



## Computer Science BSc

Vrije Universiteit Amsterdam - Faculteit der Exacte Wetenschappen - B Computer Science - 2017-2018

Computer Science consists of a wide variety of methods, insights and skills that are related to the scientific and practical use of computers. This is why the Bachelor program has both a technical and a broad character. The technical side consists of Programming, Computer Systems and Networks, Data Structures, the Theoretical Fundamentals and the use of Mathematics and Logic.

The core of Computer Sciences also consists of methodological disciplines, like for example Software Engineering, Conceptual Modeling, Specification Methods. Next to that there is a big variety of applications: Parallel Computing, Security, Internet and Web Applications, Multimedia, Protocol Validation and Business Aspects, that you will see back in the Master programs.

During your studies you will encounter different teaching methods, depending on the courses you are following. Next to the lectures and work groups you will also do programming assignments, work in a project, write reports and give presentations. In this way you don't only learn about theory but also learn to use the skills needed later in a job related environment.

### **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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## B Computer Science expired courses

Vakken:

Naam	Periode	Credits	Code
<a href="#">Programming</a>	Ac. Jaar (september)	6.0	X_400554

## B Computer Science year 1

The first year program has multiple goals. Firstly it is meant to teach the students basic skills required in following years of the curriculum. This consists of course with logic and mathematics and the principles of programming as subject. Secondly the courses give an overview and introduction of the main subjects in the whole Computer Science curriculum.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Academic Writing (FEW)</a>	Periode 5	3.0	L_ETBAALG006
<a href="#">Computational thinking</a>	Periode 1	3.0	X_400475
<a href="#">Computer Networks</a>	Periode 4	6.0	X_400487
<a href="#">Computer Programming</a>	Periode 1	6.0	XB_40011
<a href="#">History of Science</a>	Periode 5	3.0	X_400318
<a href="#">Introduction Computer Science</a>	Periode 1	3.0	X_401087
<a href="#">Logic and Sets</a>	Periode 4	6.0	X_401090
<a href="#">Networks and Graphs</a>	Periode 5	6.0	X_401010
<a href="#">Physical Computing</a>	Periode 2	6.0	XB_40008
<a href="#">Project Application Development</a>	Periode 6	6.0	X_400556
<a href="#">Systems Architecture</a>	Periode 2	6.0	XB_40009
<a href="#">Web Technology</a>	Periode 3	6.0	X_400488

## B Computer Science year 2

The second year program is still fixed but the courses are more advanced and require more independence from the student. Lectures, work groups and practicals are the tuition forms.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Advanced Programming</a>	Periode 1	6.0	X_400561
<a href="#">Data Structures and Algorithms</a>	Periode 1	6.0	X_400614



<a href="#">Databases</a>	Periode 5	6.0	X_401008
<a href="#">Human-Computer Interaction</a>	Periode 6	6.0	X_400432
<a href="#">Intelligent Systems</a>	Periode 3	6.0	X_401086
<a href="#">Linear Algebra</a>	Periode 4	6.0	X_400649
<a href="#">Logic and Modelling</a>	Periode 5	6.0	X_401015
<a href="#">Operating Systems</a>	Periode 2	6.0	X_405067
<a href="#">Software Design</a>	Periode 4	6.0	XB_40007
<a href="#">Statistical Methods</a>	Periode 2	6.0	X_401020
<a href="#">Study and career</a>	Ac. Jaar (september)	0.0	X_400633

## B Computer Science year 3

In the first semester of the third year students can follow elective courses which are offered in so called minors. The minors offered by the Computer Science Department have different focused topics. The second semester consists of two compulsory courses and a Bachelor Project that marks the end bachelor. In the Bachelor Project is individual project where students will get the chance to deepen their knowledge on a selected topic and show their skills and knowledge which they have acquired during the bachelor program.

Opleidingsdelen:

- [B Computer Science minor programmes](#)

Vakken:

Naam	Periode	Credits	Code
<a href="#">Automata and Complexity</a>	Periode 4	6.0	X_401049
<a href="#">Bachelor Project Computer Science</a>	Periode 5+6	15.0	XB_40001
<a href="#">Machine Learning</a>	Periode 4	6.0	X_400154
<a href="#">Philosophy</a>	Periode 5	3.0	X_400433

## B Computer Science minor programmes

The different minors offered for the students in CS, IMM and LI.

Opleidingsdelen:

- [Universiteitsminoren](#)
- [Minor Artificial Intelligence](#)
- [Minor Bioinformatics and Systems Biology](#)
- [Minor Deep Programming](#)
- [Flexible Minor](#)
- [Minor Web Services and Data](#)

## Universiteitsminoren

## De universiteitsminoren

- Zijn in principe toegankelijk voor alle bachelorstudenten van alle faculteiten.
- Kennen voor sommige minoren een toegangseis.
- Hebben een vaste omvang van 30 EC.
- Vooraf geen toestemming van je eigen examencommissie nodig om de 30 EC van deze minor mee te laten tellen in het afstudeerpakket van je opleiding.
- Indien een bepaald vak uit de universiteitsminor onderdeel uitmaakt van je reguliere curriculum, kun je deze minor niet (volledig) volgen omdat vakken niet twee keer kunnen meetellen. Vraag in dat geval toestemming van de examencommissie voor de invulling van de profileringsruimte.

## Opleidingsdelen:

- [Minor Brain and Mind](#)
- [Minor Sustainability: Global Challenges, Interdisciplinary Solutions](#)
- [Minor Sport, Bewegen en Gezondheid](#)
- [Minor Business Administration](#)
- [Minor Global Food Security](#)
- [Minor Managing Digital Innovation](#)
- [Minor Economics](#)
- [Minor Islam](#)
- [Minor Digital Humanities and Social Analytics](#)
- [Minor in English](#)
- [Minor Gender and Diversity](#)
- [Minor History](#)
- [Minor Aan de slag met Literatuur](#)
- [Minor Migration Studies](#)
- [Minor Psychologie en het Brein](#)
- [Minor Law and Global Society](#)
- [Minor Technology, Law and Ethics](#)
- [Minor Development and Global Challenges](#)
- [Minor Political Science](#)
- [Minor Filosofie](#)

## Minor Brain and Mind

### Vakken:

Naam	Periode	Credits	Code
<a href="#">Brain in Trouble</a>	Periode 2	6.0	AB_1038
<a href="#">Cognitive Neuroscience</a>	Periode 1	6.0	AB_1056
<a href="#">Mind and Machine</a>	Periode 3	6.0	AB_1060
<a href="#">Nature versus Nurture</a>	Periode 1	6.0	AB_1057
<a href="#">The Developing Brain</a>	Periode 2	6.0	AB_1059

## Minor Sustainability: Global Challenges, Interdisciplinary Solutions

### Vakken:

Naam	Periode	Credits	Code
<a href="#">Designing Solutions for Global Sustainability</a>	Periode 3	6.0	AB_1231
<a href="#">Governance of Global Sustainability</a>	Periode 1	6.0	AB_1229
<a href="#">Grand Challenges for Sustainability</a>	Periode 1	6.0	E_IBA3_GCS
<a href="#">Sustainability and Environmental Change</a>	Periode 2	6.0	AB_1230
<a href="#">Sustainable Supply Chain Management</a>	Periode 2	6.0	E_IBA3_SSCM

## Minor Sport, Bewegen en Gezondheid

Vakken:

Naam	Periode	Credits	Code
<a href="#">Inleiding Inspanningsfysiologie</a>	Periode 1	6.0	B_IF
<a href="#">Neuro- en Revalidatiepsychologie</a>	Periode 3	6.0	B_NEURREVPSY
<a href="#">Revalidatie</a>	Periode 1	6.0	B_REVAL
<a href="#">Sensomotorische Coordinatie</a>	Periode 2	6.0	B_SENSOCOR
<a href="#">Sportpsychologie</a>	Periode 1	6.0	B_SPORTPSY
<a href="#">Talent and Talent Identification</a>	Periode 3	6.0	B_TALIDENT
<a href="#">Toegepaste Inspanningsfysiologie</a>	Periode 2	6.0	B_TIF

## Minor Business Administration

Why are some companies outperforming their rivals? How is it that companies like Nike and ASML are responsive to changes in customer preferences and are successfully battling their competitors, whereas companies like General Motors and Philips struggle? Why are companies like Airbnb and Uber successful in developing and selling product and service innovations, whereas publishers and record companies lack innovative capacity? How is it possible that long-existing companies are surpassed by new venture start-ups with radical different business approaches, such as Shapeways and Blendle? The answers to these questions show that high-performing companies excel in using new ways of management and organization. Specifically, these companies have business models that work in today's dynamic environment.

