



Track Science, Business & Innovation

Vrije Universiteit Amsterdam - Faculteit der Exacte Wetenschappen - M Chemistry (joint degree) - 2017-2018

The curriculum in this Master's programme mainly takes place at the University of Amsterdam. For in-depth information about the structure and the courses, please visit the [website of the University of Amsterdam](#).

The specialization Science, Business and Innovation mainly takes place at the Vrije Universiteit Amsterdam. More information about the structure and the courses can be found below.

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Compulsory Choice 1 out of 2

Vakken:

Naam	Periode	Credits	Code
Business, Innovation and Value Creation in the Life Science Industry	Periode 3	6.0	X_432723
Current Sustainable Energy Technologies	Periode 3	6.0	X_422582

Compulsory Choice of 12 EC

Vakken:

Naam	Periode	Credits	Code
Biomedical Modelling and Simulation	Periode 1	6.0	X_430112
BioSolar Cells	Periode 1	6.0	X_428531
Chemical Biology	Periode 1	6.0	X_432538
Green Chemistry	Periode 1	6.0	X_430557
Innovation in Medical Technology to Improve the Health Care System	Periode 6	6.0	X_430602
Organic Photovoltaics	Periode 5	6.0	X_422590
Principles of Pharmaceutical Sciences / Pharmacology	Periode 1	6.0	X_435675
Project Sustainable Future	Periode 6	6.0	X_432784
Protein Science	Periode 1	6.0	AM_470145

Compulsory Choice of 24 EC

Vakken:

Naam	Periode	Credits	Code
Business & Innovation Project	Ac. Jaar (september)	24.0	XM_432845
Materials for energy and environmental sustainability	Periode 4+5	12.0	X_432850
Researching science research	Periode 4+5	12.0	X_432849
Science project	Ac. Jaar (september)	24.0	XM_422591

Recommended electives

Vakken:

Naam	Periode	Credits	Code
Science and Society in Historical Perspective	Periode 4+5	6.0	X_400424
Technology and Innovation Processes	Periode 2	6.0	E_BA_TIP

Compulsory Courses

Vakken:

Naam	Periode	Credits	Code
Management of Sustainable Innovation	Periode 2	6.0	E_BA_MANSI
Networked Organizations and Communication	Periode 2	6.0	S_NOC
SBI Project & Master Thesis	Ac. Jaar (september)	36.0	X_432735
SBI Research Methodology	Periode 1	6.0	X_432846
Transdisciplinarity and Transition	Periode 2	6.0	X_430604

Biomedical Modelling and Simulation

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

Doel vak

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

To gain experience with and to apply MatLab and Mathematica to acquire,

analyse and evaluate biomedical signals and to model and simulate biomedical processes.

Inhoud vak

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

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

Examples will concentrate on cardiovascular function: linear and nonlinear viscoelastic models of pressure volume relations, compartment models of the interaction between contractile proteins to simulate force and pressure development and a description of an ion pump for instance to import Ca-ions into the cell during an action potential.

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

Onderwijsvorm

Lectures, working groups, assignments.

Toetsvorm

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

Literatuur

Syllabus.

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

Doelgroep

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

BioSolar Cells

Vakcode	X_428531 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.P. Dekker
Examinator	dr. J.P. Dekker
Docent(en)	dr. J.P. Dekker, dr. R.N. Frese
Lesmethode(n)	Hoorcollege

Niveau	400
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Doel vak

- To obtain insight in the three main themes of BioSolar Cells (in short research to improve the efficiency of photosynthesis in plants, research to produce biofuel or other products from algae on a semi-industrial scale and research to convert solar energy directly into a fuel in an artificial leaf with very high efficiency).
- To perform a literature study on one of the themes from BioSolar Cells.

Inhoud vak

BioSolar Cells is a Dutch national research programme with the aim to optimize the photosynthesis process in plants, algae and bacteria, and to develop 'artificial leaves' that combine physical and chemical components. The course will start with interactive lectures by experts on each of the three themes from BioSolar Cells. The students will have to read one or two papers before each lecture and formulate research questions, after which the lecturer gives his/her lecture and the questions are discussed. In the second stage of this course, the students choose a research topic, conduct a literature study, prepare a scientific review paper and present their work in a session with all participating students and staff.

Onderwijsvorm

- Lecture
- Self-study

Toetsvorm

Assessment of scientific review article and of a presentation.

Literatuur

Other: Scientific papers.

