Medical Natural Sciences MSc

VU University Amsterdam - Faculteit der Exacte Wetenschappen - M Medical Natural Sciences - 2015-2016

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):

Variant	**O**	**M**	**C**	**E**
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			
Total (cp)	**120**	**120**	**120**	**120**

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.

Contact

For more information please contact the master coordinator:

dr. ir. T.J.C. Faes
R T-061
T +31 (0) 20 598 1508

E t.j.c.faes@vu.nl

Index

Communication variant

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

Programme components:

- 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.

Programme components:

- Optional courses: select at least 12EC
- Internship communication
- Compulsory Courses

Optional courses: select at least 12EC

Courses:

Name	Period	Credits	Code
Communication, Organization and Management	Period 2	6.0	AM_470572
Science in Dialogue	Period 2	6.0	AM_1002
Science Journalism	Period 2	6.0	AM_471014
Science Museology	Period 3	6.0	AM_470590

Internship communication

Courses:

Name	Period	Credits	Code
Reflective Practice Internship Science Communication	Ac. Year (September)	30.0	AM_1163
Research Internship Science Communication	Ac. Year (September)	30.0	AM_1162

Compulsory Courses

Courses:

Name	Period	Credits	Code
Research methods for analyzing complex problems	Period 1	6.0	AM_1182
Science and Communication	Period 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.

Programme components:

- 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.

Courses:

Name	Period	Credits	Code
Bio-analysis & Clinical Diagnostics	Period 1	6.0	X_432765
Pathophysiology of Heart and Circulation	Period 1	6.0	M_CPATHO09
Physics of Organs 1: Cardio-Pulmonary Physics	Period 1	6.0	X_428527
Soft Condensed Matter and Biological Physics	Period 2	6.0	X_420167

Compulsory courses Academic Skills

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

Courses:

Name	Period	Credits	Code
Ethics in Biomedical Research	Period 3	3.0	X_422592

Scientific Writing in English for Medical Natural Sciences	Period 3	3.0	X_420563

Compulsory Courses

Courses:

Name	Period	Credits	Code
Advanced Medical Image Processing	Period 2	6.0	X_422610
Biomedical Modelling and Simulation	Period 1	6.0	X_430112
Colloquium / Literature thesis	Ac. Year (September)	6.0	X_422611
Major research Project	Ac. Year (September)	36.0	X_422615

Education Variant

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

Programme components:

- Courses for Education Part
- MNS Courses for C-E-M variant

Courses for Education Part

Programme components:

- Master Leraar VHO Natuurkunde, vanaf 2015
- Leraar voorbereidend hoger onderwijs in Natuurkunde verplicht
- Master Leraar VHO Scheikunde vanaf 2015
- Leraar voorbereidend hoger onderwijs in Scheikunde verplicht
- LVHO Natuurkunde, overgangsregeling
- LVHO Scheikunde, overgangsregeling

Master Leraar VHO Natuurkunde, vanaf 2015

Courses:

Name	Period	Credits	Code
Didactiek 1	Period 1, Period 4	6.0	O_MLDIDAC_1
Didactiek 2	Period 2+3, Period 5+6	6.0	O_MLDIDAC_2
Didactiek 3	Period 4+5+6	9.0	O_MLDIDAC_3
Peergroup 1	Period 1+2+3, Period 4+5+6	0.0	O_MLPEERGR_1

Peergroup 2	Period 3+4+5	0.0	O_MLPEERGR_2
Praktijk 1	Period 1, Period 4	6.0	O_MLPRAK_1
Praktijk 2	Period 2+3, Period 5+6	9.0	O_MLPRAK_2
Praktijk 3	Period 4+5+6	15.0	O_MLPRAK_3
Praktijk onderzoek 1	Period 3, Period 6	3.0	O_MLPROZ_1
Praktijk onderzoek 2	Period 4+5+6	6.0	O_MLPROZ_2

Leraar voorbereidend hoger onderwijs in Natuurkunde verplicht

Courses:

Name	Period	Credits	Code
Educational and Pedagogical Studies II	Period 1+2	3.0	O_MLADEPII
Research II	Period 1+2+3	6.0	O_MLVPOOII
Specialisation	Period 2+3	3.0	O_MLVERD
Teaching Methodology Physics II	Period 1+2	6.0	O_MLVDNAII
Teaching Practice II	Period 1+2+3	15.0	O_MLPRAKII

Master Leraar VHO Scheikunde vanaf 2015

Courses:

Name	Period	Credits	Code
Didactiek 1	Period 1, Period 4	6.0	O_MLDIDAC_1
Didactiek 2	Period 2+3, Period 5+6	6.0	O_MLDIDAC_2
Didactiek 3	Period 4+5+6	9.0	O_MLDIDAC_3
Peergroup 1	Period 1+2+3, Period 4+5+6	0.0	O_MLPEERGR_1
Peergroup 2	Period 3+4+5	0.0	O_MLPEERGR_2
Praktijk 1	Period 1, Period 4	6.0	O_MLPRAK_1
Praktijk 2	Period 2+3, Period 5+6	9.0	O_MLPRAK_2
Praktijk 3	Period 4+5+6	15.0	O_MLPRAK_3
Praktijk onderzoek 1	Period 3, Period 6	3.0	O_MLPROZ_1
Praktijk onderzoek 2	Period 4+5+6	6.0	O_MLPROZ_2

Leraar voorbereidend hoger onderwijs in Scheikunde verplicht

Courses:

Name	Period	Credits	Code
Educational and Pedagogical Studies II	Period 1+2	3.0	O_MLADEPII

Research II	Period 1+2+3	6.0	O_MLVPOOII
Specialisation	Period 2+3	3.0	O_MLVERD
Teaching Methodology Chemistry II	Period 1+2	6.0	O_MLVDSKII
Teaching Practice II	Period 1+2+3	15.0	O_MLPRAKII

LVHO Natuurkunde, overgangsregeling

Courses:

Name	Period	Credits	Code
Educational and Pedagogical Studies I	Period 1+2	6.0	O_MLADEPI
Research I	Period 1+2+3	3.0	O_MLVPOOI
Teaching Methodology Physics I	Period 1+2	3.0	O_MLVDNAI
Teaching Practice I	Period 1+2+3	15.0	O_MLPRAKI

LVHO Scheikunde, overgangsregeling

Courses:

Name	Period	Credits	Code
Educational and Pedagogical Studies I	Period 1+2	6.0	O_MLADEPI
Research I	Period 1+2+3	3.0	O_MLVPOOI
Teaching Methodology Chemistry I	Period 1+2	3.0	O_MLVDSKI
Teaching Practice I	Period 1+2+3	15.0	O_MLPRAKI

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.

Programme components:

- 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.

Courses:

Name	Period	Credits	Code
Bio-analysis & Clinical Diagnostics	Period 1	6.0	X_432765
Pathophysiology of Heart and Circulation	Period 1	6.0	M_CPATHO09
Physics of Organs 1: Cardio-Pulmonary Physics	Period 1	6.0	X_428527
Soft Condensed Matter and Biological Physics	Period 2	6.0	X_420167

Compulsory courses Academic Skills

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

Courses:

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

Compulsory Courses

Courses:

Name	Period	Credits	Code
Advanced Medical Image Processing	Period 2	6.0	X_422610
Biomedical Modelling and Simulation	Period 1	6.0	X_430112
Colloquium / Literature thesis	Ac. Year (September)	6.0	X_422611
Major research Project	Ac. Year (September)	36.0	X_422615

MNS programme

Programme components:

- 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.

