



## Medical Natural Sciences MSc

Vrije Universiteit Amsterdam - Faculteit der Exacte Wetenschappen - M Medical Natural Sciences - 2017-2018

## Structure of the training

The Master's programme of Medical Natural Sciences offers three different variants for graduation:

- MNS programme (O - variant)
- Society oriented variant (M - variant)
- Communication variant (C - variant)
- Education variant (E - variant)

Schematic overview of the Master course Medical Natural sciences (in cp):

<b>Variant</b>	<b>O</b>	<b>M</b>	<b>C</b>	<b>E</b>
Compulsory courses (Major)	36	18	18	12
Research project (Major)	39	36	36	36
Literature study	6	6	6	6
Minor programme (obligatory in O-variant)	21	-	-	-
Internship (e.g. at a company)	-	30	30	-
M or C projects	-	24	24	-
High school teacher education	-	-	-	60
Ethics	3	3	3	3
Writing a scientific article	3	3	3	3
Optional program O-variant, for example - Deficiency courses - Extension research project - Extension literature study - extra courses	12			
<b>Total (cp)</b>	<b>120</b>	<b>120</b>	<b>120</b>	<b>120</b>

The programme consists of 120 credits:

- compulsory courses 90 credits (including a Minor research project of 21 credits, Master Research Project of 39 credits and a Colloquium and thesis report of 6 credits about the Master Project)
- restricted choice 18 credits from a list
- optional courses 12 credits (free to choose)

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

### More information

- All compulsory courses and electives you find in the [year schedule](#);
- A complete description of the programme you find in the [Teaching and Examination Regulations](#);
- For more information about the programme you can contact the [academic advisor](#) (VU students only);
- As a VU student you need to register for all courses via [VU.net](#). Only after you completed your enrollment for the study programme you can register for courses;

-More information on all the courses you find through the links below.

For more information please contact the master coordinator:

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## M Medical Natural Sciences Communication Variant

In addition to the courses below a total of at least 18 ECTS has to be chosen.

Opleidingsdelen:

- [Courses for Communication Part](#)
- [MNS courses for C-E-M variant](#)

### Courses for Communication Part

To complete the Master programme (120 EC) of the Communication Variant, the student has to choose 60 EC Communication courses.

Opleidingsdelen:

- [Optional courses: select at least 12EC](#)
- [Internship communication](#)
- [Compulsory Courses](#)

### Optional courses: select at least 12EC

Vakken:

Naam	Periode	Credits	Code
<a href="#">Communication, Organization and Management</a>	Periode 2	6.0	AM_470572
<a href="#">Science in Dialogue</a>	Periode 2	6.0	AM_1002
<a href="#">Science Journalism</a>	Periode 2	6.0	AM_471014
<a href="#">Science Museology</a>	Periode 3	6.0	AM_470590

### Internship communication

Internship communication. Choose one.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Reflective Practice Internship Science Communication</a>	Ac. Jaar (september)	30.0	AM_1163
<a href="#">Research Internship Science Communication</a>	Ac. Jaar (september)	30.0	AM_1162

### Compulsory Courses

Vakken:

Naam	Periode	Credits	Code
<a href="#">Research methods for analyzing complex problems</a>	Periode 1	6.0	AM_1182
<a href="#">Science and Communication</a>	Periode 1	6.0	AM_470587

## MNS courses for C-E-M variant

MNS courses for C-variant. 60 ec of MNS courses from the specialization has to be chosen in consultation with the master coordinator.

Opleidingsdelen:

- [Compulsory choice of at least 6 EC](#)
- [Compulsory courses Academic Skills](#)
- [Compulsory Courses](#)

## Compulsory choice of at least 6 EC

Students need to select a total of 18 credits or more from the following list.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Bio-analysis &amp; Clinical Diagnostics</a>	Periode 1	6.0	X_432765
<a href="#">Physics of Organs 1: Cardio-Pulmonary Physics</a>	Periode 1	6.0	XMU_428527
<a href="#">Soft Condensed Matter and Biological Physics</a>	Periode 2	6.0	X_420167

## Compulsory courses Academic Skills

Compulsory choice Ethics for all tracks. Choose one of two.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Ethics in Biomedical Research</a>	Periode 3	3.0	X_422592

Scientific Writing in English for Medical Natural Sciences	Periode 3	3.0	X_420563
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## Compulsory Courses

Vakken:

Naam	Periode	Credits	Code
Advanced Medical Image Processing	Periode 2	6.0	X_422610
Biomedical Modelling and Simulation	Periode 1	6.0	X_430112
Colloquium / Literature thesis	Ac. Jaar (september)	6.0	XM_422611
Major research Project	Ac. Jaar (september)	36.0	XM_422615

## M Medical Natural Sciences Education variant

In addition to the courses below a total of at least 18 ECTS has to be chosen.

Opleidingsdelen:

- [Courses for Education Part](#)
- [MNS courses for E variant](#)

## Courses for Education Part

Opleidingsdelen:

- [Master Leraar VHO Natuurkunde, vanaf 2015](#)
- [Master Leraar VHO Scheikunde vanaf 2015](#)
- [LVHO Natuurkunde, overgangsregeling](#)
- [LVHO Scheikunde, overgangsregeling](#)

## Master Leraar VHO Natuurkunde, vanaf 2015

Vakken:

Naam	Periode	Credits	Code
Didactiek 1	Periode 1	6.0	O_MLDIDAC_1
Didactiek 2	Periode 2+3	6.0	O_MLDIDAC_2
Didactiek 3	Periode 4+5+6	9.0	O_MLDIDAC_3
Peergroup fase 1	Periode 1+2+3	0.0	O_MLPEERGR_1
Peergroup Fase 2	Periode 3+4+5	0.0	O_MLPEERGR_2
Praktijk 1	Periode 1	6.0	O_MLPRAK_1



Praktijk 2	Periode 2+3	9.0	O_MLPRAK_2
Praktijk 3	Periode 4+5+6	15.0	O_MLPRAK_3
Praktijk 3 voor 2-jarige Master		15.0	O_M2PRAK3
Praktijkonderzoek 1	Periode 3	3.0	O_MLPROZ_1
Praktijkonderzoek 2	Periode 4+5+6	6.0	O_MLPROZ_2

## Master Leraar VHO Scheikunde vanaf 2015

Vakken:

Naam	Periode	Credits	Code
Didactiek 1	Periode 1	6.0	O_MLDIDAC_1
Didactiek 2	Periode 2+3	6.0	O_MLDIDAC_2
Didactiek 3	Periode 4+5+6	9.0	O_MLDIDAC_3
Peergroup fase 1	Periode 1+2+3	0.0	O_MLPEERGR_1
Peergroup Fase 2	Periode 3+4+5	0.0	O_MLPEERGR_2
Praktijk 1	Periode 1	6.0	O_MLPRAK_1
Praktijk 2	Periode 2+3	9.0	O_MLPRAK_2
Praktijk 3	Periode 4+5+6	15.0	O_MLPRAK_3
Praktijk 3 voor 2-jarige Master		15.0	O_M2PRAK3
Praktijkonderzoek 1	Periode 3	3.0	O_MLPROZ_1
Praktijkonderzoek 2	Periode 4+5+6	6.0	O_MLPROZ_2

LVHO Natuurkunde, overgangsregeling

LVHO Scheikunde, overgangsregeling

MNS courses for E variant

Opleidingsdelen:

- Compulsory choice of at least 6 EC
- Compulsory courses Academic Skills
- Compulsory Courses

Compulsory choice of at least 6 EC

Vakken:

Naam	Periode	Credits	Code
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Bio-analysis & Clinical Diagnostics	Periode 1	6.0	X_432765
Colloquium / Literature thesis	Ac. Jaar (september)	6.0	XM_422611
Physics of Organs 1: Cardio-Pulmonary Physics	Periode 1	6.0	XMU_428527
Soft Condensed Matter and Biological Physics	Periode 2	6.0	X_420167

## Compulsory courses Academic Skills

Compulsory choice Ethics for all tracks. Choose one of two.

Vakken:

Naam	Periode	Credits	Code
Ethics in Biomedical Research	Periode 3	3.0	X_422592
Scientific Writing in English for Medical Natural Sciences	Periode 3	3.0	X_420563

## Compulsory Courses

Vakken:

Naam	Periode	Credits	Code
Advanced Medical Image Processing	Periode 2	6.0	X_422610
Biomedical Modelling and Simulation	Periode 1	6.0	X_430112
Major research Project	Ac. Jaar (september)	36.0	XM_422615

## M Medical Natural Sciences MNS programme

Opleidingsdelen:

- Compulsory choice of at least 6 EC
- Restricted Choice
- Compulsory Choice 1 of 2
- Compulsory courses Academic Skills
- Compulsory Courses for the MNS programme.

## Compulsory choice of at least 6 EC

Students need to select a total of 18 credits or more from the following list.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Bio-analysis &amp; Clinical Diagnostics</a>	Periode 1	6.0	X_432765
<a href="#">Physics of Organs 1: Cardio-Pulmonary Physics</a>	Periode 1	6.0	XMU_428527
<a href="#">Soft Condensed Matter and Biological Physics</a>	Periode 2	6.0	X_420167

## Restricted Choice

Students need to select a total of 18 credits or more from the following list.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Advanced Medical Technology</a>	Periode 5	6.0	X_437026
<a href="#">Bio-analysis &amp; Clinical Diagnostics</a>	Periode 1	6.0	X_432765
<a href="#">Biomedical Optics</a>	Periode 5	6.0	XM_41014
<a href="#">Drug-induced Stress and Cellular Responses</a>	Periode 2	6.0	X_432536
<a href="#">Dynamics of Biomolecules and Cells</a>	Periode 4	6.0	X_422583
<a href="#">Elektronica en signaalverwerking</a>	Periode 4	6.0	X_420533
<a href="#">High-Throughput Screening</a>	Periode 2	6.0	X_435047
<a href="#">Image Processing for MNS</a>	Periode 2	6.0	X_422612
<a href="#">Live Cell Imaging</a>	Periode 1	6.0	AM_470726
<a href="#">Parameter Estimation Applied to Medical and Biological Sciences</a>	Periode 4	6.0	X_432631
<a href="#">Physics of Organs 1: Cardio-Pulmonary Physics</a>	Periode 1	6.0	XMU_428527
<a href="#">Physics of Organs 2: Sensory Organs and Bioelectricity</a>	Periode 2	6.0	XMU_428528
<a href="#">Protein Analysis</a>	Periode 5	6.0	X_435045
<a href="#">Proteomics in Biomedical Research</a>	Periode 3	3.0	M_CPROTBI09
<a href="#">Signal Transduction in Health and Disease</a>	Periode 2	6.0	X_432535

<a href="#">Soft Condensed Matter and Biological Physics</a>	Periode 2	6.0	X_420167
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## Compulsory Choice 1 of 2

Vakken:

Naam	Periode	Credits	Code
<a href="#">Minor research Project</a>	Ac. Jaar (september)	21.0	XM_422614
<a href="#">Minor research Project (27EC)</a>	Ac. Jaar (september)	27.0	XM_42000

## Compulsory courses Academic Skills

Compulsory choice Ethics for all tracks. Choose one of two.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Ethics in Biomedical Research</a>	Periode 3	3.0	X_422592
<a href="#">Scientific Writing in English for Medical Natural Sciences</a>	Periode 3	3.0	X_420563

## Compulsory Courses for the MNS programme.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Advanced Medical Image Processing</a>	Periode 2	6.0	X_422610
<a href="#">Biomedical Modelling and Simulation</a>	Periode 1	6.0	X_430112
<a href="#">Colloquium / Literature thesis</a>	Ac. Jaar (september)	6.0	XM_422611
<a href="#">Major research Project</a>	Ac. Jaar (september)	39.0	XM_422613

## M Medical Natural Sciences Society Oriented Variant

In addition to the courses below a total of at least 18 ECTS has to be chosen.

Opleidingsdelen:

- [Courses for Society Oriented Part](#)

- [MNS courses for C-E-M variant](#)

## Courses for Society Oriented Part

To complete the Master programme (120 EC) of the Society Oriented Variant, the student has to choose 60 EC Society Oriented courses.

Opleidingsdelen:

- [MSc Biology Science in Society specialisation](#)

## MSc Biology Science in Society specialisation

The Master's graduate with a Science in society specialization combines an academic approach with the skills and competences that will allow him or her to perform scientific research at the interface of the biomedical sciences and society. The specialization aims to develop strategies that contribute to an understanding of complex societal problems and strategies to solve complex societal problems through interdisciplinary research. In addition, the programme analyses the social, economic and ethical aspects of new developments in the biological sciences, so as to assess their implications for society. Master's graduates have the necessary skills to collaborate and communicate with researchers from various scientific disciplines (including but not limited to those in the biological sciences) and societal actors, and the ability to use these academic insights.

The Science in Society specialization has a study load of 54 EC.

Opleidingsdelen:

- [Compulsory courses](#)
- [Compulsory choice of at least 6 EC](#)

## Compulsory courses

Vakken:

Naam	Periode	Credits	Code
<a href="#">Analysis of Governmental Policy</a>	Periode 1	6.0	AM_470571
<a href="#">Communication, Organization and Management</a>	Periode 2	6.0	AM_470572
<a href="#">Research methods for analyzing complex problems</a>	Periode 1	6.0	AM_1182

## Compulsory choice of at least 6 EC

Vakken:

Naam	Periode	Credits	Code
<a href="#">Business Management in Health and Life Sciences</a>	Periode 2	6.0	AM_470584
<a href="#">Clinical Development and Clinical Trials</a>	Periode 3	3.0	AM_1180
<a href="#">Disability and Development</a>	Periode 2	6.0	AM_470588
<a href="#">Epidemiology</a>	Periode 3	3.0	AM_1179
<a href="#">Health, Globalisation and Human Rights</a>	Periode 2	6.0	AM_470818
<a href="#">Policy, Politics and Participation</a>	Periode 2	6.0	AM_470589
<a href="#">Science in Dialogue</a>	Periode 2	6.0	AM_1002
<a href="#">Societal entrepreneurship in health and life sciences</a>	Periode 1	6.0	AM_470575

## MNS courses for C-E-M variant

MNS courses for C-variant. 60 ec of MNS courses from the specialization has to be chosen in consultation with the master coordinator.

Opleidingsdelen:

- [Compulsory choice of at least 6 EC](#)
- [Compulsory courses Academic Skills](#)
- [Compulsory Courses](#)

## Compulsory choice of at least 6 EC

Students need to select a total of 18 credits or more from the following list.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Bio-analysis &amp; Clinical Diagnostics</a>	Periode 1	6.0	X_432765
<a href="#">Physics of Organs 1: Cardio-Pulmonary Physics</a>	Periode 1	6.0	XMU_428527
<a href="#">Soft Condensed Matter and Biological Physics</a>	Periode 2	6.0	X_420167

## Compulsory courses Academic Skills

Compulsory choice Ethics for all tracks. Choose one of two.

Vakken:

Naam	Periode	Credits	Code
Ethics in Biomedical Research	Periode 3	3.0	X_422592
Scientific Writing in English for Medical Natural Sciences	Periode 3	3.0	X_420563

## Compulsory Courses

Vakken:

Naam	Periode	Credits	Code
Advanced Medical Image Processing	Periode 2	6.0	X_422610
Biomedical Modelling and Simulation	Periode 1	6.0	X_430112
Colloquium / Literature thesis	Ac. Jaar (september)	6.0	XM_422611
Major research Project	Ac. Jaar (september)	36.0	XM_422615

## Advanced Medical Image Processing

<b>Vakcode</b>	X_422610 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. J.C. de Munck
<b>Examinator</b>	dr. J.C. de Munck
<b>Docent(en)</b>	dr. ir. T.J.C. Faes, dr. J.C. de Munck
<b>Lesmethode(n)</b>	Hoorcollege, Computerpracticum
<b>Niveau</b>	400

### Doel vak

- 1) To provide students with knowledge and skills to understand the state of the art of modern medical imaging analysis in one or more of the topics: data structures, interpolation, connected component algorithms, geometric modelling, optimized algorithms, noise filtering, Frangi filter, seeded watershed.
- 2) To develop image analysis software tools from concept to algorithm and code in C++ .

### Onderwijsvorm

Lectures, literature review, workshops, demonstrations, computer practicles.

### Toetsvorm

Individual end-of-course assignment on a specific topic in medical image processing, including the development and evaluation of the programme code and its documentation. Moreover, a written presentation

on the assignment is included.

### Aanbevolen voorkennis

- Medische Beeldvorming (bachelor natuurkunde en bachelor medische natuurwetenschappen)
- Introductie medische beeldbewerking (bachelor natuurkunde en bachelor medische natuurwetenschappen).