Business & Innovation Project

Vakcode	XM_432845 ()
Periode	Ac. Jaar (september)
Credits	24.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.P. Dekker
Examinator	dr. J.P. Dekker
Niveau	400

Doel vak

This project is an alternative for the Science Project (X-422591), but only for those students who have performed a science-based project during their bachelor program, like students with completed chemistry, physics or related bachelors programs.

Course objective is similar to that of the Science Project, but a science base is not required.

Inhoud vak

See Science Project, except that this project is based on business and innovation instead of science.

Toetsvorm

Report and presentation

Business, Innovation and Value Creation in the Life Science Industry

Vakcode	X_432723 ()
Periode	Periode 3
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	drs. P. van Hoorn
Examinator	drs. P. van Hoorn
Docent(en)	prof. dr. I.J.P. de Esch, drs. P. van Hoorn
Lesmethode(n)	Hoorcollege
Niveau	500

Doel vak

Business, Innovation and Value Creation in the Life Sciences Industry (BIV in LSI) aims to provide two distinct goals:

- a. To obtain in-depth and comprehensive insight into current business, innovation and entrepreneurship trends, approaches and state-of-the-art practice in the LSI through theory, literature and case analysis.
- b. To utilize and apply insights and experiences gained under a. in a personal entrepreneurship case in which each individual student elects a target product or service.

And develops a business plan for this product or service according to a set methodology. Essential parts of this process include: building strategy, business modeling, transactional modelling, building a value proposition, assessing investment requirements, rNPV modelling, leveraging IP, marketing and commercialization planning.

Inhoud vak

The LSI landscape is shown in several ways:

1. Understanding the Pharma, Biotech and Health Care sectors and their primary and secondary drivers, including the role of contributing sciences
2. Understanding relevant business, value chain and innovation models that are common in these industries and sectors
3. Understanding typical product life-cycle dynamics in the Pharma and Biotech and related Health sectors
4. Understanding the relative contribution and position of Genomics, Proteomics and other scientific specialization areas in the future of Health and Life Sciences
5. Understanding current product categories and future scenarios for diagnosis, therapy and prevention

In addition to lectures on the above topics, students will be handed certain texts and articles that illustrate the 'State of the Art' in the LSI sector from both a product development as well as from a business

development standpoint. As a result the student will get insight into the business decisions and dynamic that are linked to basic bio-scientific research from product inception through to development and commercialization. The course thus aims to provide a general overview of how life science and business are interwoven in everyday industrial practice.

Onderwijsvorm

A mix of lectures, guest lectures, Pharma sector casework and related assignments. Individual coaching on the business planning exercise. Outputs include a report and oral presentations.

Toetsvorm

In order to receive 6 credits for this course, each student must meet the following criteria. The case work assignment will be graded on the following components according to a specific rubric as follows: Definition including idea generation (5% of final grade), Discovery research (10% of final grade), Construct (10% of final grade), Outcomes including Report and Presentations (75% of final grade). Where each component must score 6 or higher. Absence of active participation in class may result in a lower final grade.

Literatuur

Selected scientific publications
New World Drug Discovery by R Robert M. Ryzewski 2008
Business Model Generation – Osterwalder 2010

Vereiste voorkennis

Completed Bachelor SBI or comparable

Doelgroep

M SBI

Overige informatie

In case you have any questions about this course, please contact the coordinator at p.van.hoorn@vu.nl;

Chemical Biology

Vakcode	X_432538 (432538)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. J.E. van Muijlwijk-Koezen
Examinator	prof. dr. J.E. van Muijlwijk-Koezen
Docent(en)	dr. M.H. Siderius, prof. dr. R. Leurs, dr. J. Kool, prof. dr. J.E. van Muijlwijk-Koezen
Lesmethode(n)	Hoorcollege, Computerpracticum
Niveau	400

Doel vak

To get students acquainted with modern chemical biology techniques to study proteins and the modulation of their function, with a specific emphasis on drug discovery

Inhoud vak

In this course emphasis will be given on the interface between Chemistry and Biology. How can one understand biological processes using small molecules? How can one identify small molecules targeting new biochemical pathways, either by using modern biochemical or cellular assays or in silico using the wealth of new information from structural biology? How to detect and/or modulate DNA, RNA and protein expression and/or function with chemical probes? These are the questions that are central to this course.

Onderwijsvorm

lectures, tutorial, consultancy sessions and case study/presentation

Toetsvorm

Students will work in small groups on an integrated case study. Based on primary literature, background information from Comprehensive Medicinal Chemistry, interaction with "Protein Champions", students will work on a "Chemical Biology Protein Report" and oral presentation. Finally, there will be a written examination at the end of the course on the various topics presented in the course.

