

(epi)genetics, Molecular Biology, immunology

Fac. Health, Medicine and Life Sciences

Modern Approaches to Diagnosis and Therapy of Disease

Full course description

The course consists of three two-week modules (i.e. six weeks in total). The students are divided into tutorial groups of eight to ten students. The modules deal with the following topics: 1) prevention 2) screening & diagnosis 3) therapy. These will be discussed using as examples diseases that are study focuses here in Maastricht. Examples are the metabolic syndrome, cardiovascular diseases, Alzheimer, Parkinson, cancer, and infectious diseases. Next to lectures, students will have Journal Clubs on seminal papers discussing these diseases and will study one of these diseases in groups, analyzing different aspects of the diseases such as nutrition, immunology, prevention, genetics, hypo/hyperplasia, etc. Finally, one module-spanning assignment investigating the above- mentioned topics using one disease as an example will be carried out per group.

Course objectives

Knowledge and understanding o Basic knowledge of and insight into the latest work on the molecular mechanisms involved in the onset of chronic diseases. o Broad knowledge of innovative research for improving molecular screening, preventive measures, diagnostics and therapy. o Detailed knowledge of experimental (pre)clinical research. Applying knowledge and understanding o Integration of methodologies of different disciplines for application in the diagnostics and treatment of disease.

Forming an opinion o Critical evaluation of scientific publications (hypothesis, problem definition, research approach, interpretation of results, conclusions, limitations) Communication o Active participation in scientific discussions o Experience with oral presentations and written reports of specific assignments Learning skills o Experience with Problem-Based Learning

Recommended reading

Basic Immunology Updated Edition: Functions and Disorders of the Immune System by Abul K. Abbas

BMS1002

Period 2

24 Oct 2016

2 Dec 2016

[Print course description](#)

ECTS credits:

9.0

Instruction language:

English

Coordinator:

[F.R.M. Stassen](#)

Teaching methods:

Assignment(s), Work in subgroups, Lecture(s), PBL, Presentation(s)

Assessment methods:

Assignment, Attendance, Participation, Presentation, Written exam

Keywords:

Prevention, screening, Diagnosis, therapy of disease. Vascular biology, immunology, infectious disease, neurology, metabolic syndrome

Fac. Health, Medicine and Life Sciences

Basic Skills for 'Upcoming' Scientists

Full course description

This third course aims to teach students statistical approaches to study design. The emphasis is on applied statistics and hands-on experience. Set-up of experimental groups in away that allows calculation and correction of session effects; calculation of risk factors; 'meet-in- the-middle' approach to link exposure to results (biomarker discovery). In addition, practical preparation of the junior internship will take place: diligent keeping of a lab-journal in the light of scientific fraud; moreover, students will receive tasks for the internship on science and communication (writing of a short article for a daily newspaper on their junior internship), and ethics and fraud, that will be analysed in block 1.5 (after the internship).

Course objectives

Knowledge and understanding o Knowledge of study design, practical considerations of experimental

setups from a statistical point of view: session effects and factor correction; outlier analysis. o Power calculation, risk analysis in epidemiological studies, confounding factors. Applying knowledge and understanding o Applied statistics in practical sessions. Setup of experiments to improve statistical analysis. Forming an opinion o Critical evaluation of statistical data in research publications. Communication o Active participation in practical trainings. Learning skills o Experience with Problem-Based Learning

Recommended reading

Good clinical practice guide by Medicines and Healthcare products Regulatory Agency Make Your Mark in Science: Creativity, Presenting, Publishing, and Patents, A Guide for Young Scientists by Claus Ascheron and Angela Kickuth Turning Points: Changing Your Career from Science to Patent Law by Dustin T. Holloway Scientific Integrity: Text and Cases in Responsible Conduct of Research by Macrina, Francis [http://www.vsnul.nl/files/documenten/Domeinen/Onderzoek/Code_wetenschapsb_oefening_2004_\(2012\).pdf](http://www.vsnul.nl/files/documenten/Domeinen/Onderzoek/Code_wetenschapsb_oefening_2004_(2012).pdf) (in Dutch)