Courses:

Name	Period	Credits	Code
Bio-analysis & Clinical Diagnostics	Period 1	6.0	X_432765
Pathophysiology of Heart and Circulation	Period 1	6.0	M_CPATHO09
Physics of Organs 1: Cardio-Pulmonary Physics	Period 1	6.0	X_428527
Soft Condensed Matter and Biological Physics	Period 2	6.0	X_420167

Restricted Choice

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

Courses:

Name	Period	Credits	Code
Advanced Cardiac Diagnostics	Period 3+4+5	3.0	M_CCARDIA09
Advanced Medical Technology	Period 5	6.0	X_437026
Bio-analysis & Clinical Diagnostics	Period 1	6.0	X_432765
Biomedical Optics	Period 5	6.0	X_428529
Drug-induced Stress and Cellular Responses	Period 2	6.0	X_432536
Dynamics of Biomolecules and Cells	Period 4	6.0	X_422583
Electronics and signal processing	Period 4	6.0	X_420533
High-Throughput Screening	Period 2	6.0	X_435047
Image Processing for MNS	Period 2	6.0	X_422612
Live Cell Imaging	Period 1	6.0	AM_470726

Mass Spectrometry	Period 2	6.0	X_435604
Parameter Estimation Applied to Medical and Biological Sciences	Period 4	6.0	X_432631
Pathophysiology of Heart and Circulation	Period 1	6.0	M_CPATHO09
Physics of Organs 1: Cardio-Pulmonary Physics	Period 1	6.0	X_428527
Physics of Organs 2: Sensory Organs and Bioelectricity	Period 2	6.0	X_428528
Protein Analysis	Period 5	6.0	X_435045
Proteomics in Biomedical Research	Period 3+4+5	3.0	M_CPROTBI09
Signal Transduction in Health and Disease	Period 2	6.0	X_432535
Soft Condensed Matter and Biological Physics	Period 2	6.0	X_420167

Compulsory Choice 1 of 2

Courses:

Name	Period	Credits	Code
Minor research Project	Ac. Year (September)	21.0	X_422614
Minor research Project (27EC)	Ac. Year (September)	27.0	XM_42000

Compulsory courses Academic Skills

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

Courses:

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

Compulsory Courses for the MNS programme.

Courses:

Name	Period	Credits	Code

Advanced Medical Image Processing	Period 2	6.0	X_422610
Biomedical Modelling and Simulation	Period 1	6.0	X_430112
Colloquium / Literature thesis	Ac. Year (September)	6.0	X_422611
Major research Project	Ac. Year (September)	39.0	X_422613

Society Oriented Variant for Medical Natural Sciences

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

Programme components:

- 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.

Programme components:

- MSc BIO Science in Society specialisation

MSc BIO 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.

Programme components:

- Compulsory courses
- Compulsory choice of at least 6 EC

Compulsory courses

Courses:

Name	Period	Credits	Code
Analysis of Governmental Policy	Period 1	6.0	AM_470571
Communication, Organization and Management	Period 2	6.0	AM_470572
Internship Science in Society	Ac. Year (September)	30.0	AM_1134
Research methods for analyzing complex problems	Period 1	6.0	AM_1182

Compulsory choice of at least 6 EC

Courses:

Name	Period	Credits	Code
Business Management in Health and Life Sciences	Period 2	6.0	AM_470584
Clinical Development and Clinical Trials	Period 3	3.0	AM_1180
Disability and Development	Period 2	6.0	AM_470588
Entrepreneurship in Health and Life Sc.	Period 2	6.0	AM_470575
Epidemiology	Period 3	3.0	AM_1179
Health, Globalisation and Human Rights	Period 2	6.0	AM_470818
Policy, Politics and Participation	Period 2	6.0	AM_470589
Science in Dialogue	Period 2	6.0	AM_1002

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.

Programme components:

- 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.

Courses:

Name	Period	Credits	Code
Bio-analysis & Clinical Diagnostics	Period 1	6.0	X_432765
Pathophysiology of Heart and Circulation	Period 1	6.0	M_CPATHO09
Physics of Organs 1: Cardio-Pulmonary Physics	Period 1	6.0	X_428527
Soft Condensed Matter and Biological Physics	Period 2	6.0	X_420167

Compulsory courses Academic Skills

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

Courses:

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

Compulsory Courses

Courses:

Name	Period	Credits	Code
Advanced Medical Image Processing	Period 2	6.0	X_422610
Biomedical Modelling and Simulation	Period 1	6.0	X_430112
Colloquium / Literature thesis	Ac. Year (September)	6.0	X_422611
Major research Project	Ac. Year (September)	36.0	X_422615

Advanced Cardiac Diagnostics

Course code	M_CCARDIA09 (3120004)
Period	Period 3+4+5
Credits	3.0
Language of tuition	English
Faculty	VUmc
Coordinator	dr. O. Kamp

Examinator	dr. O. Kamp
Teaching method(s)	Lecture, Study Group
Level	500

Course objective
This course focuses on the physical background and clinical application of different cardiac imaging modalities.

Course content
- Lectures on the physical background of MRI, SPECT/CT, echo, PCI
- Visits to the abovementioned techniques in the clinic
- Literature study

Type of assessment
Written exam and literature study.

Course reading
Lectures/articles handed out during course.

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

Advanced Medical Image Processing

Course code	X_422610 ()
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	dr. ir. T.J.C. Faes
Examinator	dr. J.C. de Munck
Teaching staff	dr. ir. T.J.C. Faes
Teaching method(s)	Lecture, Computer lab
Level	400

Course objective
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: Quantitative aspects of image analysis; Image matching; 4D image processing (motion correction, fMRI-image analysis); Meshing in 2D and 3D (e.g., the marching cube algorithms, Delaunay triangulation, data structures, interpolation, connected component algorithms, geometric modelling, optimized algorithms).
2) To develop from concept to algorithm and code (C++ or MATLAB) image analysis software tools in the form of an evaluated (efficacy) and documented programme code.

Form of tuition
Lectures, literature review, workshops, demonstrations, computer practicles.

Type of assessment
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, an oral and written presentation on the assignment is included.

Recommended background knowledge
- Medische Beeldvorming (bachelor natuurkunde en bachelor medische natuurwetenschappen)
- Introductie medische beeldbewerking (bachelor natuurkunde en balcelor medische natuurwetenschappen).

Target group
MNS-master & Master Physcics of Life & Health

Advanced Medical Technology

Course code	X_437026 (437026)
Period	Period 5
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	prof. dr. ir. R.M. Verdaasdonk
Examinator	prof. dr. ir. R.M. Verdaasdonk
Teaching staff	prof. dr. ir. R.M. Verdaasdonk
Teaching method(s)	Lecture
Level	400

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

Course content
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 knifes, endoscopes, etc. Also recent research and new developments of instruments will be shown.

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

Remarks
Students should also register in advance for this course on Blackboard.

Analysis of Governmental Policy

Course code	AM_470571 ()
Period	Period 1

Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	M.J. Kishna
Examinator	prof. dr. J.T. de Cock Buning
Teaching staff	prof. dr. J.T. de Cock Buning
Teaching method(s)	Lecture, Study Group, Computer lab
Level	500

Course objective
- To acquire critical knowledge regarding different policy models and theories
- To master the correct use of central concepts in political and policy discourses.
- To further deepen your analytic skills with respect to the critical assessment of a complex societal question or dilemma in the health and life science;
- To learn to integrate science- specific knowledge with the knowledge and skills of other disciplines of the social sciences
- To practice skills in data collection and analysis
- To learn to set up valid lines of argumentation;
- To learn to translate research findings into policy recommendations;
- To get experienced in writing a policy advisory report;
- To improve your communication skills;
- To improve your skills in working effectively in a project team, through team building, team analysis and feedback.

Course content
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 psychologal 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.

