



## Cardiovascular Research

Vrije Universiteit Amsterdam - VUmc - M Cardiovascular Research - 2017-2018

This study guide contains information on the Cardiovascular Research Master Programme organized by the VUmc School of Medical Sciences for the academic year 2017-2018. All information about the structure of the course components, admission, planning and student facilities are available on the faculty website [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 needed. 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. 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 our programme.

VU University Medical Centre 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 provided by staff members of the [Institute for Cardiovascular Research](#).

### **Structure of organisation**

The VUmc School of Medical Sciences coordinates all educational activities. The programme director and master coordinator of the Cardiovascular Research master take care of the organisation and gearing of the curriculum. The Cardiovascular Research master has an examination board and a programme committee. The programme committee advises the executive board of the VUmc, the director of the VUmc School of Medical Sciences and the programme director about the content of the Master's Programme and the quality of execution. The examination board (EC ECRO) decrees norms concerning admission of students, and makes sure that bachelors comply with the requirements for admission. EC ECRO further decrees the terms concerning examination of different disciplines and overlooks the results of examinations, internships and theses. Furthermore, the examination board evaluates the combinations of optional courses and internships of each individual student. All compulsory and optional courses are coordinated by different course coordinators.

The Cardiovascular Research master has an Admission Board, which is responsible for the execution of the Cardiovascular Research entry assessment and the selection of the applicants during the admission procedure.

General information about organisation, education, research and patient's care within VUmc can be found on the [VUmc website](#).

For more information please contact the programme coordinator:

Telephone: 020-4446345

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

Student Service Centre (SSC):

Students can turn to the Student Service Centre with general questions about the graduation, registration for courses and examinations, registration of grades and schedules.

VUmc School of Medical Sciences:

Ground floor G010

Van der Boechorststraat 7 - 1081 BT Amsterdam

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

### **Compulsory courses**

All students of the Cardiovascular Research Master must attend the compulsory courses of the programme.

### **Optional courses**

Students require consent of the board of examiners EC ECRO, if they want to attend an optional course. Approval can be requested via a digital approval form, which can be found on the faculty website of the VUmc School of Medical Sciences. Courses attended without the consent of the board of examiners will not be registered. For registration of optional courses students can use VUnet. If registration is not possible by using VUnet (e.g. external courses), the mode of inscription and corresponding e-mail addresses are indicated in each course description. Students are motivated to look for optional courses outside VUmc or VU University. Courses attended without the written consent of the board of examiners will not be registered. Possible financial consequences will be recovered from the student.

**Minor, major internship and study of literature**

The board of examiners has to approve all internships and the literature study. Approval can be requested via a digital approval form, which can be found on the faculty website. Unapproved practical training/ literature study periods will not be registered by the educational secretarial office. Possible financial consequences will be recovered from the student.

**External students**

If a particular compulsory course can have more participants, students of other Master programmes from the VU can attend the course, providing that they meet the entry requirements. A written request for participation needs to be done in advance with the Cardiovascular Research Admission Board including a C.V., a motivation letter, a reference letter and a recent transcript. Without permission of the Cardiovascular Research Admission Board and the board of examiners of the main study programme non-Cardiovascular Research students are not accepted in class. This study guide contains information on the Cardiovascular Research Master Programme organised by the VUmc School of Medical Sciences for the academic year 2017-2018. All information about the aim of the programme, the structure of the course components, admission, planning, student facilities etc. are available on the faculty website [VUmc School of Medical Sciences](#).

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## Master Cardiovascular Research - Optional Courses

The optional courses are intended to deepen the knowledge acquired in the compulsory courses. These options cover both theoretical and practical aspects of cardiovascular and biomedical research. Your choice of courses will depend on your own interests and the focus of your practical training. In principle you will be given the greatest possible freedom to choose, however the board of examiners has to approve your choice. We encourage students to find optional courses outside our own institution.

