



## Science, Business and Innovation MSc

Vrije Universiteit Amsterdam - Faculteit der Exacte Wetenschappen - M Science, Business and Innovation - 2017-2018

The master program Science, Business & Innovation (SBI) aims to contribute to the persistent and growing need in academia, society and business for scientific and practical insights into valorization of scientific knowledge and findings. A combined understanding of the natural sciences, as well as of business and social sciences is supportive to knowledge and practice development in the field of valorization of (natural) scientific knowledge.

The master program SBI intently and substantially crosses the boundaries of natural and social sciences, within the context of natural scientific innovation. The learning process is structured and driven by developing scientific research projects in the specific empirical setting. This takes place within one of the following specialization areas:

- 1) Energy & Sustainability, with an emphasis on renewable and clean energy development;
- 2) Life & Health, emphasizing drug development, molecular diagnostics and innovative medical instrumentation.

## Structure of the program

The curriculum comprises the following:

- Compulsory business and innovation courses (18 EC)
- Specialisation-related science elective courses (12 EC)
- One specialisation-related compulsory integration course (6 EC)
- Science project (24 EC)
- Master project (36 EC)
- Compulsory Research Methodology course (6 EC)
- Electives (18 EC) If the student wishes to take a different unit of study than the units of study listed, advance permission must be obtained in writing from the Examinations Board.

Personal Education Plan: At the start of the program, students must fill in a [Personal Education Plan](#) (PEP)

## More information

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

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# M Science, Business and Innovation specialisation Energy and Sustainability

Opleidingsdelen:

- [M Science, Business and Innovation constrained choice 1 out of 2](#)
- [M Science, Business and Innovation constrained choice of 24 EC](#)
- [M Science, Business and Innovation constrained choice 12 EC - Energy and Sustainability](#)
- [M Science, Business and Innovation recommended electives](#)
- [M Science, Business and Innovation compulsory course](#)

## M Science, Business and Innovation constrained choice 1 out of 2

One specialisation-related compulsory integration course (6 EC)  
Students who are following the Energy & Sustainability track must complete the course: Current Sustainable Energy Technologies and students who are following the Life & health track must complete Business, Innovation and Value Creation in the Life Science Industry.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Business, Innovation and Value Creation in the Life Science Industry</a>	Periode 3	6.0	X_432723
<a href="#">Current Sustainable Energy Technologies</a>	Periode 3	6.0	X_422582

## M Science, Business and Innovation constrained choice of 24 EC

Two variants

Variant 1: Science project/ Business & Innovation project 24 EC

- Energy & Sustainability track: Internship/research in(to) valorization aspects of a lab setting or R&D setting in the sustainable energy sector
- Life & Health track: Internship/research in(to) valorization aspects of a lab setting or R&D setting in the life sciences or health care sector

Variant 2: 12 EC course Researching Science Research and 12 EC of natural science courses selected from the Energy & Sustainability list or from the Life & Health list.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Business &amp; Innovation Project</a>	Ac. Jaar (september)	24.0	XM_432845
<a href="#">Researching science research</a>	Periode 4+5	12.0	X_432849
<a href="#">Science project</a>	Ac. Jaar (september)	24.0	XM_422591

## M Science, Business and Innovation constrained choice 12 EC - Energy and Sustainability

Energy & Sustainability track:

Biosolar cells 6 EC

Chemical biology 6 EC\*

Green chemistry 6 EC

Photovoltaics 6 EC

Project sustainable future 6 EC

Materials for energy and environmental sustainability 12 EC

\*this course is only for second year students

Vakken:

Naam	Periode	Credits	Code
<a href="#">BioSolar Cells</a>	Periode 1	6.0	X_428531
<a href="#">Green Chemistry</a>	Periode 1	6.0	X_430557
<a href="#">Materials for energy and environmental sustainability</a>	Periode 4+5	12.0	X_432850
<a href="#">Organic Photovoltaics</a>	Periode 5	6.0	X_422590
<a href="#">Project Sustainable Future</a>	Periode 6	6.0	X_432784