Final grades will be based on results of the case study (35%), case presentation and discussion (15%) and final exam (50%). Each part must at least be satisfactory (mark "6 out of 10" or higher).

Literatuur

Selected book chapters from Comprehensive Medicinal Chemistry II, 2007, Elsevier, Editors-in-Chief: John B. Taylor and David J. Triggle (available at VU library as e-book) and primary literature.

Vereiste voorkennis

Bachelor Pharmaceutical Sciences, Medical Natural Science, Science, Business and Innovation or Chemistry. Portal course MSc Biomolecular Science or Principles of Pharmaceutical Sciences, Signal Transduction in Health and Disease, or equivalent for mBMS students and students with Bsc SBI or Chemistry.

With a BSc SBI or Chemistry, please contact prof. van Muijlwijk before registration on your eligibility to participate.

Doelgroep

mBMS-BC, mCh-SBI (2nd year), mDDS-BCCA, mDDS-CMCT, mDDS-DD&S, mDDS-DDSA, mDDS-DDTF, mDDS-C-var, mDDS-E-var, mDDS-M-var, mPhys-SBI (2nd year)

Intekenprocedure

Please register as soon as possible online.

Overige informatie

Presence is obliged at predefined moments of the course (e.g. kick-off meeting, computer practical, presentation session, examination) for finishing the course successfully.

Current Sustainable Energy Technologies

Vakcode	X_422582 ()
Periode	Periode 3

Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.P. Dekker
Examinator	dr. J.P. Dekker
Docent(en)	dr. J.P. Dekker, dr. R.N. Frese
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	500

Doel vak

To obtain a complete overview of the technical, economic and societal feasibilities of all possible forms of sustainable energy, including relevance and positive and negative effects.

The students should be able to:

- explain the basic features of these technologies
- be able to make quantitative predictions for each of these technologies.

Inhoud vak

In week 1, students read all chapters of the book and formulate for each chapter a technological and/or economic/societal question. The question will be accompanied with hypothetical answers or estimations or working hypotheses. Answers must be as quantitative as possible. In week 2, students will present and discuss their questions and hypotheses with their group. Then, participants will be handed specific assignments for further research. In week 3, students will present the results of their further research, and will receive feedback from the other participants in their group. In week 4, students will give their final presentations to all participants of the course and will hand in the final report of their work.

Onderwijsvorm

- Lecture
- Self-study

Toetsvorm

Initial questions, hypothetical answers and participation in the discussion result in 50% of the grade. The final document constitutes also 50% of the grade. All documents will be graded by two independent lecturers, their marks will be averaged. Both parts need to have a mark of 6.0 or higher.

Literatuur

Literature: David J.C. Mackay, 'Sustainable energy - without the hot air', 2008; available free online at <http://www.withouthotair.com>

Green Chemistry

Vakcode	X_430557 (430557)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slotweg

Examinator	dr. J.C. Slootweg
Lesmethode(n)	Hoorcollege
Niveau	400

Inhoud vak

<http://studiegids.uva.nl/xmlpages/page/2017-2018/zoek-vak/vak/35116>

Overige informatie

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

Education Service Centre, Science Park 904,

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

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

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

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

Innovation in Medical Technology to Improve the Health Care System

Vakcode	X_430602 ()
Periode	Periode 6
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. ir. T.J.C. Faes
Examinator	dr. ir. T.J.C. Faes
Docent(en)	dr. ir. T.J.C. Faes
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	500

Inhoud vak

<http://studiegids.uva.nl/xmlpages/page/2017-2018-en/search-course/course>

Overige informatie

This course is part of the MSc Physics and Astronomy (joint degree) and

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.

Management of Sustainable Innovation

Vakcode	E_BA_MANSI ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	School of Business and Economics
Coördinator	dr. R.J.A. Klein Woolthuis
Examinator	dr. R.J.A. Klein Woolthuis
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	400

Doel vak

Students are inspired to become a sustainable business leader. Therefore, after this course students should be able to:

- Understand and critically assess theories of sustainable value creation and diffusion of sustainable innovation, and understand how sustainable entrepreneurs and business leaders help to transform industries and co-create a more sustainable future.
- Apply theoretical insights to conceive sustainable business innovations that create shared value, such as cars without emissions, houses that produce their own energy, technologies that make clean drinking water for the poor
- Define strategies and tactics can be used to align the interests of stakeholders, i.e. companies, public and government and make these innovations a success

Inhoud vak

A paradigm shift is happening at this moment. Where over the past decades firms were focused on creating monetary profits for shareholders, the creation of 'shared value' is now gaining terrain: the creation of value for people, planet and profit. Think of:

- Elon Musk of Tesla who want to revolutionize our energy industries and take people to Mars,
- Feike Sijbesma of DSM that is transforming his chemicals company into a bio-tech company geared up to health and nutrition,
- Teun Van der Keuken who created Tony Chocology and managed to get 80% of Dutch chocolate fair trade certified within a year,
- Jaap Korteweg of the Vegetarische Slager who wins championships for best meat products with his cleverly engineered plant based meats, and
- Boyan Slat who has no lesser ambition than to clean up the oceans from plastic with his Ocean Cleanup.

