



## Cardiovascular Research

Vrije Universiteit Amsterdam - VUmc - M Cardiovascular Research - 2013-2014

This study guide contains information on the Cardiovascular Research Master Programme organised by VUmc school of medical sciences for the academic year 2014-2015. This guide provides you with general information about the aim of the programme and the structure of the course components. Specific information regarding admission, planning, interim examinations, student facilities and all necessary forms can be found on the [website of VUmc School of Medical Sciences](#).

### Aim of the study programme

Every day, more than 100 people die of cardiovascular diseases in the Netherlands. To reduce this number of casualties, more scientific research focusing on the pathophysiology and treatment of cardiovascular disease is warranted. The Cardiovascular Research Master aims to train (bio)medically oriented bachelors and related bachelors in life sciences to become masters with in depth knowledge, attitudes and skills in the field of cardiovascular research. Duration of the programme is two years (120 European Credits (EC)). The master programme is composed of compulsory courses, optional courses, an academic core, a study of literature and two practical training periods (minor and major internships, 63 credits in total). Cardiovascular research is interdisciplinary by nature and flourishes by the collaboration between clinical researchers and basic scientists. This interdisciplinary approach is a key element of the programme.

VU medical center has identified cardiovascular research as one of its core research areas. This programme forms the perfect start for a career in cardiovascular research. Teaching within the Cardiovascular Research Master programme is mainly provided by staff members of the [Institute for Cardiovascular Research](#).

### Course information

The Cardiovascular Research Master programme consists of:

#### Year 1

Course	Credits	Period
<a href="#">Pathophysiology of heart and circulation</a>	6	September
<a href="#">Clinical aspects of heart and circulation</a>	6	October
<a href="#">Vascular Function and metabolic disease</a>	6	November
<a href="#">Remodelling of the circulatory system</a>	6	December
<a href="#">Biostatistics:</a>	6	January
<a href="#">Writing scientific English</a>	3	February -June
Academic core	3	Academic year
<a href="#">Minor internship</a>	21-27	February- June

#### Year 2

Course	Credits	Period
<a href="#">Optional courses</a>	15	September
<a href="#">Literature study</a>	9	October
<a href="#">Master's Thesis</a>	33-42	February – June

For more information please contact:

Dr. Edwin Kanters

Coordinator of the Cardiovascular Research Master

Telephone: 020-4445895

Email: [cvmaster@vumc.nl](mailto:cvmaster@vumc.nl)

### Student service desk:

Students can turn to the Student Service Desk with general questions about the graduation, registration for courses

and examinations, registration of grades and schedules.  
Van der Boechorststraat 7, Room: MF A-114

### *Summary of requirements and guidelines for participation*

#### **Compulsory courses**

All students of the Cardiovascular Research Master have to attend the compulsory courses of the programme. If a particular course can have more participants, students of other Master's programmes can attend the course, providing that they meet the entry requirements of the programme.

#### **Optional courses**

Students need to have consent of the examination board, if they want to attend an optional course. An online form needs to be used, this form can be found on the website of the school of medical sciences. Courses attended without the consent of the board of examiners will not be registered. For registration of optional courses students use VUnet. If registration is not possible by using VUnet (e.g. external courses), the mode of inscription and the e-mail addresses that need to be contacted are indicated in each course description.

#### **Internships and study of literature**

The examination board has to give its approval of all internships and the literature study. Forms and guidelines can be found on the faculty website. Unapproved internships will not be registered by the educational secretarial office. The corresponding course codes for minor and major internship and literature study are, respectively: M\_CMINORI09, M\_CMAJORI09 and M\_CLITSTU09.

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## Master Cardiovascular Research - Optional Courses

The Cardiovascular Research Master has reserved 18 ECTS credit points for optional courses. The optional courses are listed underneath. These courses are approved by the examination board of the Cardiovascular Research Master and do not need individual student approvals. Additional optional courses will be announced on the blackboard site

"Cardiovascular Research Master ". If a student wants to follow a course which is not indicated, an individual approval by the examination board is required. Some optional courses are organized together with or by other faculties, like FEW (Faculty of Exact Sciences and FALW)(Faculty of Earth and Life Sciences).