### Doelgroep

MNS-master & Master Physics of Life & Health

## Advanced Medical Technology

<b>Vakcode</b>	X_437026 (437026)
<b>Periode</b>	Periode 5
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. ir. T.J.C. Faes
<b>Examinator</b>	prof. dr. ir. R.M. Verdaasdonk
<b>Docent(en)</b>	prof. dr. ir. R.M. Verdaasdonk, prof. dr. R. Boellaard
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

Understanding the physical principles of medical equipment in view of a safe and effective application.

### Inhoud vak

The course consists of an overview of various medical devices discussing the physical principles and mechanism of action when used with a patient. The understanding of the physics contributes to the safety of the patient and the way the device can be applied most optimally. Particular devices will be discussed like electro-surgery, lasers, ultrasonic knives, endoscopes, etc. Also recent research and new developments of instruments will be shown.

### Onderwijsvorm

Combination of lectures, practical hands-on with medical equipment, short projects of practical and literature research, oral project presentations.

### Overige informatie

Students should also register in advance for this course on Canvas.

## Analysis of Governmental Policy

<b>Vakcode</b>	AM_470571 ()
<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>	dr. O.E. Popa



<b>Examinator</b>	dr. O.E. Popa
<b>Docent(en)</b>	J.W. Schuijjer, drs. ir. A. Fraaije, A.E. Bunders MSc, drs. ir. F. Vogels
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep, Computerpracticum
<b>Niveau</b>	500

### Doel vak

- To acquire critical knowledge regarding different policy models and theories;
- To master the correct use of central concepts in political and policy discourses;
- To create skills for the analysis of complex societal questions or dilemmas;
- To learn to integrate scientific expertise with laypersons' experience;
- To practice data collection and analysis;
- To learn to set up valid lines of argumentation from data to policy recommendations;
- To experience writing a policy advisory report;
- To improve communication skills during a group project;
- To improve skills in working effectively in a project team, through team building, team analysis and feedback.

### Inhoud vak

Governmental policy affects millions of people and is thus object of intensive debate and target of strong societal forces, like political parties, media and interest groups. Being an advisor or policy maker requires a thorough understanding of the dynamics of policy making, as well as from the psychological side as from the more social structures and their influence on a deliberative democracy.

The course contains several lectures on theoretical concepts and models concerning policy analysis. Furthermore you will be challenged, under supervision, to apply and practice these concepts and models in the project assignment. From the very first day, you will be part of a project team of about ten students. You are confronted with a real policy problem from an external commissioning institution (e. g. a non-governmental organization, a Ministry, an advisory council). Within those 4 weeks you will collect data by literature review and interviews and conduct an interdisciplinary analysis on the basis of which you provide an advice. Specific attention is paid to working in a project team and team building. At the end of the course, you prepare an advisory report. On the last day of the course you present the report to the representative of the external institution who commissioned the project. In that presentation your team will highlight the main results of your analysis and defend the recommendations you propose.

### Onderwijsvorm

Analysis of Governmental Policy is a parttime course of eight weeks (6 ECTS). Tuition methods include lectures, training workshops, and self-study. Attendance to lectures and project meetings is compulsory. In our experience, relying on self-study alone is insufficient to pass the exam.

### Toetsvorm

Written multiple-choice exam (30%)  
 Personal performance in group meetings (20%)  
 Group products (50%): report (25%), presentation (25%)

All have to be passed successfully for the student to pass the course

### Literatuur

Buse, K., Mays, N., & Walt, G. (2012). Making health policy. McGraw-Hill Education (UK).

### Aanbevolen voorkennis

The project integrates the research design made and lessons learned from the first compulsory MPA course: Research Methods for Analyzing Complex Problems

### Doelgroep

Compulsory course within the Masterprogramme Management, Policy Analysis and Entrepreneurship for the health and life sciences (MPA) and the Societal differentiation of Health, Life and Natural Sciences Masters programmes.

### Intekenprocedure

Additional information about the schedule for work groups is available in Canvas.

### Overige informatie

The case is policy analysis and advice, but the exercised methods and skills are equally applicable to strategic marketing advice or evaluation studies. The teams will be coached by workgroup tutors.

## Bio-analysis & Clinical Diagnostics

<b>Vakcode</b>	X_432765 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. H. Lingeman
<b>Examinator</b>	dr. H. Lingeman
<b>Docent(en)</b>	dr. H. Lingeman
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

Giving a clear account on the instrumental bio-analytical techniques and strategies in bio-analysis and clinical diagnostics.

### Inhoud vak

This basic course on bio-analytical and clinical chemistry is focusing on decision trees (strategic decisions) that can be used during the method development and optimization of analytical procedures to determine both endogenous and exogenous compounds in complex biological samples. Approaches and procedures with respect to sampling, sample preparation, separation, spectroscopy, electrochemistry, as well as immunological and enzymatic procedures will be dealt with. Case studies will be used to clarify the decisions that have to be taken.

### Onderwijsvorm

Lectures and tutorials.

### Toetsvorm

Written or oral examination.

### Literatuur

Hand-outs (electronically available).

### Aanbevolen voorkennis

Basic knowledge of biochemistry, chromatography, electrophoresis and mass spectrometry.

### Doelgroep

mCH-AS, mDDS, mMNS

## Biomedical Modelling and Simulation

<b>Vakcode</b>	X_430112 (430112)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. I.H.M. van Stokkum
<b>Examinator</b>	dr. I.H.M. van Stokkum
<b>Docent(en)</b>	dr. I.H.M. van Stokkum, dr. ir. T.J.C. Faes, dr. J.C. de Munck
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Practicum, Werkgroep
<b>Niveau</b>	400

### Doel vak

To gain knowledge of the most important theoretical and practical concepts in modelling and simulation of biomedical processes at different scales, ranging from macroscopic organ function, cellular function down to biochemical interactions and signaling pathways within cells.

To gain experience with and to apply MatLab and Mathematica to acquire, analyse and evaluate biomedical signals and to model and simulate biomedical processes.

### Inhoud vak

This course will start with a general overview the various types of models used to describe biomedical processes by parametric and non-parametric models using linear and non linear (differential) equations. Basic knowledge of vector and matrix calculations and differential equations is required but will be refreshed.

During the course, attention will be paid to viscoelastic models, spectral analysis, compartment models, geometric modelling used in image analysis and models to describe molecular structures and their dynamic behaviour.

Examples will concentrate on cardiovascular function: linear and nonlinear viscoelastic models of pressure volume relations, compartment models of

the interaction between contractile proteins to simulate force and pressure development and a description of an ion pump for instance to import Ca-ions into the cell during an action potential.

The introductory lectures will be combined and followed by practical courses in which, through exercises, experience will be gained of MatLab and Mathematica (4th generation computer languages). Finally students will be offered a choice of 1 out of 5 modelling problems to be solved in small groups, guided by a supervisor. At the end of the course each group will present and discuss their work with all participants and supervisors of the course.

### Onderwijsvorm

Lectures, working groups, assignments.

### Toetsvorm

Assignments (20%), report and presentation on modelling problem (40%) and written exam (40%).

### Literatuur

Syllabus.

Book (recommended): Gilat, A., MatLab: An Introduction with Applications, 5th ed, Wiley.

### Doelgroep

mCh-SBI, mMNS-MPs, mMNS-PoL, mMNS-MPy, mPhys-PLH, mPhys-SBI

## Biomedical Optics

<b>Vakcode</b>	XM_41014 ()
<b>Periode</b>	Periode 5
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Examinator</b>	prof. dr. J.F. de Boer
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

Provide students with a broad overview of medical imaging and diagnosis based on the interaction of light with tissue.

Practical skills include math (during class) and depending on the number of students, computer simulations.

The course learns the student how to translate fundamental physical concepts into practical, clinical applications.

In depth treatment of state-of-the-art biomedical optical techniques.

### Inhoud vak

The course consists of lectures during which (homework) assignments, representative for the exam, are discussed. The following topics are discussed:

Fundamentals of light-tissue interaction, optical properties, light propagation in tissue.

Clinical applications: Reflection Spectroscopy, Fluorescence

Spectroscopy, Raman Spectroscopy; measurement of flow and perfusion

using Laser Doppler Flowmetry and Speckle Imaging; Optical Coherence Tomography; Photo-acoustic Tomography

### Onderwijsvorm

Lectures, demonstrations, computer simulations, experiments.

### Toetsvorm

Written exam, the student is allowed to bring all course materials and a calculator. The exam will be organized into 3 or 4 questions that each highlight one of the main topics in the course.

### Literatuur

Will be provided.

### Doelgroep

Students interested in applying physics and engineering in a (pre) clinical setting or research setting, diagnosis and treatment of tissue using light.

### Overige informatie

Lecturer: Dr. D.J. Faber  
[d.j.faber@amc.uva.nl](mailto:d.j.faber@amc.uva.nl)

## Business Management in Health and Life Sciences

<b>Vakcode</b>	AM_470584 ()
<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>	drs. A.M.G. Neevel
<b>Examinator</b>	prof. dr. H.J.H.M. Claassen
<b>Docent(en)</b>	prof. dr. H.J.H.M. Claassen
<b>Lesmethode(n)</b>	Hoorcollege, Computerpracticum
<b>Niveau</b>	500

### Doel vak

1. To acquire knowledge and understanding into theory of knowledge valorisation in health and life sciences
2. To acquire knowledge and insight in how to organise, protect and finance a business in health and life sciences
3. To acquire knowledge and understanding into the pharmaceutical industry's business model and business processes
4. To acquire knowledge and understanding into the challenges that face the pharmaceutical industry
5. To apply newly acquired knowledge and understanding by solving case examples
6. To apply newly acquired knowledge and understanding in writing a business plan
7. To reflect on and critically evaluate the role of the pharmaceutical industry in the healthcare system
8. To learn to autonomously write a business plan

### Inhoud vak

As a result of external factors (for example ageing of the population and technological advancement, leading to increased healthcare costs), it is being stated that our healthcare system is under pressure. As a central stakeholder in this healthcare system, the pharmaceutical industry is facing significant challenges the coming years. More than ever, the pharmaceutical industry is challenged to survive. Business Management in the Health and Life Sciences focuses on gaining insight in the pharmaceutical industry, its business model, business processes, challenges, as well as strategies and actions to overcome these challenges.

During the course, prof.dr. Eric Claassen

(<http://www.falw.vu.nl/en/research/athena-institute/staff/claassen.asp>)

together with highly experienced guest lecturers from the field will teach theoretical and practical knowledge during lectures and seminars. Tangible subjects that will be discussed during the lectures and seminars include the pharmaceutical industry's business model and business processes, intellectual property, portfolio management, finance, risk capital, grants and subsidies, team building and people management, different legal entities, fiscal and legal aspects when starting a new company, SWOT analysis in the life sciences and clinical trials.

The newly acquired knowledge is tested via an assignment (during which students will write either a personal career business plan or a 'real' business plan) (40% of the total grade), a written exam (40% of the total grade), and a computer seminars (20% of the final grade).

### **Onderwijsvorm**

Lectures: +-50 h

Computer seminars: 7,5 h

Work on assignment and self-study: +- 40h

### **Toetsvorm**

Written exam: 40%

Personal Business Plan: 40%

Computer seminar: 20%

All parts have to be passed successfully.

### **Literatuur**

- Osterwalder, A. & Pigneur, Y. (2009). Business model generation. Self-published.
- Kubr, Marchesi & Ilar (McKinsey & company). (1998). Starting up. Achieving success with professional business planning. McKinsey & Company, Inc. The Netherlands, Amstel 344, 1017 AS Amsterdam.

### **Doelgroep**

Optional course for Master students Management, Policy Analysis and Entrepreneurship in Health and Life Sciences (MPA), Societal differentiation of the Health, Life & Natural Sciences.

### **Overige informatie**

Guest lecturers, companies/organisations:

- Robert Al, TU Eindhoven
- Bart van Wezenbeek, Vereenigde
- Bart Bergstein, Forbion Capital partners
- Michael Mellink & Majorie Soeter, Odgers Berndtson
- Marga Janse, Innovatief LerenLeren BV
- Yp Kroon & Peter van Dongen, NL Octrooicentrum

- Jeroen Dekker & Rosalie Witjas-Paalberends, Price Waterhouse Coopers
- Arjan Bisseling, AsjesBisseling Belastingadviseurs
- Henk Viëtor, FFund

## Clinical Development and Clinical Trials

<b>Vakcode</b>	AM_1180 ()
<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>	drs. A.M.G. Neevel
<b>Examinator</b>	prof. dr. H.J.H.M. Claassen
<b>Docent(en)</b>	prof. dr. H.J.H.M. Claassen
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### Doel vak

- To gain knowledge and insight into the function clinical trials in today's healthcare system
- To gain knowledge and insight into the design of clinical trials
- To gain knowledge and insight into the conduct of clinical trials, including the applying rules and regulations (including ICH-GCP)
- To gain knowledge and insight into and critically reflect on the roles, tasks and responsibilities of the stakeholders involved in clinical trials
- To gain insight into challenges in clinical development as well as in strategies to deal with these challenges
- To learn where and how to look up rules and regulations

### Inhoud vak

In today's healthcare system, clinical trials have gained the status of golden standard to test the safety and efficacy of newly developed drugs. For new drugs to enter the market, clinical trials must be passed and as a consequence, clinical trial outcomes have major effects on our healthcare system. While our healthcare system currently is under pressure to remain affordable and available to all, at the same time, clinical trial regulations are increasingly tightened and the prominence of clinical trials in our healthcare system is being criticized. For that matter, it is of great importance to learn about and reflect on the role of clinical trials in today's healthcare system.

The Clinical Development & Clinical Trials course will elaborate on the function, design and conduct of clinical trials, as well as the relevant stakeholders involved. The course consists of a theoretical part and an important practical part (e.g. gaining knowledge on clinical trial regulations). Classes include for example: 'Life Cycle of a Clinical Trial', 'Clinical Trial Methodology', 'ICH-GCP Principles', 'The Ethics Committee', 'Safety Considerations in Clinical Trials', 'Quality Control & Quality Assurance', 'Compliance, Misconduct & Fraud'.

The gained knowledge and skills will be evaluated by means of a written exam at the end of the course.

**Onderwijsvorm**

Lectures: +-35 h

Self study: +- 40 h

**Toetsvorm**

Written exam: 100%

**Literatuur**

Ray, S., Fitzpatrick, S., Golubic, R. & Fisher, S. (2016). Oxford Handbook of Clinical and Healthcare Research. Oxford University Press, Oxford, UK.

(Additional reading will be provided via Canvas and will serve as background reading for the lectures).

**Doelgroep**

Optional course for Master students Management, Policy Analysis and Entrepreneurship in Health and Life Sciences (MPA), Societal differentiation of the Health, Life & Natural Sciences.

**Overige informatie**

Guest lecturers, organisations/companies:

- Eric Klaver, FourPlus Clinical

**Colloquium / Literature thesis**

<b>Vakcode</b>	XM_422611 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. ir. T.J.C. Faes
<b>Niveau</b>	500

**Doel vak**

The aim is:

- 1) Knowledge of the requirements set to conduct and report a structured literature study.
- 2) Literature study on a specific topic related to the Medical Natural Sciences.

**Inhoud vak**

The topic will be chosen in close cooperation with the supervisors and with approval of the master coordinator.

**Onderwijsvorm**

Self-study and supervision sessions.

**Toetsvorm**

Conduction of the project, a written report and an oral presentation. See Evaluation Form in Master Guide book.

**Literatuur**

To be determined in consultation with the supervisor.



**Aanbevolen voorkennis**

Preferably, the MNS master courses of periods one to three.

**Doelgroep**

mMNS

**Communication, Organization and Management**

<b>Vakcode</b>	AM_470572 ()
<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>	dr. E. Muniz Pereira Urias
<b>Examinator</b>	dr. E. Muniz Pereira Urias
<b>Docent(en)</b>	dr. E. Muniz Pereira Urias
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

**Doel vak**

- To get acquainted with theories on organisational behaviour
- To obtain a deeper understanding of communication from the perspective of sharing and influencing results
- To acquire knowledge on organisational structures and designs
- To get acquainted with important theories on organisational transitions and change management
- To acquire insight into different management practices in the health and life sciences sector
- To gain insight in leadership and interpersonal behaviour
- To obtain insight in methods for motivation and conflict management
- To improve communication skills
- To practise analytical and advisory skills

**Inhoud vak**

Organisations in the health and life science sector are changing fast, a phenomenon driven by newly emerging technologies and increasing societal complexity. A growing number of students with a beta degree will hold professional and managerial functions in these organisations. During this course students will learn how to be effective performers within these environments, both individually and in teams. This requires an understanding of the macro aspects of organisational behaviour, including designing organisations, managerial skills and ways of strategic thinking. Several speakers conduct lectures on aspects as motivation, managing interpersonal behaviour, leadership, communication and developing and changing organisations. The speakers explain theories from literature and relate them to their practical experiences. Also, practical cases of health care companies will be analysed and discussed, resulting in advisory reports for management. With the other students you discuss your experiences and a coach helps you relate the experiences to theory.