Form of tuition
Analysis of Governmental Policy is a fulltime course of four weeks (6 ECTS). The most recent course schedule is to be found on Blackboard. Tuition methods include lectures, training workshops, and self-study. The different elements have the following study time:
- lectures: 15 hours

- project and self-study: remaining hours (within the project: 18x 1 hour coach meeting)
- examination: 2 hours

Please note that attendance to the project meetings is compulsory. Attendance to the lectures is highly recommended. In our experience, relying on self-study alone is insufficient to pass the exam

Type of assessment
Written exam (25%) and individual evaluation based on personal performance in the project team (50%), and assessment of various group products (report and presentation (25%)). All parts have to be passed successfully.

Course reading
Buse, Mays and Walt: "Making Health Policy" McGrawHill/Open University press. (at least 2nd edition 2012).

Recommended background knowledge
The project integrates the learned lessons from the first compulsory MPA courses: Qualitative & Quantitative Methods.\

Target group
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.

Remarks
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 leaders.

Bio-analysis & Clinical Diagnostics

Course code	X_432765 ()
Period	Period 1
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Teaching staff	dr. H. Lingeman
Teaching method(s)	Lecture
Level	400

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

Course content
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.

Form of tuition
Lectures and tutorials.

Type of assessment
Written or oral examination.

Course reading
Hand-outs (electronically available).

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

Target group
mCH-AS, mDDS, mMNS

Biomedical Modelling and Simulation

Course code	X_430112 (430112)
Period	Period 1
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	dr. I.H.M. van Stokkum
Examinator	dr. I.H.M. van Stokkum
Teaching staff	dr. I.H.M. van Stokkum, dr. ir. T.J.C. Faes, dr. J.C. de Munck, prof. dr. G.J.M. Stienen
Teaching method(s)	Lecture, Seminar, Practical, Study Group
Level	400

Course objective
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.

Course content
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.

Form of tuition
Lectures, working groups, assignments.

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

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

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

Biomedical Optics

Course code	X_428529 (428529)
Period	Period 5
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Level	400

Course content
http://studiegids.uva.nl/xmlpages/page/2015-2016/zoek-vak/vak/16171

Remarks
This course is offered at the UvA. For more information contact: FNWI Education Service Centre, Science Park 904,
servicedesk-esc-science@uva.nl, +31 (0)20 525 7100.
Enrolment via https://m.sis.uva.nl/vakaanmelden is required.

Business Management in Health and Life Sciences

Course code	AM_470584 ()
Period	Period 2

Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	prof. dr. H.J.H.M. Claassen
Examinator	prof. dr. H.J.H.M. Claassen
Teaching staff	prof. dr. H.J.H.M. Claassen
Teaching method(s)	Lecture, Computer lab
Level	500

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

Course content
As a result of external factors (for example ageing of the population), 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 and 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) and a written exam, both counting for 50% of the final grade.

Form of tuition

Lectures:35h
Assignment: 4h
Work on assignment (self study): 40h
Self-study: remaining hours

Type of assessment
Written exam: 50%
Personal Business Plan: 50%
Both have to be passed

Course reading
• 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.

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

Remarks
Guest lecturers/organisations:
• Robert Al, TU Eindhoven
• Tamar Weenen, VU university
• Esther Pronker, VU university
• Patrick de Boer & Jochem Bosschenbroek, Ttopstart BV
• Bart van Weezenbeek
• Bart Bergstein, Forbion Capital partners
• Michael Mellink & Majorie Soeter, Odgersberndtson
• Marga Janse, innovatief LerenLeren BV
• NL Octrooicenrtum
• Price Waterhouse Coopers
• AsjesBisseling Belastingadviseurs
• And others to be announced

Clinical Development and Clinical Trials

Course code	AM_1180 ()
Period	Period 3
Credits	3.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	prof. dr. H.J.H.M. Claassen
Examinator	prof. dr. H.J.H.M. Claassen
Teaching method(s)	Lecture, Study Group
Level	500

Course objective
- to gain knowledge and insight into the function of clinical trials
- 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 reflect on the roles, tasks and

responsibilities of the stakeholders involved in clinical trials
- to reflect on the role of golden standard in our healthcare system
- to learn where and how to look up rules and regulations.

Course content
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.

Form of tuition
Lectures: 35 h.
Self study: remaining hours

Type of assessment
Written exam: 100%.

Course reading
Will be announced on Blackboard 1 month before the start of the course.

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

Remarks
Guest lecturers/organisations:
• Eric Klaver
• DOCS
• Others to be announced.

Colloquium / Literature thesis

Course code	X_422611 ()
Period	Ac. Year (September)
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen

Coordinator	dr. A. Bhulai
Level	500

Communication, Organization and Management

Course code	AM_470572 ()
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	M.J. Kishna
Examinator	M.J. Kishna
Teaching staff	dr. H. Wels, prof. dr. F. Scheele, dr. M.B.M. Zweekhorst
Teaching method(s)	Lecture, Study Group
Level	500

Course objective
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

Course content
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 lecturers 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. In addition, the students interview managers in health organisations and analyse these interviews using the newly acquired theoretical concepts. 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.

Form of tuition
Lectures: approximately 22 hours
Response lectures: 4 hours

Training workshops 12 hours
Self-study and writing project assignment: remaining hours.

Type of assessment
Written exam (60%;) and assessment of the interviews, case study analysis, and reports (40%). Grades of both parts must at least be 6 or higher.

Course reading
To be announced on Blackboard

Target group
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

Remarks
Attendance to training, workshops, interviews and discussions is indispensable

Didactiek 1

Course code	O_MLDIDAC_1 ()
Period	Period 1, Period 4
Credits	6.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	C.L. Geraedts
Examinator	dr. A. Handelzalts
Teaching staff	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, drs. W.S. Hoekstra, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. B. Klein, drs. W. Jongejan, drs. L.J. van Well-van Grootheest, dr. H.B. Westbroek, C.L. Geraedts, drs. A. Krijgsman, dr. A.A. Kaal, dr. A. Handelzalts, drs. K.L. Schaap, W. Maas, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw
Teaching method(s)	Lecture, Study Group
Level	400

Didactiek 2

Course code	O_MLDIDAC_2 ()
Period	Period 2+3, Period 5+6
Credits	6.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	drs. B. Klein
Examinator	dr. A. Handelzalts

Teaching staff	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, drs. W.S. Hoekstra, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. B. Klein, drs. W. Jongejan, drs. L.J. van Well-van Grootheest, dr. H.B. Westbroek, C.L. Geraedts, drs. A. Krijgsman, dr. A.A. Kaal, dr. A. Handelzalts, drs. K.L. Schaap, W. Maas, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw
Teaching method(s)	Study Group, Lecture
Level	400

Didactiek 3

Course code	O_MLDIDAC_3 ()
Period	Period 4+5+6
Credits	9.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	drs. K.L. Schaap
Examinator	drs. K.L. Schaap
Teaching staff	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, drs. W.S. Hoekstra, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. B. Klein, drs. W. Jongejan, drs. L.J. van Well-van Grootheest, dr. H.B. Westbroek, C.L. Geraedts, drs. A. Krijgsman, dr. A.A. Kaal, dr. A. Handelzalts, drs. K.L. Schaap, W. Maas, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw
Teaching method(s)	Lecture, Study Group
Level	400

Disability and Development

Course code	AM_470588 ()
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. R.M.H. Peters
Examinator	dr. R.M.H. Peters
Teaching method(s)	Lecture, Study Group
Level	500

Course objective
• To develop an understanding of disability and the issues faced by people with disabilities
• To develop knowledge and skills for disability research, policy development and management related to disability, rehabilitation and development
• To acquire insight into the epidemiology of disability, with separate attention for important determinants like gender, poverty and

HIV/AIDS
• To learn how to use relevant models of disability and the conceptual framework of the International Classification of Functioning, Disability and Health (ICF)
• To understand the importance of human rights in relation to disability and to learn to use the UN Convention for the Rights of Persons with Disabilities for advocacy and other rights-based interventions
• To acquire skills and knowledge in measurement and research methods relevant to disability
• To understand the importance of inter-sectoral collaboration
• To gain insight in participatory approaches

Course content
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. The realisation that the Millennium Development Goals cannot be met without addressing the needs of people with disability has brought a new impetus to the field of disability and development. Another major recent development was the adoption of the UN Convention on the Rights of Persons with Disabilities in December 2006. 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.