In the Minor in Business Administration you will learn to build, assess, and change business models and tackle management and organization issues.

The Minor in Business Administration is a 30 EC programme taught in English. You will become familiar with the foundations of business

administration: strategy, marketing, finance, accounting, logistics, technology, and human resource management. Using business model thinking, you will combine and apply the knowledge from these disciplines to study businesses. In addition, midway the programme you are asked to select a specialization theme, which enables you to obtain a deeper understanding about the relationship between your profession and a business discipline. In addition to academic skills, the programme emphasizes professional skills, including creativity, communication, reflexivity, and consultancy. The Minor Business Administration provides you with knowledge and skills to successfully act in dynamic organizations, irrespective of your professional background.

Students in the BSc programmes Economics and (International) Business Administration are excluded from participating in this University Minor.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Business Model Assessment</a>	Periode 2	6.0	E_MB_BMA
<a href="#">Business Model Innovation</a>	Periode 1	6.0	E_MB_BMI
<a href="#">Business Professionals</a>	Periode 2	6.0	E_MB_BPROF
<a href="#">Business Project</a>	Periode 3	6.0	E_MB_BPROJ
<a href="#">Foundations of Business Administration</a>	Periode 1	6.0	E_MB_FBA

## Minor Global Food Security

Global food security is at the core of many of today's societal problems, varying from undernourished children to obese adults and elderly; climate change presents a challenge for future food production; novel technologies raise ethical questions with respect to animal welfare, preservation of biodiversity, and protection of national policy autonomy. These and many other societal issues are part of the content of this course. These insights will be useful to a variety of academic and societal fields, and may help you to choose your master's programme.

This minor takes real world problems as a starting point. Examples, assignments and (guest)lectures will be based on the variety of actual challenges related to food security. Throughout the minor, culminating in an advisory report in the last course, you will conduct an assignment for a real organization active in the field of food security; e.g. the Ministry of Economic Affairs; Oxfam Novib; FrieslandCampina.

Jobs are increasingly about combinations of insights and skills rather than specialized knowledge only. In this minor you will acquire skills and insights from different scientific backgrounds to be able to conduct interdisciplinary research. The fact that this minor is offered by the Amsterdam Centre for World Food Studies, an institute that brings together researchers from different faculties of the VU to conduct inter- and transdisciplinary research on food security, guarantees the richness of skills and methods taught.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Agriculture for Food and Nutrition Security</a>	Periode 1	6.0	E_MG_AFNS
<a href="#">Applications in Food and Nutrition Security Analysis</a>	Periode 3	6.0	E_MG_AFNSA
<a href="#">Challenges of Food and Nutrition Security</a>	Periode 1	6.0	E_MG_CFNS
<a href="#">Economics and Politics for Food and Nutrition Security</a>	Periode 2	6.0	E_MG_EPFNS
<a href="#">Food and Quality of Life</a>	Periode 2	6.0	E_MG_FQL

## Minor Managing Digital Innovation

The opportunities of the digital era are essentially unlimited. Innovative technologies may completely change how business and design processes are set up, while new directions for fruitful start-ups are countless. This calls for new and strategic ways of organising these opportunities to innovate in the digital world. If you are interested in new, exciting ways to organise for digital innovation, if you want to learn how new digital technologies such as big data, 3D printing and robotization change the way of working in your own field of expertise; if you are interested in how to design and organise pervasive digital technologies, if you would like to start your own Spotify, Uber or Airbnb in your own specific discipline and would like to learn how to do so; if you are interested in new professional, organisational and managerial insights related to digital innovation, this minor is for you.

This minor is a 30 EC programme taught in English. The programme consists of five courses taught during the first semester of the third year of your Bachelor program.

Students in the Bachelor programmes (International) Business Administration are excluded from participating in this university minor.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Business Intelligence and Analytics</a>	Periode 2	6.0	E_MM_BIA
<a href="#">Ethics of Algorithms</a>	Periode 3	6.0	E_MM_ETHA
<a href="#">Introduction to Digital Innovation</a>	Periode 1	6.0	E_MM_IDI
<a href="#">New Ways of Working</a>	Periode 2	6.0	E_MM_NWW
<a href="#">Strategic Management of Technology and Innovation</a>	Periode 1	6.0	E_BK3_SMTI

## Minor Economics

What is the future of employment in the face of technical innovation? Why does the discovery of natural resources make a country sometimes poorer rather than richer? How can we keep the pension and health care

system sustainable if there are only half as many working age people?  
 Why do economic crises occur? These questions illustrate how economics touches upon the most pressing problems of today: economic well-being, inequality and sustainability. In the minor in Economics you will learn to tackle economic issues by learning to think like an economist.

The minor in Economics is a 30 EC programme taught in English. You will become familiar with the development of economic thought, including the principles of micro- and macroeconomic theory and key insights from empirical economic analysis. You will gain insight into the role of economic policy, learning to identify when markets fail and when policy interventions may provide solutions. Finally, you learn to take a structured approach to solving practical problems using economic core concepts. Upon completion you will have a proven ability to apply sound economic reasoning to a range of issues on a micro- and macroeconomic level, for example related to health, law, environment, finance, labor, transport, and development.

Students in the BSc programmes Economics and Econometrics are excluded from participating in this university minor.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Applications in Economic Policy: Policy Analysis, Formulation and Evaluation</a>	Periode 3	6.0	E_ME_AEP
<a href="#">Business Cycles and Stabilization Policy</a>	Periode 2	6.0	E_ME_BCSP
<a href="#">Development of Macroeconomic Thought</a>	Periode 1	6.0	E_ME_DMT
<a href="#">Foundations of Microeconomics</a>	Periode 1	6.0	E_ME_FM
<a href="#">Structural Policy</a>	Periode 2	6.0	E_ME_SP

## Minor Islam

Vakken:

Naam	Periode	Credits	Code
<a href="#">Hadith-wetenschappen</a>	Periode 2	6.0	G_HADITHW
<a href="#">Inleiding in de Koran en Soenna</a>	Periode 1	6.0	G_INLKOSO
<a href="#">Islam en Europese cultuur</a>	Periode 1	6.0	G_ISLEURCUL
<a href="#">Islamitische ethiek</a>	Periode 3	6.0	G_ISLAMET
<a href="#">Islamitische theologie/Kalam</a>	Periode 2	6.0	G_ISLMTHKAL

## Minor Digital Humanities and Social Analytics

Vakken:

Naam	Periode	Credits	Code
<a href="#">Digital Humanities and Social Analytics in Practice</a>	Periode 3	6.0	L_AABAALG048
<a href="#">Digitization: from Life to Data (UvA)</a>	Periode 1	6.0	L_AABAUVA008
<a href="#">Introduction to Information and the Digital (UvA)</a>	Periode 1	6.0	L_AABAUVA001
<a href="#">Programming for Humanities and Social Sciences</a>	Periode 2	6.0	L_AABAALG069
<a href="#">Text Mining for Digital Humanities</a>	Periode 2	6.0	L_PABAALG004
<a href="#">Visualizing Humanities and Social Analytics</a>	Periode 2	6.0	L_AABAALG066

## Minor in English

Vakken:

Naam	Periode	Credits	Code
<a href="#">Global English</a>	Periode 1	6.0	L_ETBAETK209
<a href="#">Minor English: English in my own Discipline</a>	Periode 3	6.0	L_ETBAALG008
<a href="#">Minor English: Grammar and Writing 1</a>	Periode 1	6.0	L_ETBAALG007
<a href="#">Minor English: Pronunciation and Presentation</a>	Periode 2	6.0	L_EABAALG006
<a href="#">Minor English: Writing 2</a>	Periode 2	6.0	L_ETBAALG005

## Minor Gender and Diversity

In this multidisciplinary minor you will learn how to critically perceive contemporary discussions in science and society from the perspective of gender and diversity. You will gain knowledge of the relevant theories on gender, race, ethnicity and sexual orientation in the disciplinary fields of history, philosophy, literature, medicine, sociology and anthropology, and theology. You develop a diverse perspective in discussions with students from other disciplines in the classroom. In assignments you apply the knowledge achieved to your own disciplinary field.