Below you find the link to the optional courses organised by the VUmc School of Medical Sciences. Via this link

[http://www.med.vu.nl/en/Images/Optional\\_courses\\_onco\\_tcm237-825974.pdf](http://www.med.vu.nl/en/Images/Optional_courses_onco_tcm237-825974.pdf)

you find a list of all optional courses followed by students in previous years, including courses at other faculties and institutions.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Biobusiness Course</a>	Periode 3+4	3.0	M_OBIOBUS10
<a href="#">Life Cell Imaging</a>	Periode 3+4+5	3.0	M_CLIFECE09
<a href="#">Policy, Management and Organisation in International Public Health</a>	Periode 2	6.0	AM_470819
<a href="#">Proteomics in Biomedical Research</a>	Periode 3	3.0	M_CPROTBI09
<a href="#">Radiation Protection Course, Level 5B</a>	Ac. Jaar (september)	3.0	M_ORADPRO04

## Master Cardiovascular Research - Compulsory Courses

The first semester of the programme consists of compulsory courses that provide you the basic knowledge about the main themes in cardiovascular anatomy, physiology, pathology, treatment options and science. The last two courses will support you to improve your academic skills. Master Cardiovascular Research students need to positively conclude at least three out of the first four compulsory courses to start their Minor Internship or Literature Study.

Opleidingsdelen:

- [Academic Core Cardiovascular](#)

Vakken:

Naam	Periode	Credits	Code
<a href="#">Biostatistics</a>	Periode 3	3.0	M_FBIOSTA16
<a href="#">Cardiac disease</a>	Periode 1	6.0	M_CCDMDT16
<a href="#">Diabetes and vascular disease</a>	Periode 2	6.0	M_CDVDMDT16

<a href="#">From advanced imaging to stemcells</a>	Periode 2	6.0	M_CFAISC16
<a href="#">Heart and circulation:basic principles</a>	Periode 1	6.0	M_CHCBP16
<a href="#">Writing Scientific English</a>	Periode 3	3.0	M_FWSE09

## Academic Core Cardiovascular

Vakken:

Naam	Periode	Credits	Code
<a href="#">Academic Core Cardiovascular 1st year</a>	Ac. Jaar (september)	0.0	M_CACCCOREA14
<a href="#">Academic Core Cardiovascular 2nd year</a>	Ac. Jaar (september)	3.0	M_CACCCOREB14

## Master Cardiovascular Research - Internships

In total, a student has to spend 66 EC for two Internships: a Minor Internship (30 EC) and a Major Internship (36 EC). Both Internships have to be performed at a research laboratory or clinical research group acknowledged by the Examination Board of the Master Cardiovascular Research. The Minor Internship may be any (bio)medical topic related to Cardiovascular Research and has to be performed at one of the departments of the VU/VUmc, AMC or Sanquin. The Major Internship must have a cardiovascular character and should preferentially be performed outside the VU or abroad. Each Internship needs to be approved in advance by the Examination Board.

The Master thesis includes the results of the Major Internship, integrated with and from the perspective of the knowledge acquired in the compulsory education. The Master thesis will get a uniform cover provided and designed by the Master programme.

All regulations regarding Internships and required forms can be found on the faculty website ([www.med.vu.nl](http://www.med.vu.nl)). These regulations apply to all students, which started the Master Cardiovascular Research in 2016 or later.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Major Internship</a>	Ac. Jaar (september)	36.0	M_CMAJORI16
<a href="#">Minor Internship</a>	Ac. Jaar (september)	30.0	M_CMINORI16

## Master Cardiovascular Research - Study of Literature

The Literature Study will be carried out under supervision, but in this stage of the education it is expected that the student acts highly independent. It is also possible that the student proposes his/her own subject and presents an own question. The study may be focused on a

scientific (bio)medical question, but a more applied or social question is also allowed. The literature objective may be related to the Major Internship. The aim of the Literature Study is that the student will be able to select, evaluate and critically discuss relevant literature. Based on the literature analysis, the student has to clearly explain not only the state-of-the-art, but also the limitations and problems in the literature. 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. It might be advised to use the concept of a systematic review.