**Onderwijsvorm**

- Lectures: approximately 22 hours
- Response lectures: 4 hours
- Training workshops 16 hours

Self-study and writing project assignment: remaining hours.

### Toetsvorm

Written exam (60%;) and assignment (40%). Grades of both parts must at least be 6 or higher.

### Literatuur

To be announced on Canvas

### Doelgroep

Compulsory course within the Master programme Management, Policy Analysis and Entrepreneurship for the Health and Life Sciences (MPA) and the Societal differentiation of Health, Life and Natural Sciences Masters programmes

### Overige informatie

Attendance to training/discussions is indispensable

Lecturers:

dr. E.M.P Urias

guest lectures will be announced on Canvas

## Didactiek 1

<b>Vakcode</b>	O_MLDIDAC_1 ( )
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	C.L. Geraedts
<b>Examinator</b>	C.L. Geraedts
<b>Docent(en)</b>	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, drs. I. Pauw, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. B. Klein, dr. H.B. Westbroek, C.L. Geraedts, dr. A.A. Kaal, dr. A. Handelzalts, dr. B. de Vries, drs. A.J.C. Monquil, drs. J.B. Penninx, drs. L.A. van der Bruggen, W. Maas, drs. H. Stouthart, drs. N.H. Ypenburg, drs. E.D. van Noort, F.L. de Vries, drs. J. Quartel MA
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### Doel vak

De cursus Didactiek 1 is onderdeel van de eerste fase (fase I) van de Universitaire Lerarenopleiding (ULO) van de VU, en loopt parallel aan de cursus Praktijk 1. De cursus is breed van opzet en omvat verschillende onderdelen die in samenhang worden aangeboden: algemene didactiek (AD), vakdidactiek (VD) en peergroup (PG).

Aan het eind van de cursus heeft de student de nodige basale algemeen didactische en vakdidactische bagage aan te reiken die nodig is voor het handelen als docent in simpele en overzichtelijke situaties op niveau van één les. Hierbij wordt nadrukkelijk aangesloten bij de

ontwikkelingsfase waarin de docent-in-opleiding (dio) zich bevindt (zie inhoud).

### **Inhoud vak**

De cursus is geordend rondom zogeheten kernpraktijken die fundamenteel zijn voor het beroep van docent. Bij Didactiek 1 staan de volgende kernpraktijken centraal: (1) contact maken, (2) de les starten, (3) krediet opbouwen en uitgeven, (4) de les voorbereiden, (5) sturen en corrigeren en (6) volledige instructie geven en de les afsluiten. De reikwijdte van het didactisch denken en handelen is in deze eerste fase meestal nog beperkt tot één les. De genoemde kernpraktijken komen expliciet aan de orde bij AD. Bij VD wordt aangesloten bij deze kernpraktijken en wordt de vertaalslag gemaakt naar het eigen (school)vak. Daarnaast worden bij VD belangrijke vakdidactische concepten en werkwijzen geïntroduceerd

Bij PG staat de eigen onderwijspraktijk van de docent-in-opleiding (dio) centraal. Concrete vragen en situaties uit de praktijk vormen aanleiding tot analyse en reflectie. Waar bij AD en VD de nadruk ligt op de rollen van de uitvoerende en ontwerpende docent en pedagoog, wordt bij PG nadrukkelijk vorm gegeven aan de rol van onderzoekende professional.

De ervaring leert dat de kernpraktijken die bij Didactiek 1 centraal staan bij de meeste dio's uitgebreid aan de orde komen tijdens het eerste deel van de praktijkstage (Praktijk 1). Alle inhoudscomponenten uit deze cursus worden tijdens de bijeenkomsten en in verwerking verbonden met de werkplekpraktijk van de student. De dio en de werkplekbegeleider krijgen ook suggesties voor (observatie)opdrachten die kunnen bijdragen aan de ontwikkeling van de competenties die bij deze kernpraktijken horen.

### **Onderwijsvorm**

Alle onderwijs vindt plaats op de instituutsdag (maandag). Studenten zijn de hele dag aanwezig. In de ochtend is er een hoor/werkcollege AD, waarbij dio's van verschillende vakken samen zitten. De colleges AD worden steeds verzorgd door een tweetal docenten. In de middag is er een werkcollege VD onder begeleiding van de vakdidacticus. Deze colleges worden samen met dio's van hetzelfde vak in verschillende samenstellingen (homogeen en heterogeen) gevolgd.

Tenslotte zijn er, verspreid over de periode, drie PG bijeenkomsten, waarbij dio's van verschillende vakken in kleine groepen en onder begeleiding de eigen onderwijspraktijk onder de loep nemen en eventuele concerns daarbij bespreken.

Bij alle onderdelen (AD, VD en PG) wordt een actieve houding van de student gevraagd, zowel tijdens de bijeenkomsten als daarbuiten. Regelmatig worden er verwerkingsopdrachten gegeven, waar individueel of in groepsverband aan wordt gewerkt. Deze opdrachten worden formatief geëvalueerd, onder andere door middel van (peer)feedback.

### **Toetsvorm**

Didactiek 1 wordt afgesloten met een startproef waarin de studenten demonstreren dat zij één les kunnen ontwerpen en uitvoeren en kunnen reflecteren op de manier waarop voorbereiding, uitvoering en afronding hebben plaatsgevonden. De proef bestaat uit een lesontwerp (incl. verantwoording op basis van theorie, en eigen leerdoelen bij deze les), een videocompilatie (15 min.) van de gegeven

les en een terugblik op de les. Bij het ontwerpen en uitvoeren van de les staan de kernpraktijken behandeld in de colleges algemene didactiek en vakdidactiek centraal (met een focus op de les en de leerling). De terugblik op ontwerp en uitvoering vindt plaats aan de hand van de perspectieven van een docent als professional, ontwerper, uitvoerder, pedagoog en teamlid en de daarbij behorende relevante theorie. De proef wordt beoordeeld aan de hand van een beoordelingsformulier gerelateerd aan de rubrics die voor elk van de docentperspectieven zijn geformuleerd voor fase I.

### Literatuur

Bij deze cursus worden de volgende algemeen didactische handboeken gebruikt:

- Ebbens, S. & Ettekooven, S. (2016). Effectief leren – basisboek. Groningen: Noordhoff Uitgevers B.V.
- Korthagen, F. & Lagerwerf, B. (2014). Een leraar van klasse. Den Haag: Boom Lemma Uitgevers
- Teitler, P. (2013). Lessen in orde. Bussum: Coutinho.
- Kohnstamm, R. (2009). Kleine ontwikkelingspsychologie: III de puberjaren. Houten: Bohn Stafleu van Loghum.

Oudere edities van bovenstaande boeken zijn over het algemeen goed bruikbaar.

Behalve van bovenstaande literatuur wordt veelvuldig gebruik gemaakt van relevante en actuele wetenschappelijke literatuur. Deze artikelen worden tijdens de cursus ter beschikking gesteld. De literatuur die bij VD gebruikt wordt is afhankelijk van het schoolvak waarvoor wordt opgeleid.

### Overige informatie

Beheersing van de inhoud van het desbetreffende schoolvak wordt als voorkennis verondersteld.

## Didactiek 2

<b>Vakcode</b>	O_MLDIDAC_2 ()
<b>Periode</b>	Periode 2+3
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	drs. L.J. van Well-van Grootheest
<b>Examinator</b>	drs. L.J. van Well-van Grootheest
<b>Docent(en)</b>	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, drs. I. Pauw, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. B. Klein, dr. H.B. Westbroek, C.L. Geraedts, dr. A.A. Kaal, dr. A. Handelzalts, dr. B. de Vries, drs. A.J.C. Monquil, drs. J.B. Penninx, drs. L.A. van der Bruggen, W. Maas, drs. H. Stouthart, drs. N.H. Ypenburg, drs. E.D. van Noort, F.L. de Vries, drs. J. Quartel MA
<b>Lesmethode(n)</b>	Werkgroep, Hoorcollege
<b>Niveau</b>	400

## **Doel vak**

De cursus Didactiek 2 is onderdeel van de tweede fase (fase II) van de Universitaire Lerarenopleiding (ULO) van de VU, en loopt parallel aan de cursus Praktijk 2. De cursus omvat verschillende onderdelen die in samenhang worden aangeboden: algemene didactiek (AD), vakdidactiek (VD) en peergroup (PG).

Aan het eind van de cursus heeft de student de nodige algemeen didactische en vakdidactische bagage aan te reiken die nodig is voor het handelen als docent waarbij op basis van bestaande lesmaterialen wordt gewerkt.

Hierbij wordt nadrukkelijk aangesloten bij de ontwikkelingsfase waarin de docent-in-opleiding (dio) zich bevindt (zie inhoud).

## **Inhoud vak**

Didactiek 2 is geordend rondom een aantal voor het beroep van docent fundamentele kernpraktijken. Bij Didactiek 2 staan de volgende kernpraktijken centraal: (1) leerprocessen zichtbaar maken, (2) leerprocessen bevorderen, (3) leerprocessen toetsen, (4) communiceren en leiding geven, (5) leerlingen verantwoordelijkheid geven (van docentgestuurd naar leerlinggestuurd) en (6) aandacht geven aan verschillen. Ten opzichte van de cursus Didactiek 1 wordt de focus verlegd van de (individuele) les naar het leerproces van de leerling. De reikwijdte van het didactisch denken en handelen wordt daarmee ook groter: er wordt een begin gemaakt met het ontwerpen en uitvoeren van reeksen van lessen.

De genoemde kernpraktijken komen expliciet aan de orde bij AD. Bij VD wordt aangesloten bij deze kernpraktijken en wordt de vertaalslag gemaakt naar het eigen (school)vak. Daarnaast worden bij VD belangrijke vakdidactische concepten en werkwijzen geïntroduceerd.

Bij PG staat wederom de eigen onderwijspraktijk van de dio centraal. Waar bij AD en VD de nadruk ligt op de rollen van de uitvoerende en ontwerpende docent en pedagoog, wordt bij PG nadrukkelijk vorm gegeven aan de rol van reflectieve onderzoekende professional. De samenhang tussen Didactiek 2 en Praktijk 2 komt onder andere tot stand doordat de dio en de werkplekbegeleider op school suggesties krijgen voor (observatie)opdrachten die kunnen bijdragen aan de ontwikkeling van de competenties die bij deze kernpraktijken horen. Alle inhoudscomponenten uit deze cursus worden tijdens de bijeenkomsten en in verwerking verbonden met de werkplekpraktijk van de student

In de laatste weken van de cursus is nadrukkelijker ruimte voor de eigen leervragen en behoefte van de student. Er worden keuzeworkshops aangeboden rondom uiteenlopende (vak)didactische thema's. Ook zijn er bijeenkomsten waarin dio's die veel moeite hebben met (o.a.) klassenmanagement extra coaching kunnen krijgen of extra aandacht verdienen op het gebied van bijvoorbeeld lesontwerp.

## **Onderwijsvorm**

Alle onderwijs vindt plaats op de instituutsdag (maandag). Studenten zijn de hele dag aanwezig. In de ochtend is er een hoor/werkcollege AD, waarbij dio's van verschillende vakken samen zitten. De colleges AD worden steeds verzorgd door een tweetal docenten. In de middag is er een werkcollege VD onder begeleiding van de vakdidacticus. Deze colleges worden samen met dio's van hetzelfde vak in verschillende

samenstellingen (homogeen en heterogeen) gevolgd .

Tenslotte zijn er, verspreid over de periode, drie PG bijeenkomsten, waarbij dio's van verschillende vakken in kleine groepen en onder begeleiding de eigen onderwijspraktijk onder de loep nemen en eventuele concerns daarbij bespreken.

Bij alle onderdelen (AD, VD en PG) wordt een actieve houding van de student gevraagd, zowel tijdens de bijeenkomsten daarbuiten. Regelmatig worden er verwerkingsopdrachten gegeven, waar individueel of in groepsverband aan wordt gewerkt. Deze opdrachten worden formatief geëvalueerd, onder andere door middel van (peer)feedback.

### **Toetsvorm**

Didactiek 2 wordt afgesloten met een geschreven basisproef waarin de studenten demonstreren dat zij een korte lessenreeks kunnen ontwerpen en (deels) uitvoeren en kunnen reflecteren op de manier waarop voorbereiding, uitvoer en afronding hebben plaatsgevonden. De proef bestaat uit een docentenhandleiding bij de lessenreeks, gebaseerd op bestaand lesmateriaal, (incl. een globale planning, twee uitgewerkte lesontwerpen, verantwoording op basis van praktijk en theorie, en eigen leerdoelen bij deze les), een videocompilatie (15 min.) van de gegeven lessen en een terugblik op ontwerp en uitvoering. Bij het ontwerpen en uitvoeren van de les staan de kernpraktijken behandeld in de colleges algemene didactiek en vakdidactiek centraal (met een focus op de leerling en het leerproces). De terugblik op ontwerp en uitvoering vindt plaats aan de hand van de reflectiecirkel van Korthagen, de perspectieven van een docent als professional, ontwerper, uitvoerder, pedagoog en teamlid en de daarbij behorende relevante theorie. De proef wordt beoordeeld aan de hand van een beoordelingsformulier gerelateerd aan de rubrics die voor elk van de docentperspectieven zijn geformuleerd voor fase 2.

### **Literatuur**

Bij deze cursus worden de volgende algemeen didactische handboeken gebruikt:

- Ebbens, S. & Ettekoven, S. (2016). Effectief leren – basisboek. Groningen: Noordhoff Uitgevers B.V.
- Korthagen, F. & Lagerwerf, B. (2014). Een leraar van klasse. Den Haag: Boom Lemma Uitgevers
- Teitler, P. (2013). Lessen in orde. Bussum: Coutinho.
- Kohnstamm, R. (2009). Kleine ontwikkelingspsychologie: III de puberjaren. Houten: Bohn Stafleu van Loghum.

Oudere edities van bovenstaande boeken zijn over het algemeen goed bruikbaar.

Behalve van bovenstaande literatuur wordt veelvuldig gebruik gemaakt van relevante en actuele wetenschappelijke literatuur. Deze artikelen worden tijdens de cursus ter beschikking gesteld. De literatuur die bij VD gebruikt wordt is afhankelijk van het schoolvak waarvoor wordt opgeleid.

### **Overige informatie**

Beheersing van de inhoud van het desbetreffende schoolvak wordt als voorkennis verondersteld.

Voorwaardelijk voor afronding van Didactiek 2: een voldoende beoordeling van Didactiek 1.

## **Didactiek 3**

<b>Vakcode</b>	O_MLDIDAC_3 ()
<b>Periode</b>	Periode 4+5+6
<b>Credits</b>	9.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. B. de Vries
<b>Examinator</b>	dr. B. de Vries
<b>Docent(en)</b>	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, drs. I. Pauw, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. B. Klein, drs. W. Jongejan, dr. H.B. Westbroek, C.L. Geraedts, dr. A.A. Kaal, dr. A. Handelzalts, dr. B. de Vries, drs. A.J.C. Monquil, drs. J.B. Penninx, drs. L.A. van der Bruggen, W. Maas, drs. H. Stouthart, drs. N.H. Ypenburg, drs. E.D. van Noort, drs. J. Quartel MA
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### Doel vak

De cursus Didactiek 3 is onderdeel van de derde en laatste fase (fase III) van de Universitaire Lerarenopleiding (ULO) van de VU, en loopt parallel aan de cursussen Praktijk 3 en POO 2. De omvang van de cursus is een heel semester.

Aan het eind van de cursus heeft de student de verdiepende pedagogische, didactische en vakdidactische bagage die nodig is voor het handelen als docent in complexe situaties. Hierbij wordt nadrukkelijk aangesloten bij de ontwikkelingsfase waarin de docent-in-opleiding (dio) zich bevindt (zie inhoud).

### Inhoud vak

Het eerste blok van de cursus Didactiek 3 is weer geordend rondom een aantal voor het beroep van docent fundamentele kernpraktijken, namelijk: (1) differentiëren, (2) toetsen, (3) gedrags- en leerproblemen herkennen, (4) omgaan met gedrags- en leerproblemen, (5) mentor zijn en (6) een plek in de schoolorganisatie innemen.