Choose 2 out of 3 courses in period 2: American Film; From Cell to Society; Identity, Diversity and Inclusion

Vakken:

Naam	Periode	Credits	Code
<a href="#">American Film: Cinematic Representations of the "Other"</a>	Periode 2	6.0	L_ELBAELK208
<a href="#">Critical Perspectives on Science</a>	Periode 1+2+3	6.0	W_CPOS
<a href="#">From Cell to Society</a>	Periode 2	6.0	W_FCTS
<a href="#">Identity, Diversity and Inclusion</a>	Periode 2	6.0	S_IDI
<a href="#">Religions and Gender</a>	Periode 3	6.0	G_RELGEN
<a href="#">The Personal is Political: Biography, Gender and Diversity</a>	Periode 1	6.0	L_AABAALG068

## Minor History

Vakken:

Naam	Periode	Credits	Code
<a href="#">Decolonizing Europe</a>	Periode 2	6.0	L_GCBAALG008
<a href="#">Democracy: A History</a>	Periode 2	6.0	L_GABAGES212
<a href="#">General History</a>	Periode 1	6.0	L_GABAALG013
<a href="#">Imagining the Dutch: themes Dutch History</a>	Periode 1+2	6.0	L_GCBAALG003
<a href="#">Research Tutorial</a>	Periode 3	6.0	L_GABAALG014

## Minor Aan de slag met Literatuur

Vakken:

Naam	Periode	Credits	Code
<a href="#">Creative Writing</a>	Periode 2	6.0	L_NNBAALG001
<a href="#">Het boek: papier en digitaal</a>	Periode 1	6.0	L_AABAALG067
<a href="#">Meesterwerken uit de wereldliteratuur</a>	Periode 1+2	12.0	L_AABAALG020
<a href="#">Schrijvershuisbezoeken</a>	Periode 2	6.0	L_NNBAALG002

## Minor Migration Studies

Vakken:



Naam	Periode	Credits	Code
Human Rights and Citizenship	Periode 2	6.0	R_HumRC
Human Rights and the Border	Periode 1	6.0	R_HumRB
Introduction Migration Studies	Periode 1	6.0	L_GABAALG011
Migration, Ethnicity and the Economy	Periode 1	6.0	L_GWBAALG002
Nation and Migration	Periode 2	6.0	S_NM
Research Paper Migration Studies	Periode 3	6.0	L_GWBAALG003

## Minor Psychologie en het Brein

De kennis over de psyche en ons brein groeit snel. Wekelijks verschijnen er artikelen en boeken met baanbrekende inzichten over de werking van onze hersenen en het effect hiervan op ons gedrag. Deze kennis verandert de wereld, met steeds sterk wordende effecten op marketing, rechtspraak, technologie, computers, onze voeding en de economie. Het geeft ons inzichten in waarin en waarom we van elkaar verschillen, en helpt ons bepaalde groepsprocessen in de maatschappij te verklaren. Kennis over de psychologie en ons brein zijn een must voor iedereen die wil begrijpen waarom we doen wat we doen.

### Doel

De minor Psychologie en het brein laat studenten kennismaken met de vakgebieden die gedrag en brein onderzoeken. Studenten krijgen in de minor een overzicht van de psychologie en de cognitieve neurowetenschappen, en worden vervolgens geïntroduceerd in de manier van onderzoek doen in deze velden. De doelstellingen hierbij zijn bij de student:

- de kennis aan te brengen om met verstand te oordelen over claims die zowel binnen als buiten de wetenschap over psyche en brein worden gemaakt,
- de vaardigheden bij te brengen om zelf onderzoek te doen naar psyche en brein.

### Doelgroep:

De minor is aantrekkelijk voor studenten met een algemene interesse in psychologie en de hersenen, met voorkennis van statistiek (zoals aangeboden in bachelors in de sociale wetenschappen, economie, exacte en biomedische wetenschappen).

### Ingangseisen:

- Minstens 90 EC behaald binnen één bachelorprogramma.
- Minstens 6 EC behaald aan statistische vakken.

### Aantal deelnemers:

Er geldt een maximum van vijftig studenten per jaar, die op basis van First come First serve worden gekozen.

### Vakken:

Naam	Periode	Credits	Code
<a href="#">Behaviour Genetics</a>	Periode 2	6.0	P_BBEHGEN
<a href="#">Biologische Psychologie (UM)</a>	Periode 2	6.0	P_UBIOPSY
<a href="#">Cognitive Neuroscience</a>	Periode 1	6.0	P_BCOGNEUS
<a href="#">Inleiding Psychologie (UM)</a>	Periode 1	6.0	P_UINLPSY
<a href="#">Psychophysiological and Cogn. Appl.</a>	Periode 3	6.0	P_BPCAPP

## Minor Law and Global Society

Globalisation impacts the way we live. We meet different people, learn about diverse cultures, and internet facilitates world-wide communication and information exchange. Law traditionally focuses on nation states, but topics like migration, internet, climate, and terrorism do not stop at the border. Quite the contrary. The objective of this minor is to become aware of the fact that many societal issues ask for a transboundary approach to law.

The minor explores the role of law in defining and resolving social issues concerning the globalisation of societies. Central topics are migration (transnational movement), internet (transnational communications) and climate change (transnational action).

This minor offers students insight in questions, such as:

- Why transnational issues are not suited for unilateral, national actions;
- What states can do within international law (such as European Union law);
- The ways in which states are currently responding to these issues;
- The criticism of the current actions and regulations;
- Future perspectives.

After completing this minor, the student has knowledge of the core of the legislation concerning the three topics, has gained insight in the most important critique and analysis of this legislation (from a legal, policy-orientated, sociological, anthropological and/or philosophical perspective), and is capable of critically judging proposed changes. For each of the topics the student knows which actors play a role in making rules and policy, how states work together (or not), the consequences of this (lack of) cooperation and the future perspective for transnational regulations in migrations, climate change and internet. Knowledge of these 'case studies' and the theory involved also enables student to independently reflect on other areas of transnational problems, such as security.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Climate Change Law</a>	Periode 2	6.0	R_TL-TP
<a href="#">Current Issues in Migration Law</a>	Periode 3	3.0	R_HumRCI
<a href="#">Current Issues in Transnational Law</a>	Periode 3	3.0	R_CIsTrL
<a href="#">Human Rights and Citizenship</a>	Periode 2	6.0	R_HumRC

<a href="#">Human Rights and the Border</a>	Periode 1	6.0	R_HumRB
<a href="#">Internet Governance</a>	Periode 1	6.0	R_InternGov

## Minor Technology, Law and Ethics

Vakken:

Naam	Periode	Credits	Code
<a href="#">Data Analytics and Privacy</a>	Periode 2	6.0	R_DAP
<a href="#">Governance and Regulation of Emerging Technologies</a>	Periode 1	6.0	R_GRET
<a href="#">Law and Ethics of Reproductive Technologies</a>	Periode 3	6.0	R_LERT
<a href="#">Philosophy and Neuroethics</a>	Periode 2	6.0	W_BA_PNEU
<a href="#">Robot Law and Artificial Intelligence</a>	Periode 1	6.0	R_RLAI