All regulations regarding the Literature Study and required forms can be found on the faculty website ([www.med.vu.nl](http://www.med.vu.nl)). These regulations apply to all students, which started the Master Cardiovascular Research in 2016 or later.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Literature Study</a>	Ac. Jaar (september)	9.0	M_CLITSTU16

## Academic Core Cardiovascular 1st year

<b>Vakcode</b>	M_CACCOREA14 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	0.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. C. Boer
<b>Examinator</b>	dr. C. Boer
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	400

### Doel vak

The course Academic Core is created to prepare you for the transition from student to scientific researcher. The course will focus on the knowledge and skills, which you are not able to learn from a textbook but need to be practiced, experienced, discussed etc. Some of the Academic Core themes will be integrated within the compulsory courses, while others will be emphasised during seminars, events etc.

### Inhoud vak

The course spreads out over the two years of the Master program and consists of the following modules:

- Presenting in English
- Debating
- Data management
- Ethics and legislation
- Networking
- Research orientation
- Career tracking
- Mentor contact

### Onderwijsvorm

During the whole Master program, lectures and workshops with Academic Core themes will be organised. Part of these will be organised within the compulsory courses, such as debating and writing a research proposal. Other themes will be scheduled as Academic Core lectures and supported by assignments. A large part of the Academic Core will be independent learning of competences obtained during these lectures and assignments.

### Intekenprocedure

Students will be automatically registered for the first year module of the course (A). Students can register for the second year module (B) through [vunet.vu.nl](http://vunet.vu.nl) (under My study, register for courses and exams). The first year needs to be successfully completed to register and take part in second year activities. 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.

## Academic Core Cardiovascular 2nd year

<b>Vakcode</b>	M_CACCOREB14 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. C. Boer
<b>Examinator</b>	dr. C. Boer
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	500

### Doel vak

This course is designed to prepare you for your transition from student to scientist, the course spreads out and is part of the 2 year master program.

### Inhoud vak

During the second year of the Academic Core, there is a CV assignment, a second mentor meeting and an exit meeting. Only when the first and second year module of the course has been successfully assessed by the master coordinator, the student will obtain the credits for this course.

### Onderwijsvorm

Interactive lectures and assignments

### Doelgroep

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. The course is only available for the Cardiovascular Research master Students.



## 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>Coördinator</b>	prof. dr. A.W. Griffioen
<b>Examinator</b>	prof. dr. A.W. Griffioen
<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?

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 commercialisation;
- The keys to success in translating innovative technologies and therapeutic principles to new drugs 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 course 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.

### Literatuur

There is no mandatory literature for this course. The assignments involve reading of dedicated papers and viewing of web-based lectures.

### Doelgroep

This course is optional for students of the Masters Oncology and Cardiovascular Research, who have completed at least three out of the four compulsory courses of their programme. If enough places are available, students from other MSc in Life Sciences may apply.

### Uitleg in Blackboard/Canvas

A CANVAS course is available for this module. Students will be enrolled automatically when they register for the module via VUUnet. The lecturers will post information such as presentations slides and literature links in the course.

### 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

If you have any questions or need extra information, please contact Maartje Klaassen ([maartje.klaassen@vumc.nl](mailto:maartje.klaassen@vumc.nl)).

## Biostatistics

<b>Vakcode</b>	M_FBIOSTA16 ()
<b>Periode</b>	Periode 3
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. B.I. Lissenberg-Witte
<b>Examinator</b>	dr. B.I. Lissenberg-Witte

<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<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, binary 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 binary outcome variables: chi-square test and logistic regression;
- multiple regression analysis: association and prediction models;
- repeated measures analysis: repeated measures ANOVA, linear mixed models.

### Toetsvorm

Final examination will take place via a written (open book) exam (50%) and an SPSS assignment (50%). Grades of both the written exam and the SPSS assignment have to be 5.5 in order to pass the course.