Vakken:

Naam	Periode	Credits	Code
<a href="#">Academic teaching and presenting</a>	Periode 3+4	3.0	M_CACTP09
<a href="#">Advanced Cardiac Diagnostics</a>	Periode 3+4+5	3.0	M_CCARDIA09
<a href="#">Biobusiness Course</a>	Periode 3+4	3.0	M_OBIOBUS10
<a href="#">Containment Strategies of Infectious Diseases in Global Context</a>	Periode 1	6.0	AM_470127
<a href="#">Developmental Biology</a>	Periode 2	6.0	AM_470613
<a href="#">Ethics in Life Sciences</a>	Periode 3	3.0	AM_470707
<a href="#">Extension Practical Training</a>	Ac. Jaar (september)	3.0	M_CEXTENS09
<a href="#">Life Cell Imaging</a>	Periode 3+4+5	3.0	M_CLIFECE09
<a href="#">Proteomics in Biomedical Research</a>	Periode 3+4+5	3.0	M_CPROTBI09
<a href="#">Radiation Protection Course, Level 5B</a>	Ac. Jaar (september)	3.0	M_CRADPRO09
<a href="#">Research Ethics</a>	Periode 3+4+5, Periode 4	3.0	M_CETHICA09

## Master Cardiovascular Research - Compulsory Courses

All students of the Cardiovascular Research Master have to attend the compulsory Courses of the programme. If more study places are available, students of other Master's programmes can attend the course, providing that they meet the entry requirements.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Biostatistics</a>	Periode 3	3.0	M_CBIOSTA09
<a href="#">Clinical Aspects of Heart and Circulation</a>	Periode 1	6.0	M_CCLINBIO09
<a href="#">Pathophysiology of Heart and Circulation</a>	Periode 1	6.0	M_CPATHO09

<a href="#">Remodelling of the Circulatory System</a>	Periode 2	6.0	M_CREMODE09
<a href="#">Vascular Function and Metabolic Diseases</a>	Ac. Jaar (september)	6.0	M_CVASCFU09
<a href="#">Writing Scientific English</a>	Semester 2	3.0	M_FWSE09

## Master Cardiovascular Research - Internships

In total, a student has to spend 63 ECTS credit points for two internships: a minor (=>21 ECTS) and a major (=>36 ECTS). Both internships have to be performed at a research laboratory, acknowledged by the examination board of the Cardiovascular Research Master: One internship has to be performed at one of the departments/laboratories of the VU/VUmc and the other one preferentially "outside" the VU. It is not allowed to do both internships outside the VU/VUmc.

### Thesis

The Master's thesis includes the results of the major internship, integrated with and from the perspective of the knowledge acquired in the cursory education. The Master's thesis will get an uniform cover provided and designed by the Master. The Master's thesis will be defended in public.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Major Internship</a>	Ac. Jaar (september)	36.0	M_CMAJORI09
<a href="#">Minor Internship</a>	Ac. Jaar (september)	21.0	M_CMINORI09

## Master Cardiovascular Research - Study of Literature

The study of literature will be carried out under supervision, yet highly independent. It is also possible that the student proposes his or her own subject and presents an own question. The study may be focused on a scientific biomedical question, but a more applied or social question is also allowed.

The aim of the literature study is that the student will be able to select, evaluate and discuss critically relevant literature. Based on the study, the student has to explain clearly not only the state of the art, but also the limitations and problems. Depending on the context of the study the student has to formulate recommendations and strategies for further research to solve remaining problems. The literature study is written in the format of a review paper.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Study of Literature</a>	Ac. Jaar (september)	9.0	M_CLITSTU09

## Academic teaching and presenting

<b>Vakcode</b>	M_CACTP09 ()
<b>Periode</b>	Periode 3+4

<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. J.M.H. Swennen
<b>Lesmethode(n)</b>	Werkgroep, Hoorcollege
<b>Niveau</b>	500

### Doel vak

This course is meant for students who prepare for a career in the academic world and becoming researcher (to start with a PhD student) and a lecturer, as teachers in Higher education are often called. During this course you learn how to present in an academic and attractive way, how to prepare lectures and interactive teaching and how to interact well with students and an academic audience.

### Onderwijsvorm

Introduction: Getting to know each other, Explanation of the course, assignments and assessment, Introduction into teaching and learning in HE, Preparations of lectures, Feedback, Reflection, Interaction with groups, Introduction mini paper, Introduction good academic presentations, Plenary Presentations, Plenary lectures, Preparation of lecture about teaching and learning in HE, Preparing the mini paper.

### Toetsvorm

1. Lecture: A complete and well prepared lecture with attention for the group process and two appropriate student activities. (40%), The performance of the lecture (40%), The feedback of the group and the course lecturer on the performance and the reflection of the group members on the feedback (30%) Total for assessment 40
2. Presentation: (Presentation (50%) The feedback of the group and the course lecturer on the performance and the reflection of the group members on the feedback (50%). Total for assessment 40%
3. Mini paper and two reviews of a concept mini paper of a group member. Total for assessment 20%

### Literatuur

The study material is given during the course and also involves of the active participation of the student. Here are some main books, a journal and a useful web site.