## Minor Development and Global Challenges

Vakken:

Naam	Periode	Credits	Code
<a href="#">Development and Globalization</a>	Periode 1	6.0	S_DG
<a href="#">Environment and Development</a>	Periode 1	6.0	S_ED
<a href="#">Global Political Economy</a>	Periode 2	6.0	S_GPE
<a href="#">Identity, Diversity and Inclusion</a>	Periode 2	6.0	S_IDI
<a href="#">Minor's Tutorial in Development and Global Challenges</a>	Periode 1+2+3	0.0	S_MWDCG
<a href="#">Urban Studies</a>	Periode 1+2+3	6.0	S_UBS

## Minor Political Science

Vakken:

Naam	Periode	Credits	Code
<a href="#">Comparative Political Research</a>	Periode 1	6.0	S_CPR
<a href="#">EU Governance in an International Context</a>	Periode 2	6.0	S_EUGIC

<a href="#">Global Political Economy</a>	Periode 2	6.0	S_GPE
<a href="#">Research Project Political Science</a>	Periode 2+3	6.0	S_RPPS
<a href="#">State, Power and Conflict</a>	Periode 1	6.0	S_SPC

## Minor Filosofie

Vakken:

Naam	Periode	Credits	Code
<a href="#">Ethics I</a>	Periode 2	6.0	W_BA_ETH1
<a href="#">Kopstukken I</a>	Periode 1	6.0	W_BA_KOPI
<a href="#">Kopstukken II</a>	Periode 2+3	6.0	W_BA_KOPII
<a href="#">Philosophy of Mind II</a>	Periode 2	6.0	W_BA_PHMII
<a href="#">Wetenschapsfilosofie</a>	Periode 1	6.0	W_BA_MWET

## Minor Artificial Intelligence

Vakken:

Naam	Periode	Credits	Code
<a href="#">Advanced Programming</a>	Periode 1	6.0	X_400561
<a href="#">Collective Intelligence</a>	Periode 2	6.0	X_401047
<a href="#">Computational logic</a>	Periode 1	6.0	XBU_40010
<a href="#">Heuristics</a>	Periode 3	6.0	X_401012
<a href="#">Information Retrieval</a>	Periode 2	6.0	X_400435

## Minor Bioinformatics and Systems Biology

In de eerste twee maanden van de minor maak je kennis met Bioinformatica en Systeem Biologie aan de hand van voorbeelden uit het wetenschappelijk onderzoek. De laatste drie maanden kunnen gebruikt worden om gaten in je kennis aan te vullen, bijvoorbeeld programmeren voor studenten van een bachelor in Biologie, Biologie voor studenten met een achtergrond in Informatica en Wiskunde of Statistiek voor studenten van een HBO Bioinformatica opleiding. Zie voor een uitgebreide beschrijving van het programma:

[https://wiki.cs.vu.nl/mp/index.php/Bioinformatics\\_and\\_Systems\\_Biology\\_Minor\\_Program](https://wiki.cs.vu.nl/mp/index.php/Bioinformatics_and_Systems_Biology_Minor_Program)

Opleidingsdelen:

- [HBO Bioinformatics / Biotechnologie \(12 EC vereist\)](#)
- [Biomedische wetenschappen / Biologie / HLO \(12 EC vereist\)](#)
- [Minor BSB keuze vakken](#)
- [Life Style Informatics \(12 EC vereist\)](#)
- [Medische Natuurwetenschappen \(12 EC vereist\)](#)

- Minor BSB verplichte vakken

## HBO Bioinformatics / Biotechnologie (12 EC vereist)

Vakken:

Naam	Periode	Credits	Code
<a href="#">Calculus</a>	Periode 1+2	6.0	X_400617
<a href="#">Evolutionary Genetics</a>	Periode 3	6.0	AB_1022

## Biomedische wetenschappen / Biologie / HLO (12 EC vereist)

Vakken:

Naam	Periode	Credits	Code
<a href="#">Calculus</a>	Periode 1+2	6.0	X_400617
<a href="#">Inleiding programmeren (Python)</a>	Periode 2	6.0	X_401096

## Minor BSB keuze vakken

Lijst met keuzevakken (kies 12 ec)

Vakken:

Naam	Periode	Credits	Code
<a href="#">Collective Intelligence</a>	Periode 2	6.0	X_401047
<a href="#">Evolutionary Genetics</a>	Periode 3	6.0	AB_1022
<a href="#">From Protein to Cell</a>	Periode 2	6.0	AB_1052
<a href="#">Heuristics</a>	Periode 3	6.0	X_401012
<a href="#">Information Retrieval</a>	Periode 2	6.0	X_400435
<a href="#">Knowledge and Data</a>	Periode 1	6.0	X_400083
<a href="#">Mechanics and Thermodynamics in the Cell</a>	Periode 2	6.0	X_422589
<a href="#">Molecular Cell Biology</a>	Periode 2	6.0	AB_1053

## Life Style Informatics (12 EC vereist)

Vakken:

Naam	Periode	Credits	Code
<a href="#">Biochemie</a>	Periode 2	6.0	AB_1137
<a href="#">Calculus</a>	Periode 1+2	6.0	X_400617

## Medische Natuurwetenschappen (12 EC vereist)

Vakken:

Naam	Periode	Credits	Code
<a href="#">Evolutionary Genetics</a>	Periode 3	6.0	AB_1022
<a href="#">Inleiding programmeren (Python)</a>	Periode 2	6.0	X_401096

## Minor BSB verplichte vakken

Vakken:

Naam	Periode	Credits	Code
<a href="#">Principles of Bioinformatics</a>	Periode 1	6.0	X_401094
<a href="#">Research Questions in Bioinformatics</a>	Periode 2+3	6.0	XB_401081

## Minor Deep Programming

The minor Deep Programming elaborates on important principles, different paradigms and modern developments in computer programming. Systems Programming and Equational Programming are advanced courses on programming in the imperative language C and the functional language Haskell. Compiler Construction provides in-depth knowledge on building compilers for translating source code from a high-level to a lower-level programming language. Secure Programming focuses on cryptography in software development. Concurrency & Multithreading teaches foundations and programming principles for multicore computing. This minor aims to turn students into highly skilled programmers and is an excellent preparation for entering a Master program in Computer Science.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Compiler Construction</a>	Periode 3	6.0	XB_0003
<a href="#">Concurrency &amp; Multithreading</a>	Periode 2	6.0	X_401031
<a href="#">Equational Programming</a>	Periode 2	6.0	X_401011
<a href="#">Secure programming</a>	Periode 1	6.0	XB_40005
<a href="#">Systems Programming</a>	Periode 1	6.0	X_400377

## Flexible Minor

Studenten die deze minor kiezen, moeten minimaal 30 ec halen uit onderstaande lijst.

Voor de invulling van de keuzeonderdelen is de goedkeuring van de examencommissie vereist.