## M Science, Business and Innovation recommended electives

Students choice 18 EC of electives. Below some recommendations:

Vakken:

Naam	Periode	Credits	Code
<a href="#">Industriële eigendom</a>	Periode 1	6.0	R_Indu.eig
<a href="#">International Intellectual Property Law</a>	Periode 4	6.0	R_Int.prop.l
<a href="#">Management of Digital Innovation</a>	Periode 1	6.0	E_BA_MDI
<a href="#">Managing Service Innovation</a>	Periode 5	6.0	E_BA_MSI
<a href="#">Science and Society in Historical Perspective</a>	Periode 4+5	6.0	X_400424

## M Science, Business and Innovation compulsory courses

All students complete 18 EC of compulsory business and innovation courses, 6 EC compulsory Research Methodology course and 36 EC Master research project.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Management of Sustainable Innovation</a>	Periode 2	6.0	E_BA_MANSI
<a href="#">Networked Organizations and Communication</a>	Periode 2	6.0	S_NOC
<a href="#">SBI Project &amp; Master Thesis</a>	Ac. Jaar (september)	36.0	X_432735
<a href="#">SBI Research Methodology</a>	Periode 1	6.0	X_432846
<a href="#">Transdisciplinarity and Transition</a>	Periode 2	6.0	X_430604

## M Science, Business and Innovation specialisation Life and Health

Opleidingsdelen:

- [M Science, Business and Innovation constrained choice 1 out of 2](#)
- [M Science, Business and Innovation constrained choice of 24 EC](#)
- [M Science, Business and Innovation recommended electives](#)
- [M Science, Business and Innovation constrained choice 12 EC - Life and Health](#)
- [M Science, Business and Innovation compulsory courses](#)

## M Science, Business and Innovation constrained choice 1 out of 2

One specialisation-related compulsory integration course (6 EC)  
 Students who are following the Energy & Sustainability track must complete the course: Current Sustainable Energy Technologies and students who are following the Life & health track must complete Business, Innovation and Value Creation in the Life Science Industry.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Business, Innovation and Value Creation in the Life Science Industry</a>	Periode 3	6.0	X_432723
<a href="#">Current Sustainable Energy Technologies</a>	Periode 3	6.0	X_422582

## M Science, Business and Innovation constrained choice of 24 EC

Two variants

Variant 1: Science project/ Business & Innovation project 24 EC

- Energy & Sustainability track: Internship/research in(to) valorization aspects of a lab setting or R&D setting in the sustainable energy sector
- Life & Health track: Internship/research in(to) valorization aspects of a lab setting or R&D setting in the life sciences or health care sector

Variant 2: 12 EC course Researching Science Research and 12 EC of natural science courses selected from the Energy & Sustainability list or from the Life & Health list.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Business &amp; Innovation Project</a>	Ac. Jaar (september)	24.0	XM_432845
<a href="#">Researching science research</a>	Periode 4+5	12.0	X_432849
<a href="#">Science project</a>	Ac. Jaar (september)	24.0	XM_422591

## M Science, Business and Innovation recommended electives

Students choice 18 EC of electives. Below some recommendations:

Vakken:

Naam	Periode	Credits	Code
<a href="#">Industriële eigendom</a>	Periode 1	6.0	R_Indu.eig
<a href="#">International Intellectual Property Law</a>	Periode 4	6.0	R_Int.prop.l
<a href="#">Management of Digital Innovation</a>	Periode 1	6.0	E_BA_MDI
<a href="#">Managing Service Innovation</a>	Periode 5	6.0	E_BA_MSI
<a href="#">Science and Society in Historical Perspective</a>	Periode 4+5	6.0	X_400424

## M Science, Business and Innovation constrained choice 12 EC - Life and Health

Biomedical modeling and simulation 6 EC

Principles of Pharmaceutical Sciences/Pharmacochimistry 6 EC

Protein science 6 EC

Innovation in medical technology 6 EC

Chemical biology 6 EC

Green chemistry 6 EC

Vakken:

Naam	Periode	Credits	Code
<a href="#">Biomedical Modelling and Simulation</a>	Periode 1	6.0	X_430112
<a href="#">Chemical Biology</a>	Periode 1	6.0	X_432538
<a href="#">Green Chemistry</a>	Periode 1	6.0	X_430557
<a href="#">Innovation in Medical Technology to Improve the Health Care System</a>	Periode 6	6.0	X_430602
<a href="#">Principles of Pharmaceutical Sciences / Pharmacochimistry</a>	Periode 1	6.0	X_435675
<a href="#">Protein Science</a>	Periode 1	6.0	AM_470145

## M Science, Business and Innovation compulsory courses

All students complete 18 EC of compulsory business and innovation courses, 6 EC compulsory Research Methodology course and 36 EC Master research project.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Management of Sustainable Innovation</a>	Periode 2	6.0	E_BA_MANSI
<a href="#">Networked Organizations and Communication</a>	Periode 2	6.0	S_NOC
<a href="#">SBI Project &amp; Master Thesis</a>	Ac. Jaar (september)	36.0	X_432735
<a href="#">SBI Research Methodology</a>	Periode 1	6.0	X_432846
<a href="#">Transdisciplinarity and Transition</a>	Periode 2	6.0	X_430604

## Biomedical Modelling and Simulation

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

### Doel vak

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

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

### Inhoud vak

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

During the course, attention will be paid to viscoelastic models,



spectral analysis, compartment models, geometric modelling used in image analysis and models to describe molecular structures and their dynamic behaviour.

Examples will concentrate on cardiovascular function: linear and nonlinear

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

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

### Onderwijsvorm

Lectures, working groups, assignments.

### Toetsvorm

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

### Literatuur

Syllabus.

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

### Doelgroep

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

## BioSolar Cells

<b>Vakcode</b>	X_428531 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. J.P. Dekker
<b>Examinator</b>	dr. J.P. Dekker
<b>Docent(en)</b>	dr. J.P. Dekker, dr. R.N. Frese
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### 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

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

<b>Vakcode</b>	X_432723 ()
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<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	drs. P. van Hoorn
<b>Examinator</b>	drs. P. van Hoorn
<b>Docent(en)</b>	prof. dr. I.J.P. de Esch, drs. P. van Hoorn
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	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% ofg), Construct (10% ofg), Outcomes including Report and Presentations (75% ofg). 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. Rydzewski 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](mailto:p.van.hoorn@vu.nl);

## Chemical Biology

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

<b>Vakcode</b>	X_422582 ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. J.P. Dekker
<b>Examinator</b>	dr. J.P. Dekker
<b>Docent(en)</b>	dr. J.P. Dekker, dr. R.N. Frese
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	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

<b>Vakcode</b>	X_430557 (430557)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. J.C. Slootweg
<b>Examinator</b>	dr. J.C. Slootweg
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	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](mailto:servicedesk-esc-science@uva.nl), +31 (0)20 525 7100. Enrolment via <https://m.sis.uva.nl/vakaanmelden> is required. For courses taught in period 1 and period 2, enrolment via <https://datanose.nl/#specialenrol> is required.

## Industriële eigendom

<b>Vakcode</b>	R_Indu.eig (201564)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Rechtsgeleerdheid
<b>Coördinator</b>	prof. dr. M.R.F. Senftleben
<b>Examinator</b>	prof. dr. M.R.F. Senftleben
<b>Docent(en)</b>	prof. dr. M.R.F. Senftleben
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	400

### Doel vak

Het verwerven van kennis van de rechtsobjecten, de manier waarop het recht wordt verkregen en tenietgaat, alsmede de inhoud en omvang van de voornaamste industriële eigendomsrechten; en van inzicht in de overeenkomsten en verschillen tussen de afzonderlijke rechten. Het ontwikkelen van het vermogen zelfstandig problemen op dit rechtsgebied te kwalificeren en op te lossen. Het ontwikkelen van het vermogen dit rechtsgebied in de grotere context van het bevorderen van innovatie en eerlijke mededinging te plaatsen, en de op dit rechtsgebied geldende normen in het licht van de vrijheid van mededinging en de vrijheid van meningsuiting kritisch te heroverwegen.