Ramsden, P. (2013). Learning to Teach in Higher Education: Taylor & Francis.

Svinicki, M. D., & McKeachie, W. J. (2011). McKeachie's Teaching Tips: Strategies, Research, and Theory for College and University Teachers: Wadsworth, Cengage Learning.

Teaching in Higher Education is an international, peer-reviewed journal. The journal addresses the roles of teaching, learning and the curriculum in higher education in order to explore and clarify the intellectual challenges which they present. The journal is interdisciplinary and aims to open up discussion across subject areas by involving all those who share an enthusiasm for learning and teaching:

<http://www.tandf.co.uk/journals/titles/13562517.asp>

## Advanced Cardiac Diagnostics

<b>Vakcode</b>	M_CCARDIA09 (3120004)
<b>Periode</b>	Periode 3+4+5
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. O. Kamp
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### Doel vak

This course focuses on an update in different cardiac image modalities to quantify myocardial perfusion and myocardial function in coronary artery disease and cardiomyopathy.

### Inhoud vak

- MRI, PET/CT, Intracoronary FFR/CFR
- Echocardiography diagnostic and therapeutic
- Cardiac Resynchronisation Therapy and Two Stage procedure
- Literature study

### Toetsvorm

Written exam. In addition, students will receive their credits only when they have participated in the classes and also have fulfilled all requirements.

### Literatuur

Syllabus including relevant articles.

### Intekenprocedure

Students can register for this course and examinations via [vunet.vu.nl](http://vunet.vu.nl) (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

## Biobusiness Course

<b>Vakcode</b>	M_OBIOBUS10 (311180)
<b>Periode</b>	Periode 3+4
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### Doel vak

Whether scientific discoveries get translated into novel therapeutics or diagnostics, is dependent on many issues. These include such down-to-



earth factors as whether a drug can indeed be manufactured at large scale, and careful indication selection and clinical study planning. The goal of the course is to provide insight in the factors that dictate success in present-day development of therapeutics and diagnostics.

Questions that will be addressed are:

- What are the many factors involved in getting from a laboratory discovery to a novel approved medicine, from clinical and regulatory to economic issues;
- How does the pharma and biotech industry access innovation through strategic partnerships with universities and small companies;
- How do entrepreneurial universities contribute to innovation, and turn science into novel medicines and diagnostics.

### **Inhoud vak**

The subjects of the course will include the following:

- General aspects of how several miracle drugs have been developed (Gleevec, Herceptin, Rituxan, Avastin, anti-TNF), from early laboratory research stage to development and clinical proof-of-principle, and the economic and regulatory issues involved;
- General aspects of how certain novel diagnostic tools for staging cancers and for determining drug sensitivity have been developed (for instance for breast cancer, the mamma chip developed by Agendia);
- Impact of careful indication selection and clinical study planning in drug development;
- Regulatory issues regarding drug development, including impact of the European Clinical Trial Directive for Advanced medicinal Therapy Products;
- Examples of a number of VUmc spin-off companies and their activities in drug development and diagnostics;
- Legal and patent issues in technology transfer and partnerships between universities and pharma, biotech and devices companies.

### **Onderwijsvorm**

There will be 24 contact hours, in the form of lectures by the study coordinator and a number of invited lecturers. These will include external experts on molecular diagnostics and regulatory affairs, VUmc colleagues with presentation on their own spin-off companies, and TTO colleagues on legal and patent issues. In addition the course consists of independent learning on the basis of exploring literature and business reports on selected topics, with the intent of preparing a final presentation and report at the end of the course by small groups.

### **Toetsvorm**

The course will be concluded by group presentations on studies of scientific literature and business reports on development of certain drugs and diagnostics. These will be assigned by the course coordinator, and the literature and business studies will also be summarized in short written reports, to be delivered at the end of the course.

### **Doelgroep**

This course is optional for students of the Master Course in Oncology and Cardiovascular research who have completed at least three of the four compulsory courses of their master programme. If enough places are available students from other MSc in life sciences may apply by sending an email to [masteroncology@vumc.nl](mailto:masteroncology@vumc.nl).

### Intekenprocedure

Students can register for this course and examinations via [vunet.vu.nl](http://vunet.vu.nl) (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

### Overige informatie

- After the course the students will have thorough knowledge and in depth insight in:
- the scientific, clinical, regulatory and economic issues involved in present-day drug development;
- which party plays which role at all stages from research to development to commercialization;
- the keys to success in translating innovative technologies and therapeutic principles to new drugs and diagnostics.