This rapidly increasing interest in disability, as a development and human rights issue, means that this emerging field of study will rapidly gain in importance and should become part of any serious higher education programme in social and development studies and in international public health. The course will cover essential knowledge and skills in this subject.

The 4-week 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 disability research
• An introduction to community-based rehabilitation and disability inclusive development.

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

• Lectures: 36 hours
• Tutorial groups: 18 hours
• Other events: 12 hours
• Self-study: remaining hours

Type of assessment
Participation in tutorial groups: 10%
Take-home examination, submitted electronically: 60%
Scientific article/essay: 30%

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

Course reading
See e-reader

Entry requirements
Bachelor-level education; any subject

Target group
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.

Remarks
For more information contact Ruth Peters (r.m.h.peters@vu.nl)

Drug-induced Stress and Cellular Responses

Course code	X_432536 (432536)
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	dr. J.N.M. Commandeur
Examinator	dr. J.N.M. Commandeur
Teaching staff	dr. J.N.M. Commandeur
Teaching method(s)	Lecture
Level	500

Course objective
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.

Course content
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,
• genetic toxicology and chemical carcinogenesis,
• role of mitochondria in necrosis and apoptosis,
• impairment of cell proliferation and tissue repair,
• immune-mediated toxicity.

Form of tuition
Lectures and self study.

Type of assessment
Written exam

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

Entry requirements
Bachelor Physics, Chemistry, Mathematics, Biology, Medical Biology Pharmaceutical Sciences, Medical Natural Science Biomolecular Science portal course, or equivalent

Target group
mDDS, mBMS

Dynamics of Biomolecules and Cells

Course code	X_422583 ()
Period	Period 4
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	dr. J.T.M. Kennis
Examinator	dr. J.T.M. Kennis
Teaching staff	dr. J.T.M. Kennis
Teaching method(s)	Lecture
Level	400

Course objective
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.

Course content
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

Form of tuition
Lectures, guest lectures, literature essay, oral literature presentation

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

Course reading
Notes, handouts and papers.

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

Target group
mMNS-PoL, mPhys-LSBP, mPhys-PLH

Educational and Pedagogical Studies I

Course code	O_MLADEPI ()
Period	Period 1+2
Credits	6.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. A. Handelzalts
Examinator	dr. A. Handelzalts
Teaching staff	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, drs. W.S. Hoekstra, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. B. Klein, drs. W. Jongejan, dr. H.B. Westbroek, C.L. Geraedts, drs. A. Krijgsman, dr. A.A. Kaal, drs. K.L. Schaap, W. Maas, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw
Teaching method(s)	Lecture
Level	500

Educational and Pedagogical Studies II

Course code	O_MLADEPII ()

Period	Period 1+2
Credits	3.0
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. A. Handelzalts
Examinator	dr. A. Handelzalts
Teaching staff	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, drs. W.S. Hoekstra, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. B. Klein, dr. T. Bosma, dr. H.B. Westbroek, C.L. Geraedts, drs. A. Krijgsman, dr. A.A. Kaal, drs. K.L. Schaap, W. Maas, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw
Teaching method(s)	Lecture, Seminar
Level	500

Electronics and signal processing

Course code	X_420533 (420533)
Period	Period 4
Credits	6.0
Language of tuition	Dutch
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	drs. ing. J.M. Mulder
Examinator	drs. ing. J.M. Mulder
Teaching staff	drs. ing. J.M. Mulder
Teaching method(s)	Practical
Level	300

Entrepreneurship in Health and Life Sc.

Course code	AM_470575 ()
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	prof. dr. E. Masurel
Examinator	prof. dr. E. Masurel
Teaching staff	prof. dr. E. Masurel
Teaching method(s)	Lecture, Study Group
Level	500

Course objective
Students obtain knowledge about and insight in the relevance of entrepreneurship and innovation for their own discipline. Students learn about the processes which are involved in the recognition and exploitation of opportunities, about creating economic and social value and about the nature and role of networks. In addition students gain knowledge of different entrepreneurial processes and the importance of

valorisation of (bio)medical findings and business ideas for a knowledge-based economy.
Learning objectives

- Become familiar with an innovation outlook on entrepreneurship.
- Become aware that value-adding opportunities not only contain financial aspects but also social and ecological aspects (sustainable entrepreneurship).
- Gain the ability to write a feasibility plan on how to bring an innovation to the market.
- Obtain knowledge about and insight in the relevance of entrepreneurship and innovation for science disciplines.
- Learn about the processes which are involved in the recognition and exploitation of opportunities, about creating economic and social value and about the nature and role of networks.
- Gain knowledge of different entrepreneurial processes and the importance of valorisation of (bio)medical findings and business ideas for a knowledge-based economy.

Course content
This course consists of two tracks: a theoretical track and a practical track. These two tracks run simultaneously. In the first track you learn about entrepreneurship. Answers are found on questions such as: What is entrepreneurship? What defines an entrepreneur? What are entrepreneurial opportunities? What is the role of innovation in entrepreneurship? What is corporate social responsibility (CSR)? How can we judge the feasibility of entrepreneurial ambitions? Simultaneously you work on an assignment (second track). In the first week of this course you search for an innovation in your own discipline (product, service, process etc). Your choice must be approved by the lecturers. The first part of the assignment consists of a description of the innovation which you have chosen. Subsequently, you make a SWOT-analysis and a network analysis of the innovation. Also a paragraph on CSR aspect should be added. The final part of the assignment is your own feasibility study: how would you valorize the innovation to the market?

Form of tuition
Lectures, personal meetings. Each week scientific lectures are given (on entrepreneurship, SWOT-analysis, innovation, CSR etc). These lectures are both the basis for the exam and for the assignment. Each week the student has a short meeting with his / her supervisor, in order to discuss the progress of his/her assignment.

Schedule and study time
The total study time is 160 hours.
Tuition methods include lectures, consultancies and self-study.
The different elements have the following study time:
- lectures 18 hours
- consultancies 8 hours
- writing feasibility plan 65 hours
- examination 4 hours
- self study remaining hours

Type of assessment
You conduct a written exam and an assignment. Both the exam and the assignment determine 50% of the grade. The exam and the assignment must be of sufficient quality.

Course reading
To be announced on Blackboard

Target group
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.

Remarks
Attendance is compulsory. Prior knowledge: Business Management in Health and Life sciences.

Epidemiology

Course code	AM_1179 ()
Period	Period 3
Credits	3.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. R.M.H. Peters
Examinator	dr. R.M.H. Peters
Teaching method(s)	Lecture, Study Group, Computer lab
Level	500

Course objective
• To gain an understanding of the principles of different study designs
• To gain an understanding of issues concerning measures of disease and association
• To gain an understanding of principles of bias and confounding
• To gain an understanding of the principles of screening and critically appraise its use in public health
• To learn how to calculate and interpret sensitivity, specificity, positive and negative predictive values
• To acquire skills to perform statistical analyses using a database (during the computer-based sessions) and interpret, describe and present the results critically

Course content
This two week course will help you to obtain an understanding of the principles of study designs (cross-sectional, longitudinal, case-control, clinical trails). Issues concerning exposure and disease measurement and exposure-disease relationships will be discussed in detail, and examples will be provided. Together with your colleagues, you will learn how to apply this knowledge first by hand (during the lectures), then to an epidemiologic database (during the computer-based sessions) and how to interpret the results critically.

Form of tuition
• Lectures (12 hours)
• Work groups (12 hours)
• Computer practicum (12 hours)
• Self-study (remaining time)

Type of assessment

• Exam
• Assignment
Both elements need to be passed.