### Inhoud vak

Industriële eigendom is een verzamelnaam voor een aantal rechten op immateriële goederen. Deze rechten zijn bij uitstek van belang voor het bedrijfsleven. Het vak omvat met name de volgende onderdelen:

- octrooirecht, regelt rechten op uitvindingen;
- modellenrecht, regelt rechten met betrekking tot de vormgeving van producten;
- merkenrecht, beschermt de merken die ondernemingen gebruiken om hun goederen en diensten te onderscheiden van die van andere ondernemingen;
- handelsnaamrecht, beschermt de naam die een onderneming voert;
- ongeoorloofde mededinging, goeddeels ongeschreven recht dat normen stelt voor het gedrag van marktdeelnemers.

In het kader van de bespreking van deze onderdelen komen actuele businessstrategieën betreffende research en development, marketing, branding en portfolio management aan de orde.

Naar hun aard zijn rechten op het terrein van de industriële eigendom niet aan landsgrenzen gebonden. Het vak heeft dan ook een duidelijk internationale dimensie via overeenkomsten als het Unieverdrag van Parijs en het TRIPS-verdrag. Het Europese recht en het beleid van de Europese Commissie spelen een grote rol, o.a. in de vorm van Europese richtlijnen.

### Onderwijsvorm

De stof wordt in hoorcolleges besproken en verdiept. Daarnaast worden werkcolleges aangeboden waarin onder meer vragen en casus uit eerdere tentamens worden besproken.

### Toetsvorm

Geroosterd schriftelijk tentamen

### Literatuur

De literatuurlijst wordt bekend gemaakt op Canvas.

### Doelgroep

Behalve voor reguliere studenten, staat het vak ook open voor: bijvakstudenten en contractanten

### Overige informatie

De afgestudeerde master beschikt over een academisch werk- en denkniveau:

heeft diepgaande en specialistische kennis van en inzicht in minimaal één deelgebied van het recht

heeft inzicht in de samenhang tussen verschillende onderdelen van het recht, met inbegrip van het nationale en internationale recht

De afgestudeerde master beschikt over de volgende (juridische) vaardigheden:

Analytische vaardigheden:

de juridische en maatschappelijke aspecten van een vraagstuk in hun onderlinge samenhang beoordelen en daarover kritisch nadenken/oordelen  
zich inzicht verschaffen in de problemen die zich bij rechtsvorming op het gekozen deelgebied voordoen en een bijdrage leveren aan oplossing daarvan

een probleem vanuit verschillende deelgebieden op een integratieve manier benaderen

literatuur en juridische bronnen diepgaand analyseren en interpreteren en kritisch beschouwen (waar relevant ook in de Engelse taal, waar relevant ook op nieuwe rechtsgebieden)

rechtsregels afleiden uit concrete gevallen (inductie)

Probleemoplossende vaardigheden:

complexe casus diepgaand analyseren en interpreteren en zelfstandig juridische oplossingen aandragen

complexe juridische problemen onderkennen, analyseren en oplossen

## Innovation in Medical Technology to Improve the Health Care System

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



<b>Niveau</b>	500
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### 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](mailto:servicedesk-esc-science@uva.nl), +31 (0)20 525 7100.

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

## International Intellectual Property Law

<b>Vakcode</b>	R_Int.prop.I (200991)
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Rechtsgeleerdheid
<b>Coördinator</b>	prof. dr. M.R.F. Senftleben
<b>Examinator</b>	prof. dr. M.R.F. Senftleben
<b>Docent(en)</b>	prof. dr. M.R.F. Senftleben
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	400

### Doel vak

The course provides an overview of the international legal framework for the protection of intellectual property (IP).