Use VUUnet to register for this course. If you have any questions or need extra information please contact [masteroncology@vumc.nl](mailto:masteroncology@vumc.nl)

## Biostatistics

<b>Vakcode</b>	M_CBIOSTA09 (3120003)
<b>Periode</b>	Periode 3
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. B.I. Witte
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### Doel vak

The aim of the course is to introduce several standard statistical methods and the use of the statistical software SPSS to the students.

### Inhoud vak

This course focuses on the practical application and interpretation of statistical analyses. A lot of attention is given to regression analysis in case of continuous, dichotomous or survival outcome variables. But also the t-test, the chi-square test and analysis of variance are discussed.

- analysis of continuous outcome variables: t-test, ANOVA and linear regression analysis;
- analysis of dichotomous outcome variables: chi-square test and logistic regression;
- analysis of survival data: Kaplan Meier curves and Cox regression analysis;
- multiple regression analysis: prediction and associations models.

### Onderwijsvorm

The course consists of six lectures and exercise classes. In the exercise classes, the students will actively apply the discussed methods to data using the statistical software SPSS.

### **Intekenprocedure**

Students can register for this course and examinations via [vunet.vu.nl](http://vunet.vu.nl) (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

### **Overige informatie**

Contact: [e.kanters@vumc.nl](mailto:e.kanters@vumc.nl)

## **Clinical Aspects of Heart and Circulation**

<b>Vakcode</b>	M_CCLINBIO09 (3120000)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. O. Kamp
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### **Doel vak**

This course focuses on the basic principles and clinical aspects of normal cardiac and circulatory function and dysfunction and the development of heart failure. Special attention will be given to the biophysical and clinical aspects of imaging.

### **Inhoud vak**

The following topics will be addressed: Cardiac excitation and contraction, physics of heart and circulation, hem rheology and fluid dynamics, Coronary artery disease: ischemic syndromes; Heart failure: Pathophysiology, diagnosis, treatment and prognosis; Hypertension and other risk factors of Coronary Artery Disease: Clinical diagnosis, treatment and complications; Inflammation of the heart: Pericarditis, myocarditis and endocarditis; Mitral & aortic valve disease; Aortic and peripheral vascular disease: Clinical spectrum, diagnosis and treatment; Pulmonary hypertension; Clinical recognition of supra- and ventricular arrhythmias; Cardiovascular positron emission tomography, MRI, Ultrasound; Implants: pacemakers/defibrillators; Cardiac Resynchronization Therapy (CRT).

### **Onderwijsvorm**

Lectures, working groups, assignments

### **Toetsvorm**

Written exam and assignments

### **Literatuur**

Book: Cardiology, Crawford-Di Marco-Paulus 3rd Ed (recommended) syllabus including relevant articles.

### **Intekenprocedure**

Students can register for this course and examinations via [vunet.vu.nl](http://vunet.vu.nl) (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be

found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

## Containment Strategies of Infectious Diseases in Global Context

<b>Vakcode</b>	AM_470127 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	prof. dr. J.F. van den Bosch
<b>Docent(en)</b>	dr. D.R. Essink, prof. dr. P.R. Klatser, prof. dr. J.F. van den Bosch
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### Doel vak

The student

- Has acquired in-depth theoretical and practical knowledge in relation to health intervention strategies for infectious diseases.
- Has acquired insights in various infectious diseases and characteristics in relation to containment strategies
- Has acquired insight into the role of international institutions, such as the WHO, governmental advisory bodies, relevant professionals, executing institutions, NGOs and communities in designing and carrying out health interventions.
- Understands which barriers are important when implementing containment strategies of infectious diseases, with a focus on vaccination programmes
- Has acquired insight in theoretical concepts and methods to interpret results, evaluations and the effectiveness of programs
- Has learned to develop and apply risk assessment, risk management, and risk communication methods
- Has learned and practiced interdisciplinary methods and techniques to plan health interventions at community level in an interactive way.

### Inhoud vak

This course covers developments in intervention strategies used to address health needs in a global context. Containment strategies of infectious diseases, in particular vaccination programmes, alert systems and intervention strategies, provide specific areas of attention. The containment strategies to be discussed include programmes for known infections (including vaccination strategies and in case of absence of a vaccine, diagnosis and treatment strategies) and emerging infections (including isolation, prevention and communication strategies).

The student learns how to analyze bottlenecks and opportunities of the various strategies, how to interpret the results and to evaluate the implementation of programmes.

In addition, the student will take part in a group assignment on how to design containment strategies at community level in an interactive way, for e.g. tuberculosis, polio, rabies, malaria, HIV/AIDS, etc. A presentation and writing of an essay will be part of the group assignment.