BMS1003

Period 2

5 Dec 2016

16 Dec 2016

[Print course description](#)

ECTS credits:

3.0

Instruction language:

English

Coordinator:

[C.J.H. van der Kallen](#)

Teaching methods:

Assignment(s), Work in subgroups, Lecture(s), Paper(s), PBL

Assessment methods:

Assignment, Attendance, Computertest, Final paper

Keywords:

statistics, popular writing, valorisation of knowledge and patents, Good Clinical Practice, scientific integrity

Fac. Health, Medicine and Life Sciences

Junior Practical Training - Internship

Full course description

This 22-week internship period provides students with their first practical experience of setting up and conducting scientific research. It emphasises the exploration of new and relevant research techniques and methodologies. Students are introduced to and gain practical experience in several state-of-the-art techniques/methodologies. Internships may take place within the UM or another host institute. The internship includes an obligatory 3-week course on laboratory animal research. Students may choose

either the theoretical course or the certified animal course. During the course the following topics will be taught and discussed: Opportunities and limitations of animal models in modern research – choice of an optimal model; animal nutrition, genetics, law and ethics, animal health. All students are obliged to follow a 1-week course on BioSafety (unless they can present a valid certificate showing that they have the required experience and have received specific instructions (to be approved by the Biosafety Officer)). In addition, students may attend the elective 2-week course “working with radionuclides” that certifies the participant to work with radioactive material in the Netherlands (Certificate 5b). The total number of course weeks within the internship may however not exceed 6 weeks (including the obligatory courses).

Course objectives

Objectives: (Applying) knowledge and understanding:

- Experience in setting up experimental research/focused experiments;
- Practical understanding of modern research techniques and methodologies (possibilities and limitations);
- Practical experience in an ongoing research project. Exposure to the real-life research environment;
- Experience in keeping a laboratory journal.

Communication:

- Active participation in academic discussions in professional practice;
- Exchange of newly acquired knowledge by presenting & reporting to other students and/or scientists and writing a report

Recommended reading

L.F.M. van Zutphen, V. Baumans, A.C. Beijnen, Handboek Proefdierkunde. Elsevier Gezondheidszorg (for the animal course)

BMS1004

Period 3

9 Jan 2017

28 Jun 2017

[Print course description](#)

ECTS credits:

36.0

Instruction language:

English

Coordinator:

[H.R. Gosker](#)

Teaching methods:

Assignment(s), Work in subgroups, Lecture(s), Patientcontact, Paper(s), Presentation(s), Research, Skills, Training(s)

Assessment methods:

Attendance, Final paper, Observation, Participation, Presentation, Written exam

Keywords:

Practical training internship / placement; research; animal course with certificate; radiology course with certificate 5b; microscopy course; BioSafety course with certificate; scientific report / thesis;

Fac. Health, Medicine and Life Sciences

Laboratory Animal Science

Full course description

Annually many millions of animals are used worldwide in research. Yet biomedical research using laboratory animals remains highly controversial. Advocates frequently claim such research is vital for preventing, curing or alleviating human diseases. However, such claims are hotly contested, and a growing body of empirical evidence casts doubt upon their scientific utility as experimental models of humans.

Nevertheless, there is a constant need for testing new drugs and therapies. This urges the need for animal models to test the efficacy of new treatments. But what is a good animal model to be used for research and the tests of new drugs for a certain disease? Why are new drugs still necessary? Is there a difference in research between academia and pharmaceutical companies? This and other questions have to be discussed as new animal models are taken into account for an investigation.

Another reason to use animal models is the desire to understand mechanisms in health and disease. Certain causal effects can only be investigated in vivo but this is not possible in humans for ethical reasons.