Participants will obtain a general understanding of the role of IP protection in international trade, underlying policy considerations and the current debate on imbalances in the international protection system. Participants will acquire the ability to identify and solve problems arising from the international nature of intellectual property, and the ability to assess the current IP system critically in the light of social, cultural and economic needs in developing and developed countries.

### Inhoud vak

The course focuses on the principles and minimum standards of protection established in the Berne Convention for the Protection of Literary and Artistic Works, the Paris Convention for the Protection of Industrial Property and, in particular, the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). The following issues will be dealt with in particular:

- patent protection and public health, in particular the issue of access to medicine in developing countries;
- copyright protection and freedom to create, in particular the remix and reuse of protected works in the digital environment and the room for corresponding online platforms, such as YouTube;
- trademark protection of powerful brands, such as enhanced protection for trademarks in the luxury goods industry;
- current topics on the international IP agenda.

International intellectual property registration systems constitute an

additional topic of the course. The Madrid System for the International Registration of Marks and the Patent Cooperation Treaty will be discussed.

### **Onderwijsvorm**

The course is based on weekly lectures in which the norms of international intellectual property law, underlying policies and the current debate on the further development of the law will be discussed. In working group sessions, the students will present and discuss selected problems of current international intellectual property law. For this purpose, student presentation groups will be established at the beginning of the course.

### **Toetsvorm**

Written exam and presentation

### **Literatuur**

WIPO Intellectual Property Handbook - Policy, Law and Use,  
2nd edition, Geneva, 2004  
WIPO Publication No. 489(E),  
ISBN 92-805-1291-7  
available at: <http://www.wipo.int/about-ip/en/iprm/>

In addition to this general overview of the international framework of protection, academic articles on specific topics of international IP law will be made available to the students as reading assignments during the course.

### **Doelgroep**

Apart from regular students, the course is also available for:  
Students from other universities/faculties  
Exchange students  
Contractor (students who pay for one course)

### **Intekenprocedure**

A maximum number of 40 students may participate in this course.

### **Overige informatie**

#### **CAPACITY**

A maximum number of 40 students may participate in this course.

### **OBJECTIVES**

The following course objectives are only available in Dutch:

Eindtermen master Rechtsgeleerdheid

De afgestudeerde master beschikt over een academisch werk- en denkniveau:

heeft diepgaande en specialistische kennis van en inzicht in minimaal één deelgebied van het recht

heeft inzicht in de samenhang tussen verschillende onderdelen van het recht, met inbegrip van het nationale en internationale recht

De afgestudeerde master beschikt over de volgende (juridische) vaardigheden:

Analytische vaardigheden:

de juridische en maatschappelijke aspecten van een vraagstuk in hun

onderlinge samenhang beoordelen en daarover kritisch nadenken/oordelen  
zich inzicht verschaffen in de problemen die zich bij rechtsvorming op  
het gekozen deelgebied voordoen en een bijdrage leveren aan oplossing  
daarvan

een probleem vanuit verschillende deelgebieden op een integratieve  
manier benaderen

literatuur en juridische bronnen diepgaand analyseren en interpreteren  
en kritisch beschouwen (waar relevant ook in de Engelse taal, waar  
relevant ook op nieuwe rechtsgebieden)

rechtsregels afleiden uit concrete gevallen (inductie)

Probleemoplossende vaardigheden:

complexe casus diepgaand analyseren en interpreteren en zelfstandig  
juridische oplossingen aandragen

complexe juridische problemen onderkennen, analyseren en oplossen

Onderzoeks- en presentatievaardigheden:

individueel een rechtswetenschappelijk onderzoek op academisch niveau  
voorbereiden en uitvoeren (probleemstelling formuleren en afbakenen,  
informatie verzamelen, gegevens interpreteren, conclusies trekken,  
evalueren en aanbevelingen en suggesties doen voor verder onderzoek)

met argumenten onderbouwde mening formuleren over een complex juridisch  
probleem of een nieuwe ontwikkeling

actief deelnemen aan een wetenschappelijk debat op het deelgebied dat  
het masterprogramma beslaat

The following course objectives of the Masterprogramme of International  
Business Law

The Master's graduate has thorough knowledge and understanding of the  
main areas of international business law.