Vakken:

Naam	Periode	Credits	Code
<a href="#">Advanced Programming</a>	Periode 1	6.0	X_400561
<a href="#">Bedrijfsmodellering en requirements engineering</a>	Periode 1	6.0	X_401005
<a href="#">Collective Intelligence</a>	Periode 2	6.0	X_401047
<a href="#">Concurrency &amp; Multithreading</a>	Periode 2	6.0	X_401031
<a href="#">Data Structures and Algorithms</a>	Periode 1	6.0	X_400614
<a href="#">Equational Programming</a>	Periode 2	6.0	X_401011
<a href="#">Heuristics</a>	Periode 3	6.0	X_401012
<a href="#">Information Retrieval</a>	Periode 2	6.0	X_400435
<a href="#">Integratief modelleren</a>	Periode 1	6.0	X_401001
<a href="#">Principles of Bioinformatics</a>	Periode 1	6.0	X_401094
<a href="#">Service Science</a>	Periode 1	6.0	X_401077
<a href="#">Systems Programming</a>	Periode 1	6.0	X_400377

## Minor Web Services and Data

Vakken:

Naam	Periode	Credits	Code
<a href="#">Collective Intelligence</a>	Periode 2	6.0	X_401047
<a href="#">Heuristics</a>	Periode 3	6.0	X_401012
<a href="#">Information Retrieval</a>	Periode 2	6.0	X_400435
<a href="#">Service Science</a>	Periode 1	6.0	X_401077
<a href="#">Strategic Management of Technology and Innovation</a>	Periode 1	6.0	E_BK3_SMTI

## B Computer Science Honours programme

Opleidingsdelen:

- [Interdepartmental Honours Courses](#)

### Interdepartmental Honours Courses

The interdisciplinary components of the Honours Programme are taught mainly in the evening by lecturers from Vrije Universiteit, the University of Amsterdam and Amsterdam University College, as well as guest lecturers from the Netherlands and abroad. The classes are small and you will be expected to give presentations, write papers and make an active contribution to discussions.

You have to choose at least 12 credits of Interdepartmental honours courses from the overview of interdepartmental honours courses, as well as an application form, at: <http://www.vu.nl/honourscourses>.

## Academic Writing (FEW)

<b>Vakcode</b>	L_ETBAALG006 ()
<b>Periode</b>	Periode 5
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. G.A. Dreschler
<b>Examinator</b>	dr. G.A. Dreschler
<b>Docent(en)</b>	dr. G.A. Dreschler, dr. C.A.M. de Jong, drs. I.M.W. 't Hart MPhil
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	100

### Doel vak

The aims of this course are to introduce students to the basic requirements of formal writing in English; to develop their academic skills with regard to text structure, linguistic accuracy, and clarity of expression; and to introduce them to the basic conventions of using sources through quoting, referring and paraphrasing. After following the course, you will be able to write an essay of 1000 words about an academic topic which uses academic sources appropriately, which has no major grammatical errors, and which uses a clear structure and a suitable style for academic texts.

### Inhoud vak

The subjects covered are the following:

- Academic style: formality, use of academic phrases
- Quoting, referring and avoiding plagiarism
- Structure: introduction, thesis statement, paragraph structure, conclusion
- Linguistic accuracy: grammar, vocabulary and punctuation
- Clarity of formulation: linking language, clause combining

### Onderwijsvorm

Lectures (1 hour a week) and seminars (2 hours a week).

### Toetsvorm

1. a written assignment at the end of week 3, constituting 20% of the final mark
2. a written assignment at the end of week 6, pass/fail, required
2. a written assignment due at the end of week 9, constituting 80% of the final mark



## Literatuur

No required reading. A list of suggested background reading will be made available on Canvas.

## Doelgroep

XB\_CS 1, XB\_LI 1, XB\_IMM 1

## Overige informatie

This course has obligatory attendance.

## Advanced Programming

<b>Vakcode</b>	X_400561 (400561)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	ir. M.P.H. Huntjens
<b>Examinator</b>	ir. M.P.H. Huntjens
<b>Docent(en)</b>	ir. M.P.H. Huntjens
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	200

## Doel vak

To learn advanced programming skills, to get to know and understand advanced programming concepts like inheritance and to get experience with programming some of the data structures that were taught in the course Data Structures & Algorithms.

## Inhoud vak

abstract data types (ADT's), exceptions, inheritance, interfaces, modifiers, polymorfisme, marker interfaces, wrapper classes, Javadoc, super, this, instanceof, copy constructor, from class Object: clone(), equals() and toString(), auto (un)boxing, generic classes, command line arguments, iterators, interface Iterable, for-each statement, methods with a variable number of parameters, implementation of: list and binary search tree, EBNF, parsing when EBNF of input is given, from API: ArrayList

## Onderwijsvorm

lectures and practicals

## Toetsvorm

practical

## Literatuur

Absolute Java, Walter Savitch, Pearson International Edition, Fifth International Edition, ISBN: 978-0-273-76479-3.

## Vereiste voorkennis

Practical of Programming (X\_400554)

## Doelgroep

**Overige informatie**

Via VUnet en BB

**Agriculture for Food and Nutrition Security**

<b>Vakcode</b>	E_MG_AFNS ()
<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. ir. B.G.J.S. Sonneveld
<b>Examinator</b>	dr. ir. B.G.J.S. Sonneveld
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep, Computerpracticum
<b>Niveau</b>	200

**Doel vak**

After successfully completing this course, students will:

- be familiar with main concepts of agronomy relevant for Food and Nutrition Security (FNS) analysis;
- understand the relation between locational (environmental) factors and the food production system;
- understand the relation between food production systems and FNS;
- be able to analyze these relationships with empirical data, including spatial analysis, and to interpret the results;
- be able to critically reflect and communicate on contemporaneous land use issues.

**Inhoud vak**

- Understanding the interlinkage between locational (environmental) factors and the food production system;
- Understanding the interlinkage between agricultural production systems and food productivity;
- Understanding the position of agriculture in total land use.

**Onderwijsvorm**

Lectures (7 x 2 hours), workgroups (6 x 4 hours).

**Toetsvorm**

Exam (60%), assignments (30%), presentation (10%)

**Aanbevolen voorkennis**

Basics of geography; basics of biology

**Doelgroep**

Bachelor students interested in Food Security

**Overige informatie**

In this course you will learn the basic agronomic principles underlying the interlinkages between food production and agricultural production systems on the one hand, and between agricultural production systems and environmental resources on the other hand. Basic principles of crop and livestock production will be introduced, and you will learn how they are employed across different production systems and how they affect the

interaction between production systems and the environment. Given that the nature of these linkages also vary across space and time, the course will have an explicit temporal (dynamic and historical) and spatial focus to understand long term trends and diversity in food production and environmental impacts. Also alternative agricultural production systems to the dominant systems currently in use will be discussed, such as low input farming systems, including their potential for up-scaling and sustainability. You will also be taught the basics of GIS and how spatially explicit analysis can be utilized to better understand land use patterns and production possibilities and restrictions

## American Film: Cinematic Representations of the "Other"

<b>Vakcode</b>	L_ELBAELK208 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. R.V.J. van den Oever
<b>Examinator</b>	dr. R.V.J. van den Oever
<b>Docent(en)</b>	dr. R.V.J. van den Oever
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	200

### Doel vak

Students become acquainted with the study of identity representation in American film.

### Inhoud vak

What theoretical questions arise when studying the representation of identity - think of race, gender, sexuality - in American film? Per meeting, we discuss a particular theoretical issue - for instance, stereotyping, the male gaze, character engagement, identity politics, queer subtext - after which students apply this theoretical perspective to an assigned filmic text.

### Onderwijsvorm

Seminar meetings, 2 x 2 hours per week.

### Toetsvorm

Exam.

### Literatuur

To be announced.

### Vereiste voorkennis

None.

### Doelgroep

This course is part of two minor packages: (1) American Studies; (2) Gender and Diversity. Students from other Bachelor's programs are welcome.

### Intekenprocedure

There is a slightly different enrollment procedure for this course. The standard procedure of the Faculty of Humanities has students sign up for (i) the course, (ii) the type of class (lecture and/or preferred seminar group), and (iii) the exam. However, for this course the instructor will assign the students to the seminar groups. Therefore, students should sign up for (i) the course, (ii) the lectures (if applicable), and (iii) the exam, but not for the seminar groups.

There is limited seating in this course. Priority will be given to students of two minor packages: (1) American Studies; (2) Gender and Diversity. Students from other Bachelor's programs are initially placed on a waiting list.

### Overige informatie

The level of English in this course is high.