De cursussen Didactiek 1 en 2 vormen samen het basisdeel van de Universitaire Lerarenopleiding (ULO); de cursus Didactiek 3 moet gezien worden als het verdiepingsdeel. In Didactiek 3 komen meer complexe thema's en kernpraktijken aan de orde. Het (vak)didactisch denken en handelen strekt zich nu ook uit over de lange termijn: er is bijvoorbeeld uitgebreid aandacht voor het vorm geven aan leerlijnen en het omgaan met gedrags- en leerproblemen. Ook wordt de dio nadrukkelijker uitgedaagd om een eigen visie op onderwijs vorm te geven en uit te dragen. Zo is de lesmethode niet langer leidend, maar wordt van dio's in toenemende mate verwacht zelf invulling te geven aan de inhoud en didactiek van de lessen (waarbij natuurlijk zowel bestaand als eigen materiaal kan worden gebruikt). Tenslotte zullen de (vak) didactische overwegingen die ten grondslag liggen aan de eigen visie onderbouwd moeten worden met behulp van relevante literatuur en eigen praktijkervaringen.

In het tweede blok van de cursus is er bij AD nadrukkelijk ruimte voor differentiatie en de eigen leerbehoefte van de student. Er worden verschillende keuzemodules aangeboden rondom uiteenlopende algemeen

didactische thema's, zoals de multiculturele school, zorg op school, omgaan met ordeproblemen en internationalisering. Studenten worden uitgenodigd om (voor een deel) zelf invulling te geven aan deze keuzeruimte.

### **Onderwijsvorm**

Alle onderwijs vindt plaats op de instituutsdag (maandag). Studenten zijn de hele dag aanwezig. In de ochtend is er een hoor/werkcollege AD, waarbij dio's van verschillende vakken samen zitten. De colleges AD worden steeds verzorgd door een tweetal docenten. In de middag is er een werkcollege VD onder begeleiding van de vakdidacticus. Deze colleges worden samen met dio's van hetzelfde vak in verschillende samenstellingen (homogeen en heterogeen) gevolgd.

Tenslotte zijn er, verspreid over de periode, drie PG bijeenkomsten, waarbij dio's van verschillende vakken in kleine groepen en onder begeleiding de eigen onderwijspraktijk onder de loep nemen en eventuele concerns daarbij bespreken.

Bij alle onderdelen (AD, VD en PG) wordt een actieve houding van de student gevraagd, zowel tijdens de bijeenkomsten daarbuiten. Regelmatig worden er verwerkingsopdrachten gegeven, waar individueel of in groepsverband aan wordt gewerkt. Deze opdrachten worden formatief geëvalueerd, onder andere door middel van (peer)feedback.

### **Toetsvorm**

Didactiek 3 wordt afgesloten met een geschreven meesterproef waarin de studenten demonstreren dat zij een volle lessenreeks kunnen ontwerpen en uitvoeren en kunnen reflecteren op de manier waarop voorbereiding, uitvoer en afronding hebben plaatsgevonden. De proef bestaat uit een lessenreeks met een coherente leerlijn en expliciet gemaakte inhoudelijke en didactische keuzes. Het materiaal bevat: een lessenserie met een toets, een koppeling aan en neerslag van de (pedagogische) onderwijsvisie en visie op het vak van de student en de school, docenthandleiding, leerlingmateriaal, evaluatie met collega's en leerlingen, een videocompilatie (15 min.) van de gegeven lessen en een terugblik op ontwerp en uitvoering. Bij het ontwerpen en uitvoeren van de les maakt de student een relevante selectie uit de kernpraktijken die tijdens de opleiding centraal hebben gestaan. De terugblik op ontwerp en uitvoering vindt plaats aan de hand van de reflectiecirkel van Korthagen, de perspectieven van een docent als professional, ontwerper, uitvoerder, pedagoog en teamlid en de daarbij behorende relevante theorie. Hierbij staat de student stil bij zijn/haar ontwikkeling op het gebied van deze rollen. De proef wordt beoordeeld aan de hand van een beoordelingsmodel gerelateerd aan de rubrics die voor elk van de docentperspectieven zijn geformuleerd voor fase 3 (een startbekwame docent).

### **Literatuur**

Bij deze cursus worden de volgende algemeen didactische handboeken gebruikt:

- Ebbens, S. & Ettekoen, S. (2012). Effectief leren – basisboek. Groningen: Noordhoff Uitgevers B.V.
- Korthagen, F. & Lagerwerf, B. (2014). Een leraar van klasse. Den Haag: Boom Lemma Uitgevers
- Teitler, P. (2013). Lessen in orde. Bussum: Coutinho.
- Kohnstamm, R. (2014). Kleine ontwikkelingspsychologie: III de puberjaren. Houten: Bohn Stafleu van Loghum.

Daarnaast wordt veelvuldig gebruik gemaakt van relevante en actuele



wetenschappelijke literatuur. Deze artikelen worden tijdens de cursus ter beschikking gesteld. De literatuur die bij VD gebruikt wordt is afhankelijk van het schoolvak waarvoor wordt opgeleid.

### Overige informatie

Beheersing van de inhoud van het desbetreffende schoolvak wordt als voorkennis verondersteld.

Voorwaardelijk voor afronding van Didactiek 3: een voldoende beoordeling van Didactiek 2.

## Disability and Development

<b>Vakcode</b>	AM_470588 ()
<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>	A. van Luijn MSc
<b>Examinator</b>	K. De Sabbata
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### Doel vak

- To define the concept of disability and development
- To explain the complexities related to disability and development (e.g. relation to poverty, diversity, identity, disability paradox)
- To explain the issues and barriers faced by people with disabilities (e.g. sexuality)
- To explain the importance of human rights in relation to disability and the UN Convention for the Rights of Persons with Disabilities
- To explain and apply relevant models and frameworks related to disability (e.g. medical model, social model, ICF model, ecological system theory, twin-track approach, stigma).
- To explain issues related to disability research (including participatory and inclusive approaches) and practice (including community-based rehabilitation)
- To apply research skills during the problem-based learning sessions and group assignment (participating in scientific discussions, formulating of research objectives, literature research, abstracting, summarizing and giving feedback on findings, drawing conclusions )

### Inhoud vak

The Disability and Development (D&D) course focuses on a broad range of issues related to disability and rehabilitation in the context of development. This means that the focus is on people with disabilities in low and middle-income countries. Disability affects an estimated 1 billion people worldwide, the majority of whom live in low and middle-income countries. The large majority are poor and have no access to rehabilitation services; neither are facilities in place to allow them to be included in the mainstream of society.

To date, very few services and programmes are available to address these needs. It is expected that there will be a substantial increase in demand for training of a large variety of professionals (e.g. researchers, managers, architects, lawyers,

health professionals) with formal training and qualifications in the field of disability-inclusive development. The course will cover essential knowledge and skills in this subject.

The course programme will include the following subjects:

- Disability models and stereotypes,
- Frequencies and distribution of disability,
- Experience of having a disability,
- ICF conceptual framework,
- Disability rights, including the UN Convention on the Rights of Persons with Disabilities,
- Culture and disability,
- Determinants of disability, including stigma and discrimination, poverty, gender and HIV/AIDS,
- Disability-relevant research methods, including examples of participatory methods,
- An introduction to community-based rehabilitation and disability inclusive development.

### **Onderwijsvorm**

Problem-based learning supported by lectures and an article writing assignment.

- Lectures: 24 hours
- Tutorial groups: 24 hours
- Optional event: 4 hours
- Self-study: remaining hours

### **Toetsvorm**

- Individual written examination (60%)
- Group assignment (30%)
- Participation in the tutorial group work (10%)

For all parts a pass grade (> 5.5) needs to be obtained in order to receive a final mark.

### **Literatuur**

See Canvas for suggested readings

### **Vereiste voorkennis**

Bachelor-level education; any subject

### **Aanbevolen voorkennis**

The Disability & Development module is an optional course for Master students Management, Policy Analysis and Entrepreneurship in Health and Life Sciences (MPA), International Public Health and Biomedical Sciences; external students from low and middle-income countries are strongly encouraged to apply. We encourage the participation of students with disabilities, especially from low and middle-income countries.

### **Doelgroep**

The Disability & Development module is an optional course for Master students Management, Policy Analysis and Entrepreneurship in Health and Life Sciences (MPA), International Public Health and Biomedical Sciences; external students from low and middle-income countries are strongly encouraged to apply. We encourage the participation of students with disabilities, especially from low and middle-income countries.

## Overige informatie

For more information contact Dr. Ruth Peters ([r.m.h.peters@vu.nl](mailto:r.m.h.peters@vu.nl))

# Drug-induced Stress and Cellular Responses

<b>Vakcode</b>	X_432536 (432536)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. J.N.M. Commandeur
<b>Examinator</b>	dr. J.N.M. Commandeur
<b>Docent(en)</b>	J.C. Vos, dr. J.N.M. Commandeur
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	500

## Doel vak

At the end of this theoretical course, the students are aware of the latest insights of cellular stress responses which can occur after exposure of cells to reactive drugs and/or reactive drug metabolites.

## Inhoud vak

Exposure of tissues to high levels of drugs and/or drug metabolites in some cases can trigger various biochemical responses. Interaction with sensor proteins can lead to adaptative stress responses which will protect the cell against further damage. If these adaptative stress responses are insufficient, interaction with critical proteins may lead to cell death or exaggerated, fatal pharmacological responses.

The following aspects will be studied in the course drug-induced stress and cellular signaling:

- (types of) adverse drug reactions
- role of biotransformation and drug transport in adverse drug reactions,
- reversible and irreversible interactions of toxic drugs with biological macromolecules,
- cellular adaptation to exposure to reactive intermediates and reactive oxygen species;
- cellular and molecular mechanisms leading to toxic effects,
- role of mitochondria in necrosis and apoptosis,
- impairment of cell proliferation and tissue repair,
- immune-mediated toxicity.

## Onderwijsvorm

Lectures, assignment and self study.

## Toetsvorm

Written exam and assignment

## Literatuur

Boelsterli, Mechanistic Toxicology: The Molecular Basis of How Chemicals Disrupt Biological Targets 2nd ed, CRC Press, 2007 (ISBN 0849372720).

Recent literature will be provided

**Vereiste voorkennis**

Bachelor Pharmaceutical Sciences, Biomedical Sciences , Medical Natural Sciences, Medical Biology or equivalent

**Doelgroep**

Master students Drug Discovery and Safety and Biomolecular Sciences

**Intekenprocedure**

Registration by VU-Net

**Dynamics of Biomolecules and Cells**

<b>Vakcode</b>	X_422583 ()
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. ir. I. Heller
<b>Examinator</b>	dr. ir. I. Heller
<b>Docent(en)</b>	prof. dr. J.T.M. Kennis
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

**Doel vak**

Life is, by its very definition, a dynamic quantity. In this course an overview is given of dynamic processes that take place in biomolecules, membranes and cells in relation to biological functionality, and the biophysical methods that are applied to study them.

**Inhoud vak**

The significance of small movements to large-scale and slow reorganizations are being discussed as well the experimental techniques employed.

- DNA processing and dynamics (techniques: optical tweezers, AFM, tethered particle motion, magnetic tweezers). DNA structure and stability, DNA/RNA polymerase, DNA architectural proteins, DNA repair.
- Protein dynamics (techniques: ultrafast spectroscopy, Infrared and Raman spectroscopy, single-molecule fluorescence). Photoactive proteins, light-driven enzymes, Motor proteins, optogenetics.
- Membrane dynamics and remodeling (techniques AFM, single molecule, electron microscopy). Photosynthesis, crowding and membrane protein diffusion, Neuroimaging.
- superresolution microscopy

**Onderwijsvorm**

Lectures, guest lectures, literature essay, oral literature presentation

**Toetsvorm**

- Essay (literature or research proposal)
- Oral literature presentation
- written Exam

**Literatuur**

Notes, handouts and papers.

### Vereiste voorkennis

BSc. Physics, BSc. Medical Natural Sciences, BSc Chemistry or comparable

### Doelgroep

mMNS-PoL, mPhys-LSBP, mPhys-PLH

## Elektronica en signaalverwerking

<b>Vakcode</b>	X_420533 (420533)
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	drs. ing. J.M. Mulder
<b>Examinator</b>	drs. ing. J.M. Mulder
<b>Docent(en)</b>	drs. ing. J.M. Mulder
<b>Lesmethode(n)</b>	Practicum, Deeltoets extra zaalcapaciteit
<b>Niveau</b>	300

### Doel vak

Het doel van het "Elektronica en Signaalverwerking" practicum is het bekend worden met verschillende relevante meet-, regel- en signaalverwerkingstechnieken, die in de experimentele onderzoeksgroepen gebruikt worden. Technieken zoals lock-in versterker, PID regelsystemen en verschillende filters, waarbij zowel naar hardwarematige als softwarematige oplossingen gekeken wordt. Voor het begrijpen, ontwerpen en onderzoeken van deze technieken is kennis nodig van de basisbegrippen elektronica, die in het begin van de cursus behandeld worden. In de cursus worden ook vaardigheden geleerd op het gebied van probleemoplossende en -voorkomende methoden in complexe elektronische schakelingen (meetsystemen).

### Inhoud vak

In het college zullen de volgende onderwerpen aan de orde komen:

Bekend worden met de basisprincipes en analysetechnieken in gelijk- en wisselstroom circuits;

- Netwerk theorema's en vervangingsschema's
- Complexe overdrachtsfuncties en bodeplots van verschillende filters en resonantiecircuiten

Het begrijpen en bouwen van diodeschakelingen: Enkel- en dubbelfasige gelijkrichting

Het begrijpen en bouwen van operationele versterkerschakelingen en circuits met negatieve terugkoppeling;

- Niet inverterende versterkers
- Bufferversterkers
- Som- en verschilversterkers
- Instrumentatieversterker
- Integrator
- Differentiator

Het begrijpen en bouwen van actieve filters; het Butterworth filter.

Het begrijpen en simuleren van de digitale logica: Adder (half en full)

Het ontwerpen, bouwen en onderzoeken van Regelsystemen;

- Een analoge P-regelaar.
- Een digitale PID-regelaar.

Het ontwerpen, bouwen en onderzoeken van modulatie en demodulatie technieken;

- Amplitude (de)modulatie
- Synchrone detector; Onderzoeken van een Lock-in detector

### Onderwijsvorm

Hoorcollege  
(Computer)practicum  
Werkcollege  
Begeleiding/feedbackmomenten

### Toetsvorm

De beoordeling vindt plaats op grond van de resultaten van schriftelijke toetsen, het vertoonde inzicht en de experimentele vaardigheid tijdens de uitvoering van de experimenten, en het bijgehouden waarnemingenboek.

### Literatuur

Syllabus: Elektronica en signaalverwerking  
Aanvullende practicum informatie

### Aanbevolen voorkennis

Practicum Natuurkunde en Informatica, en Project systeemmodelleren.

### Doelgroep

mMNS-MPs (verplicht voor aantekening NVKF)

## Epidemiology

<b>Vakcode</b>	AM_1179 ()
<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>	dr. M.D. Hilverda
<b>Examinator</b>	dr. M.D. Hilverda
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep, Computerpracticum
<b>Niveau</b>	500

### Doel vak

To be able to describe the key characteristics, strengths and weaknesses of traditional epidemiological study designs and select an appropriate study design for a given research question and context;  
To be able to understand, calculate, and apply measures of occurrence and association;  
To be able to understand and assess possible bias and effect modification;  
To be able to understand and apply principles of accuracy in epidemiology;  
To gain an understanding of the principles of screening and calculate related measures;  
To be able to perform bio statistical analyses with Epi Info and interpret, describe, and present the outcomes.

## Inhoud vak

The course consists of a theoretical, contextual, and practical component. The theoretical component is divided into two parts: the first part will focus on methodology (e.g. study-designs and bias), whereas the second part will emphasize applying statistical methods commonly used in epidemiology. You will primarily learn how to apply and interpret these methods in an epidemiological setting. We will focus less on the mathematical background (hence, we refer to this as 'applied biostatistics'). The contextual component will focus on past and current epidemiological developments, for instance the start of the HIV/AIDS pandemic. Lastly, the practical component will focus on applying all your new skills.

## Onderwijsvorm

- Lectures (14 hours)
- Work groups (12 hours)
- Computer practicum (8 hours)
- BPO assignment (8 hours)
- Self-study (remaining time)

## Toetsvorm

- Exam (100%)
- Assignment (insufficient/ sufficient)

Both elements need to be sufficient.

## Literatuur

Available on Canvas

## Doelgroep

This course is solely intended for students without a background in epidemiology (i.e. students who attended and completed another bachelor or master course in methodology and applied biostatistics, epidemiology and biostatistics, or similar, are strongly advised not to enroll in this course).