Course reading
To be announced

Target group
Students without a background in epidemiology

Registration procedure
n/a

Remarks
Maximum 25 students

For more information contact Ruth Peters (r.m.h.peters@vu.nl)

Ethics in Biomedical Research

Course code	X_422592 ()
Period	Period 3
Credits	3.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	prof. dr. J.T. de Cock Buning
Examinator	prof. dr. J.T. de Cock Buning
Teaching staff	prof. dr. J.T. de Cock Buning
Teaching method(s)	Lecture, Seminar, Study Group
Level	400

Course objective
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;
- To 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;
- Being able to apply these various methods and analytical tools in the context of medical natural science and to facilitate constructive discussions about ethical aspects.

Course content
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 formulated 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.

Form of tuition
Ethics in Medical Research is a halftime course of four weeks (3 EC). 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 workgroups, and to pass the exam.

Type of assessment
- Degree of intellectual participation in the workgroups (10%)
- Exam (50%) has to be passed
- written and verbal execution of the moral dialogue: assignment 'position' (20%) and assignment 'middle ground' (20%)

Course reading
Available on Blackboard

Entry requirements
BSc Medical Natural science or equivalent BSc
Research experience

Target group
Students of master Medical Natural Sciences

Registration procedure
VUnet

Remarks
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

Course code	AM_470818 ()
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	A. van Luijn MSc
Examinator	dr. C.W.M. Dedding
Teaching staff	prof. dr. P. Heutink
Teaching method(s)	Lecture, Study Group

Level	500

Course objective
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

Course content
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.

Form of tuition
Contact hours

Lectures: 33 hours
Work groups: 12 hours
Group project, simulation and exam: 11 hours

Self study and preparing: remaining hours

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

Course reading
To be announced at the start of the first work group/lecture

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

Remarks

(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 Wanda Konijn (w.s.konijn@vu.nl) or Anna van Luijn (a.van.luijn@vu.nl)

High-Throughput Screening

Course code	X_435047 (435047)
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	dr. J. Kool
Examinator	dr. J. Kool
Teaching staff	dr. J. Kool
Teaching method(s)	Lecture
Level	500

Course objective
In depth study on the bio-analytical and screening aspects related to target and lead discovery of drugs.

Course content
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 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.

Form of tuition
The course starts with a thorough explanation on all subjects that will be discussed, and during which lecture. During the lectures, relevant literature per lecture will be mentioned. This literature is mainly from e-books (chapters) and from academic papers/reviews. All literature that will be mentioned can be found in the course documents on BlackBoard. All this literature has to be studied for the oral examination. All students will work on an assignment related to a topic in high throughput screening. This assignment results in a document and a PowerPoint presentation of 8 minutes.

Type of assessment
Examination is in the form of an oral or written examination accounting for 50% of the final mark (depending on the number of students entering the course). 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 of 8 minutes 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 document is between 6 and 8 pages (Times New Roman type 12; line spacing 1) including title page and with a maximum of 4 Figures/Tables. 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 (6.0).
(If more than 12 students join this course, students will form groups of two students. In that case, the presentations will be given by both students per group and each presentation has a duration of 12 minutes. The document is then between 10 and 14 pages (Times New Roman type 12; line spacing 1) including title page and with a maximum of 6 Figures/Tables. The oral examination will then still be on individual basis).

Course reading
Please see the Course Documents on BlackBoard. The PowerPoint presentation named "HTS Course Overview" gives a detailed explanation/overview of the lectures, tutorials and course structure. All PowerPoint lectures will be placed on BlackBoard at least one day before each lecture. All PDF e-book chapters and other literature (e.g. academic research papers and reviews) can already be found on BlackBoard. It will be announced when each PDF literature is/are to be read in order to prepare for a respective lecture.

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

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

Image Processing for MNS

Course code	X_422612 ()
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	dr. ir. T.J.C. Faes
Examinator	dr. J.C. de Munck
Teaching staff	dr. ir. T.J.C. Faes
Teaching method(s)	Lecture, Practical
Level	400

Internship Science in Society

Course code	AM_1134 ()
Period	Ac. Year (September)
Credits	30.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. T.J. Schuitmaker-Warnaar
Examinator	dr. T.J. Schuitmaker-Warnaar

Course objective
The aim of the internship as part of the Major Science in Society (societal specialisation) is to apply the competences acquired during the previous courses in a research project in order to ground the knowledge, attitudes and skills of interdisciplinary research. More specifically, the aims of the internships are:
• The student learns to independently conduct scientific research.
• The student is able to independently find scientific information and to evaluate this for the benefit of his or her own research question.
• The student is able to apply scientific methods and knowledge, to answer research questions and to generate evidencebased knowledge.
• The student is able to formulate a research question, to choose, to implement and to evaluate the (appropriate) research method, and to phrase the obtained results in report.
• The student is able to cooperate with researchers of various disciplines.
• The student is able to orally present the research results and to discuss the findings.
• The student obtains a good impression of a potential future field of career.

Course content
The internship is a compulsory part of the one year specialisation as part of the regular master. The duration of the internship is 5 months (30 EC). An internship placement must provide the student with the opportunity to learn how to conduct research under supervision. The onsite supervisor of the internship is linked to an academic or research institution.

Internships can be done at various locations such as the Ministry of Health, Welfare and Sports, the Public Health Inspectorate, the Health Council, medical organizations such as the municipality health service (GGD), consultancies, the (pharmaceutical) industry and several research institutes, such as universities or e.g. the National Institute for Public Health and the Environment (RIVM).

An internship typically has three phases

• In the first phase, you write your research proposal consisting of an introduction, background, theoretical/conceptual framework, research questions and your research methodology.
• In the second phase, you collect your (qualitative and/or quantitative) data.
• In the third phase, you do your final analysis and present your findings both orally and in a report. The presentation seminar is a compulsory part of this third phase.

Form of tuition
Research internship

Type of assessment
Report (55%), Oral presentation (15%), Execution (30%) and Attitude (Pass/fail)

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 onsite supervision can be carried out by a trainee research assistant (AIO), postdoc or researcher.

Entry requirements
To ensure that students do have enough background knowledge, it is required that you have passed the three compulsory courses: ‘Qualitative and Qualitative Research Methods’, ‘Communication Organization and Management’, and ‘Analysis of Governmental Policy’ (grade at least 6).

Target group
Students Major Science in Society

Registration procedure
Internships can only start when the draft research proposal and application and agreement form is approved and signed by the specialization coordinator.

Remarks
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 Examination Board.

Information on internships is made available on Blackboard.

Live Cell Imaging

Course code	AM_470726 ()
Period	Period 1
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. R.F.G. Toonen
Examinator	dr. R.F.G. Toonen
Teaching staff	dr. R.M. Meredith
Teaching method(s)	Lecture
Level	500

Course objective
This course will provide the student with theoretical and practical knowledge to utilize emerging cellular and sub-cellular imaging

technologies in neuroscience.

Course content
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. The course will examine a variety of molecular probes of cell function, including calcium-sensitive dyes, voltage-sensitive dyes, photo-activated ("caged") compounds, and exocytosis tracers for synaptic vesicle and neuropetide containing vesicles.
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 to monitor vesicle release and transport, especially Green-Fluorescent Protein (GFP) and its variants.

Form of tuition
This is a full time course.
In the first two weeks of the course 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. The last 2 weeks will be devoted to hands-on experiments in the lab in small groups.

Theory: (20%)
A. Lectures: 10 x 2 hrs: 20h
B. Journal clubs/lab tour: 10h
Hands-on lab work (45%)
A. Practicals & data analysis: 8 x 7h: 56h
B. Presentations/data assessment/exam: 15h + 2h exam
Self-study (35%)
- 58h
Total: 160h

Type of assessment
Oral presentations (2x) of lab experiments (50%) and Mid-term Exam (50%)
Students need to pass both parts (grade > 5.5) to obtain final grade.