The Master's graduate understands the relationships between the main  
areas of international business law and recognizes which legal issues  
are involved and how these influence each other.

The Master's graduate knows who the actors of the international business  
law environment are and how they interact with each other, while  
acknowledging legal and cultural differences. The Master's graduate  
understands the role of governments and the horizontal economic  
relationships between them, the vertical relationship between them and  
private business and, finally, the horizontal relationships between  
private companies. Consequently, the graduate discerns the legal  
position of various parties and understands how the conduct of these  
parties can influence legal positions.

The Master's graduate possesses analytical skills to apply acquired  
knowledge and insights to concrete problems in the area of IBL.

The Master's graduate 'translates' practical problems into legally  
manageable problems.

The Master's graduate can analyse and assess scholarly literature, case  
law and legal and policy documents and critically reflect upon them.

The Master's graduate shows evidence of an independent, critical  
attitude with regard to existing theories and knowledge.

The Master's graduate possesses the necessary knowledge of research  
methodologies in international law and the necessary research skills to  
independently prepare and carry out a jurisprudential study of some  
size. The Master's graduate can critically assess the value of research  
findings, draw conclusions from them and relate research results to  
theoretical debates within the domain and adjust them when necessary.

The Master's graduate should be able to analyse complex issues in  
relation to international business and make useful legal  
recommendations. A Master's graduate can formulate an independent and

well-substantiated opinion on complex legal issues and take a substantiated position within the existing debates on various international business law topics.

The Master's graduate should have the ability to present orally and/or in writing the setup, research methodology, theoretical foundations and findings of their research to both experts and non-experts. The Master's graduate has a good command of English legal terms which are used within international business law.

The Master's graduate has a self-critical attitude that enables them to independently acquire new knowledge and to improve their analytical, research and communicative skills.

## Management of Digital Innovation

<b>Vakcode</b>	E_BA_MDI ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	School of Business and Economics
<b>Coördinator</b>	dr. P.R. Tuertscher
<b>Examinator</b>	dr. P.R. Tuertscher
<b>Docent(en)</b>	prof. dr. ir. J.J. Berends, dr. P.R. Tuertscher, dr. ir. F. Deken
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	400

### Doel vak

Academic & research skills: Be able to critically examine established and new innovation management concepts in the area of digital innovation

Knowledge: Knowledge of the technological, organizational, processual, and economic aspects of the management of digital innovation

Professional social skills: Ability to work effectively in teams and communicate on project findings

Self awareness: Ability to reflect about the learning process itself, which enables students to take responsibility for their own learning and knowledge creation

### Inhoud vak

The digitization of products, services and business models requires an effective approach to the management of innovation. Innovation is increasing in speed and scope and becoming more disruptive with the digitization of business. The management of digital innovation can draw upon established innovation management concepts, but some existing approaches may have limited relevance and even be counterproductive. New concepts are emerging but their reach and effectiveness are yet to be tested. Therefore this course explores innovation management for products, services and business models that incorporate digital technologies, with simultaneous attention for technology, process, organization and industrial dynamics.

Thus, the course will be organized around three interrelated topics: basic properties of digital innovation (e.g. layered modular architecture, digital materiality, digital platforms); industrial dynamics associated with digital innovation (industry disruption, network economics, ecosystems and collaboration); and innovation

processes for digital innovation (e.g. traditional and agile approaches, entrepreneurial approach).

The course will center around assignments that will be organized as “course research”. Students apply concepts to real life cases and examine the validity and usefulness of existing innovation management concepts as well as new theories focused on digital innovation.