### Onderwijsvorm

Lectures, group assignment, presentation, essay, self-study.  
Group assignment attendance is compulsory.  
Contact hours: lectures 34 hrs, group work 8 hrs.  
Self-study approx. 80 hrs.

### Toetsvorm

Individual exam (60%) and group assignment presentation and essay (40%).  
Both parts must at least be sufficient (6 or higher)

### Literatuur

R. Webber, 2009. Communicable Disease Epidemiology and Control. 3rd Edition. CAB International, UK and USA. ISBN 978-1-84593-504-7.

Lecturers may make further readings available on Blackboard.

### Vereiste voorkennis

Basic knowledge about microbiology and immunology.

### Aanbevolen voorkennis

Basic knowledge about infectious diseases

### Doelgroep

Compulsory course within the Master differentiation International Public Health; optional course for students in other differentiations of the Masters Health Sciences, Biomedical Sciences, and Management, Policy Analysis and Entrepreneurship in Health and Life Sciences. Students from other backgrounds, please contact our secretariat for further information at [secretariaat.athena@falw.vu.nl](mailto:secretariaat.athena@falw.vu.nl)

### Overige informatie

Guest lecturers:

Dr. Jim van Steenberg (RIVM/LUMC)  
Dr. Peter Gondrie (KNCV)  
Dr. Richard Anthony (Royal Tropical Institute)  
Dr. Merel Langelaar (Inspectorate Public Health)  
Prof. dr. Maarten Postma (RUG)  
Dr. Kitty Maassen (RIVM)  
Dr. Elena Pinelli (RIVM)  
Prof. dr. Robert Sauerwein (UMC Nijmegen)  
Prof. dr. Cees Hamelink (VU)  
Prof. dr. Ab Osterhaus (EMC Rotterdam)

## Developmental Biology

<b>Vakcode</b>	AM_470613 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen

<b>Coördinator</b>	prof. dr. R.E. Koes
<b>Docent(en)</b>	dr. R.F.G. Toonen, dr. ing. E.J. Souer, prof. dr. R.E. Koes
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	600

### Doel vak

The development of a single cell, the fertilized egg cell, into a complex organism with all its tissue and organs in the right place is one of the most intriguing phenomena in biology. Whereas disciplines like molecular and cell biology aim to unravel the molecular mechanisms of a single cell, developmental biology aims to understand how such mechanisms make cells work together in a coherent way to form an entire organism. The overall aim of this course is to provide insight into these molecular mechanisms, such as the regulation of the expression of master genes and cell-to-cell signaling pathways underlying plant and animal development.

Final attainment levels:

- the student has a basic understanding of morphological events that take place during embryogenesis in animals
- the student can describe and distinguish key-concepts in development, such as (i) pattern formation (ii) determination of cell fate, (ii) differentiation and link that to general phenomena known in molecular biology, such as gene regulation, epigenetic phenomena, cell-signalling etc.
- The student can describe the similarities in the development of animals as different as fruitflies and vertebrates, in terms of morphological events and underlying molecular mechanisms.
- The student can explain the paradox that development of organisms with very different morphologies is governed by deeply conserved genes, and understands the molecular evidence for the current ideas.
- The student acquires experience in the critical analysis and discussion of experimental data as presented in research papers and the presentation of such data for a large(r) audience.

### Inhoud vak

The first two weeks will be shared with the MSc course Developmental Neurobiology of the vertebrate brain. The first week consists of lectures on general developmental biology For the second week one of two paths can be chosen: (1) Development of the brain or (2) Plant development. The first part of the course finishes with a written "mid term exam"

In the third and the fourth week the focus shift to specific "hot topics" and research. Three or four masterclasses will be given by invited speakers/researchers that will give an overview of their own research field and discuss their experimental results.

Furthermore, students (couples) will choose 2-3 recent research papers on a hot topic of their interest that they will study in depth to prepare for a small masterclass at the end of week 4 in which they outline the current status of the chosen subject , and present (and critically evaluate) the latest experimental data. Students can freely choose papers on plant or animal development. This ensures that everyone can follow his/her own preference for animal or plant biology and that, in the end, everyone gets a broad view on what is currently going on in (plant or animal) developmental biology.

Specific issues that we will address in the first two weeks are:

- General key-concepts in development, such as pattern formation, segmentation, determination of cell fate, with emphasis on the experimental evidence on which our current knowledge is based
- Research strategies that are widely used in developmental biology.
- Molecular mechanisms that govern the development of embryos in insects (*Drosophila*) and vertebrates
- Elementary aspects of stem cell biology and "reprogramming" of differentiated cells into stem cells
- Evolutionary aspects: how can it be that deeply conserved genes govern the development of organisms with entirely different bodyplans, like fruitflies and vertebrates, or weed plants and trees.
- Late events in embryogenesis, the formation of organs (organogenesis). This will be entirely focused on development of the brain (for students taking the path Brain development)
- Early (embryogenesis) and late events (development of flowers and leaves) in the development of plants. What are similarities and differences with the development of animals?