Shared value creation inspires business leaders and entrepreneurs around the world to do things differently, to radically change the way they do business and think about what role they want to play in our societies. This course aims to inspire you to also become such a protagonist for change. Who are these business leaders that change our world? What do their business models look like? What strategies and tactics do they use to become successful? How do strategies centered around respect for the environment, employees, and other stakeholders create positive self-reinforcing cycles of value creation? All these changes require fundamentally different management models in which collaboration with a wide array of stakeholders in key.

Sustainability is hence no longer a story of wishful thinking or environmental activists, it is at the core of corporate strategy and decision making. Moreover, growth in sustainable markets as renewable energy, organic food, and e.g. fair trade products is double digit year after year. Sustainability is not a fashion or an attempt of firms to 'look good'. Empirical evidence suggest that proper sustainability management improves firm performance and creates new entrepreneurial opportunities in rapidly growing markets.

Onderwijsvorm

Lectures
Tutorials

Toetsvorm

Written exam

Assignment/business pitch

Literatuur

Academic articles (to be announced in course manual).

All lectures will discuss 2-3 academic articles that will help students to understand sustainable business models and the way sustainable entrepreneurs and business leaders implement these.

Book for background reading (obligatory):

Senge, Peter M., Bryan Smith, Nina Kruschwitz, Joe Laur, Sara Schley, 2008, The Necessary Revolution: How Individuals and Organizations Are Working Together to Create a Sustainable World, Doubleday (or later edition)

Vereiste voorkennis

For the course it is required that students know:

The concept of Triple P: Planet, people, profit.

The Brundtland report Our common future 1987

The 17 UN Global Sustainability goals.

Aanbevolen voorkennis

For the course it is recommended that students have basic understanding of sustainability, such as:

The concept of Triple P: Planet, people, profit.

The Brundtland report Our common future 1987

The 17 UN Global Sustainability goals.

Doelgroep

Students that want to make a change in existing companies, or co-create change in our societies. Concrete profile:

- Students that want to become business or policy consultant in new business models and sustainability.
- Students that want to become a manager in large companies and want to support the company in making the necessary transition towards more sustainable business models.
- Students that want to work in a policy role in a community, province or national government to develop knowledge on how regions can be transformed to co-create value in business and society.

Materials for energy and environmental sustainability

Vakcode	X_432850 ()
Periode	Periode 4+5
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.P. Dekker
Examinator	dr. J.P. Dekker
Docent(en)	dr. J.P. Dekker
Lesmethode(n)	Hoorcollege

Niveau	500
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Inhoud vak

This course will help you understand critical relationships between the environment, energy and sustainability. The course will provide comprehensive coverage of each topic, bringing together diverse subject matter by integrating theory with engaging insights. It includes helpful features to aid understanding, including a historical overview and suggested questions for discussion.

Literatuur

Book 'Fundamentals of Materials for Energy and Environmental Sustainability' by D.S. Ginley and D. Cahen (MRS, Cambridge University Press)

Doelgroep

Master SBI, track Life & Health and Energy & Sustainability

Networked Organizations and Communication

Vakcode	S_NOC ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Sociale Wetenschappen
Coördinator	dr. C. Moser
Examinator	dr. C. Moser
Docent(en)	dr. C. Moser, N.S.S. Dessing
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	600

Doel vak

Students who have completed the seminar will be able to critically approach, interpret, and compare theories and literature on social networks and networked organizations. They can carry out a small-scale research project (in groups) using a network software tool to conduct social and semantic network analysis, and reflect on the results.

Inhoud vak

The seminar Networked Organizations and Communication aims at gaining in-depth insight into networked organizations and network analysis. The seminar begins with an introduction to network theory, general terms, and concepts. On the basis of recent network literature, the seminar then focuses on how organizations and organizational members become (dis)connected to (from) each other. A particular focus will be on gaining insights into social and semantic networks and on the software program with which one can analyze and visualize such networks. This course addresses three aspects of organizational networks: structure, content and meaning.