## Intekenprocedure

n/a

## Overige informatie

For more information contact Dr. Ruth Peters ([r.m.h.peters@vu.nl](mailto:r.m.h.peters@vu.nl))

## Ethics in Biomedical Research

<b>Vakcode</b>	X_422592 ()
<b>Periode</b>	Periode 3
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	P. Klaassen MA
<b>Examinator</b>	P. Klaassen MA
<b>Docent(en)</b>	P. Klaassen MA
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Werkgroep
<b>Niveau</b>	400

## **Doel vak**

The objectives of this course are:

- To acquire insight in and understanding of the central concepts and theories in applied philosophy and professional ethics,
- To understand the instrumental role of professional codes of conduct, the role of ethical review committees in medical research, ethical aspects of translational research and the challenges of being an ethically responsible researcher;
- Can interpret and reflect on relevant key concepts in ethics, including moral dilemmas;
- Being able to have an open and respectful attitude with respect to different value patterns;
- To acquire insights into various methods and analytical tools to identify and analyse ethical dilemmas in order to formulate proper justifications;
- Can apply these various methods and analytical tools in the context of medical natural science and to facilitate constructive discussions about ethical aspects.

## **Inhoud vak**

Researchers in medical natural sciences generate knowledge and applications that, for example, offer new and improved options for prevention, diagnosis, treatment and enhancement, which can profoundly change people's lives. It is therefore important that researchers take responsibility for the decisions they make when designing and implementing applications. In this course you will acquire and apply theoretical knowledge and skills to critically analyse complex case studies in order to formulate proper justifications and establish fair decision-making. Relevant case studies in the field of medical natural sciences will be used as illustration. In small work groups, you are encouraged to critically analyse and deal with ethical dilemmas.

## **Onderwijsvorm**

The total study time is 80 hours. The different course elements have the following study time:

Lectures: 9 hours; Work groups: 19 hours; Exam: 2 hours; Self-study: 50 hours.

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 work groups, and to pass the exam.

## **Toetsvorm**

- Degree of intellectual participation in the workgroups (10%)
  - Exam (50%)
  - written and verbal execution of the moral dialogue: assignment 'start position' (20%) and assignment 'middle ground' (20%)
- All three elements have to be passed.

## **Literatuur**

Available on Canvas

## **Vereiste voorkennis**



BSc Medical Natural science or equivalent BSc  
Research experience

### Doelgroep

Students of master Medical Natural Sciences

### Intekenprocedure

VUnet

### Overige informatie

Lectures in English, part of the workgroups are in Dutch when appropriate. All presentations and plenary discussions in English. Attendance to work groups is compulsory.

## Health, Globalisation and Human Rights

<b>Vakcode</b>	AM_470818 ()
<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>	A. van Luijn MSc
<b>Examinator</b>	A. van Luijn MSc
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### Doel vak

The student;

- Is able to describe, understand and apply human rights concepts in a global context
- Develops a deeper understanding and A critical attitude towards scientific literature in the field of health, globalization and human rights in order to formulate soundly argued positions
- Is able to create his/her own vision with regard to the socio-cultural dimensions of human rights values in relation to public health
- Is able to apply methods of human rights assessment in relation to innovations in health care
- Demonstrates the ability to write and present according to academic standards

### Inhoud vak

This course focuses on the human rights issues that are raised around the globe in connection with public health concerns. The course introduces the students to the effects of globalization on health issues, to the relevant UN human rights instruments on health and to the mechanisms to promote and protect these rights. Attention is given to a wide range of human rights topics in which health and well being play a crucial role. Examples are situations of armed conflict, reproductive rights, migration and refugee issues and childrens rights. Within the context of current globalisation processes the importance of local cultural insights into the human rights & public health interaction will be discussed. During the course students will prepare and participate in a simulation on a human rights assessment of innovations in health technology and discuss relevant scientific

literature in study groups. In the exam students will show their creative problem-solving skills applying them to human rights dilemmas in public health.

### Onderwijsvorm

Contact hours

Lectures: 33 hours

Work groups: 12 hours

Group project, simulation and exam: 11 hours

Self study and preparing: remaining hours

### Toetsvorm

Group project (10%), Simulation (20%), exam (70%). All parts need to be passed (6.0)

### Literatuur

To be announced at the start of the first work group/lecture and via Canvas for group project.

### Doelgroep

Optional course for students in all specializations of the Masters Health Sciences, Biomedical Sciences and Management, Policy Analysis and Entrepreneurship in the Health and Life Sciences.

### Overige informatie

(Guest) Lectures and guest organisations (under reservation):

Cees Hamelink

Christine Dedding (Children and rights)

Fiona Budge (Culture and Health)

Bert Keizer (Elderly Rights)

Els Mons (Rights and disabled persons)

Women on Waves

Doctors without Borders

And more to be announced.

For more information contact Anna van Luijn ([a.van.luijn@vu.nl](mailto:a.van.luijn@vu.nl))

## High-Throughput Screening

<b>Vakcode</b>	X_435047 (435047)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. J. Kool
<b>Examinator</b>	dr. J. Kool
<b>Docent(en)</b>	dr. J. Kool
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	500

### Doel vak

In depth study on the High Throughput Screening (HTS), drug target, bioassay development, bio-analytical and high content screening aspects

related to target and lead discovery of drugs.

### **Inhoud vak**

During this course the potential of modern analytical and biological screening techniques used in target, hit and lead discovery will be discussed. The emphasis will be on the treatment of advanced sample preparation techniques (i.e. automation, high-throughput / combinatorial chemistry, miniaturization), biological and immunological high throughput screening assays, drug target classes, assay development, and advanced separation methods. Also, the so called "Omics" will be discussed (e.g. proteomics and metabolomics). These techniques will be discussed in relation with pharmacokinetic studies and the applicability of the various techniques within the various stages of target discovery, hit screening, ADME(tox), and early lead discovery. Finally, miniaturization approaches will be dealt with.

### **Onderwijsvorm**

The course starts with a thorough explanation on all subjects that will be discussed, and during which lecture. During, prior to, or directly after the lectures, relevant literature per lecture will be provided. This literature is mainly from e-books (chapters) and from academic papers/reviews. All literature that has to be studied will be provided in the course documents section on Canvas. All literature provided on Canvas is part of and has to be studied for the written examination. All students will work on an assignment related to a topic in high throughput screening. This assignment results in a Word document and a PowerPoint presentation.

### **Toetsvorm**

Examination is in the form of a written examination accounting for 50% of the final mark (depending on the number of students entering the course, optionally the written examination can be changed into an oral examination). All lectures and all literature provided are included in the examination. All material to be studied and learned for the examination can be accessed during the examination. Students can take all printed material and/or a computer with them during the examination. De presentation followed by questions and replies to these questions constitutes 25% of the final mark. The document's topic and the presentation's topic are related to each other. The assignment document constitutes the other 25% of the final mark. The marks of the examination, the presentation and discussion afterwards, and the assignment document all have to be sufficient (mark of 5.5 or higher). If more than 12 students join this course, students will form groups of three students for the assignment document and presentation (Otherwise groups of two students will be formed).

### **Literatuur**

Electronically provided Course Documents. The PowerPoint presentation named "HTS Course Overview" gives a detailed explanation/overview of the lectures, tutorials and course structure. All PowerPoint lectures will be provided electronically at least one day before each lecture. All PDF e-book chapters and other literature (e.g. academic research papers and reviews) will also be provided electronically.

### **Aanbevolen voorkennis**

Basic knowledge of biochemistry, separation sciences, spectroscopy and mass spectrometry.

## Overige informatie

Basic knowledge of biochemistry, separation sciences, spectroscopy and mass spectrometry.

## Image Processing for MNS

<b>Vakcode</b>	X_422612 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. J.C. de Munck
<b>Examinator</b>	dr. J.C. de Munck
<b>Docent(en)</b>	dr. ir. T.J.C. Faes
<b>Lesmethode(n)</b>	Hoorcollege, Practicum, Computerpracticum
<b>Niveau</b>	400

### Doel vak

The main goal of the course is to teach students how to apply basic image processing tools on medical images using MATLAB®. The student will be able to write efficient MATLAB® applications to addresses and solve a range of clinical research questions.

### Inhoud vak

Image analysis methods play an increasingly important role in medical science and clinical patient care. This course discusses the most important image analysis techniques and explains how they can be applied. These include image histogram analysis, neighbourhood processing, image fusion, and morphological operations. Rationales for using these techniques are illustrated with examples from several imaging modalities and clinical fields. The student then learns how to apply these techniques practically using MATLAB®. The final mark is the average of the mark obtained at the written examination and the mark obtained at the final practical assignment.

### Onderwijsvorm

Lectures and practicals

### Toetsvorm

50% written examination,  
50% assignment practical work.  
Both should be sufficient to pass the exam.

### Literatuur

McAndrew, A. Introduction to Digital Image Processing with MATLAB®. (ISBN 0-534-40011-6). This book will be made available through the lecturers at a price of around 15 euros.

### Vereiste voorkennis

Some Matlab experience is recommended.

### Doelgroep

MNS

# Live Cell Imaging

<b>Vakcode</b>	AM_470726 ()
<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>	dr. R.F.G. Toonen
<b>Examinator</b>	dr. R.F.G. Toonen
<b>Docent(en)</b>	dr. R.F.G. Toonen, dr. R.M. Meredith
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	500

## Doel vak

This course will provide the student with theoretical and practical knowledge to utilize emerging cellular and sub-cellular imaging technologies in neuroscience.

## 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 nervous system, from synaptic terminals to networks in the brain. This intensive theoretical and practical course will provide participants in-depth knowledge to utilize emerging imaging technologies. The primary emphasis of the course will be on vital light microscopy. Students will learn the principles of light microscopy, as well as use of different types of electronic cameras, laser scanning systems, functional fluorophores, delivery techniques, and digital image-processing software. In addition to transmitted light microscopy for viewing cellular motility, the course will examine a variety of molecular probes of cell function, including calcium-sensitive dyes, voltage-sensitive dyes, photoactivated ("caged") compounds, and exocytosis and vesicle trafficking tracers. Issues arising in the combination of imaging with electrophysiological methods will be covered. Particular weight will be given to single- and multi-photon laser scanning microscopy, photo-stimulation techniques and to newly available biological fluorophores, especially Green-Fluorescent Protein (GFP) and its variants.

## Onderwijsvorm

This is a full time course. In the first two weeks we will address all major live cell imaging techniques and their applications in a series of lectures and Masterclass meetings with experts in the field. A mid-term exam will test the obtained knowledge. The last 2 weeks will be devoted to hands-on experiments in the lab in small groups. Students will perform 2 imaging experiments under guidance of an experienced PhD-student or Postdoc.

## Toetsvorm

Oral group presentations of results experiments (50%) and Mid-term Exam (50%). Students need to pass both parts (grade > 5.5) to obtain final grade.

## Literatuur

Course coordinators will provide selected chapters from Live Cell Imaging. A laboratory Manual. Editors: Goldman and Spector and a selection of primary scientific papers at start of the course.

## Vereiste voorkennis

1st year Master of Neuroscience or equivalent. Course is also open to 2nd year Master students from other courses and to non-VU neuroscience students but ONLY if course is not filled-up by VU Master students. Non-neuroscience master students need to contact course coordinators with study program details for eligibility check prior to self enrolment.

## Doelgroep

2nd year Master of Neuroscience students.

## Intekenprocedure

Standard VU enrolment. Non-neuroscience master students need to contact course coordinators with study program details for eligibility check prior to self enrolment.

## Overige informatie

Maximum number of students is 20. Master of Neuroscience students will have priority. In case more than 20 Master students apply, selection will be based on grades obtained in year 1 of the Master. Vacant positions (if any) will be filled on basis of first come first serve but only after eligibility check.

For further information and application, please contact: Dr. R. Toonen ([r.f.g.toonen@vu.nl](mailto:r.f.g.toonen@vu.nl)) or Dr. R. Meredith ([r.m.meredith@vu.nl](mailto:r.m.meredith@vu.nl)).

## Major research Project

<b>Vakcode</b>	XM_422615 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	36.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. ir. T.J.C. Faes
<b>Examinator</b>	dr. ir. T.J.C. Faes
<b>Niveau</b>	500

## Doel vak

The aim is to conduct a research project in the field of Medical Physics in order to demonstrated the knowledge, the skills and the attitude required to perform research in an interdisciplinary team.

## Inhoud vak

The topic will be chosen in close cooperation with the supervisors and with approval of the master coordinator.

## Onderwijsvorm

Conducting a supervised research project.

**Toetsvorm**

Implementation of the project, the written report and an oral presentation. See Evaluation Form in Master Guide book.

**Literatuur**

To be determined in consultation with the supervisor.

**Vereiste voorkennis**

Preferably, the MNS master courses of the first master year.

**Doelgroep**

mMNS

**Major research Project**

<b>Vakcode</b>	XM_422613 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	39.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. ir. T.J.C. Faes
<b>Examinator</b>	dr. ir. T.J.C. Faes
<b>Niveau</b>	500

**Doel vak**

The aim is to conduct a research project in the field of Medical Physics in order to demonstrate the knowledge, the skills and the attitude required to perform research in an interdisciplinary team.

**Inhoud vak**

The topic will be chosen in close cooperation with the supervisors and with approval of the master coordinator.

**Onderwijsvorm**

Conducting a supervised research project.

**Toetsvorm**

Implementation of the project, the written report and an oral presentation. See Evaluation Form in Master Guide book.

**Literatuur**

To be determined in consultation with the supervisor.

**Vereiste voorkennis**

Preferably, the MNS master courses of the first master year.

**Doelgroep**

mMNS

**Minor research Project**

<b>Vakcode</b>	XM_422614 ()
<b>Periode</b>	Ac. Jaar (september)

<b>Credits</b>	21.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. ir. T.J.C. Faes
<b>Examinator</b>	dr. ir. T.J.C. Faes
<b>Niveau</b>	500

#### **Doel vak**

The aim is to conduct a research project in the field of Medical Physics in order to demonstrate the knowledge, the skills and the attitude required to perform research in an interdisciplinary team.

#### **Onderwijsvorm**

Conducting a supervised research project.

#### **Toetsvorm**

Implementation of the project, the written report and an oral presentation. See Evaluation Form in Master Guide book.

#### **Literatuur**

To be determined in consultation with the supervisor.

#### **Vereiste voorkennis**

Preferably, the MNS master courses of the first master year.

#### **Doelgroep**

mMNS

### Minor research Project (27EC)

<b>Vakcode</b>	XM_42000 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	27.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. ir. T.J.C. Faes
<b>Niveau</b>	500

#### **Doel vak**

The aim is to conduct a research project in the field of Medical Physics in order to demonstrate the knowledge, the skills and the attitude required to perform research in an interdisciplinary team.

#### **Inhoud vak**

The topic will be chosen in close cooperation with the supervisors and with approval of the master coordinator.

#### **Onderwijsvorm**

Conducting a supervised research project.

#### **Toetsvorm**

Implementation of the project, the written report and an oral presentation. See Evaluation Form in Master Guide book.



**Literatuur**

To be determined in consultation with the supervisor.

**Vereiste voorkennis**

Preferably, the MNS master courses of the first master year.

**Doelgroep**

mMNS

## Parameter Estimation Applied to Medical and Biological Sciences

<b>Vakcode</b>	X_432631 (432631)
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. J.C. de Munck
<b>Examinator</b>	dr. J.C. de Munck
<b>Docent(en)</b>	dr. J.C. de Munck
<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<b>Niveau</b>	500

**Doel vak**

The course treats the theory of parameter estimation problems in general, but the theory is illustrated extensively by examples from medical and biological sciences and brain imaging (fMRI and MEG/EEG) in particular. Linear and non-linear regression analysis is treated, as well as confidence intervals and significance testing. The goal of the course is to provide insight into the theory of parameter estimation and to develop a critical attitude towards its application and interpretation in order to avoid inconsistent and improper use of the theory.

**Inhoud vak**

Linear-non linear parameter models, basic matrix-vector algebra, maximum likelihood principle, correlated-uncorrelated noise, OLS, GLS, data outliers, nuisance parameters, linear (time invariant) filters, t-test, F-test, confidence intervals, fMRI data model, missing data, MEG/EEG source localisation. These topics are treated in the form of a series of lectures alternated with exercises.

Extra topics: L1 en L2 norms.

**Onderwijsvorm**

Lecture and (MatLab) exercises.

**Toetsvorm**

Written exam plus bonus point for critical review of scientific paper.

**Literatuur**

A syllabus and slides will be provided by the lecturer.

**Aanbevolen voorkennis**

Some Matlab experience is recommended.