### Study load

7 lectures (3 hours each): 21 hours  
 7 SPSS practical s(4 hours): 28 hours  
 theoretical exam: 02 hours  
 SPSS assignment: 08 hours  
 self-study: 25 hours

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Total 84 hours (3 ECTS x 28 hours)

### Literatuur

Course reading – advised, not compulsory

1. BR Kirkwood & JAC Sterne (2003). Essential Medical Statistics - 2nd edition. Blackwell Science Ltd, Oxford,
2. Gerber, SB and Voelkl Finn, K (2005). Using SPSS for Windows – data analysis and graphics. Springer, New York (electronic access at university via <http://link.springer.com/book/10.1007/0-387-27604-1/page/1>).

Lecture notes (i.e. PowerPoint sheets) are provided on canvas

### Aanbevolen voorkennis

Some basic knowledge on (descriptive) statistics is recommended: different types of variables [binary, categorical and continuous], different ways to describe data [mean, standard deviation, median, inter quartile range, proportion] and to report data [frequency tables, scatterplot, histogram, boxplot].

### 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.

## Cardiac disease

<b>Vakcode</b>	M_CCDMDT16 ()
<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>Examinator</b>	dr. W.S. Simonides
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### Doel vak

To obtain a thorough understanding of the mechanisms underlying cardiac disease and current diagnostic and therapeutic modalities.

To get familiar with state-of-the-art knowledge and scientific frontiers in the field of cardiac disease.

### Inhoud vak

This course focuses on cardiac disease, with specific emphasis on heart failure, cardiac arrhythmias, pulmonary hypertension and right ventricular failure and myocardial infarction.

Clinicians and experimental researchers active in the area of scientific research for cardiac disease provide the lectures. Students are required to read scientific articles and to participate in scientific discussions.

### Onderwijsvorm

Lectures, demonstrations and study groups

### Toetsvorm

Written exam (knowledge test) and assignments

### Literatuur

Scientific articles related to the specific lectures. More information about these scientific articles can be found on CANVAS.

### Vereiste voorkennis

Bachelor in life sciences, biomedical sciences, (technical) medicine, movement sciences.

### Aanbevolen voorkennis

Cardiovascular Physiology Concepts  
Second edition  
R.E. Klabunde

### Doelgroep

Students following the Cardiovascular Research master program.  
The course is only available for the Cardiovascular Research Master Students.

### Uitleg in Blackboard/Canvas

Course information, course reading, course announcements

### **Intekenprocedure**

In order to take the exam of this course you should register at least 2 weeks in advance through the VUnet student portal. All rules and regulations concerning exams and retake of courses are described in the Academic and Examination Regulations (OER).

### **Overige informatie**

This is an advanced course and basic knowledge of cardiac structure and function is required to complete the course successfully.

Examinator: Dr. W.S. Simonides

Vakcoördinator: Prof.dr. C. Boer

## **Diabetes and vascular disease**

<b>Vakcode</b>	M_CDVDMDT16 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. W.S. Simonides
<b>Examinator</b>	dr. W.S. Simonides
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### **Doel vak**

To obtain a thorough understanding of the mechanisms underlying the development of diabetes and vascular disease and current diagnostic and therapeutic modalities.

To get familiar with state-of-the-art knowledge and scientific frontiers in the field of cardiac disease.

### **Inhoud vak**

This course focuses on cardiac disease, with specific emphasis on renal disease and dialysis, obesity and diabetes, and vascular thrombosis and inflammation.

Clinicians and experimental researchers active in the area of scientific research for vascular disease provide the lectures. Students are required to read scientific articles and to participate in scientific discussions.

### **Onderwijsvorm**

Lectures, demonstrations and study groups

### **Toetsvorm**

Written exam (knowledge test) and assignments

### **Literatuur**

Scientific articles related to the specific lectures. More information about these scientific articles can be found on CANVAS.