Course objectives

1. Define the disease which your group has received as topic!
2. Is this disease normally present in mice thereby making them a good model for humans? If not, what has to be done to make mice a suitable or even good model?
3. What kind of aspects of the disease do you think can be investigated in an animal model? What special points do you have to think about to do these investigations?
4. Discuss the validity and necessity of animal models for human diseases!
5. If a new drug for the therapy of a certain disease shall be tested, what are the limitations and what are the advantages of such animal models?

Recommended reading

Abelaira, H. M., Reus, G. Z., & Quevedo, J. (2013). Animal models as tools to study the pathophysiology of depression. *Rev Bras Psiquiatr*, 35 Suppl 2, S112-120. Denayer, T., Stöhr, T., & van Roy, M. (2014). Animal models in translational medicine: Validation and prediction. *New Horizons in Translational Medicine*(2), 5-11. Ruggeri B. A., Camp F., Miknyoczki S. (2014). Animal models of disease: pre-clinical animal models of cancer and their applications and utility in drug discovery. Sharpless, N. E., & DePhino, R. A. (2006). Model organisms: The mighty mouse: genetically engineered mouse models in cancer drug development. *Nature reviews*, 741-754.

BMS1104

Period 3

9 Jan 2017

28 Jun 2017

Period 5

10 Apr 2017

9 Jun 2017

[Print course description](#)

ECTS credits:

0.0

Instruction language:

English

Coordinator:

[A. Herrler](#)

Teaching methods:

Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentation(s)

Assessment methods:

Assignment, Final paper, Participation, Presentation

Keywords:

animal models, alternatives, ethics, validity

Fac. Health, Medicine and Life Sciences

Safe Microbiological Techniques

Full course description

Many researchers use micro-organisms, cells, tissues, biological materials or animals. This biological material does have some risks for the worker and the environment. Therefore the employee has to be informed about the risks and has to be competent to control them. This Biosafety course is based on the guidelines of the committee on education of the Dutch Society of Biosafety Officers for working with genetically modified bacteria, viruses and cells and the European and Dutch legislation on this subject. It also addresses safe working with biological materials like blood and primary cell lines. The target groups of this course are PhD- and students of the faculties of Medicine and Health and Life Sciences of Maastricht University. Moreover researchers at the Academical Hospital Maastricht and other European institutions and companies are welcome.

Course objectives

- Gain knowledge of the risks of biological materials
- Be able to work safely with biological material
- Gain knowledge how to work properly in a biosafety cabinet
- Gain practical experience in working safely in a Biosafety Cabinet
- Be able to perform a small risk assessment
- Become aware of the pillars of the gmo-legislation: notifications and permits, transparency and containment principles
- Gain knowledge of the risk of aerosol formation and the prevention of these aerosols
- Become familiar how to dispose the various kinds of biological waste
- Be able to handle incidents and calamities

The course is composed of a theoretical and an instructional part. The concepts of infection and defence and risk control are explained in lectures. The evolution of possible risks and control

measurements like disinfection and working in a biological safety cabinet are part of the practical assignments. The course is obligatory for students who have no SMT license (details will be explained prior to the course) and is organized by CRISP.

Recommended reading

Biosafety in the laboratory, 2nd edition. Students will get this book digitally.

BMS1204

Period 3

9 Jan 2017

3 Feb 2017

[Print course description](#)

ECTS credits:

0.0

Instruction language:

English

Coordinator:

[H.R. Gosker](#)

Teaching methods:

Assignment(s), Lecture(s), Training(s)

Assessment methods:

Written exam

Keywords:

Biosafety Biological agents Working Conditions act and Working Conditions Decree Decree and Ministerial Order of GMO Containment Disinfection

Fac. Health, Medicine and Life Sciences

Market your Science

Full course description

The course consists of one two-week module. The students are divided into tutorial groups of eight to ten students. Tasks on popular scientific writing will be presented. Ethical issues and integrity issues will be discussed using recent examples from newspapers concerning (Dutch) scientists. Lectures on entrepreneurship, good clinical practice, valorisation, quality control will be coupled to Journal Clubs.