**Doelgroep**

mMNS

**Peergroup fase 1**

<b>Vakcode</b>	O_MLPEERGR_1 ()
<b>Periode</b>	Periode 1+2+3
<b>Credits</b>	0.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	drs. I. Pauw
<b>Examinator</b>	dr. A. Handelzalts
<b>Lesmethode(n)</b>	Werkgroep
<b>Niveau</b>	400

**Doel vak**

In de peergroup staat de rol als 'professional' centraal. Studenten leren de regie te nemen over hun eigen leerproces en hun visie op onderwijs te beschrijven. Ze ontwikkelen een professionele identiteit, waarin ze de eisen die het beroep van docent aan ze stelt verbinden met eigen waarden en motieven. In peergroups reflecteren studenten op hun handelen in de praktijk, leiden daaruit ontwikkelpunten af, formuleren acties en evalueren deze. Verschillende instrumenten en methodes worden gebruikt (logboek, reflectiecirkel, intervisie, videoreflectie, etc.) om de student in staat te stellen de complexiteit van de onderwijspraktijk te doorgronden en hiervan te leren.

**Peergroup Fase 2**

<b>Vakcode</b>	O_MLPEERGR_2 ()
<b>Periode</b>	Periode 3+4+5
<b>Credits</b>	0.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. A. Handelzalts
<b>Examinator</b>	dr. A. Handelzalts
<b>Lesmethode(n)</b>	Werkgroep

**Doel vak**

In de peergroup staat de rol als 'professional' centraal. Studenten leren de regie te nemen over hun eigen leerproces en hun visie op onderwijs te beschrijven. Ze ontwikkelen een professionele identiteit, waarin ze de eisen die het beroep van docent aan ze stelt verbinden met eigen waarden en motieven. In peergroups reflecteren studenten op hun handelen in de praktijk, leiden daaruit ontwikkelpunten af, formuleren acties en evalueren deze. Verschillende instrumenten en methodes worden gebruikt (logboek, reflectiecirkel, intervisie, videoreflectie, etc.) om de student in staat te stellen de complexiteit van de onderwijspraktijk te doorgronden en hiervan te leren.

## Physics of Organs 1: Cardio-Pulmonary Physics

<b>Vakcode</b>	XMU_428527 (428527)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Inhoud vak

<http://studiegids.uva.nl/xmlpages/page/2017-2018/zoek-vak/vak/31638>

### Overige informatie

This course is offered at the UvA. For more information contact: FNWI

Education Service Centre, Science Park 904,

[servicedesk-esc-science@uva.nl](mailto:servicedesk-esc-science@uva.nl), +31 (0)20 525 7100.

Enrolment via <https://m.sis.uva.nl/vakaanmelden> is required.

For courses taught in period 1 and period 2, enrolment via

<https://datanose.nl/#specialenrol> is required.

## Physics of Organs 2: Sensory Organs and Bioelectricity

<b>Vakcode</b>	XMU_428528 (428528)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Inhoud vak

<http://studiegids.uva.nl/xmlpages/page/2017-2018/zoek-vak/vak/31639>

### Overige informatie

This course is offered at the UvA. For more information contact: FNWI

Education Service Centre, Science Park 904,

[servicedesk-esc-science@uva.nl](mailto:servicedesk-esc-science@uva.nl), +31 (0)20 525 7100.

Enrolment via <https://m.sis.uva.nl/vakaanmelden> is required.

For courses taught in period 1 and period 2, enrolment via

<https://datanose.nl/#specialenrol> is required.

## Policy, Politics and Participation

<b>Vakcode</b>	AM_470589 ()
<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>	P. Klaassen MA

<b>Examinator</b>	P. Klaassen MA
<b>Docent(en)</b>	dr. J.F.H. Kupper, P. Klaassen MA, prof. dr. J.E.W. Broerse
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### **Doel vak**

- 1) To deepen your analytic skills with respect to the investigation of a complex societal problem;
- 2) To deepen and broaden your knowledge of political theory and policy-making;
- 3) To acquire further insight into the practice of qualitative social scientific research;
- 4) To acquire further insight into specific methods and techniques of qualitative social scientific research;
- 5) To improve skills in data collection and data analysis;
- 6) To improve your argumentation skills;
- 7) To improve your communication skills;
- 8) To improve your skills in working effectively in a project team.

### **Inhoud vak**

In this course you get the chance to gain experience in the practical implementation of a prominent methodology for interactively investigating complex societal problems: focus group research. In a research project aimed at the development of policy recommendations concerning such complex problem, you will both improve your focus group research skills and deepen your understanding of the relevant theoretical concepts in the areas of policy studies, science and technology studies and political theory. In a group of eight to twelve students you will participate in an interactive research project executed at the Athena institute (possibly with a real external client). In this project you will be trained in and practice various skills for data collection (such as focus group design and facilitation) and data analysis (such as qualitative content analysis). Specific attention is paid to your personal interactive research skills. At the end of the course, you present your findings and recommendations orally.

In parallel to the group work for your research project, you will follow lectures, attend and prepare for guest lectures by people active in the field of policy-making, and actively participate in seminars following the so-called "CARQ"-methodology. During these CARQ-seminars literature is studied and discussed via the identification of a Core quotation, an analysis of the Argumentative structure of the paper at issue, the identification and articulation of pertinent Relations the paper has with other material/ issues/ papers/ methodologies/..., and, finally Questions that elicit in-depth discussions of topics pertinent to the course.

### **Onderwijsvorm**

Lectures: 18 hours  
 Training workshops: 19 hours  
 CARQ seminars: 24 hours  
 Project assignment: 80 hours  
 focus group execution: 6 hours  
 Final presentations project results: 4 hours  
 Self study and assignment: remaining hours

## Toetsvorm

The course does not have an exam. You will be assessed on the basis of the group assignment, a group presentation, your individual performance during the course and a take-home assignment. More precisely:

Individual grade [45%]:

CARQ facilitation and participation (10%)

Focus group facilitation (10%)

Participation (10%)

Take-home assignment (15%)

Group grade [55%]:

Focus group design and execution (20%)

Presentation (including analysis, policy recommendations and discussion) (35%)

For all group assignments a pass grade (> 5.5) needs to be obtained in order to receive a final mark. For individual assignments a resit can be done.

## Literatuur

To be announced on Canvas

## Vereiste voorkennis

Basic knowledge of (interactive) policy processes, policy analysis and relevant research skills are required.

## Doelgroep

Optional course for Master students Management, Policy Analysis and Entrepreneurship in Health and Life sciences (MPA), Societal differentiation of the Health, Life & Natural Sciences. Mandatory course for MPA students who specialize in Policy.

## Intekenprocedure

Registration deadline by VUnet is 4 weeks before the start of the course.

## Overige informatie

Attendance is compulsory. (You will spend a great deal of your time on team work.)

## Praktijk 1

<b>Vakcode</b>	O_MLPRAK_1 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	drs. Y.G. Meindersma
<b>Examinator</b>	drs. Y.G. Meindersma

<b>Docent(en)</b>	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, drs. I. Pauw, drs. C.D.P. van Oeveren, drs. S. Donszelmann, dr. H.B. Westbroek, C.L. Geraedts, dr. A.A. Kaal, dr. A. Handelzalts, drs. A.J.C. Monquil, drs. J.B. Penninx, drs. L.A. van der Bruggen, W. Maas, drs. H. Stouthart, drs. N.H. Ypenburg, drs. E.D. van Noort, F.L. de Vries, drs. J. Quartel MA
<b>Lesmethode(n)</b>	Werkgroep
<b>Niveau</b>	400

### Inhoud vak

Op de school wordt de aandacht op dezelfde kernpraktijken gericht als gedurende de instituutsopleiding. De werkplekbegeleider is op de hoogte van de onderwerpen die op de instituutdag gebruikt worden en gebruikt dezelfde rubric als de instituutsopleiders en vakdidactici om de vorderingen van de studenten te beoordelen.

### Onderwijsvorm

Onder begeleiding van de werkplekbegeleider nemen de studenten steeds een groter en actiever aandeel in het lesgeven en werken in de school. Studenten met een baan (zij-instromers, onderwijstrainees etc) geven in dit stadium al zelfstandig les. Bij deze studenten is de nadruk bij de begeleiding vanuit de werkplekbegeleider op het niveau van didactische handelen in de les.

### Toetsvorm

Op de school geven de studenten een presentatie over hun prestaties in de eerste acht weken. Dat doen ze aan de hand van de relevante rollen (vier van de vijf waarbij uitvoerder, ontwerper en pedagoog de meeste aandacht krijgen bij de reflectie op het lesgeven). De werkplekbegeleider gebruikt de rubric om het functioneren van de studenten in de klas te evalueren.

## Praktijk 2

<b>Vakcode</b>	O_MLPRAK_2 ()
<b>Periode</b>	Periode 2+3
<b>Credits</b>	9.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. A. Handelzalts
<b>Examinator</b>	drs. Y.G. Meindersma
<b>Docent(en)</b>	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, drs. C.D.P. van Oeveren, drs. S. Donszelmann, dr. H.B. Westbroek, C.L. Geraedts, dr. A.A. Kaal, dr. A. Handelzalts, drs. A.J.C. Monquil, drs. J.B. Penninx, drs. L.A. van der Bruggen, W. Maas, drs. H. Stouthart, drs. N.H. Ypenburg, drs. E.D. van Noort, F.L. de Vries, drs. J. Quartel MA
<b>Lesmethode(n)</b>	Werkgroep
<b>Niveau</b>	400

### Inhoud vak

Tijdens de praktijkstage werken studenten aan het verder ontwikkelen van de kernpraktijken die in het instituutsdeel aan de orde zijn gekomen. Net als in fase 1 komt de verbinding tussen theorie en praktijk aan de orde. Op de werkplek wordt de aandacht op dezelfde vaardigheden gericht als tijdens de instituutsopleiding. Dit betekent dat studenten, samen met hun werkplekbegeleider, gericht werken aan de verschillende thema's besproken in de (vak)didactiekcolleges van Didactiek 1 en 2.

### Onderwijsvorm

Onder begeleiding van de werkplekbegeleider nemen de studenten steeds een groter en actiever aandeel in het lesgeven en werken in de school.

### Toetsvorm

De praktijkbeoordeling wordt uitgevoerd door de vakdidacticus/instituutsopleider en de werkplekbegeleider aan de hand van het eerste lesbezoek en de ingevulde rubric.

### Overige informatie

Voorwaardelijk voor afronding van Praktijk 2: een voldoende beoordeling van Praktijk 1 en Didactiek 1.

## Praktijk 3

<b>Vakcode</b>	O_MLPRAK_3 ()
<b>Periode</b>	Periode 4+5+6
<b>Credits</b>	15.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	drs. Y.G. Meindersma
<b>Examinator</b>	drs. Y.G. Meindersma
<b>Docent(en)</b>	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, drs. I. Pauw, drs. C.D.P. van Oeveren, drs. S. Donszelmann, dr. H.B. Westbroek, C.L. Geraedts, dr. A.A. Kaal, dr. A. Handelzalts, drs. A.J.C. Monquil, drs. J.B. Penninx, W. Maas, drs. H. Stouthart, drs. N.H. Ypenburg, drs. E.D. van Noort
<b>Niveau</b>	400

### Inhoud vak

In het verdiepingsdeel gaat de student meer en meer zelf(standig) lesgeven. De voorbereiding en evaluatie wordt samen met de werkplekbegeleider gedaan. Op de werkplek komen dezelfde onderwerpen aan de orde als in het instituut: vakdidactische verdieping van onderwijsconcepten en –strategieën, aandacht voor het afstemmen van onderwijs op de behoeften van individuele leerlingen, diversiteit en excellentie.

Op de werkplek wordt de aandacht op dezelfde vaardigheden gericht als tijdens de instituutsopleiding. Dit betekent dat studenten, samen met hun werkplekbegeleider, gericht werken aan de verschillende thema's besproken in de vakdidactiekdidactiek en de keuze modules. Het instituut biedt hiervoor concrete handreikingen aan in de vorm van een stageplan (gekoppeld aan de rubric).

### Onderwijsvorm

Onder begeleiding van de werkplekbegeleider nemen de studenten steeds een groter en actiever aandeel in het lesgeven en werken in de school.

### Toetsvorm

Voor de beoordeling van Praktijk 3 maakt de student in blok 6 een afspraak met zijn WPB en SO voor een afrondend lesbezoek. In overleg met de WPB en SO bepaalt de student welke klas hiervoor het meest geschikt is.

Na afloop van het lesbezoek blikken WPB en SO met de student terug op de les. WPB en SO beoordelen de les aan de hand van de checklist (rubric).

Gecombineerd met het oordeel van vakdidacticus aan de hand van de tweede lesbezoek wordt een cijfer vastgesteld.

### Overige informatie

Voorwaarden voor afronding van Praktijk 3: een voldoende beoordeling van Praktijk 2 en Didactiek 2.

## Praktijk 3 voor 2-jarige Master

<b>Vakcode</b>	O_M2PRAK3 ()
<b>Credits</b>	15.0
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. A. Handelzalts
<b>Examinator</b>	dr. A. Handelzalts
<b>Niveau</b>	400

### Inhoud vak

In het verdiepingsdeel gaat de student meer en meer zelf(standig) lesgeven. De voorbereiding en evaluatie wordt samen met de werkplekbegeleider gedaan. Op de werkplek komen dezelfde onderwerpen aan de orde als in het instituut: vakdidactische verdieping van onderwijsconcepten en –strategieën, aandacht voor het afstemmen van onderwijs op de behoeften van individuele leerlingen, diversiteit en excellentie.

Op de werkplek wordt de aandacht op dezelfde vaardigheden gericht als tijdens de instituutsopleiding. Dit betekent dat studenten, samen met hun werkplekbegeleider, gericht werken aan de verschillende thema's besproken in de vakdidactiekdidactiek en de keuze modules. Het instituut biedt hiervoor concrete handreikingen aan in de vorm van een stageplan (gekoppeld aan de rubric).

### Onderwijsvorm

Onder begeleiding van de werkplekbegeleider nemen de studenten steeds een groter en actiever aandeel in het lesgeven en werken in de school.

### Toetsvorm

Voor de beoordeling van Praktijk 3 maakt de student in blok 6 een afspraak met zijn WPB en SO voor een afrondend lesbezoek. In overleg met de WPB en SO bepaalt de student welke klas hiervoor het meest geschikt is.

Na afloop van het lesbezoek blikken WPB en SO met de student terug op de les. WPB en SO beoordelen de les aan de hand van de checklist (rubric).

Gecombineerd met het oordeel van vakdidacticus aan de hand van de tweede



lesbezoek wordt een cijfer vastgesteld.

### Overige informatie

Voorwaarden voor afronding van Praktijk 3: een voldoende beoordeling van Praktijk 2 en Didactiek 2.

## Praktijkonderzoek 1

<b>Vakcode</b>	O_MLPROZ_1 ()
<b>Periode</b>	Periode 3
<b>Credits</b>	3.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. H.B. Westbroek
<b>Examinator</b>	dr. H.B. Westbroek
<b>Docent(en)</b>	drs. J.K.W. Riksen, dr. J.M.H. Swennen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, prof. dr. M. Meeter, drs. I. Pauw, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. B. Klein, drs. W. Jongejan, drs. L.J. van Well-van Grootheest, dr. T. Bosma, dr. H.B. Westbroek, C.L. Geraedts, dr. A.A. Kaal, dr. A. Handelzalts, dr. B. de Vries, drs. A.J.C. Monquill, drs. J.B. Penninx, drs. L.A. van der Bruggen, W. Maas, drs. H. Stouthart, drs. N.H. Ypenburg, drs. E.D. van Noort, drs. J. Quartel MA
<b>Lesmethode(n)</b>	Werkgroep, Hoorcollege
<b>Niveau</b>	400

### Doel vak

Tijdens praktijkonderzoek 1 en 2 vullen studenten de tijdens hun master opgedane onderzoeksvaardigheden aan met onderzoeksvaardigheden voor de eigen onderwijspraktijk.

### Inhoud vak

In praktijkonderzoek 1 richt de opdracht zich primair op het leren herkennen, waarderen en gebruiken van verschillen type bronnen (praktijkbronnen, vakliteratuur en wetenschappelijke literatuur) om praktijkproblemen te analyseren en te duiden. Studenten krijgen handvatten aangereikt om bronnen te zoeken en te beoordelen op kwaliteit en bruikbaarheid voor de (eigen) praktijk.

### Onderwijsvorm

De begeleiding vindt plaats op het instituut en bestaat uit de volgende vormen: college en werkcolleges.