### **Vereiste voorkennis**

Bachelor in life sciences, biomedical sciences, (technical) medicine, movement sciences.

**Aanbevolen voorkennis**

Cardiovascular Physiology Concepts

Second edition

R.E. Klabunde

**Doelgroep**

Students following the Cardiovascular Research master program.

**Uitleg in Blackboard/Canvas**

Course information, course reading, course announcements.

**Intekenprocedure**

In order to take the exam of this course you should register at least 2 weeks in advance through the VUnet student portal. All rules and regulations concerning exams and retake of courses are described in the Academic and Examination Regulations (OER).

**Overige informatie**

This is an advanced course and basic knowledge of cardiac structure and function is required to complete the course successfully.

Examinator: Dr. W.S. Simonides

Vakcoördinator: Prof.dr. C. Boer

**From advanced imaging to stemcells**

<b>Vakcode</b>	M_CFAISC16 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. W.S. Simonides
<b>Examinator</b>	dr. W.S. Simonides
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

**Doel vak**

To obtain a thorough understanding of state-of-the-art imaging techniques in the experimental and clinical setting that can be used for scientific research and novel diagnostic and therapeutic modalities in patients with cardiovascular disease.

To get familiar with the role of personalized medicine in the treatment of cardiovascular diseases.

**Inhoud vak**

This course focuses on state-of-the-art imaging techniques that are used during experimental and clinical scientific research, including super-resolution microscopy, PET-CT and optical imaging of the microvasculature.

The treatment of cardiovascular disease will increasingly rely on personalized medicine and patient-centered care. The student will get familiar with developments like genotyping, systems biology and remote monitoring.

**Onderwijsvorm**

Lectures, demonstrations and study groups

**Toetsvorm**

Written exam (knowledge test) and assignments

**Literatuur**

Scientific articles related to the specific lectures. More information about these scientific articles can be found on CANVAS.

**Vereiste voorkennis**

Bachelor in life sciences, biomedical sciences, (technical) medicine, movement sciences.

**Aanbevolen voorkennis**

Cardiovascular Physiology Concepts  
Second edition  
R.E. Klabunde

**Doelgroep**

Students following the Cardiovascular Research master program.

**Uitleg in Blackboard/Canvas**

Course information, course reading, course announcements

**Intekenprocedure**

In order to take the exam of this course you should register at least 2 weeks in advance through the VUnet student portal. All rules and regulations concerning exams and retake of courses are described in the Academic and Examination Regulations (OER).

**Overige informatie**

This is an advanced course and basic knowledge of cardiac structure and function is required to complete the course successfully.

Examinator: Dr. W.S. Simonides

Vakcoördinator: Prof.dr. C. Boer

**Heart and circulation:basic principles**

<b>Vakcode</b>	M_CHCBP16 ()
<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>Examinator</b>	dr. W.S. Simonides
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

**Doel vak**

To obtain a thorough understanding of the function of heart and circulation, including integrative physiological concepts. cardiovascular function and the role of the underlying molecular

components and mechanisms in the development of cardiovascular pathology.

### **Inhoud vak**

This course focuses on the fundamental aspects of normal cardiac and vascular function. The physiology of the heart and the circulation in health and disease will be addressed, with emphasis on the molecular mechanisms involved. Moreover, integrative physiology concepts focusing on oxygen transport and coagulation will be discussed. Students are required to read scientific articles and to participate in scientific discussions.

### **Onderwijsvorm**

Lectures, demonstrations and study groups

### **Toetsvorm**

Written exam (knowledge test) and assignments

### **Literatuur**

Scientific articles related to the specific lectures. More information about these scientific articles can be found on CANVAS.

### **Vereiste voorkennis**

Bachelor in life sciences, biomedical sciences, (technical) medicine, movement sciences.

### **Aanbevolen voorkennis**

Cardiovascular Physiology Concepts  
Second edition  
R.E. Klabunde

### **Doelgroep**

Students following the Cardiovascular Research master program.