Course objectives

Knowledge and understanding o Knowledge of requirements for good clinical practice and valorisation of experimental results. Students will get an overview over the life sciences industry and health care organisation. Applying knowledge and understanding o Students will discuss ethical issues of clinical studies as well as scientific integrity and fraud. Forming an opinion o Critical evaluation of ethical issues in patient research. Critical evaluation of popular scientific articles in daily papers. Communication o Active participation in tutorial groups. Writing of a popular scientific article based on

the junior internship. Communication of scientist with laypeople. Learning skills o Ability to independently maintain and extend professional knowledge and competences

Recommended reading

Good clinical practice guide by Medicines and Healthcare products Regulatory Agency Make Your Mark in Science: Creativity, Presenting, Publishing, and Patents, A Guide for Young Scientists by Claus Ascheron and Angela Kickuth Turning Points: Changing Your Career from Science to Patent Law by Dustin T. Holloway Scientific Integrity: Text and Cases in Responsible Conduct of Research by Macrina, Francis [http://www.vsnu.nl/files/documenten/Domeinen/Onderzoek/Code_wetenschapsb_eoefening_2004_\(2012\).pdf](http://www.vsnu.nl/files/documenten/Domeinen/Onderzoek/Code_wetenschapsb_eoefening_2004_(2012).pdf) (in Dutch)

BMS1005

Period 6

19 Jun 2017

30 Jun 2017

[Print course description](#)

ECTS credits:

3.0

Instruction language:

English

Coordinator:

[C.J.H. van der Kallen](#)

Teaching methods:

PBL, Lecture(s), Training(s)

Assessment methods:

Participation, Written exam

Keywords:

statistics, popular writing, patent, Good Clinical Practice, scientific integrity

Second year courses

Biomedical Sciences Year 2

Fac. Health, Medicine and Life Sciences

Thesis

Full course description

1. Course summary During this 30-week internship, students participate in ongoing scientific research at UM or UH, at other knowledge centres in the Netherlands/Belgium, or in other countries (see below). The internship is prepared during course 2.1. A practical, hands-on experience, it offers students a unique opportunity to gain experience in independently carrying out a research project which they personally designed. The length of the training period ensures the acquisition of valuable, in- depth experience, necessary for students' development into independent researchers. The

internship in the CMS specialisation consists of subjects related to clinical diagnostics and therapy of chronic diseases, while that in the MHS specialisation looks at the relationship between exogenous circumstances and chronic diseases. Students following the ODB specialisation will work on a project relating to cancer or developmental biology. 2. Content Students work individually and take part in ongoing research projects, supervised by a tutor or researcher. In this framework, they also participate in the regular meetings of the relevant research team. Further, they return to the university three times during the internship period to present their progress and comment on other students' projects. The internship period concludes with a final presentation to the other students as well as tutors and other experts. The final internship report is prepared in the form of an extensive scientific paper, which constitutes the master's thesis. The optional courses are integrated into the internship period.

Course objectives

Objectives (Applying) knowledge and understanding o Ability to carry out a research project independently in a research environment o Experience in adhering to a research plan (in terms of content and time management) o Experience in problem solving during research o Ability to revise or set up follow-up research (adjusted to the results obtained) Forming an opinion o Ability to process, interpret and report results Communication o Active participation in regular discussions in the research environment o Ability to present and discuss interim and final results to and with colleagues and supervisors

Recommended reading

Science Research Writing: A Guide for Non-Native Speakers of English by Hilary Glasman-Deal
[http://www.vsnul.nl/files/documenten/Domeinen/Onderzoek/Code_wetenschapsb_oefening_2004_\(2012\).pdf](http://www.vsnul.nl/files/documenten/Domeinen/Onderzoek/Code_wetenschapsb_oefening_2004_(2012).pdf) (in Dutch)