### Toetsvorm

Praktijkonderzoek 1 wordt afgesloten met een onderbouwd advies voor de (eigen) praktijk

### Literatuur

Relevante en actuele artikelen over verschillende kernpraktijken die in fase 1 en 2 aan de orde zijn geweest. De artikelen worden beschikbaar gesteld, en zelf opgezocht

### Overige informatie

Binnen Didactiek 1 en 2 hebben de studenten kennisgemaakt met het toepassen van relevante bronnen, waaronder onderzoeksartikelen, om praktijksituaties te duiden.

## Praktijkonderzoek 2

<b>Vakcode</b>	O_MLPROZ_2 ()
<b>Periode</b>	Periode 4+5+6
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. H.B. Westbroek
<b>Examinator</b>	dr. H.B. Westbroek
<b>Docent(en)</b>	drs. J.K.W. Riksen, dr. J.M.H. Swennen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, prof. dr. M. Meeter, drs. I. Pauw, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. B. Klein, drs. W. Jongejan, drs. L.J. van Well-van Grootheest, dr. T. Bosma, dr. H.B. Westbroek, C.L. Geraedts, dr. A.A. Kaal, dr. A. Handelzalts, dr. B. de Vries, drs. A.J.C. Monquil, drs. J.B. Penninx, drs. L.A. van der Bruggen, W. Maas, drs. H. Stouthart, drs. N.H. Ypenburg, drs. E.D. van Noort
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	400

### Doel vak

Tijdens het praktijkonderzoek vullen studenten de tijdens hun master opgedane onderzoeksvaardigheden aan met onderzoeksvaardigheden voor de eigen onderwijspraktijk.

### Inhoud vak

In Praktijkonderzoek 2 worden onderzoeksvragen uit de onderwijspraktijk vertaald in empirisch onderzoek. De student analyseert data uit de onderwijspraktijk om een antwoord te vinden op de onderzoeksvraag en rapporteert de bevindingen in een onderzoeksverslag en een presentatie aan de collega's in de school en aan mede-studenten op het instituut. Er wordt met name aandacht besteed aan de aard en doelen van praktijkonderzoek, en consequenties die dit heeft voor kwaliteitseisen en de betekenis van praktijkonderzoek voor de beroepspraktijk.

### Onderwijsvorm

De begeleiding vindt plaats op school (academische opleidingsschool) en op het instituut en bestaat uit de volgende vormen: colleges, werkcolleges, duo-begeleiding (VO docent/ULO docent).

### Toetsvorm

Praktijkonderzoek 2 wordt afgesloten met een verslag en een posterpresentatie over hun bevindingen en ze delen hun bevindingen zowel op het instituut als op school.

### Literatuur

- Van der Donk, C., & Van Lanen, B. (2012). Praktijkonderzoek in de school. 2de druk. Coutinho, Bussum. ISBN 9789046903001
- Relevante en actuele artikelen over het onderzoeksonderwerp (via

Canvas en zelf verzamelen).

### Vereiste voorkennis

Vereiste voorkennis: Praktijkonderzoek 1 en onderzoekservaring op masterniveau in het eigen domeinvak.

## Protein Analysis

<b>Vakcode</b>	X_435045 (435045)
<b>Periode</b>	Periode 5
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. H. Lingeman
<b>Examinator</b>	dr. H. Lingeman
<b>Docent(en)</b>	dr. H. Lingeman
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	500

### Doel vak

Providing a clear overview on the principles and techniques that can be used for the qualitative and quantitative determination of protein-type of compounds.

### Inhoud vak

The qualitative and quantitative determination of protein frequently is performed by a combination of chromatographic /electrophoretic and mass spectrometric techniques. The principles of these techniques will be discussed as well as their applications. Special attention will be given to sample treatment procedures and affinity-based separation techniques. With respect to the identification of unknown biological macromolecules, the power of hyphenated techniques in combination with the various modes of mass spectrometry will be highlighted.

### Onderwijsvorm

Lectures and tutorials

### Toetsvorm

Oral examination.

### Literatuur

Hand-outs (electronically available).

### Vereiste voorkennis

Basic knowledge of biochemistry, separation sciences, spectroscopy and mass spectrometry.

### Doelgroep

mCh-AS, mCh-MDSC, mDDS-BCCA, mDDS-DDTF

## 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 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 (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**

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)

## Reflective Practice Internship Science Communication

<b>Vakcode</b>	AM_1163 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	30.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	dr. J.F.H. Kupper
<b>Niveau</b>	600

### Doel vak

The internship is a compulsory part of the Master's programme. The aims of the internship are:

- Learn to independently apply and expand your practical science communication skills in one particular area of the field (writing, multi-media, facilitation, policy and strategy development, content design, etc.).
- Critical self-assessment and reflection on acquired science communication competencies in the field.
- Conduct scientific research independently: assess scientific information, design a research project, apply scientific methods, collect data, report and discuss findings.
- Present and discuss about internship and research outcomes.
- Learn to cooperate with researchers and practitioners of various disciplines.
- Gain an impression of a potential future field of career.

### Inhoud vak

When you are enrolled in the VU Science Communication specialization or the UvA Major Science Communication you need to conduct one internship (30 ECTS, 5 months). One of the two possible formats is the Reflective Practice Internship (RPI). The complete and up-to-date information about the internship can be found in the SC internship guide line on Canvas (science communication community).

### Onderwijsvorm

Work-based placement

### Toetsvorm

Written report and oral presentation.

Within six weeks after the start of the master internship, an interim evaluation will take place to assess whether there is a reasonable chance of the placement being brought to a successful completion.

The internship is supervised and assessed by two lecturers. Both lecturers are members of the academic staff at VU University Amsterdam.

The day-to-day supervision can be carried out by a trainee research assistant (AIO), postdoc or researcher.

### Doelgroep

Students MSc Earth science year 2

### Overige informatie

Participation in this compulsory component is only permitted if the student meets the relevant requirements for admission. These requirements are detailed in the Internship guidelines of Earth science (on

Canvas) and in the Academic and Examination Regulations.

The work-based placement is subject to the FALW document: "Student placement (internship) and literature regulations". These regulations require detailed written agreements between supervisors and student that specify the conditions for the Master research project. This agreement should be sent for approval by the science communication co-ordinator at least two weeks before the planned start of the work-based placement.

If the proposal is of sufficient quality, you can start your internship.

If not, you'll need to adapt your proposal and send it for approval again. You can only start your internship after your research design has been approved.

The placement may be extended by 6 EC, subject to conditions that can be found in the FALW document "Student placement (internship) and literature regulations". The student must send a request for extension to the Earth science Examination Board.

Information on Master internships is made available on Canvas.

## Research Internship Science Communication

<b>Vakcode</b>	AM_1162 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	30.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	dr. J.F.H. Kupper
<b>Niveau</b>	600

### Doel vak

The internship is a compulsory part of the Master's programme. The aims of the internship are:

- Learn to independently apply and expand your practical science communication skills in one particular area of the field (writing, multi-media, facilitation, policy and strategy development, content design, etc.).
- Critical self-assessment and reflection on acquired science communication competencies in the field.
- Conduct scientific research independently: assess scientific information, design a research project, apply scientific methods, collect data, report and discuss findings.
- Present and discuss about internship and research outcomes.
- Learn to cooperate with researchers and practitioners of various disciplines.
- Gain an impression of a potential future field of career.

### **Inhoud vak**

When you are enrolled in the VU Science Communication specialization or the UvA Major Science Communication you need to conduct one internship (30 ECTS, 5 months). One of the two possible formats is the full Research Internship. The complete and up-to-date information about the internship can be found in the SC internship guide line on Canvas (science communication community).

### **Onderwijsvorm**

Work-based placement

### **Toetsvorm**

Written report and oral presentation.

Within six weeks after the start of the master internship, an interim evaluation will take place to assess whether there is a reasonable chance of the placement being brought to a successful completion. The internship is supervised and assessed by two lecturers. Both lecturers are members of the academic staff at VU University Amsterdam. The day-to-day supervision can be carried out by a trainee research assistant (AIO), postdoc or researcher.

### **Doelgroep**

Students Earth science year 2

### **Overige informatie**

Participation in this compulsory component is only permitted if the student meets the relevant requirements for admission. These requirements are detailed in the Internship guideline of science communication (on Canvas) and in the Academic and Examination Regulations.

The work-based placement is subject to the FALW document: "Student placement (internship) and literature regulations". These regulations require detailed written agreements between supervisors and student that specify the conditions for the Master research project. This agreement should be sent for approval by the science communication internship or master co-ordinator

at least two weeks before the planned start of the work-based placement.

If the proposal is of sufficient quality, you can start your internship.

If not, you'll need to adapt your proposal and send it for approval again. You can only start your internship after your research design has been approved.

The placement may be extended by 6 EC, subject to conditions that can be found in the FALW document "Student placement (internship) and literature regulations". The student must send a request for extension to the earth science Examination Board.

Information on Master internships is made available on Canvas.

## **Research methods for analyzing complex problems**

<b>Vakcode</b>	AM_1182 ()
<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>	drs. D.H.J. Lynch
<b>Examinator</b>	A. van Luijn MSc

<b>Docent(en)</b>	J.W. Schuijjer, drs. ir. A. Fraaije, A.E. Bunders MSc, drs. ir. F. Vogels
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Computerpracticum, Deeltoets extra zaalcapaciteit
<b>Niveau</b>	400

### Doel vak

The objectives of this course are:

- To understand the differences between beta- and gamma research;
- To acquire insight in and understanding of a real world research process, including knowledge of the character of complex societal issues and the needs, advantages and disadvantages of real world research;
- To acquire insight relevant research methods (both quantitative and qualitative) to address complex societal problems, their underlying theoretical concepts and their relative strengths and weaknesses;
- Being able to apply these various research methods in a specific societal context;
- To interpret quantitative and qualitative findings;
- Being able to create an adequate research design for the investigation of a specific complex societal problem.

### Inhoud vak

Contemporary societies increasingly face complex social problems, such as climate change, HIV/ AIDS or ethnic and religious diversity. These complex problems involve a variety of social actors: policy-makers, professionals, NGOs, industries, science and, of course, the public at large. Addressing these complex issues demands an approach that investigates, analyzes and integrates the positions and knowledge of different actors.

This course offers an (advanced) introduction to various research methods used in real world research, including questionnaires, surveys, semi-structured interviews, and focus groups. These methods are commonly used in research into complex problem contexts, communication and opportunities for intervention. Strengths and weaknesses of each research method and technique will be discussed, as well as its possibility to be applied in different societal contexts.

### Onderwijsvorm

Research Methods for Analyzing Complex Problems is a parttime course of eight weeks (6 ECTS). The total study time is 160 hours. Tuition methods include lectures, workgroups, workshops, group project work and self-study.

The different elements have the following study time:

- lectures 20 hours
- workgroups and training 36 hours
- examination 3 hours
- project work & reading (self-study) Remaining hours

Please note that attendance to the workgroup sessions is compulsory. If you miss one workgroup, with a good reason, you will receive an additional assignment. If you miss more than one workgroup session it is



no longer possible to pass the project part of the course.

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**

The course grade is based on the group assignment 'research design' and the exam. Both aspects need to be graded 6.0 or higher.

Exam 50% of total grade

Group assignment 'research design' 50% of total grade

### **Literatuur**

The literature of this course consists of selected scientific articles that are provided on Canvas, and the books:

- Verschuren, D.E. and Doorewaard, H. (2010). Designing a Research Project

(2nd edition)Eleven International Publishing, the Hague. ISBN 978-90-5931-572-3.

- Gray, D.E. (2014) Doing Research in the Real World (3rd edition)Sage Publications Ltd, United Kingdom. ISBN 978-1-4462-6019-7

An overview of the literature per lecture will be provided on Canvas.

### **Doelgroep**

The course 'Research Methods for Analyzing Complex Problems' is a compulsory course for first year master students 'Management, Policy Analysis and Entrepreneurship in Health and Life Sciences'. This course is also a compulsory course within the Science communication- and Societal differentiations of Health, Life and Natural Sciences Master programmes. It is an optional course for other Life Sciences Master program students at the VU University.

### **Intekenprocedure**

VUnet

### **Overige informatie**

Lectures are in English, part of the workgroups are in Dutch. The assignments are written in English.

Please note that attendance to the workgroup sessions is compulsory. If you miss one workgroup, with a good reason, you will receive an additional assignment. If you miss more than one workgroup session it is no longer possible to pass the project part of the course.

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.

Contact:

Durwin Lynch ([d.lynch@vu.nl](mailto:d.lynch@vu.nl))

## **Science and Communication**

<b>Vakcode</b>	AM_470587 ()
<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>	P. Klaassen MA
<b>Examinator</b>	P. Klaassen MA
<b>Docent(en)</b>	dr. J.F.H. Kupper, dr. ir. M.G. van der Meij, P. Klaassen MA
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### Doel vak

- a) Gain theoretical insight in the nature of science,
- b) Gain theoretical insight in the nature of communication,
- c) Gain theoretical insight in the relationship between science and society,
- d) Gain insight in the role of science communication in this relationship,
- e) Acquire knowledge of different theories and models of science communication,
- f) Acquire knowledge of different strategies, media and activities for science communication,
- g) Learn how to practically apply theoretical concepts from the field of science communication in communicating science,
- h) Develop practical skills for science communication (especially writing and giving oral presentations).
- i) Reflect on your own knowledge and competencies pertinent to your projected (ideal) role as science communicator.

### Inhoud vak

Science is all around us and shapes our lives in many different ways. From the vaccines you need to get when traveling abroad to the smartphone you use on a daily basis, and from the public transportation you use to get to the university to the ingredients of your toothpaste: scientific knowledge is elemental to all of these. Simultaneously, society shapes the ways in which science and technology develop too. Science, technology and society influence each other continuously—or, to put it differently, they ‘communicate’.

Students of the Science Communication specialization are expected to become experts in understanding and designing interactions between science and society. In order to make this interaction fruitful and valuable for both science and society, it is first of all important to gain theoretical knowledge about science, about communication and about science communication. Science and Communication provides students with the theoretical and conceptual foundations of the discipline of science communication. Thus, you will develop an in-depth understanding of communication processes at the core of several interfaces, including those between scientists from different disciplines, between different sciences and their stakeholders, and between science and the public.

### Onderwijsvorm

- Lectures (18 h)
- Workgroups (15 h)
- Home-study for group assignments (12 h)
- Home-study for individual assignments/exam (100 h)

## Toetsvorm

a) Participation. (10%)

This consists of the following:

- (small) individual assignments,
- a pitch presentation and
- a "job application".

All these are assessed as pass or fail. If you pass all of them, you have earned the first 10% of your final mark. For each one you fail, you have to do an alternative assignment.

Nota bene: if you fail your participation, this cannot be compensated with an alternative assignment!

b) A group assignment in which you develop a label to an exhibit at a science museum and write an accompanying essay. (10%)

c) A review of a science communication effort of your own choosing (an exhibit at a science center or museum, a public lecture, a (popular) science book, et cetera...). (10%)

d) "TED-talk" in which you present the research you did (e.g. for your Bsc thesis or (first) Msc internship). (20%)

e) Exam. (50%)

To pass, your grades for assignments (a), (b) and (e) have to be 6 or higher. Assignments (b), (c) and (d) are all mandatory, but grades for these individual components can be compensated by other grades.

Resit:

In case your weighed average of (a) to (e) (with sufficient grades for (a), (b) and (e)!) is not sufficient, you have to take a resit. This can either consist of a second attempt at (c) or (d), or a re-exam.

## Literatuur

Academic articles. Direct links to articles will be provided on Canvas.

## Doelgroep

The course Science and Communication is a compulsory course for students of the Master specialisation Science Communication

(Wetenschapscommunicatie) and is a prerequisite for the internship.

Science and Communication is an optional course for students from other master programs in the health and life sciences.

## Science in Dialogue

<b>Vakcode</b>	AM_1002 ()
<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>	dr. J.F.H. Kupper
<b>Examinator</b>	dr. J.F.H. Kupper
<b>Docent(en)</b>	dr. J.F.H. Kupper
<b>Lesmethode(n)</b>	Werkgroep, Hoorcollege, Werkcollege
<b>Niveau</b>	500

## **Doel vak**

To gain knowledge of and insight into:

- the basic concepts and issues in the understanding of science-society interactions, both from a science and technology studies and communication science perspective
- the nature and course of interpersonal and group communication processes relevant to the formal and informal dialogue between science and society
- the nature and form of dialogical science communication, aimed at reflective learning and mutual understanding

To acquire or improve:

- individual skills for effective interpersonal communication
- individual skills for the design and facilitation of the science-society dialogue

## **Inhoud vak**

This course examines the public character of scientific controversy and focuses on the communicative aspects of a fruitful science-society dialogue. At the dawn of the 21st century, science, and particularly fields that combine science and engineering such as nanotechnology and synthetic biology, holds a great promise for the progress of our societies. At the same time, these developments are controversial. They lead to a variety of concerns related to risks, benefits and wider moral issues. Nanotechnology creates materials with novel characteristics that help us, but may also contain risks for health and environment. Synthetic biology develops new biological systems that may be very useful, but radically change the nature and meaning of life. Clearly, advances in science do not always match the needs, desires and expectations of society. On the other hand, parts of society might not always appreciate the nature and scope of scientific findings. For a fruitful relationship between science and society, a constructive science-society dialogue is necessary.