### **Uitleg in Blackboard/Canvas**

Course information, course reading, course announcements

### **Intekenprocedure**

In order to take the exam of this course you should register at least 2 weeks in advance through the VUnet student portal. All rules and regulations concerning exams and retake of courses are described in the Academic and Examination Regulations (OER).

### **Overige informatie**

This is an advanced course and basic knowledge of cardiac structure and function is required to complete the course successfully.

Examinator: Dr. W.S. Simonides

Vakcoördinator: Prof.dr. C. Boer

## **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>Examinator</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.

### Uitleg in Blackboard/Canvas

A CANVAS course is available for this module. Students will be enrolled automatically when they register for the module via VUnet. The lecturers will post information such as presentations slides and literature links in the course.

### 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)

## Literature Study

<b>Vakcode</b>	M_CLITSTU16 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	9.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. D.W.D. Kuster
<b>Examinator</b>	dr. D.W.D. Kuster
<b>Niveau</b>	500

## Major Internship

<b>Vakcode</b>	M_CMAJORI16 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	36.0
<b>Voertaal</b>	Engels

<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. D.W.D. Kuster
<b>Examinator</b>	dr. D.W.D. Kuster
<b>Niveau</b>	500

## Minor Internship

<b>Vakcode</b>	M_CMINORI16 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	30.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	dr. D.W.D. Kuster
<b>Examinator</b>	dr. D.W.D. Kuster
<b>Niveau</b>	400

## Policy, Management and Organisation in International Public Health

<b>Vakcode</b>	AM_470819 ()
<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>	M.O. Kok
<b>Examinator</b>	prof. dr. J.E.W. Broerse
<b>Docent(en)</b>	prof. dr. J.E.W. Broerse, M.O. Kok
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### Doel vak

- To develop a detailed understanding of the health policy process and its outcomes both at national and international level
- To acquire insight into the different theoretical concepts on policy design in the field of public health
- To understand how policy decisions are translated into programs and projects, and subsequently implemented
- To get acquainted with different management practices in health programs
- To gain insight into change management
- To get acquainted with and acquire skills in international diplomacy, resolution writing, negotiation and the procedures of the United Nations

### Inhoud vak

This course contains two parts that will run parallel throughout the course: a theoretical part and a practical, diplomacy, part. In the theoretical part you study different theoretical concepts of policy science in international public health. You study core concepts of public administration in relation to IPH such as power relations, securing public interest, public versus private sector, managing change and the network society. Questions are addressed such as: In what way

does the political structure of a country influence health policies; Why do certain topics get on the policy agenda while other topics never make it; Why do policy makers and politicians regularly seem to ignore scientific insights; To what extent do international organisations (such as the World Bank and the World Health Organisation) influence national policies? In the diplomacy part you develop basic diplomatic skills by practicing them in 4 training sessions and a final 1.5 day World Health Organization simulation under Model United Nations rules of procedure (WHO MUN). Model United Nations (informally abbreviated as Model UN or MUN) is an academic simulation of the United Nations that aims to educate you about civics, effective communication, globalization and multilateral diplomacy. In Model UN, you take on roles as foreign diplomats and participate in a simulated session of the WHO.

### Onderwijsvorm

Lectures (29 hours), training workshops (14 hours) and simulation (12 hours), self study (102,5 hours), and examination (2.5 hours)

### Toetsvorm

Individual exam (70%) and diplomacy assignment (30%). Both grades need to be at least 5.5 to pass the course.

### Literatuur

"Making Health Policy", Kent Buse, Nicholas Mays & Gill Walt, 2005, Open University Press, ISBN 0-335-21839-3

"The Wisdom of Whores", Elizabeth Pisani, 2008, Granta Publications, ISBN978-1-84708-076-9

Other reading materials via Canvas

### Doelgroep

Compulsory course within the Master specialization International Public Health; optional course for students in other specializations of the Masters Health Sciences and Biomedical Sciences.