Toetsvorm

Group assignment (research project), individually written assignment.

Intekenprocedure

Please enrol in ALL available course modules, including the "exam" (although the exam consists of a written assignment.)

Organic Photovoltaics

Vakcode	X_422590 ()
Periode	Periode 5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. E.L. von Hauff
Examinator	dr. E.L. von Hauff
Docent(en)	dr. E.L. von Hauff
Lesmethode(n)	Hoorcollege
Niveau	400

Inhoud vak

<http://studiegids.uva.nl/xmlpages/page/2016-2017-en/search-course>

Overige informatie

This course is part of the MSc Physics and Astronomy (joint degree) and 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.

Principles of Pharmaceutical Sciences / Pharmacochimistry

Vakcode	X_435675 (435675)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. I.J.P. de Esch
Examinator	prof. dr. I.J.P. de Esch
Docent(en)	prof. dr. I.J.P. de Esch
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

General introduction into and deepening of knowledge of concepts, mechanisms and recent developments in pharmaceutical sciences and the pharmaceutical and biotech industry.

Inhoud vak

This course is designed for students with an interest in life sciences and the biotech/pharmaceutical industry but without prior education in this field. A general introduction will be given to the process of drug

discovery, drug design and synthesis, drug development and drug safety assessment. Subsequently, potential drug targets, mechanisms of drug actions (including drug-receptor/enzyme Using various drug classes, relationships between chemical structures and biological activities will be derived and illustrated. Finally, various modern developments and tools will be illustrated by recent applications in the field of drug research, medicinal chemistry and toxicology.

Onderwijsvorm

Lectures and tutorials.

Toetsvorm

Written examination

Literatuur

Patrick, G., An Introduction to Medicinal Chemistry 5th ed.
Oxford: Oxford University Press. 2009, ISBN: 978-0-19-969739-7

Doelgroep

3S, 3MNW, mCh, mPhys.

The course is optional for mDDS students that did not follow the VU University BSc Pharmaceutical sciences and these mDDS students should contact the mDDS coordinator before enrolling.

The course is recommended for SBI (life) mastertrack students, except for students with an bachelor in SBI or pharmaceutical sciences.

Project Sustainable Future

Vakcode	X_432784 ()
Periode	Periode 6
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	500

Inhoud vak

<http://studiegids.uva.nl/xmlpages/page/2017-2018/zoek-vak/vak/35280>

Doelgroep

mCh-SES, mPhys-SES, mSBI

Overige informatie

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

Protein Science

Vakcode	AM_470145 ()
Periode	Periode 1

Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. D. Bald
Examinator	dr. D. Bald
Docent(en)	dr. M.H. Siderius, dr. J.N.M. Commandeur, dr. D. Bald, dr. ir. K.A. Feenstra, prof. dr. M.J. Smit, dr. D.P. Geerke, prof. dr. ir. E.J.G. Peterman
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	400

Doel vak

The student:

1. knows and understands principles of protein structure, dynamics, regulation, inhibition, interaction and engineering
2. can explain protein function based on protein structure and the properties of amino acid residues.
3. can predict the function of (parts of) a protein based on understanding of its molecular properties
4. knows and understands the principle of current methods for protein investigation (e.g. overproduction, purification, interaction, engineering)
5. can analyze the strong and weak points of Protein Science techniques and can correlate an open question with a suitable technique.
6. can analyze experiments in Protein Science and design new experiments.

Inhoud vak

We will start with a repetition of protein structure and function. Subsequently, we will focus on methods in protein science and also on more specialized properties of proteins important in fundamental research, biomedicine or biotechnology. Finally we will deal with case studies on selected proteins.

Lecture topics include:

Protein Structure, Protein Function, Protein Dynamics, Molecular Machines, Control of Protein Function, Protein inhibition, Antibiotic action, Development of antibiotics and antibiotic resistance, Protein over-expression and purification, Protein Interaction, Protein Engineering, Molecular Modeling and docking

Case studies:

GPCRs as drug target, Cytochrome P450, Chaperones as Protein folding machines, Molecular Modeling/docking..

Onderwijsvorm

Lectures (36 h) accompanied by work (paper) discussions (8 h) and self study

(individual or in small groups) to prepare for the lectures and to discuss the material presented in lectures/accompanying papers.

Toetsvorm

Written exam (100%)

Literatuur

No special book required. Useful may be "Protein Structure and Function" by Petsko/Ringe. You can also use any Biochemistry textbook

(e.g. Voet and Voet) for repetition. You will receive material (reviews and original articles on relevant topics). Examples of scientific literature: Lee et al. Nature 2010, Bax et al. Nature 2010, and Kumar Exp. Opin. Drug Metab 2010.