Course reading
Course co-ordinators will provide:
• Selected chapters from Live Cell Imaging. A laboratory Manual. Editors: Goldman and Spector.
• Selection of primary scientific papers

Entry requirements
1st year Master of Neurocience or equivalent.
Course is also open to non-VU neuroscience students.
Please send email to course coordinators with study program details for eligibility check.

Target group

2nd year Master Neuroscience students of equivalent.

Registration procedure
Maximum number of students is 20. Master of Neuroscience students will have priority. Vacant positions will be filled on basis of first come first serve. For further information and application, please contact:

Dr. R. Toonen (r.f.g.toonen@vu.nl) or Dr. R. Meredith (r.m.meredith@vu.nl).

Remarks
Guest lectuerers:
Dr. C. Lohman NIN, KNAW
Dr. P Mangeol FEW
Drs B. v. Oort FEW
Drs. A. Negrean CNCR, FALW

Major research Project

Course code	X_422615 ()
Period	Ac. Year (September)
Credits	36.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	dr. ir. T.J.C. Faes
Examinator	dr. ir. T.J.C. Faes
Level	500

Major research Project

Course code	X_422613 ()
Period	Ac. Year (September)
Credits	39.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	dr. ir. T.J.C. Faes
Examinator	dr. ir. T.J.C. Faes
Level	500

Mass Spectrometry

Course code	X_435604 (435604)
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Level	400

Course content
http://studiegids.uva.nl/web/uva/sgs/nl/c/229.html

Remarks
Registration via https://www.sis.uva.nl is mandatory 4 weeks before the start of the Semester.

Minor research Project

Course code	X_422614 ()
Period	Ac. Year (September)
Credits	21.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	dr. A. Bhulai
Level	500

Minor research Project (27EC)

Course code	XM_42000 ()
Period	Ac. Year (September)
Credits	27.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	dr. A. Bhulai
Level	500

Parameter Estimation Applied to Medical and Biological Sciences

Course code	X_432631 (432631)
Period	Period 4
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	dr. J.C. de Munck
Examinator	dr. J.C. de Munck
Teaching staff	dr. J.C. de Munck
Teaching method(s)	Lecture
Level	500

Course objective
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.

Course content
Linear-non linear parameter models, basic matrix-vector algebra, maximum likelihood principle, correlated-uncorrelated noise, OLS, GLS, 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.

Form of tuition
Lecture.

Type of assessment
Written exam.

Target group
mMNS

Pathophysiology of Heart and Circulation

Course code	M_CPATHO09 (3120014)
Period	Period 1
Credits	6.0
Language of tuition	English
Faculty	VUmc
Coordinator	dr. W.S. Simonides
Examinator	dr. W.S. Simonides
Teaching method(s)	Lecture, Study Group
Level	400

Course objective
Obtaining a thorough understanding of cardiovascular function and the role of the underlying molecular components and mechanisms in the development of cardiac pathology.

Developing skills in critically reading research papers; formulating a new research concept; presenting the results of a study in a conference setting and writing a lay summary.

Course content
This course focuses on the fundamental aspects of normal cardiac function, cardiac dysfunction and the development of heart failure. The physiology of the heart and the circulation in health and disease will be addressed, with emphasis on the molecular mechanisms involved. Note: This is an advanced course and basic knowledge of cardiac structure and function is required to complete the course successfully.

The following topics will be addressed:

• circulation and blood pressure
• fluid dynamics
• electrophysiology
• cardiac contractile function
• cardiac remodelling and heart failure
• cardiomyopathies
• cardiac signal transduction and gene regulation
• mitochondrial function in heart failure

Form of tuition
Written exam and assignments.

Course reading
Book: Pathophysiology of Heart disease. Ed. L.S. Lilly 5th ed.
Various research articles and selected Chapters from Cardiology. Ed. Crawford-Di Marco-Paulus 3rd ed.

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

Peergroup 1

Course code	O_MLPEERGR_1 ()
Period	Period 1+2+3, Period 4+5+6
Credits	0.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. A. Handelzalts
Examinator	dr. A. Handelzalts
Teaching method(s)	Study Group
Level	400

Peergroup 2

Course code	O_MLPEERGR_2 ()
Period	Period 3+4+5
Credits	0.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. A. Handelzalts
Examinator	dr. A. Handelzalts
Teaching method(s)	Study Group

Physics of Organs 1: Cardio-Pulmonary Physics

Course code	X_428527 (428527)

Period	Period 1
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	prof. dr. ir. G.J.L. Wuite
Examinator	prof. dr. ir. G.J.L. Wuite
Level	400

Course content
http://studiegids.uva.nl/xmlpages/page/2015-2016/zoek-vak/vak/14927

Remarks
This course is offered at the UvA. For more information contact: FNWI
Education Service Centre, Science Park 904,
servicedesk-esc-science@uva.nl, +31 (0)20 525 7100.
Enrolment via https://m.sis.uva.nl/vakaanmelden is required.

Physics of Organs 2: Sensory Organs and Bioelectricity

Course code	X_428528 (428528)
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Level	400

Course content
http://studiegids.uva.nl/xmlpages/page/2015-2016/zoek-vak/vak/14928

Remarks
This course is offered at the UvA. For more information contact: FNWI
Education Service Centre, Science Park 904,
servicedesk-esc-science@uva.nl, +31 (0)20 525 7100.
Enrolment via https://m.sis.uva.nl/vakaanmelden is required.

Policy, Politics and Participation

Course code	AM_470589 ()
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. R.M. Edelenbosch MSc
Examinator	dr. R.M. Edelenbosch MSc
Teaching staff	dr. B.J. Regeer, dr. J.F.H. Kupper, prof. dr. J.E.W. Broerse
Teaching method(s)	Lecture, Study Group
Level	500

Course objective
To further deepen your analytic skills with respect to the assessment of a specific societal problem;
To acquire further insight into the practice of interactive research;
To acquire further insights into specific methods and techniques of interactive research;
To strengthen the skills to design an interactive research project
To practice skills in data collection and analysis;
To learn to set up valid lines of argumentation;
To improve your communication skills;
To improve your skills in working effectively in a project team, through team building, team analysis and feedback.

Course content
In this course you get the chance to gain experience in the practical implementation of methodologies for interactive research. In a four week policy project 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 democracy theory. In a group of about ten students you will participate in a real interactive research project which is executed at the Athena institute. 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 prepare a policy report to present your findings. In an oral presentation your team will highlight the main results of your analysis and defend the recommendations you propose.

Form of tuition
Lectures: 14 hours
Training workshops: 4 hours
Project assignment: 102 hours
focus group execution: 6 hours
Final presentations project results: 4 hours
Self study: remaining hours

Type of assessment
The course does not have an oral or written exam. You will be assessed on the basis of the group assignment, a group presentation and on your individual performance during the course (in the work groups, your facilitation skills in the ‘real’ focus groups). For all parts a pass grade (> 5.5) needs to be obtained in order to receive a final mark.

Your final mark will be based on: the group report (40%): oral presentation per group(40%): individual performance (20%).

Course reading
To be announced on Blackboard

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

Target group
Optional course for Master students Management, Policy Analysis and Entrepreneurship in Health and Life sciences (MPA), Societal

differentiation of the Health, Life & Natural Sciences.

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

Remarks
As the project depends on team work, attendance is compulsory.