This course offers advanced lectures on the basic concepts and issues of dialogical science communication: communication, learning, dialogue, understanding, controversy, democracy. A series of workshops and small group assignments presents communicative tools and spaces such as discussion games, science theatre and multimedia platforms that can be used to design and facilitate science-society interactions. Training workshops will focus on improving the students' individual communication and facilitation skills. The students' individual learning curve as a science communicator and facilitator is self-evaluated by means of a reflection report.

Every course week is completed with a mini-exam.

## **Onderwijsvorm**

Lectures (14h), Workgroups (28h), Training workshops (24h), Dialogue presentations (12h), Selfstudy (remaining hours)

## **Toetsvorm**

Group assignment (50%), Take home exam (30%), Reflection report (20%). All assignments must be passed (grade > 6).

## **Literatuur**

Is announced on Canvas one month before start of the course

## **Doelgroep**

Optional course in the MSc specialization Science Communication

### Overige informatie

Independence and a cooperative attitude is expected. Attendance to training workshops is mandatory.

## Science Journalism

<b>Vakcode</b>	AM_471014 ()
<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>	dr. J.F.H. Kupper
<b>Examinator</b>	dr. J.F.H. Kupper
<b>Docent(en)</b>	dr. J.F.H. Kupper
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep, Computerpracticum
<b>Niveau</b>	500

### Doel vak

To acquire knowledge of and insight into:

- the concepts, models and issues of science journalism according to contemporary scientific literature
- the criteria for effective science journalism with respect to diverse media
- the representation of science in the media
- the role of science journalism in the use of scientific knowledge in society

To acquire skills in:

- writing popular scientific texts for different genres such as news, background and interview
- science reporting using videos
- designing science communication for different media such as newspaper, radio and internet

Orientation to the professional practice of science journalism

### Inhoud vak

This course teaches the basic principles of science journalism. A series of interactive lectures reviews both the practical as well as the theoretical aspects of science journalism. Topics that are discussed are the translation of science to a language that is both compelling and understandable, the role of journalism in the interaction between science and society, images of science in the media and the ethics of science journalism. The interactive lectures invite you to take your own defensible position with regard to these issues.

Guest lectures provide insight into the professional practice of science journalists. The guest speakers work as freelancer, editor or producer at diverse science media, such as newspapers (NRC, Volkskrant), magazines (NWT), internet (Noorderlicht) and radio (Labyrint).

Finally, the course trains specific skills that you need as a science journalist, such as popular writing, popular science videos, interviewing, conceptual analysis and program design.

### Onderwijsvorm

Lectures and seminars on theory and practice of science journalism and writing skill training (36h). Considerable time is set aside for performing science journalism in assignments (108h). The assignments are assessed by lecturers and fellow students (peer-review process). Self study (remaining hours).

### Toetsvorm

Several individual assignments (60%), several small group assignments (40%). All assignments must be passed (grade > 6).

### Literatuur

Announced on Canvas one month before start of the course

### Doelgroep

All Master students with a Beta-Bachelor degree. Students taking this course as part of their C-specialisation within FALW or FEW will have precedence over other students. Students from other faculties and or universities need to get formal consent from the course coördinator (Frank Kupper) before enrolment.

### Overige informatie

Course is taught in Dutch. More information: [f.kupper@vu.nl](mailto:f.kupper@vu.nl).

## Science Museology

<b>Vakcode</b>	AM_470590 ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	A. van Luijn MSc
<b>Examinator</b>	dr. ir. M.G. van der Meij
<b>Docent(en)</b>	dr. B.J. Regeer, dr. ir. M.G. van der Meij
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep, Werkcollege, Veldwerk
<b>Niveau</b>	500

### Doel vak

- Analyze and understand the role of museum exhibits in the field of science communication.
- Analyze and understand the role of science communication concepts in the context of science museums.
- Synthesize theoretical notions of science communication and exhibit design into ideas for an exhibit experience and exhibit content.
- Create and conduct a qualitative user research method in science museum settings.
- Integrate the user research outcomes into the exhibit experience and exhibit content.
- Reflect on working for an external commissioner.

### Inhoud vak

This course is about the role of science museums/centers, zoos and natural history museums in science communication. You will get familiar with theories of science communication in museum settings, and will be

introduced to different styles of communication, different approaches to exhibit design & development, and different methods of research and evaluation of exhibitions.

Lecturers give insight into the role and work of (1) science communicators in museums and science centers, (2) researchers in the field of museology, and/or (3) professionals in informal science & technology learning environments.

Through individual and group assignments you are encouraged to combine theory and practice, working step-by-step towards an exhibit design. The group assignments are commissioned by museums and science centers, such as NEMO, Museon, Naturalis, Delft Science Centre, or Artis.

### **Onderwijsvorm**

Lectures

Workgroups

Workshops

Home-study for group assignments

Home-study for individual assignments

Field work

### **Toetsvorm**

Group assignments (45%), final presentation (15%), and individual assessment(s) (40%). For all assignments and assessments a pass-grade must be obtained.

### **Literatuur**

Academic articles. Direct links to articles will be provided on Canvas before the beginning of the course.

### **Vereiste voorkennis**

It is possible to follow the course as an elective course outside of one of the science communication master specialisations of FALW/FEW. In that case, additional reading may be asked from students, depending on the student's educational background.

### **Aanbevolen voorkennis**

We recommend to follow this course, at least, after having done the course Science & Communication.

We ask non-SC students to read Van Dam, F., De Bakker, L., & Dijkstra, A.M. (2014). Wetenschapscommunicatie, een kennisbasis. Boom Lemma uitgevers. ISBN: 978-94-6236-424-0. Chapters: 1, 2, 3, 4, 5 en 6. For English introduction literature, please contact the teaching staff.

### **Doelgroep**

Optional course in the Science Communication master specialisation of most of the two-year master programs of the FALW and FEW faculties. Master students from other universities in any scientific field are welcome as well. Additional reading may be required.

### **Overige informatie**

Guest lectures from and excursions to for instance NEMO, Artis, Naturalis, NorthernLight, or Museon, etc.

## Scientific Writing in English for Medical Natural Sciences

<b>Vakcode</b>	X_420563 ()
<b>Periode</b>	Periode 3

<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	M. van den Hoorn
<b>Examinator</b>	M. van den Hoorn
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### **Doel vak**

The aim of this course is to provide Master's students with the essential linguistic know-how for writing a scientific article 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 scientific article;
- know what the information elements are in parts of their scientific article;
- know how to produce clear and well-structured texts on complex subjects;
- know how to cite sources effectively;
- 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 what their own strengths and weaknesses are in writing;
- know how to give effective peer feedback.

Final texts may contain occasional spelling, grammatical or word choice errors, but these will not distract from the general effectiveness of the text.

### **Inhoud vak**

The course will start with a general introduction to scientific writing in English. Taking a top-down approach, we will then analyse the structure of a scientific article in more detail. As we examine each section of an article, 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:

- Structuring a scientific article
- Considering reading strategies: who is your readership? How do they read your text? What do they expect? How does that affect your writing?
- Writing well-structured and coherent paragraphs
- Composing effective sentences (sophisticated word order, information distribution).
- Arguing convincingly – avoiding logical fallacies
- Academic tone and style: hedging – why, how, where?
- Using the passive effectively
- Understanding grammar (tenses, word order, etc.)
- Understanding punctuation



Referring to sources: summarising, paraphrasing, quoting (how and when?)

Avoiding plagiarism

Vocabulary development: using appropriate vocabulary and collocations

### **Onderwijsvorm**

Scientific Writing in English is an eight-week course and consists of 2 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 (Introduction, Methods, Discussion and Abstract). Feedback on the writing assignments is given by the course teacher and by peers.

### **Toetsvorm**

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

Students hand in three writing assignments (Introduction, Methods, Discussion)

Students get a pass mark for all writing assignments;

Students provide elaborate peer feedback (Introduction, Methods, Discussion, Abstract);

Students attend at least 7 out of 8 sessions;

Students are well prepared for each session (i.e. do all homework assignments);

Students participate actively in class;

Students do not plagiarise or self-plagiarise.

Writing assignments:

1. If students have a BSc thesis in a traditional thesis form (e.g., 20+ pages) and written in English, they may use this for the writing assignments.
2. If students have a BSc thesis in a traditional form (e.g., 20+ pages) written in another language than English, they may use this for the writing assignments.
3. If students have written a paper or report in English that's not already in article form, they may use this for the writing assignment.
4. If students are working on their MSc thesis or internship report when taking Scientific Writing in English, they may use this for the writing assignments. They will have to notify their supervisor to make sure that they won't be accused of self-plagiarism.
5. If students cannot or do not wish to use any of the above-mentioned texts for the writing assignments (1-4), they are expected to do a limited Literature Review on a topic in their field of research, using at least 5 articles.

Students are not allowed to use the following texts for the writing assignments:

1. A BSc thesis written in English that's already in article form.
2. A MSc thesis written in English that's already in article form (and that has already been marked).
3. An internship report written in English that's already in article form (and that has already been marked).
4. A paper or report written in English that's already in article form.

### **Literatuur**

Effective Scientific Writing: An Advanced Learner's guide to Better English, 4th edition (February 2016) (A. Bolt & W. Bruins, ISBN 978 90 8659 617 1). VU bookstore: €27.95.

## Doelgroep

This course is only open to students of the two-year Master's programmes of the Faculty of Sciences. 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.

## Overige informatie

- To do well, students are expected to attend all lessons. Group schedules are to be found at [rooster.vu.nl](http://rooster.vu.nl) and 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 offering 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 in VUnet. This 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 [canvas.beta@vu.nl](mailto:canvas.beta@vu.nl).
- Full time students with their main registration at VU will be given preferential treatment for placement in this course. For secondary students proof of enrollment is not a guarantee of placement.

## Signal Transduction in Health and Disease

<b>Vakcode</b>	X_432535 (432535)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	prof. dr. M.J. Smit
<b>Examinator</b>	prof. dr. M.J. Smit
<b>Docent(en)</b>	dr. ir. A.H. de Boer, dr. M.H. Siderius, prof. dr. M.J. Smit, prof. dr. ir. A.H. de Boer
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	500

## Doel vak

At the end of this theoretical course, the students are aware of the latest insights of cellular signal transduction in both healthy and pathological conditions.

## Inhoud vak

This course will link human genetic variation (somatic and inherited mutations) to the development of disease and will focus on pathological signaling, mutant signaling proteins in disease and possible treatment of resulting disease (small compounds, biologicals, gene therapy). Modern pharmacological concepts, including constitutive receptor activity, receptor regulation, allosteric modulation and dimerization

will be addressed in light of signal transduction in health and disease. A special focus will be on signal transduction resulting in pathologies such as Alzheimer, Parkinson's disease, inflammatory diseases and cancer.

### Onderwijsvorm

Lectures, self-study.

Students will do a case study in groups on a signaling pathway linked to disease. Molecular mechanisms underlying pathology will be addressed and presented. Therapeutic targets within this signaling pathway will be proposed and discussed.

### Toetsvorm

Assignment and presentation, written exam.

### Literatuur

'Cell signaling', Authors: Wendell Lim, Bruce Mayer, Tony Pawson

ISBN: 9780815342441

Format: Paperback

Publication Date: June 15, 2014

Papers available on Canvas

### Aanbevolen voorkennis

Bachelor Biology, Medical Biology, Pharmaceutical Sciences, Medical Natural Sciences, Biomolecular Science portal course or equivalent

### Doelgroep

mBMS-BC, mDDS-BCCA, mDDS-CMCT, mDDS-DD&S, mDDS-DDSA, mDDS-DDTF, mDDS-C-var, mDDS-E-var, mDDS-M-var, mMNS-MCD, mMNS-MPy

## Societal entrepreneurship in health and life sciences

<b>Vakcode</b>	AM_470575 ()
<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>	L.H.M. van de Burgwal MSc
<b>Examinator</b>	prof. dr. H.J.H.M. Claassen
<b>Docent(en)</b>	prof. dr. H.J.H.M. Claassen, L.H.M. van de Burgwal MSc
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	500

### Doel vak

This course focuses on societal aspects of entrepreneurship. During the course you will study the meaning of societal and responsible entrepreneurship in a concrete setting. In the course theoretical insights are combined with practical knowledge regarding business plans. Lecturers from Athena and experts from the field discuss various relevant topics, such as: in-depth insight into the elements of a business plan, different business model configurations, the role of societal impact, and elements of CSR. The course is relevant for a wide range of business cases in the health and life sciences, ranging from starting an NGO-like organization, to starting a strong business-driven

life sciences corporation.

This course is thus intended for students that have truly considered becoming entrepreneurs themselves. To this end, we specifically encourage students to formulate a business case (as a group of 3 students) before registering for this course.

#### Learning objectives

- Understand the relevance of entrepreneurship and innovation for science disciplines.
- Explain the importance of valorisation of findings from the health and life sciences and business ideas for a knowledge-based economy.
- Outline the financial, social and ecological aspects (sustainable entrepreneurship) of value-adding opportunities.
- Recognize and design opportunities that create economic and social value
- Understand the nature and role of networks in value creation
- Recognize and understand different entrepreneurial processes
- Construct a business plan on how to bring an innovation to the market.

#### Inhoud vak

This course consists of both a theoretical and a practical component. Both components run simultaneously so that the theoretical knowledge can be applied to the development of the business plan. In the theoretical component you learn about societal entrepreneurship. We address questions such as: What is entrepreneurship? What are societal entrepreneurs? What is the role of innovation in entrepreneurship? What is corporate social responsibility (CSR)? How can we judge the feasibility of entrepreneurial ambitions?

The practical component focuses on creating a business plan based on a real-life business case. Based on the Business Model Canvas (Osterwalder & Pigneur, 2010) you develop a business plan covering aspects such as value propositions, key activities, key partners, customer segments, cost structure, and revenue streams. In setting up this business plan, societal aspects of entrepreneurship should play a key role. A jury of financiers judges the business plans on creativity and feasibility.

#### Onderwijsvorm

Lectures and workshops are key elements of this course. Each week several lectures are given. These lectures provide key knowledge for both the exam and the business plan. Additionally, each week students have workshops in which specific parts of the business plan are further developed. Attending the workshops is compulsory.

#### Schedule and study time

The total study time is 160 hours. The following hours are contact hours:

- Lectures: 42 hours
- Workshops: 14 hours
- Exam: 3 hours
- Writing business plan: 70 hours
- Self-study for remaining hours

#### Toetsvorm

Both the exam and the business plan determine 50% of the grade each. The exam and business plan must be of sufficient quality to pass the course.

## Literatuur

Business Model Generation (Osteralder & Pigneur, 2010)

## Vereiste voorkennis

Proven knowledge of business aspects in the Health and Life Sciences is required (e.g. by having passed the Business Management course).

## Doelgroep

Optional course for Master students Management, Policy Analysis and Entrepreneurship in Health and Life sciences (MPA), M-differentiation of the Health, Life & Natural Sciences, Biology, Biomedical Sciences.

## Intekenprocedure

VU-net registration will close 4 weeks before the start of the course. Students are strongly encouraged to formulate their own health & life sciences related business case to work on. Alternatively, we can arrange for a limited number of real-life business cases to work on.

## Overige informatie

Attendance to lectures and working groups is compulsory. Prior knowledge: Business Management in Health and Life sciences.

## Soft Condensed Matter and Biological Physics

<b>Vakcode</b>	X_420167 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	prof. dr. ir. G.J.L. Wuite
<b>Examinator</b>	prof. dr. ir. G.J.L. Wuite
<b>Docent(en)</b>	prof. dr. ir. G.J.L. Wuite, prof. dr. P.R. ten Wolde
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

## Inhoud vak

<http://studiegids.uva.nl/xmlpages/page/2017-2018/zoek-vak/vak/33767>

## Overige informatie

This course is offered at the UvA. For more information contact: FNWI Education Service Centre, Science Park 904, [servicedesk-esc-science@uva.nl](mailto:servicedesk-esc-science@uva.nl), +31 (0)20 525 7100.

Enrolment via <https://m.sis.uva.nl/vakaanmelden> is required.

For courses taught in period 1 and period 2, enrolment via

<https://datanose.nl/#specialenrol> is required.