Doelgroep

Masters students Biomolecular Sciences, Biomedical Sciences, Biology, Pharmaceutical Sciences and Medical Natural Sciences

Overige informatie

Visiting lecturer: Dr. Anil Koul, Tibotec J&J

Researching science research

Vakcode	X_432849 ()
Periode	Periode 4+5
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. M.L. Blankesteyn
Examinator	dr. M.L. Blankesteyn
Docent(en)	prof. dr. ir. B.A.G. Bossink, dr. M.L. Blankesteyn
Lesmethode(n)	Werkcollege, Deeltoets extra zaalcapaciteit
Niveau	500

Doel vak

To study strategy, structure, culture and the environment of a lab research group or R&D group in practice. Students learn how a lab research group or R&D group in life & health practice or energy & sustainability practice functions, on a daily basis, on a yearly basis, related to other commercial functions in its direct environment, and related to the strategy of the organization in which it is situated.

Inhoud vak

Road mapping-assignment to study strategy, structure, culture and environment of a lab research group or R&D group in life & health practice or energy & sustainability practice.

- Students learn to develop a case study research plan that enables them to study a lab or R&D group in practice
- Students learn to carry out the planned case study research steps
- Students develop an report in which they describe and discuss strategy, structure, culture of a lab research or R&D group in practice
- Students learn to orally present and discuss their finding with a student-audience.

Onderwijsvorm

- Weekly interactive assignment sessions;
- Plenary presentation sessions;

Toetsvorm

Students work on an assignment and write a report on the functioning of a lab group or R&D group they studied by means of a case study research method. The assignment is related to 12 EC of the track courses a student has chosen in his/her personal education plan. To pass a weighted average of 5.5 or higher should be scored for the assignment

(60%) and presentations (40%).

Literatuur

To be announced on blackboard.

Vereiste voorkennis

12 EC of science courses

Doelgroep

Master SBI, track Life & Health and Energy & Sustainability

SBI Project & Master Thesis

Vakcode	X_432735 ()
Periode	Ac. Jaar (september)
Credits	36.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	E.H. Kroezinga
Examinator	prof. dr. ir. B.A.G. Bossink
Docent(en)	prof. dr. ir. B.A.G. Bossink
Lesmethode(n)	Hoorcollege
Niveau	600

Doel vak

The aim of the Master project is that students individually learn how to conduct a comprehensive SBI research project.

Inhoud vak

When completing the Master project students learn to further deepen their knowledge and skills that they have obtained during their bachelor and master program.

At the start of the project, students develop a project plan. This plan consists of a literature study, research questions, research methods and techniques, a time schedule and research goals.

The student is only allowed to start with the project, when the plan has been approved by the supervisors from the VU University and the supervisor from the organization in which the student conducts the research project. The research project is completed within 6 months. It is centered around a SBI-related case that is both acknowledged by the student and the supervisors.

The student produces two deliverables:

1. A thesis consisting of scientific research design, results, discussion, and conclusions.
2. A report describing the organization in which the project is conducted.

Onderwijsvorm

For further information see Manual Master project SBI (Canvas). Student will spend most of his/her time on conducting the research project and writing the thesis.

Toetsvorm

Work execution: 40%

Aptitude test (the thesis): 45%

Final oral presentation: 15%

Literatuur

Verschuren, P., Doorewaard, H. (most recent edition) Designing a research project. The Hague: Eleven International Publishing.

Other literature as described in the plan of action.

Vereiste voorkennis

Up-to-date PEP signed by the master coordinator and the examination board. Before starting the SBI project & master thesis, students must have earned all other program credits. A shortfall of 12 credits is permissible, as long as it does not include credits for the course SBI Research Methodology.

Doelgroep

2 M SBI

Overige informatie

Students must write a reflection report when they have (almost) completed their internship. The report consists of two parts: a business analysis and a self-reflection part.

SBI Research Methodology

Vakcode	X_432846 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. P.C. van der Sijde
Examinator	prof. dr. P.C. van der Sijde
Lesmethode(n)	Hoorcollege
Niveau	500

Doel vak

The objective of the course is to learn about the different methodological traditions in science. SBI is a multidisciplinary study in which (natural) sciences, social and business studies are combined. Each with its own pedigree. The students learn about the similarities and differences and how to cope with methodological issues in their research projects.