Praktijk 1

Course code	O_MLPRAK_1 ()
Period	Period 1, Period 4
Credits	6.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. A. Handelzalts
Examinator	dr. A. Handelzalts
Teaching staff	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, drs. W.S. Hoekstra, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. L.J. van Well-van Grootheest, dr. H.B. Westbroek, C.L. Geraedts, drs. A. Krijgsman, dr. A.A. Kaal, dr. A. Handelzalts, drs. K.L. Schaap, W. Maas, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw
Teaching method(s)	Study Group
Level	400

Praktijk 2

Course code	O_MLPRAK_2 ()
Period	Period 2+3, Period 5+6
Credits	9.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. A. Handelzalts
Examinator	dr. A. Handelzalts
Teaching staff	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, drs. W.S. Hoekstra, drs. C.D.P. van Oeveren, drs. S. Donszelmann, dr. H.B. Westbroek, C.L. Geraedts, drs. A. Krijgsman, dr. A.A. Kaal, dr. A. Handelzalts, drs. K.L. Schaap, W. Maas, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw
Teaching method(s)	Study Group
Level	400

Praktijk 3

Course code	O_MLPRAK_3 ()

Period	Period 4+5+6
Credits	15.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. A. Handelzalts
Examinator	dr. A. Handelzalts
Teaching staff	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, drs. W.S. Hoekstra, drs. C.D.P. van Oeveren, drs. S. Donszelmann, dr. H.B. Westbroek, C.L. Geraedts, drs. A. Krijgsman, dr. A.A. Kaal, dr. A. Handelzalts, drs. K.L. Schaap, W. Maas, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw
Level	400

Praktijk onderzoek 1

Course code	O_MLPROZ_1 ()
Period	Period 3, Period 6
Credits	3.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. H.B. Westbroek
Examinator	dr. H.B. Westbroek
Teaching staff	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, prof. dr. M. Meeter, drs. W.S. Hoekstra, 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, drs. A. Krijgsman, dr. J.M.H. Swennen, dr. A.A. Kaal, dr. A. Handelzalts, drs. K.L. Schaap, W. Maas, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw
Teaching method(s)	Study Group, Lecture
Level	400

Praktijk onderzoek 2

Course code	O_MLPROZ_2 ()
Period	Period 4+5+6
Credits	6.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. H.B. Westbroek
Examinator	dr. A. Handelzalts

Teaching staff	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, ir. E.J.F. Scheringa, prof. dr. M. Meeter, drs. W.S. Hoekstra, 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. J.M.H. Swennen, dr. A.A. Kaal, dr. A. Handelzalts, drs. K.L. Schaap, W. Maas, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw
Teaching method(s)	Lecture, Seminar
Level	400

Protein Analysis

Course code	X_435045 (435045)
Period	Period 5
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Teaching staff	dr. H. Lingeman
Teaching method(s)	Lecture
Level	500

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

Course content
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.

Form of tuition
Lectures and tutorials

Type of assessment
Oral examination.

Course reading
Hand-outs (electronically available).

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

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

Proteomics in Biomedical Research

Course code	M_CPROTBI09 (3120006)
Period	Period 3+4+5
Credits	3.0
Language of tuition	English
Faculty	VUmc
Coordinator	prof. dr. J. de Groot-van der Velden
Examinator	prof. dr. J. de Groot-van der Velden
Teaching method(s)	Lecture, Study Group
Level	500

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

Course content
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).

Course reading
Syllabus including relevant articles

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

Remarks
Contact:
Dr. Connie R. Jimenez
Associate Professor, Head OncoProteomics Laboratory
Dept. Medical Oncology
e-mail: c.jimenez@vumc.nl

Reflective Practice Internship Science Communication

Course code	AM_1163 ()
Period	Ac. Year (September)
Credits	30.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. J.F.H. Kupper
Level	600

Course objective
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.

Course content
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 blackboard (science communication community).

Form of tuition
Work-based placement

Type of assessment
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.

Target group
Students MSc Earth science year 2

Remarks
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
Blackboard) 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 Blackboard.

Research I

Course code	O_MLVPOOI ()
Period	Period 1+2+3
Credits	3.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. A. Handelzalts
Examinator	dr. A. Handelzalts
Teaching staff	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, drs. I. Pauw, drs. W.S. Hoekstra, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. W. Jongejan, dr. H.B. Westbroek, C.L. Geraedts, drs. A. Krijgsman, prof. dr. J.J. Beishuizen, dr. A.A. Kaal, drs. K.L. Schaap, W. Maas, F.L. de Vries MSc, drs. H. Stouthart
Teaching method(s)	Lecture, Seminar
Level	500

Research II

Course code	O_MLVPOOII ()
Period	Period 1+2+3
Credits	6.0
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. H.B. Westbroek
Examinator	dr. H.B. Westbroek
Teaching staff	drs. W. Jongejan, dr. T. Bosma, dr. H.B. Westbroek, dr. A.A. Kaal, dr. A. Handelzalts, W. Maas
Teaching method(s)	Lecture, Seminar
Level	500

Research Internship Science Communication

Course code	AM_1162 ()
Period	Ac. Year (September)
Credits	30.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. J.F.H. Kupper
Level	600

Course objective
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.

Course content
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 blackboard (science communication community).

Form of tuition
Work-baed placement

Type of assessment
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.

Target group
Students Earth science year 2

Remarks
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
Blackboard) 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 Blackboard.

Research methods for analyzing complex problems

Course code	AM_1182 ()
Period	Period 1
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. M.E. Arentshorst MSc
Examinator	dr. M.E. Arentshorst MSc
Teaching method(s)	Lecture, Seminar, Computer lab
Level	400

Course objective
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 into various quantitative and qualitative research methods, their underlying theoretical concepts and their relative strengths and weaknesses;
- Being able to apply these various quantitative and qualitative 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.

Course content
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, systematic observations, surveys and statistics, 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.

Form of tuition
Research Methods for Analyzing Complex Problems is a fulltime course of four 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.

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

Exam 50% of total grade
Group assignment 'study Design' 50% of total grade

Course reading
The literature of this course consists of selected scientific articles that are provided on blackboard, 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 blackboard.

Target group
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.

Registration procedure
VUnet

Remarks
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.

course coordinator: Marlous Arentshorst - m.e.arentshorst@vu.nl

Science and Communication

Course code	AM_470587 ()
Period	Period 1
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	P. Klaassen MA
Examinator	P. Klaassen MA
Teaching staff	dr. B.J. Regeer, dr. J.F.H. Kupper, drs. ir. M.G. van der Meij, P. Klaassen MA
Teaching method(s)	Lecture, Study Group
Level	500

Course objective
- Gain theoretical insight in the relationship between science and society,
- Gain insight in the role of science communication in this relationship,
- Acquire knowledge of different theories and models of science communication,
- Acquire knowledge of different strategies, media and activities for science communication,
- Learn how to apply theoretical concepts to real-life examples,
- Development of practical skills for science communication (e.g. writing, discussing).

Course content
Science is all around us and shapes our lives in many different ways. From the vaccines you need for travelling abroad, to the technological devices you use on a daily basis. At the same time, society shapes the development of science and technology. Science and society influence each other continuously; they communicate. Students of Science Communication are expected to become experts in understanding and designing interaction between science and society. In order for this interaction to be fruitful and valuable for both science and society, it is important to gain in-depth knowledge about the theoretical basis of

the field of science communication and understand communication processes at the core of several interfaces; e.g. the communication between scientists from different disciplines, between different sciences and their stakeholders, and between science and the public. This course provides a broad basis in the field of science communication by addressing the main areas of science communication and by discussing and challenging several core concepts within this field. Students are invited to explore some issues in greater depth and active participation in lectures and workgroups is required.

Form of tuition
Lectures (22 h)
Workgroups (18 h)
Home-study for group assignments (8 h)
Home-study for individual assignments/exam (90h)

Type of assessment
Individual assignments (30%), group assignment (10%), examination (60%). For all parts a pass grade needs to be obtained.

Course reading
Academic articles. Direct links to articles will be provided on BlackBoard one month before the beginning of the course.