BMS2002

Period 2

31 Oct 2016

23 Dec 2016

[Print course description](#)

ECTS credits:

48.0

Instruction language:

English

Coordinators:

[H.R. Gosker](#)

[R.C.J. Langen](#)

Teaching methods:

Paper(s), Presentation(s)

Assessment methods:

Final paper

Keywords:

practical lab work, research project

Designing Scientific Research

Full course description

1. **Course summary** course focusing on the various aspects of writing an academic research proposal. Eight-week
2. **Content** This theoretical course aims at familiarising students with setting up fundamental or applied research and writing an academic research proposal. The central theme of the second year of the master's programme is the practical application of the scientific process: hypothesis/problem definition/experiment/result/interpretation/conclusions. The general point of departure is the setup of a follow-up study which relates to ongoing research at UM or UH, or elsewhere (Internship abroad). This provides students with preparation for the senior practical training (course 2.2), which concludes the master's programme.
3. **Skills training** The course pays explicit attention to English academic writing (by way of practical exercises) and presentation skills. Students also gain an understanding of study design (e.g. epidemiology, control groups, the setup of statistical analysis, and the evaluation of results).

Course objectives

- Understanding of the scientific process
- Ability to formulate a hypothesis to be tested and set up an executable research project using the concept of the scientific process
- Ability to draw up various research strategies to approach certain research questions
- Ability to formulate expected end results (preparation for course 2.2)
- Ability to defend a research proposal, and in doing so enter into academic discussions with colleagues and supervisors
- Ability to comment critically on other research proposals

Recommended reading

Science Research Writing: A Guide for Non-Native Speakers of English by Hilary Glasman-Deal Grant
Writing For Dummies by Beverly A. Browning

BMS2001

Period 1

5 Sep 2016

28 Oct 2016

[Print course description](#)

ECTS credits:

12.0

Instruction language:

English

Coordinators:

[R.C.J. Langen](#)

[R. Shiri - Sverdlov](#)

Teaching methods:

Assignment(s), Work in subgroups, Lecture(s), PBL, Research, Presentation(s), Training(s)

Assessment methods:

Final paper, Presentation

Keywords:

designing research proposal, scientific english, epidemiology

Fac. Health, Medicine and Life Sciences

Poster Presentation

Full course description

Present your research from the senior practical training for fellow students at the MOSA conference on a poster. Best abstracts will be selected for oral presentations. Posters and orals will be scored and are part of the SPT mark. Be part of the jury and score posters of other students from other masters.

Course objectives

making a poster, presenting your results, scientific discussion

BMS2102

Period 2

31 Oct 2016

23 Dec 2016

[Print course description](#)

ECTS credits:

0.0

Instruction language:

English

Coordinator:

[R.C.J. Langen](#)

Teaching methods:

Paper(s), Presentation(s)

Assessment methods:

Assignment, Attendance, Participation, Presentation

Keywords:

poster, oral, discussion

Fac. Health, Medicine and Life Sciences

Senior Practical Training - Internship

Full course description

A 30 week practical training period in a lab setting.

Course objectives

performing experiments, participating in a research group

Recommended reading

[http://www.vsnu.nl/files/documenten/Domeinen/Onderzoek/Code_wetenschapsb
oefening_2004_\(2012\).pdf](http://www.vsnu.nl/files/documenten/Domeinen/Onderzoek/Code_wetenschapsb
oefening_2004_(2012).pdf) (in Dutch)

BMS2202

Period 2

31 Oct 2016

23 Dec 2016

[Print course description](#)

ECTS credits:

0.0

Instruction language:

English

Coordinator:

[R.C.J. Langen](#)

Teaching methods:

Research, Skills, Training(s), Working visit(s)

Assessment methods:

Final paper, Attendance, Participation, Presentation

Keywords:

practical work full participation in research