## Applications in Economic Policy: Policy Analysis, Formulation and Evaluation

<b>Vakcode</b>	E_ME_AEP ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	School of Business and Economics
<b>Coördinator</b>	dr. W. Zant
<b>Examinator</b>	dr. W. Zant
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	300

### Doel vak

The objective of this course is to develop your capability to independently analyse a policy issue, design a policy response, or evaluate a policy intervention from an economic point of view.

Specific learning outcomes upon completion of this course are:

- you are able to identify a relevant (economic) policy issue, to motivate the urgency of the issue, and to formulate an appropriate research question;
- you are able to locate relevant economic theory in the literature and to apply it correctly in order to analyse the policy issue and to identify the economic rationale of potential or actual policy responses;
- you are able to identify, interpret and compare empirical findings from the economic literature to describe the policy issue, and/or the behavioural response of the market and government actors, and/or the impact of these responses;
- you have developed a critical attitude to the relevance and shortcomings of empirical data compared to theoretical requirements, and have become aware of limitations in insights that can be gained from theoretical reasoning alone when addressing real-life issues;
- you are able to present your findings clearly to academic expert and non-expert audiences;
- you are able to work independently, while incorporating relevant feedback into their work;
- you are able to give constructive feedback to peers.

**Inhoud vak**

In this intensive period course, you work in a policy area of your choice (e.g. international financial systems and banking regulation, macro policy, development and growth, environment, urban/transport, health, human capital, competition policy, industrial policy). You write an economic policy-oriented research paper focusing on policy analysis, design and/or evaluation.

**Onderwijsvorm**

One introductory lecture followed by weekly working groups (compulsory attendance)

**Toetsvorm**

Paper, presentation and working group participation

**Literatuur**

Various theoretical and empirical academic papers (dependent on the topic)

**Vereiste voorkennis**

Foundations of Microeconomics and Development of Macroeconomic Thought

**Aanbevolen voorkennis**

Business Cycles and Stabilization Policy and Structural Policy

## Applications in Food and Nutrition Security Analysis

<b>Vakcode</b>	E_MG_AFNSA ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	School of Business and Economics
<b>Coördinator</b>	dr. R. de Wildt-Liesveld MSc
<b>Examinator</b>	dr. R. de Wildt-Liesveld MSc
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	300

## Automata and Complexity

<b>Vakcode</b>	X_401049 (401049)
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	drs. J. Endrullis
<b>Examinator</b>	drs. J. Endrullis
<b>Docent(en)</b>	drs. J. Endrullis
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	300

## **Doel vak**

The student is acquainted with important notions and algorithms regarding formal languages, automata, grammars, compilers, computability and complexity.

This course addresses foundational questions in computer science, such as: "What is a (programming) language?", "How can languages be recognised by computers (automata)", "Which problems can be solved using a class of automata?", "How much time and memory does solving a problem require?".

The course is divided into the following parts: automata & languages and computability theory (and, if time permits, quantum computing).

## **Inhoud vak**

The first part, on automata and languages, deals with the concepts of formal language, grammar, and automaton. Two types of languages are covered: regular and context-free languages. Regular languages are used, e.g., in search queries, in the form of regular expressions.

Context-free languages are suitable to describe programming languages. The automata-theoretic counterparts here are finite automata and the more powerful pushdown automata. Pumping lemmas are discussed to determine whether a language is regular or context-free. With each type of language a class of grammars is associated: left-linear and context-free grammars. Parsing algorithms are presented for context-free languages, to determine whether a string is in the language.

In the second part of the course, on computability theory, the central question is "Which computations can be performed on a computer?". To reason about this question, Turing machines are introduced, as well the Church-Turing thesis, along with examples of undecidable problems: the halting problem and the Post correspondence problem. It is shown how undecidability of new problems can be shown by reduction from a known undecidable problem. Important complexity classes from the complexity hierarchy are discussed, notably P, NP, and NP-complete, together with the corresponding reduction arguments.

If there is enough time left, the final part treats basic concepts in quantum computing: qubits, entanglement and quantum-operations. It is shown how quantum computing can improve computing, first using a parity game, and later by introducing Simon's algorithm. The latter solves a problem in polynomial time, where in the traditional setting the best known solution has an exponential time complexity. We conclude with the quantum and probabilistic complexity classes BQP and BPP.

## **Onderwijsvorm**

4 hours per week lectures; 4 hours per week exercise classes

## **Toetsvorm**

Weekly homework exercises (which can earn up to 0.5 bonus points). The homework is mandatory to qualify for the exam.

Written exam.

## **Literatuur**

Peter Linz, An Introduction to Formal Languages and Automata, Jones & Bartlett, 4th or 5th edition

**Doelgroep**  
3CS

## Bachelor Project Computer Science

<b>Vakcode</b>	XB_40001 ()
<b>Periode</b>	Periode 5+6
<b>Credits</b>	15.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. A. Bhulai
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	300

### Doel vak

- to bring the student in touch with and, if possible, make a contribution to current research in a branch of computer science
- to learn to independently conduct a research project (albeit under supervision)
- to present and communicate the established results
- to learn finding, processing, and critical evaluation of relevant literature, and communicating of research results and ideas.

### Inhoud vak

The Bachelor Project is carried out individually. It is meant as a conclusion of computer science bachelor studies. The actual topic differs per student and per research group, and is determined in concert with the supervisor. A student can select from an assortment of topics offered, or suggest his/her own topic. Part of the project consists of the study and review of literature as well as of peer review.

### Onderwijsvorm

After an orientation meeting, the student selects a supervisor and a topic. The work, carried out on individual basis, results in a written report and an oral presentation at the annual Computer Science Bachelor Seminar. The papers that were studied are presented and discussed at research group meetings. The student performs a number of reviews of these papers as well as of final concept-reports by fellow students.

### Toetsvorm

Individual evaluation on the basis of performance, final report, oral presentation, and reviews.

### Aanbevolen voorkennis

Students should have completed (almost) all other studies within the bachelor programme.

**Doelgroep**  
3CS

### Overige informatie

More detailed information is offered in the Bachelor Project manual. Read it carefully for an overview of the project itinerary. Students should have completed (almost) all other courses within the bachelor

programme.

## Bedrijfsmodellering en requirements engineering

<b>Vakcode</b>	X_401005 (401005)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. H. Leopold MSc
<b>Examinator</b>	dr. H. Leopold MSc
<b>Docent(en)</b>	dr. H. Leopold MSc
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	200

### Doel vak

Na dit vak is de student in staat:

- een probleem- en veranderingsanalyse uit te voeren met betrekking tot een IT vraagstuk in een bedrijfsmatige context;
- op modelmatige wijze in kaart te brengen hoe een informatiesysteem als oplossing past in bedrijfsstrategie en bedrijfsproces;
- verschillende methodieken toe te passen voor het eliciteren van door de organisatie te stellen eisen aan een te ontwikkelen informatiesysteem.

### Inhoud vak

Het vak Bedrijfsmodellering en Requirements Engineering (BMRE) behandelt de analyse van bedrijfsvraagstukken, waarbij introductie of uitbreiding van een informatiesysteem een van de mogelijke oplossingen is. Dit omvat de activiteiten en methodieken die nodig zijn om:

- (1) een probleemanalyse uit te voeren met betrekking tot IT vraagstukken in een bedrijfsmatige context;
- (2) te modelleren hoe een gewenst informatiesysteem past in het bedrijfsproces en aan te geven welke eventuele veranderingen daarbij wenselijk zijn;
- (3) het ontwikkelen en toetsen van het te stellen pakket van eisen aan een te bouwen informatiesysteem.

### Onderwijsvorm

Het vak bestaat uit een college met een tentamen en een practicum. Beide moeten voldoende zijn.

### Literatuur

Syllabus.