In the last two weeks we will focus in depth on research concerning particular "topics that are currently "hot" in developmental biology.

Subjects that will be covered by invited speakers are:

- Development and functioning of stem cells and stem cell niches in the intestine.
- Role of Hox genes in the segmentation and later development of vertebrates
- Molecular mechanisms that govern pattern formation in plants

Subjects that will be covered in the masterclasses given by student depends on the choices that are made during the course and are, therefore, not entirely predictable beforehand. Some of the subjects that will almost certainly be covered are:

- Reprogramming of differentiated cells into stem cells and dangers/possibilities for use of such cells in therapy
- Intercellular movement of proteins like transcription factors, which were hitherto always believed to act only in the cells where they are synthesised

### **Onderwijsvorm**

Lectures and masterclasses (~ 58 hrs).

Self study (~ 55 hrs)

### **Toetsvorm**

Written exam (50%)

Oral presentations and (written) abstract (40%)

Active participation to discussions during masterclasses (10%)

### **Literatuur**

There is no specific handbook. You might find it useful to consult, on occasion, a handbook (any) to refresh your memory on some basic cellular processes, like gene regulation, signaling and so on, if that is necessary.

Handouts, incl. PowerPoint files of lectures, pdf files of relevant review and research papers will be provided via the Blackboard site.

### **Vereiste voorkennis**

Basic knowledge (level 1/2) of molecular biology in particular mechanisms underlying regulation of gene expression, cell-signalling.

General affection for molecular biology is recommended

## Doelgroep

Master students: Biomolecular Sciences, Biology, Biomedical Sciences

## Ethics in Life Sciences

<b>Vakcode</b>	AM_470707 ()
<b>Periode</b>	Periode 3
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	prof. dr. J.T. de Cock Buning
<b>Docent(en)</b>	prof. dr. J.T. de Cock Buning, dr. J.F.H. Kupper
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### Doel vak

To provide a toolbox of ethical instruments to analyze properly moral problems related (to one's own) research in the life sciences

- To acquire conceptual knowledge of the central concepts in applied philosophy and professional ethics
- To challenge an ethical reflection on one's own life science specialization and to open it for an impartial and constructive discussion
- To exercise a team based project to enter prepare and execute a moral dialogue
- To acquire the necessary skills to handle ethical issues in an accountable manner, as a professional academic beyond one's own inclinations and prejudices

### Inhoud vak

Researchers in life sciences generate the knowledge that builds the future of our society. Therefore, professional academics should be accountable for their decisions, experimental designs and presentation of results. In this short course, the principles of justification will be illustrated with cases of technology ethics and medical ethics. The way an ethical review committee on animal research works, is simulated by a role play exercise on an actual research protocol. Finally, as a small group training project, an ethical dialogue is prepared and executed together with another team.

### Onderwijsvorm

Ethics in the Life Sciences is a fulltime course of four weeks (3 ECTS).

The total study time is 80 hours.

The different elements have the following study time:

- Lectures: 13 hours
- Work groups: 17 hours
- Group assignment: 24 hours
- Exam: 2 hour
- Presentation : 4 hours
- Self working (reading in the first week ): 20 hours

Please note that attendance to the work group meetings is compulsory.

Attendance to the lectures is highly recommended. In our experience, relying on self-study alone is insufficient to apply the theory of the lectures in the assignments of the workgroups, and to pass the exam.



**Toetsvorm**

- Degree of intellectual participation in the workgroups (10%)
- exam (50%) has to be passed
- written and verbal execution of the ethical dialogue (40%)

**Literatuur**

Available on Blackboard

**Vereiste voorkennis**

Bsc Biology, Biomedical Sciences, Psychology with profile Biological Psychology or Neuropsychology

**Doelgroep**

Compulsory course in all FALW Master programmes, except Health Sciences and Neuro Sciences

**Overige informatie**

Lectures in English, part of the workgroups are in Dutch. All presentations and plenary discussions in English. Attendance is compulsory.

## Extension Practical Training

<b>Vakcode</b>	M_CEXTENS09 (3120035)
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Niveau</b>	500

## Life Cell Imaging

<b>Vakcode</b>	M_CLIFECE09 (3120008)
<b>Periode</b>	Periode 3+4+5
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. R.J.P. Musters
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

**Inhoud vak**

Advances in light microscopy, digital image processing, and the development of a variety of powerful fluorescent probes present expanding opportunities for investigating the cardiovascular system. This laboratory and lecture course will provide participants with the theoretical and practical knowledge to utilize novel cell imaging technologies. Students will learn the principles of light microscopy and flow cytometry as well as use of different types of electronic cameras, laser-scanning systems, functional fluophores, delivery techniques, and digital image- processing software.