### Onderwijsvorm

Lectures  
Seminars

### Toetsvorm

Individual assignments  
Group assignments  
Peer evaluation  
Exam

### Literatuur

A list of academic articles will be provided via Canvas before the start of the course.

### Aanbevolen voorkennis

Basic knowledge of innovation management and organization studies.

### Overige informatie

This course is only open for students of the Digital Business & Innovation and Science, Business & Innovation programmes

## Management of Sustainable Innovation

<b>Vakcode</b>	E_BA_MANSI ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	School of Business and Economics
<b>Coördinator</b>	dr. R.J.A. Klein Woolthuis
<b>Examinator</b>	dr. R.J.A. Klein Woolthuis
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	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 meets, and
- Boyan Slate 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.

## Managing Service Innovation

<b>Vakcode</b>	E_BA_MSI ()
<b>Periode</b>	Periode 5
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	School of Business and Economics
<b>Coördinator</b>	dr. M.J. Flikkema
<b>Examinator</b>	dr. M.J. Flikkema
<b>Docent(en)</b>	dr. M.J. Flikkema
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	400

### Doel vak

1. Have the advanced academic and research skills to contribute to the body of knowledge:
  - Are able to write a good problem statement that triggers the need for service innovation.
2. Have thorough knowledge of relevant theory and methods, and an evidence-based approach to solving complex business problems:
  - Can recommend and illustrate management practices that are fit for service innovation purposes.-
  - Apply service innovation models from state-of-the-art academic literature validly.
  - Develop managerial skills through the application of MSI-knowledge in complex contexts through assignments and case studies.
3. Have the professional and social skills to interact with other

professionals:

-Act as an effective community of advanced learners.

4. Are self-reflective professionals:

- Are able to apply the STARR methodology for reflection.

### **Inhoud vak**

This course is one of the interdisciplinary electives of the Business Administration HRM, IM, LCM, MC, and S&O programs. The course features several key topics:

1. Service innovation: core issues & challenges
2. Service innovation patterns, strategies and models
3. Service design methods
4. Open service innovation practices
5. HRM and service innovation performance
6. Intellectual Property Rights for appropriating the rents from service innovation

### **Onderwijsvorm**

Seminars and an extensive case study

### **Toetsvorm**

Case study

Midterm exam

### **Literatuur**

Reader with state-of-the art literature about Managing Service Innovation. Will be published online.

### **Aanbevolen voorkennis**

Innovation management

### **Overige informatie**

Maximum number of participants: 75.

## **Materials for energy and environmental sustainability**

<b>Vakcode</b>	X_432850 ()
<b>Periode</b>	Periode 4+5
<b>Credits</b>	12.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. J.P. Dekker
<b>Examinator</b>	dr. J.P. Dekker
<b>Docent(en)</b>	dr. J.P. Dekker
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	500

### **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

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

<b>Vakcode</b>	X_422590 ()
<b>Periode</b>	Periode 5

<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. E.L. von Hauff
<b>Examinator</b>	dr. E.L. von Hauff
<b>Docent(en)</b>	dr. E.L. von Hauff
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	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](mailto: 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

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

<b>Vakcode</b>	X_432784 ()
<b>Periode</b>	Periode 6
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. J.C. Slootweg
<b>Examinator</b>	dr. J.C. Slootweg
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	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](mailto:servicedesk-esc-science@uva.nl), +31 (0)20 525 7100.  
Enrolment via <https://m.sis.uva.nl/vakaanmelden> is required.

**Protein Science**

<b>Vakcode</b>	AM_470145 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	dr. D. Bald
<b>Examinator</b>	dr. D. Bald
<b>Docent(en)</b>	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

<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	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

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

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

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

<b>Vakcode</b>	X_400424 (400424)
<b>Periode</b>	Periode 4+5
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. D.J. Beckers
<b>Examinator</b>	dr. D.J. Beckers
<b>Docent(en)</b>	dr. D.J. Beckers
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	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](mailto:d.j.beckers@vu.nl)

## Science project

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

## Transdisciplinarity and Transition

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