### Doelgroep

2IMM, 3BA

## Behaviour Genetics

<b>Vakcode</b>	P_BBEHGEN ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0



<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. C.V. Dolan
<b>Examinator</b>	dr. C.V. Dolan
<b>Docent(en)</b>	dr. C.V. Dolan
<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<b>Niveau</b>	300

### Doel vak

The aim of this course is to introduce students to behavior genetics as applied to psychological variables. The students will learn what questions behavior genetics addresses, and how these questions are answered using the classical twin design, and some extensions of this design. The course includes practicals in which you will analyze real and simulated twin data using the R library OpenMx.

### Inhoud vak

This course will include explanation of the following:

- 1) The biometric model, underlying the twin and family designs which are used to infer the role of genetic and environmental effects from family resemblance).
- 2) Univariate and multivariate modeling of twin data using OpenMx (an R library) in the programming environment R
- 3) The meaning of gene-environment interplay (genotype X environment interaction, and genotype -environment correlation) and to model these in the classical twin design.
- 4) Detailed discussions of applied papers and papers concerns the statistical background of the twin design.

### Onderwijsvorm

Lectures and computer practicals

### Toetsvorm

A exam consisting of open and multiple choice questions and take-home computer assignments which are based directly on the computer practicals.

### Literatuur

Articles + book chapters

### Vereiste voorkennis

Please note: this course includes a statistical component.

You are expected to have a basic practical understand of correlation, linear regression and basic descriptive statistics, such as means, variance, standard deviation.

Some experience in the use of statistical programs like SPSS is useful.

Knowledge of R is an advantage.

However, the practicals include explanation of R (using the R studio interface).

## Biochemie

<b>Vakcode</b>	AB_1137 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	dr. ir. Y.J.M. Bollen
<b>Examinator</b>	prof. H. Lill
<b>Docent(en)</b>	prof. H. Lill, dr. ir. Y.J.M. Bollen, prof. dr. B. Teusink, dr. D. Molenaar
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Practicum, Werkgroep, Computerpracticum, Bijeenkomst, Deeltoets extra zaalcapaciteit, Overig
<b>Niveau</b>	100

### Doel vak

De cursus moet de basis leveren voor de moleculaire vakken. De klemtoon ligt dan ook op het gebied van de Biochemie.

De student kan:

- Bouwstenen en opbouw van biochemisch relevante macromoleculen en hun complexen identificeren en de krachten en interacties die hun structuur en samenstelling bepalen beschrijven.
- Uitleggen waardoor de richting van biochemische processen bepaald wordt, hoe enzymen werken en gereguleerd worden, en welke rol membranen in cellen hebben.
- Uitleggen hoe macromoleculen in de levende cel in netwerken functioneren en hoe ze daarin samenwerken om de belangrijke levensprocessen uit te voeren. Bijzondere aandacht ligt op de cellulaire energiehuishouding, en op de concepten, de samenhang en regulatie van metabole routes in de mens.
- De technieken zoals geleerd op VWO wiskunde-B niveau toepassen bij het oplossen van biochemische rekenproblemen.
- Rekenen aan eenvoudige wiskundige modellen van biochemische processen en formuleren wat de biologische betekenis van de resultaten is.
- Verscheidene biochemische en biofysische technieken praktisch toepassen, gegevens opnemen en verwerken en daarbij maatregelen m.b.t. biologische veiligheid bewaken.
- Biochemisch onderzoek opzetten, analyseren en in een verslag vastleggen.

### Inhoud vak

In de cursus worden behandeld:

- Het begrip van energie en de energieveranderingen bij reacties en interacties tussen moleculen.
- De bouwstenen van biologische macromoleculen en hun polymeren. De opbouw van biologische polymeren, met name eiwitten.
- De meest belangrijke rol van eiwitten in ons lichaam, de katalyse en zijn regulatie.
- De opbouw van biologische membranen en transportprocessen.
- De concepten van het katabolisme en de daaraan aansluitende transformaties van energie.
- De simulatie van cellulaire processen en de daarvoor nodige wiskundige vaardigheden.

### Onderwijsvorm

Hoorcolleges: 32 uur

Werkcolleges: 24 uur

Practica: 18 uur

### **Toetsvorm**

Tentamen theorie (50%): opgesplitst in twee digitale deeltentamens. Resultaten van deze deeltentamens zijn compenseerbaar, individuele deoltoetsen zijn niet herkansbaar.

Tentamen wiskunde en modelleren (25%): opgesplitst in twee digitale deeltentamens.

Resultaten van deze deeltentamens zijn compenseerbaar, individuele deoltoetsen zijn niet herkansbaar.

Toelichting: Er zijn twee digitale deoltoetsen, waarin in elk een stuk theorie en een stuk modelleren wordt getoetst. Er volgen twee cijfers voor elke deoltoets: een cijfer voor theorie en een cijfer voor modelleren.

Studenten die alle tussentijdse opdrachten goed beantwoorden, krijgen een half punt extra voor het theorie onderdeel, maar alleen als het tentamen voor theorie voldoende (5,5 of hoger) is gemaakt.

Practicum (25%): actieve deelname en eindverslag. Het eindverslag moet voldoende zijn. Uitsluitend bij een onvoldoende kan het eindverslag nog in dezelfde periode worden herzien, maar het cijfer kan dan niet hoger dan een 6.0 worden.

Alle toetsonderdelen (tentamen theorie, tentamen modelleren en practicum) moeten voldoende (5,5) zijn.

### **Literatuur**

Berg, Tymoczko, Stryer: Biochemistry, Freeman; Handleiding; Handboek 'Practica in de Levenswetenschappen'; Syllabus

### **Doelgroep**

Verplicht vak voor eerstejaars BSc Biomedische wetenschappen

### **Intekenprocedure**

Voor deze module dien je jezelf in te tekenen op de module, het hoorcollege, het tentamen en eventuele deeltentamens via VUnet. De faculteit tekent je daarna in voor de overige onderwijsvormen.

Let op! Als je één of meer onderdelen van het vak moet herkansen, moet je je wel zelf inschrijven voor de herkansing, ook als je alleen het practicumverslag opnieuw moet maken.

### **Overige informatie**

Voor de werkcolleges, de werkgroepen en het practicum geldt verplichte aanwezigheid.

Bij de laboratoriumpractica is het dragen van een labjas verplicht.

Voorafgaand aan het practicum wordt de handleiding en het 'Handboek Practica in de Levenswetenschappen' verkocht.

## **Biologische Psychologie (UM)**

<b>Vakcode</b>	P_UBIOPSY ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0

<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. D. van t Ent
<b>Examinator</b>	dr. D. van t Ent
<b>Docent(en)</b>	dr. D. van t Ent
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	200

### Doel vak

Inzicht verwerven in de structuur en functie van het zenuwstelsel en de rol van het zenuwstelsel in (ab)normaal gedrag.

### Inhoud vak

Begrippen uit de biologie aansluitend bij de processen die men in de psychologie bestudeert. Aan de orde komen structuur en organisatie van het centrale en perifere zenuwstelsel, neurotransmissie, psychofarmaca en de biologische mechanismen achter waarnemen, motoriek, emoties en de hogere cognitieve functies (geheugen, spraak, bewustzijn). Tijdens de colleges wordt tevens ingegaan op neurologische stoornissen (Parkinson, Broca's afasie, Alzheimer etc. ) en de biologie van gedragstoornissen (slaapstoornissen, psychosen, angstigheid, depressie, verslaving).

### Onderwijsvorm

Hoorcollege

### Toetsvorm

Tentamen

### Literatuur

Speciale VU editie, alleen te koop in de VU boekhandel:

Title: Biological Psychology

Compiled by: Dr. Dennis van 't Ent

School name: VU university, faculty of psychology and education

ISBN: 9781783991648

## Brain in Trouble

<b>Vakcode</b>	AB_1038 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	dr. H.K.E. Vervaeke
<b>Examinator</b>	dr. H.K.E. Vervaeke
<b>Docent(en)</b>	prof. dr. S. Spijker, prof. dr. T.J. de Vries, dr. H.K.E. Vervaeke
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep, Computerpracticum
<b>Niveau</b>	300

### Doel vak

The goal of this course is to deepen understanding of the etiology, expression and treatment of (psychiatric) brain disorders, as well as

models used in preclinical science. Students will be encouraged to critically analyze the impact of brain disorders on society.