## Literatuur

Syllabus including relevant articles.

## Intekenprocedure

Students can register for this course and examinations via [vunet.vu.nl](http://vunet.vu.nl) (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

## Overige informatie

Contact: [r.musters@vumc.nl](mailto:r.musters@vumc.nl)

## Major Internship

<b>Vakcode</b>	M_CMAJORI09 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	36.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Niveau</b>	500

## Minor Internship

<b>Vakcode</b>	M_CMINORI09 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	21.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Niveau</b>	400

## Pathophysiology of Heart and Circulation

<b>Vakcode</b>	M_CPATHO09 (3120014)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. W.S. Simonides
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

## Literatuur

Book: Cardiology, Crawford-Di Marco-Paulus 3rd Ed.(recommended) syllabus including relevant articles.

Book: Pathophysiology of heart disease (Ed L.S. Lilly); syllabus including relevant articles.

### **Intekenprocedure**

Students can register for this course and examinations via [vunet.vu.nl](http://vunet.vu.nl) (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

## **Proteomics in Biomedical Research**

<b>Vakcode</b>	M_CPROTBI09 (3120006)
<b>Periode</b>	Periode 3+4+5
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. C.R. Jimenez
<b>Examinator</b>	dr. C.R. Jimenez
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### **Doel vak**

Function and structure of cells depend on the composition of proteins. During pathological conditions the expression of proteins is altered leading to impaired function/structure of cells. Apart from changes in expression level, post-translational protein changes occur as a result of altered signaling pathways. Detection of these protein changes may provide candidate biomarkers and targets for therapeutic interventions. The present course will provide a solid basis for the understanding and the quantification of the diversity in protein identification by mass spectrometry and the different methods to detect and quantify cellular protein changes. In the second week, experience is gained with gel electrophoresis and mass spectroscopy techniques to identify and quantify isoform expression and the nature and extent of post translational modifications.

### **Inhoud vak**

Protein identification by tandem mass spectrometry and database searching;  
Gel electrophoresis and mass spectroscopy techniques to quantify isoform expression and the nature and extent of post translational modifications;  
Data mining: placing large scale protein expression data in a biological context (network analysis).

### **Literatuur**

Syllabus including relevant articles

### **Intekenprocedure**

Students can register for this course and examinations via [vunet.vu.nl](http://vunet.vu.nl) (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

## **Radiation Protection Course, Level 5B**

<b>Vakcode</b>	M_CRADPRO09 (311164)
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	G.W.M. Visser BSc
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### Doel vak

Aim of the course "Working with Radioactivity" is preparing researchers, assistants and students for safely working with radioactive substances and/or apparatus emitting ionising radiation.

### Onderwijsvorm

The course encloses one week, divided in theory (~ 40%) and practical work (~60%). For both parts there will be a guide book in Dutch or English available. The experiments will lead to a practical work report to be used as the guidance for futural radiological activities.

Participants shall receive a certificate as proof of their participation at the course, if they are judged to work safely with radioactivity. The with this certificate related allowance to work with radioactivity is limited to the laboratories of the Vrije Universiteit / VUmc.

### Toetsvorm

Written exam, twice a year. Only students who pass the Dutch exam and thus obtain the governmental diploma "Stralingshygiëne, deskundigheidsniveau 5B" get 3 ECTS. The diploma gives allowance to work with radioactivity in the Netherlands, and most often even in Europe and America.

### Overige informatie

For each course the maximal number of participants is 12. During the year 4 courses (twice in Dutch, twice in English) are given. During the year the possibility of 3 extra courses exists provided the number of participants is at least 8. See for more information:

<http://www.rnc.vu.nl>

M.C. Stolker-Bouknecht is the administrator of the RNC-course, Tel: 020-4449101, [mstolker@rnc.vu.nl](mailto:mstolker@rnc.vu.nl). N.B. People who do want to do the course but do not understand Dutch, are before application requested to contact: G.W.M. Visser, coordinator of the course, Tel: 020-4449710, [gvisser@rnc.vu.nl](mailto:gvisser@rnc.vu.nl)

## Remodelling of the Circulatory System

<b>Vakcode</b>	M_CREMODE09 (3120001)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	prof. dr. J.W.M. Niessen
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep

<b>Niveau</b>	400
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### Inhoud vak

This course focuses on the pathophysiological mechanisms of vascular remodelling in pulmonary disease and ischemia.