### Overige informatie

Attendance of training workshops and simulation is compulsory. For further information and application, please contact Maarten Kok ([m.kok@vu.nl](mailto:m.kok@vu.nl))

## Proteomics in Biomedical Research

<b>Vakcode</b>	M_CPROTBI09 (3120006)
<b>Periode</b>	Periode 3
<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. The large-scale analysis of proteins and their quantitative changes in health and disease, a research field called proteomics, may provide candidate biomarkers and targets for therapeutic interventions.

This proteomics course consists of one week of theory (lectures and literature study) and one week of practice in the lab. Together this will provide a solid basis for the understanding of what proteomics is about, how its central technique, mass spectrometry, can be used for global protein identification and quantification, and what biomedical/clinical questions can be answered using an appropriate experimental design. In the second week, students will get hands-on experience with a real proteomics experiment and the generated data will be used to illustrate what bioinformatics analyses can be done to enable biological insight of large scale data.

### **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

### **Uitleg in Blackboard/Canvas**

A CANVAS course is available for this module. Students will be enrolled automatically when they register for the module via VUnet. The lecturers will post information such as presentations slides and literature links in the course.

### **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**

Minimum number of participants: 5, maximum: 12  
For optimal participation, basic knowledge of molecular and cellular biology is needed.

Contact:

Prof. dr. Connie R. Jimenez  
Head OncoProteomics Laboratory  
Department of Medical Oncology, VUmc Cancer Center Amsterdam  
e-mail: [c.jimenez@vumc.nl](mailto:c.jimenez@vumc.nl)  
Website: [www.oncoproteomics.nl](http://www.oncoproteomics.nl)

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

<b>Vakcode</b>	M_ORADPRO04 (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
<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 future radiological activities. Participants shall receive a certificate as proof of their participation in 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 VU University/VUmc.

### Toetsvorm

Written exam, twice a year. Only students who pass the 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.

### Doelgroep

The course given in the Radionuclide Centre is for students who need the course for working with radioactivity during their study at the Vrije Universiteit / VUmc, and for students who are strongly interested to work with radioactivity in future.

### Overige informatie

For each course the maximal number of participants is 12. The course will be given in week 37 (September 11 – September 15) and in week 46 (November 13 – November 17) of 2017.

#### Contact:

A.Y. Rijnders, BSc

Administrator course Werken met Radioactiviteit / Radiation Protection – niveau 5B

Radiologie & Nucleaire Geneeskunde

email: [ay.rijnders@vumc.nl](mailto:ay.rijnders@vumc.nl)

G.W.M. Visser, BSc

Coordinator course Werken met Radioactiviteit / Radiation Protection – niveau 5B

email: [gwm.visser@vumc.nl](mailto:gwm.visser@vumc.nl)

Website: <http://www.mcvu.nl>

N.B. International students who want to participate in the course are requested to contact the coordinator of the course before application.

## Writing Scientific English

<b>Vakcode</b>	M_FWSE09 (3120015)
<b>Periode</b>	Periode 3
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	VUmc
<b>Coördinator</b>	drs. J.K.A. Meijer
<b>Examinator</b>	drs. J.K.A. Meijer
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	500

### Doel vak

The aim of this course is to provide Master's students with the essential linguistic know-how for composing a successful research proposal in English that is well organized, idiomatically and stylistically appropriate and grammatically correct.

At the end of the course students

- know how to structure a research proposal;
- know what the information elements are in parts of their research proposal;
- know how to produce clear and well-structured texts on complex subjects;
- know how to write well-structured and coherent paragraphs;
- know how to construct effective sentences;
- know what collocations are and how to use them appropriately;
- know how to adopt the right style (formal style, cohesive style, conciseness, hedging)
- know how to avoid the pitfalls of English grammar;
- know how to use punctuation marks correctly;
- know how to cite sources effectively;
- know what their own strengths and weaknesses are in writing;
- know how to give effective peer feedback.