Inhoud vak

The students are introduced to the different methodological traditions (- natural - sciences, social and business studies) and learn about what it means to do research. Students learn to analyze articles, formulate research question, qualitative and quantitative research, setting up research and analyzing data.

Onderwijsvorm

The course has two parts:

Part 1 - classes and workgroups. theory is introduced in the classes and via assignment elaborated in work groups.

Part 2 - the students coach Bachelorstudents in writing their Plan of

Action for the Bachelorthesis.

Toetsvorm

1. Exam (30%)
2. Research plan for a project (50%)
3. Reflection report of the coaching of Bachelor students (20%)

Literatuur

Bhattachjee, A. (2012) Social science research. (Available via Internet)

Selected articles to be announced

Doelgroep

SBI students preparing for their thesisproject

Intekenprocedure

via the normal procedures

Science and Society in Historical Perspective

Vakcode	X_400424 (400424)
Periode	Periode 4+5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. D.J. Beckers
Examinator	dr. D.J. Beckers
Docent(en)	dr. D.J. Beckers
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	400

Doel vak

To increase understanding of the various interactions between mathematics, chemistry, physics, (medical) biology, computer and earth sciences (in general: science) and society during the last two centuries.

Inhoud vak

In the last two centuries science has become one of the prime agents in the shaping of modern society. In turn social and political concerns have been equally instrumental in the shaping of the modern scientific enterprise. In this course we will study the changing relationship between science and society in this period in various case studies and from several points of view. We will use literature and source material, most notably (journal and film) advertisements, and the cartoon journal Punch to illustrate these cases. The following themes are addressed: professionalization, science and the public (e.g. the public understanding and appreciation of science); Science as product and agent of modernity (e.g. quantification and standardization as applied to nature and society); Science and politics (e.g. science policies, military and commercial interests, science and ideology), science and education.

Onderwijsvorm

Seminar.

Toetsvorm

Active participation during the seminar, essay and presentation and a short exam on the topics addressed during the classes.

Literatuur

available via blackboard.

Vereiste voorkennis

Bachelor degree

Doelgroep

Master students in the sciences who enjoy history or (historical) reflection on their field of subject, as well as master students in history, who want to acquire more understanding in the role of science in society.

Overige informatie

More information with the course coordinator: Afdeling Algemene Vorming, De Boelelaan 1081, kamer U252, d.j.beckers@vu.nl

Science project

Vakcode	XM_422591 ()
Periode	Ac. Jaar (september)
Credits	24.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.P. Dekker
Examinator	dr. J.P. Dekker
Niveau	400

Doel vak

The MSc SBI students will follow the Science Project SBI to strengthen their knowledge and experience with natural sciences in order to be able to talk the language of the specialists and to scan and interpret new developments and inventions in the field of life and health and/or energy and sustainability. The student will:

- a. actively participate in a research team and is expected to critically follow and discuss research matters that are a subject in meetings as well as present his or her own work to the group on a regular basis. In doing so and through this immersion in faculty research, the student is becoming acquainted with a research process, including its organization, objectives and challenges.
- b. design, execute and deliver his or her own research project and be individually responsible for it, under supervision of a senior scientist. A second and independent reviewer will be assigned to assess the final products.
- c. deliver a final report, present outcomes on a regular basis including a final presentation and make detailed recommendations for further research with respect to his or her research assignment.

Inhoud vak

In this project the student should work closely with laboratory researchers on a project based on modeling and/or experimental lab work.

Programs that contain innovation or valorization aspects are ideally suited for participation of SBI students. Once a topic has been agreed upon, the student will agree on a research question. Subsequently the student will draft a research plan in which is addressed: theoretical framework, research methodology and data analysis, experimentation set-up, planning, organization, anticipated outcomes and reporting format. This plan will also include a listing of some relevant literature references pertaining to the particular topic.

The plan may also include a course to provide insight and experience on experimental lab work or modeling. For instance, it is possible to define a drug discovery project that is accompanied by the integrated course Computational Design and Synthesis of Drugs (code 435673). In this course, students will learn step by step about data mining and computer-aided drug design techniques. The study load of these courses will be integrated in the Science Project SBI.

Onderwijsvorm

Research project

Toetsvorm

Report and presentation, as explained in the course manual

Literatuur

Depending on the project

Vereiste voorkennis

Requirements to enter the mSBI program

Doelgroep

mSBI

Technology and Innovation Processes

Vakcode	E_BA_TIP ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	School of Business and Economics
Coördinator	dr. P.R. Tuertscher
Examinator	dr. P.R. Tuertscher
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	400

Overige informatie

This course will not be lectured anymore from 2017-2018. For students who have attended the course 2016-2017 or earlier, but have not successfully completed the course, a transitional regulation is valid. At the introduction page of this study guide you will find an overview of transitional arrangements. In order to pass the course subscribing to the course in VUnet is necessary. The course description (including literature) can be found in last year's study guide.