The following topics will be addressed:

- pathophysiology of angiogenesis;
- vascular and cardiac effects of pulmonary hypertension;
- the role of fat tissue in vascular regulation;
- the effect of mechanical ventilation on the cardiovascular system.
- Basic aspects of atherosclerosis
- Immunology
- Therapy in cardiovascular disease

The course contains the following practical elements:

- 3D-life cell imaging of vascular cells;
- journalclub

### Literatuur

relevant articles

### Intekenprocedure

Students can register for this course and examinations via [vunet.vu.nl](http://vunet.vu.nl) (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

### Overige informatie

Contact: [j.w.m.niessen@vumc.nl](mailto:j.w.m.niessen@vumc.nl)

## Research Ethics

<b>Vakcode</b>	M_CETHICA09 (3120009)
<b>Periode</b>	Periode 3+4+5, Periode 4
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. M.J.P.A. Janssens
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### Doel vak

Provide basic insight in research ethics and ethical reviewing and provide understanding of ethical conduct, the ethics review process and other mechanisms established to protect research participants.

### Inhoud vak

Before a study can actually be carried out, you need permission of a Research Ethics Committee (REC) or another body which is authorized to review protocols on ethical aspects. This REC will judge your study protocol on its merits. The system of ethical reviewing and other control mechanisms, like codes and regulations, were established after a

set of cases of research misconduct (e.g. Nuremberg, 1949; Beecher 1966), in order to protect the public (including research participants and patients) from bad or over-enthusiastic scientists. Research ethics can be regarded as the endeavor to determine good and bad conduct in research. On some topics or principles we easily agree, on other topics we try to find a resolution through ponderous processes of discussion and negotiation, face to face or, by publication in journals. As a researcher you have the final responsibility for your research, and your research participants. Therefore it is important that you become sensitive for aspects that might endanger or harm, or are disrespectful to their rights.

#### Topics

- Introduction in research ethics
- Ethical reviewing
- Medical ethics committee
- Ethical obligations: conduct and regulations
- Decision making capacity
- Informed consent
- Risk benefit

#### Onderwijsvorm

- 5 interactive sessions, including lectures, discussion of assignments, discussion of literature, audiovisual material etc. (15h)
- 1 poster presentation (or if preferred: ppt presentation) (3h)
- Assignments (20 h)
- Self Study (39 h)

#### Toetsvorm

- Poster presentation (50%)
- Active participation (50 %)

#### Literatuur

Research articles will be provided on BB. Students are expected to carry out literature study themselves

#### Intekenprocedure

Students can register for this course and examinations via [vunet.vu.nl](http://vunet.vu.nl) (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

#### Overige informatie

Coordinator:

Prof dr G.A.M. Widdershoven  
Dr. M.J.P.A. Janssens

## Study of Literature

<b>Vakcode</b>	M_CLITSTU09 (3120036)
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	9.0
<b>Voertaal</b>	Engels

<b>Faculteit</b>	VUmc
<b>Niveau</b>	500

## Vascular Function and Metabolic Diseases

<b>Vakcode</b>	M_CVASCFU09 (3120002)
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. E.H. Serné
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### Doel vak

This course focuses on the fundamental role of inflammation, diabetes and hyperhomocysteinemia in vascular disease. Pathophysiology, new diagnostics and development of new therapies will be presented.

### Inhoud vak

The following topics will be addressed: diabetes and vascular disease; diabetes and cardiac disease; hyperhomocysteinemia and vascular disease; inflammation and vascular disease: the role of sepsis; diagnostics of vascular complications; endovascular surgery as a new therapy in vascular disease.

The course contains the following practical elements: in vivo assessment of vascular function in humans; flow- cytometry of inflammatory cells / mediators; isolation and culture of endothelial cells; protein analysis & proteomics in vascular disease.

### Toetsvorm

Written exam and assignments

### Literatuur

Book: to be announced;  
syllabus including relevant articles.

### Intekenprocedure

Students can register for this course and examinations via [vunet.vu.nl](http://vunet.vu.nl) (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

## Writing Scientific English

<b>Vakcode</b>	M_FWSE09 (3120015)
<b>Periode</b>	Semester 2
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	M.M. van Duist

<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	400

**Onderwijsvorm**

24 contact hours (24 active participation). The course is focussed on self-tuition in 8 sessions of 3 hours each. The plenary sessions concentrate on the process of writing and the product is part of writing. Homework is part of the course.

**Literatuur**

Effective Scientific Writing: An Advanced Learner's guide to Better English (A. Bolt & W. Bruins, ISBN 978 90 8659 6171). VU bookstore: €27.95.