Target group
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

Course code	AM_1002 ()
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. J.F.H. Kupper
Examinator	dr. J.F.H. Kupper
Teaching staff	dr. J.F.H. Kupper
Teaching method(s)	Study Group, Lecture, Seminar
Level	500

Course objective
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

Course content
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 refle ction report.
Every course week is completed with a mini-exam.

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

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

Course reading
Is announced on blackboard one month before start of the course

Target group
Optional course in the MSc specialization Science Communication

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

Science Journalism

Course code	AM_471014 ()
Period	Period 2

Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. J.F.H. Kupper
Examinator	dr. J.F.H. Kupper
Teaching staff	dr. J.F.H. Kupper
Teaching method(s)	Lecture, Study Group, Computer lab
Level	500

Course objective
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

Course content
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 defendable 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.

Form of tuition
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).

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

Course reading
Announced on Blackboard one month before start of the course

Target group
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.

Remarks
Course is taught in Dutch. More information: f.kupper@vu.nl.

Science Museology

Course code	AM_470590 ()
Period	Period 3
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. B.J. Regeer
Examinator	dr. B.J. Regeer
Teaching staff	dr. B.J. Regeer, drs. ir. M.G. van der Meij
Teaching method(s)	Lecture, Study Group, Seminar, Fieldwork
Level	500

Course objective
- Gain insight in the role of museum exhibits in the field of science communication.
- Gain insight in the role of science communication concepts in the context of science museums.
- Apply qualitative research methods to design, conduct, and report on a user research project in museum settings.
- Apply theoretical notions of science communication and exhibit design to advise development of exhibit experience and content design.
- Gain experience in working for an external commissioner.

Course content
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.
Guest speakers and lecturers give insight into their profession (1) as science communicators in museums and science centers, (2) as researchers in the field of museology, and/or (3) as 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 (part of) an exhibition (re-)design. The group assignments are commissioned by museums and science centers, such as NEMO, Museon, Naturalis, Delft Science Centre, and Artis.

Form of tuition
Lectures
Workgroups
Workshops
Home-study for group assignments
Home-study for individual assignments
Field work

Type of assessment
Group assignment (50%), presentation (poster and oral) (10%), and individual exam(s) (40%). For the assignments, presentations and all exams a pass-grade must be obtained.

Course reading
Academic articles. Direct links to articles will be provided on Blackboard one month before the beginning of the course.

Entry requirements
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 required depending on the student's background.

Target group
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.

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

Scientific Writing in English for Medical Natural Sciences

Course code	X_420563 ()
Period	Period 3
Credits	3.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	M. van den Hoorn
Examinator	M. van den Hoorn
Teaching method(s)	Lecture
Level	400

Course objective
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.

Course content
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

Form of tuition
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.

Type of assessment
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.

Course reading
Effective Scientific Writing: An Advanced Learner's guide to Better English, 3rd edition (June 2013) (A. Bolt & W. Bruins, ISBN 978 90 8659 617 1). VU bookstore: €27.95.

Target group
This course is only open to students of the two-year Master's programme Medical Natural Sciences 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.

Remarks
- To do well, students are expected to attend all lessons. Group schedules are to be found at VUnet and on Blackboard.
- A VUnet registration for this course automatically gives access to the corresponding Blackboard site. Group registration only takes place via Blackboard (general groups: registration by students following FEW 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 Blackboard, you are expected to

attend all sessions. If you decide to withdraw from the course, do so in time in VUnet. This all will avoid a 'fail' on your grade list for not taking part in this course and allows other students to fill in a possible very wanted group spot.
- For specific Blackboard matters concerning this course, please contact onderwijsbureau.beta@vu.nl.

Signal Transduction in Health and Disease

Course code	X_432535 (432535)
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	prof. dr. M.J. Smit
Examinator	prof. dr. M.J. Smit
Teaching method(s)	Lecture
Level	600

Course objective
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.

Course content
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.

Form of tuition
Lectures, self-study.
Students will do a case study in groups on a receptor/protein family linked to disease. Molecular mechanisms underlying pathology will be addressed and presented.

Type of assessment
Assignment and presentation, written exam.

Course reading
'Cell signaling', Authors: Wendell Lim, Bruce Mayer, Tony Pawson
ISBN: 9780815342441
Format: Paperback
Publication Date: June 15, 2014

Papers available on Blackboard

Recommended background knowledge

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

Target group
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

Soft Condensed Matter and Biological Physics

Course code	X_420167 (420167)
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Exacte Wetenschappen
Coordinator	prof. dr. ir. G.J.L. Wuite
Examinator	prof. dr. ir. G.J.L. Wuite
Teaching staff	prof. dr. ir. G.J.L. Wuite, prof. dr. P.R. ten Wolde
Teaching method(s)	Lecture
Level	400

Course objective
To provide insight into the physics of biological systems and soft condensed matter. In addition we will discuss and illustrate recent examples of the scientific literature in this field.

Course content
- The building blocks of cells.
- Statistical physics applied to soft-condensed matter.
- Random Walks, Friction and Diffusion.
- Life at low Reynolds number.
- Entropic forces at work.
- Chemical forces & self-assembly.
- The cytoskeleton, a semiflexible, crosslinked polymer network.
- Enzymes and molecular machines.
- Molecular motor proteins, the lorrries in our cells.

Form of tuition
Lectures, and self-study.

Type of assessment
Homework, Scientific literature presentations and an exam.

Course reading
Nelson, P., Biological Physics, Energy, Information, Life. New York: W.H. Freeman and Company, 2004 (ISBN 0-7167-4372-8).
Later editions are also fine.

Target group
mMNS, mPhys-AMEP, mPhys-PLH

Specialisation

Course code	O_MLVERD ()
Period	Period 2+3

Credits	3.0
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. A. Handelzalts
Examinator	dr. A. Handelzalts
Teaching staff	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, drs. W.S. Hoekstra, drs. S. Donszelmann, dr. H.B. Westbroek, C.L. Geraedts, drs. A. Krijgsman, drs. K.L. Schaap, W. Maas, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw, drs. C.D.P. van Oeveren
Teaching method(s)	Seminar,
Level	500

Teaching Methodology Chemistry I

Course code	O_MLVDSKI ()
Period	Period 1+2
Credits	3.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. H.B. Westbroek
Examinator	dr. H.B. Westbroek
Teaching staff	dr. H.B. Westbroek, F.L. de Vries MSc
Teaching method(s)	Seminar
Level	500

Teaching Methodology Chemistry II

Course code	O_MLVDSKII ()
Period	Period 1+2
Credits	6.0
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. H.B. Westbroek
Examinator	dr. H.B. Westbroek
Teaching staff	dr. H.B. Westbroek, F.L. de Vries MSc
Teaching method(s)	Seminar
Level	500

Teaching Methodology Physics I

Course code	O_MLVDNAI ()
Period	Period 1+2
Credits	3.0
Language of tuition	Dutch
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. E. van den Berg

Examinator	dr. E. van den Berg
Teaching staff	dr. H.B. Westbroek, F.L. de Vries MSc
Teaching method(s)	Seminar
Level	500

Teaching Methodology Physics II

Course code	O_MLVDNAII ()
Period	Period 1+2
Credits	6.0
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	dr. E. van den Berg
Examinator	dr. E. van den Berg
Teaching staff	dr. H.B. Westbroek, F.L. de Vries MSc
Teaching method(s)	Seminar
Level	500

Teaching Practice I

Course code	O_MLPRAKI ()
Period	Period 1+2+3
Credits	15.0
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	ir. E.J.F. Scheringa
Examinator	ir. E.J.F. Scheringa
Level	500

Teaching Practice II

Course code	O_MLPRAKII ()
Period	Period 1+2+3
Credits	15.0
Faculty	Fac. der Gedrags- en Bewegingswetensch.
Coordinator	ir. E.J.F. Scheringa
Examinator	ir. E.J.F. Scheringa
Level	500