Transdisciplinarity and Transition

Vakcode	X_430604 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	N.T. Krooneman MSc
Examinator	N.T. Krooneman MSc
Docent(en)	dr. B.J. Regeer
Lesmethode(n)	Hoorcollege, Werkcollege, Deeltoets extra zaalcapaciteit, Werkgroep
Niveau	400

Doel vak

- You can reproduce and apply the essence of current transition theories, e.g. the multi-level perspective.
- You can design a tailor made transdisciplinary approach to identify and cope with hurdles in an innovation trajectory
- You are able to make an in-depth semi-structured interview guide.
- You are able to execute, transcribe, analyse and summarise an in-depth interview.
- You are able to apply analytical tools, such as causal analysis, actor analysis, fact-value framing, SWOT.
- You are able to integrate multi-disciplinary knowledge and multi-stakeholder interests into a management advice for a transition process.

Inhoud vak

Innovation often implies a troublesome and risky process starting with a bright idea, via a small niche innovation towards a competitive position. This course focuses on the analytical skills necessary to guide and advise a niche innovation. Guiding and advising implies that you are aware of the social forces prohibiting a breakthrough and how to identify and implement tailor made solutions to deal with these forces. Therefore, this course introduces you to several theories related to innovation and societal forces, and we will offer you training with a toolbox of various analytical methods to explore the specific hurdles of a given project, in order to design a tailor made advice.

Little by little, academic research reveals the complexity of societal mechanisms behind transitions, e.g., cultural aspects, psychological aspects, structures of states, institutions and multinationals.

Transdisciplinarity is an emerging discipline in which research approaches and analytical methods are developed to connect relevant parts of different disciplines to solve complex processes, including transitions. Transitions are referred to as complex because different stakeholder groups are involved (e.g. industry, academia, consumers and NGOs) and these stakeholders often have different visions on what is "best" for society.

On the basis of experiences with large innovative consortia (Genomic Initiative - ecological genomics, Sustainable innovation/brain imaging, BE-Basic/synthetic biology) you will learn all about the do's and don'ts of the Interactive learning and Action approach, how to use an actor analysis to delineate your allies and enemies, how to use semi-structured interviews to deepen your understanding of reasons behind problems, how

to construct a causal analysis to understand the complexity of the problems you face, and how a SWOT analysis can help to identify strategic priorities.

Parallel to the lectures you will work in a group on an advice regarding an innovation, conducting interviews with key players and analysing the complexity of interests.

Onderwijsvorm

Lectures, skills training, coach meetings, self-study and project. The total study time is 6 EC (6x28 = 168 hours). Tuition methods include lectures, training sessions, self-study, and a group project on a specific case. In the case study, you will integrate different theories and tools, and apply the toolbox introduced during the lectures.

- lectures: 18 hours
- coach meetings: 14 hours
- skills training: 6 hours
- preparation and execution of interviews: 1 hours
- preparation and execution of expert meeting: 2 hours
- presentation of project results: 4 hours
- self study and project: 124 hours
- examination: 2 hours

Please note that attendance to the project meetings (coach meetings and skills training) is compulsory. Attendance to the lectures is highly recommended since relying on self-study alone has proven to be insufficient to pass the mini-exams. For the group project, you will make rules with your group during the first meeting with your coach.

Toetsvorm

The course grade is based on the project (group and individual) and the exam. All of the following need to be concluded with the grade of 5.5 or higher.

- Team project report (50%)
- Team project presentation (10%)
- Individual attitude and skills assessment (10%)
- 1 individual written exam (30%)

Literatuur

Book: Biotechnology and Food
Articles are made available via Canvas

Aanbevolen voorkennis

Science and Technology Studies (STS), Innovation studies

Doelgroep

Master students SBI

Intekenprocedure

As the number of participants will dictate the number of different projects (and the related team coaches), the deadline for VU-net registration will be 4 weeks before the start of the course. Retracting your registration for the course after the deadline will have detrimental effects on the composition of the teams, the network of contacted interviewees and contracted coaches.

Overige informatie

This course mimics the activities of an innovation task force. This implies 100% use of the available time (=20 hours a week) to carry out

data collection, literature study, brainstorming, various forms of system analysis, validation of preliminary result with external experts, and finally presenting a transition strategy. You will need to use and integrate all knowledge you acquired before.