### Inhoud vak

The course will start with a general introduction to writing a research proposal in English. Taking a top-down approach, we will then analyse the structure of a research proposal in more detail. As we examine several sections of a research proposal, we will peel back the layers and discover how paragraphs are structured, what tools are available to ensure coherence within and among paragraphs, how to write effective and grammatically correct sentences and how to choose words carefully and use them effectively.

Topics addressed during the course include the following:

- What makes a good proposal?
  - o 5 crucial questions you must always answer
- Considering you readers: who are they? What do they expect? How do they read your text? How does that affect your writing?
  - o The importance of considering reading strategies
- What is the basic structure of a research proposal and what are they key elements of each section?
- How do you "sell" your project / research? Why language matters!

Strategies for writing successful research proposals: using the English language effectively and enhancing readability

- o Keeping it brief: don't waste words
- o Writing well-structured and coherent paragraphs
- o Writing effective sentences (sophisticated word order, information distribution)
- o Using modality and boosters to your advantage
- o Using appropriate and effective vocabulary
- o Arguing convincingly
- o Using active constructions (but also using the passive effectively)
- Understanding grammar (tenses, basic word order, agreement, prepositions, etc.)
- Understanding punctuation
- Referring to sources: summarising, paraphrasing, quoting (how and when?)
- Avoiding plagiarism

### **Onderwijsvorm**

Research proposal writing in English is a four-week course that consists of 4 contact hours a week. Students are required to spend at least 6 to 8 hours of homework per week. They will work through a phased series of exercises that conclude with the requirement to write several text parts (e.g. Introduction/CANVAS, Relevance section, Summary). Feedback on the writing assignments is given by the course teacher and by peers.

### **Toetsvorm**

Students will receive 3 course credits when they meet the following requirements:

- Students hand in three writing assignments (e.g. Introduction, Relevance section, Summary) and get a pass mark for all writing assignments;
- Students provide elaborate peer feedback;
- Students attend at least 7 out of 8 sessions (or, in case of 6 sessions, they attend at least 5);
- Students are well prepared for each session (i.e. do all homework assignments);
- Students actively participate in class;
- Students do not plagiarise or self-plagiarise.

### **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.

### **Doelgroep**

This course is only open to students of the two-year Master's programme Oncology. These students are only eligible to the course if they have already conducted scientific research (e.g. for their Bachelor's thesis) or if they will be working on a research project when taking Scientific Writing in English.

### **Uitleg in Blackboard/Canvas**

A CANVAS course is available for this module. Students will be enrolled automatically when they register for the module via VU.net. The lecturers will post information such as presentations slides and literature links in the course.

## **Intekenprocedure**

All students of the Master's Programme in Oncology have to attend the compulsory Courses of the programme.

For all your courses you must register through VUnet.vu.nl. This way, you find out immediately if a place is available. All activities for which you are registered will be displayed in your personal timetable, which also includes any timetable changes. If you have not registered for a course then you will not be admitted to that course, you will not be assigned to a group, you will not be able to use CANVAS, you will have no timetable, your grades will not be recorded, etc. In short, you will not be able to take part.

From the moment that you are conditionally registered for a programme, you can sign up for specific courses via VUnet.vu.nl

This course is only meant for Master Oncology students.

## **Overige informatie**

- To do well, students are expected to attend all lessons. Group schedules are to be found on CANVAS.
- A VUnet registration for this course automatically gives access to the corresponding CANVAS site. Group registration only takes place via CANVAS (general groups: registration by students following FALW programmes containing this course, groups assigned to specific studies: registration through programme and course coordinator).
- Make sure Scientific Writing in English does not overlap with another course.
- If you have registered for a group in CANVAS, you are expected to attend all sessions (eight). If you decide to withdraw from the course, do so in time, both on CANVAS and in VUnet. This all will avoid a 'fail' on your grade list for not taking part in this course and allows other students to fill in a possible very wanted group spot.
- For specific CANVAS matters concerning this course, please contact by sending email to [masteroncology@vumc.nl](mailto:masteroncology@vumc.nl)