Learning outcomes:

The student is able to explain the contribution of genetic and environmental factors to complex multifactorial diseases such as mental disorders.

The student is able to elaborate on various treatment options for psychiatric disorders.

The student is able to critically reflect on the boundaries between normal (healthy) and abnormal (ill) behavior and the implications for society.

### **Inhoud vak**

The focus of this course is on the etiology of mental disorders, such as addiction, ADHD, obsessive-compulsive disorder, eating disorders and mood disorders, with special attention for the nature-nurture discussion. Various treatments options for these conditions, including the use of pharmacological agents, behavioral therapy and deep brain stimulation will be discussed. Students will be challenged to critically reflect on the boundaries between normality and abnormality and the implications for society.

First Theme: addiction and impulsivity

What is addiction? Is addiction truly a brain disorder? Do genes play a role in addiction? How does society view illicit drug use and addiction? Are all drugs equally harmful? How to treat addiction? Is ADHD a real mental disorder, or a cultural construct used to bring deviant or socially undesirable behavior under medical surveillance and control? Is it a good idea to treat children who have been diagnosed ADHD, with psychostimulant medications? What is the role of pharmaceutical companies? Do sugar and food additives elicit hyperactive behavior? Are there any advantages in having ADHD?

Second Theme: obsessive compulsive disorders, eating disorders and cognitive enhancement

Can you treat OCD with Deep Brain Stimulation? Is our Western beauty ideal at the root of eating disorders? Is the individual to blame for being obese? Is it ethical to improve your mental performance by cognitive enhancers?

Third Theme: mood disorders & social behaviours

Is depression a real brain disorder or an inability of our culture to accept sadness as an integral part of life? Do genes play a role in the etiology of major depressive disorder and bipolar disorder? What is the efficacy of pharmacotherapy and behavioral therapy? What is the role of pharmaceutical companies?

Is there a neural basis to antisocial behavior? If biology and circumstance conspire to prime certain individuals toward violence, how much responsibility do people really bear for their actions? Are violent delinquents worth treating? Should brain imaging / genetic profiling be used in legal cases? Can neuroscience assist in determining responsibility? If neural circuitry underlying morality is compromised,

is it morally wrong to punish prisoners?

### Onderwijsvorm

Lectures (30 hours), computer practical (2 hours), homework assignments (6 hours), class discussions (2 hours)

Course coordinators are Hylke Vervaeke and Taco de Vries

### Toetsvorm

Written exam (combination of MC-questions and open-end questions) (75%) and class discussions/assignments (25%), each at least grade 5.5.

### Literatuur

"Foundations Of Behavioral Neuroscience" by N.R. Carlson (Pearson Education (US)), 8th edition.

Extra literature on Canvas

### Aanbevolen voorkennis

The courses 'Cognitive Neuroscience' and 'Nature vs. Nurture' from the minor 'Brain & Mind'

### Doelgroep

Part of minor Brain and Mind

Open to students from all educational backgrounds (e.g., exact, social, life and economic sciences) with an interest in the brain and mind.

### Intekenprocedure

Groups for Class Discussions and Home-work Assignments via Canvas

### Overige informatie

Central Academic Skill: Debating and discussing

## Business Cycles and Stabilization Policy

<b>Vakcode</b>	E_ME_BCSP ()
<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. M. Mastrogiacomo
<b>Examinator</b>	dr. M. Mastrogiacomo
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	200

### Doel vak

The objective of the course is to introduce you to the theory and practice of macroeconomic and monetary policy, including regulation of the financial system. This course is complementary to the parallel course of Structural Policy. It is highly recommended to take both courses.

Specific learning outcomes upon completion of this course are:

- Ability to apply macroeconomic concepts and theories to analyze problems of employment and inflation;

- Capability to analyze the role macroeconomic policymakers in managing business cycles;
- An understanding of the policy problems facing central banks;
- Ability to interpret recent macroeconomic empirical work on economic crises and the effects of fiscal and monetary policy.

### **Inhoud vak**

The course starts with discussing the historical development of macroeconomic theories explaining the origin of business cycles:

- Say's law versus Malthus' gluts;
- The Great Depression and the Keynesian revolution: Keynes, Hicks, Modigliani, Samuelson;
- Business cycle theory: Schumpeter, Austrians, Kuznets;
- Recent financial crises.

Next, the course continues with discussing the roles of different authorities in conducting macroeconomic policies. This part of the course includes the following topics:

- Money: creation, control of the money supply, interest rates, bank reserves, securitization;
- Central banking: Fed, ECB, independence, different targets;
- Stabilizing role of Fiscal policy: automatic stabilizers, crowding out, budget deficits, effectiveness;
- Stabilizing role of Monetary policy: Taylor rules, quantitative easing, liquidity trap, effectiveness;
- The Debt-Driven Crisis: the Micro-explanation to the Great Recession.

The course concludes with discussing recent empirical work on economic crises and the effects of fiscal and monetary policy.

This course is the sequel to the course Development of Macroeconomic Thought and is suggested to be taken together with the course of Structural Policy that runs in parallel.

### **Onderwijsvorm**

Lectures, guest lectures and working groups

### **Toetsvorm**

Grade is average of problem sets (30 %) and written examination (70%), with written exam grade of at least 5.0. To those who participate into less than four compulsory tutorials and/or do not deliver their tutorial work, one point will be subtracted from the final grade.

### **Literatuur**

Acemoglu, Daron, David Laibson and John A. List, 2016, Economics, Harlow, Essex, Pearson Education Ltd. ISBN 13: 978-1-292-07920-2, incl. access code MYECONLAB.

### **Vereiste voorkennis**

Basic knowledge of math and statistics, as provided in the academic core of any academic program at the Vrije Universiteit Amsterdam or equivalent.

### **Aanbevolen voorkennis**

Development of Macroeconomic Thought

## **Business Intelligence and Analytics**

<b>Vakcode</b>	E_MM_BIA ()
<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>	prof. dr. J.F.M. Feldberg
<b>Examinator</b>	prof. dr. J.F.M. Feldberg
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Responsiecollege

### Doel vak

Being able to define, describe and recall the basic concepts, principles and theories underlying business intelligence & analytics solutions (decision support systems). Also, to classify and compare business intelligence & analytics solutions as well as the constituent components of business intelligence & analytics solutions (Academic Skills).

Become proficient at exploring data-driven business models and to apply business intelligence & analytics concepts, principles and theories to business problems (Quantitative Skills).

Learn to explore, analyze and determine how big data can drive business model innovation as well as to analyze business cases, and propose business intelligence & analytics solutions and decide which data to use given a business problem to be solved (Knowledge).

Adeptly evaluating and discussing the organizational and social implications of business intelligence & analytics solutions and to create insights using established business intelligence & analytics tools (Bridging Theory & Practice).

### Inhoud vak

Data is hot! How organizations deal with the overabundance of data and the ability to transform data into insights have become critical success factors for every organization. Key words in this context are 'big data', 'data science', and 'data-driven decision making and innovation'. This course offers the handles that are needed to fully deploy the potential of data, and business intelligence & analytics solutions in order to create competitive advantage. The course primarily has a managerial focus, technology will be used primarily to create hands on experience with relevant BI&A technologies and as such enhance insights in their features and characteristics. There is a lot of business involvement in this course: experts from industry and BI&A consultants will share their insights and experience in the weekly workshops.

### Onderwijsvorm

Lectures  
Tutorials  
Workshops

### Toetsvorm

Assessment Written exam – Individual assessment  
Interim Assignment(s) / Tests:  
Analytics practicum tests – Individual assessment



## Literatuur

This course is article based.

Readings will be announced in the course manual.

## Aanbevolen voorkennis

Recommended knowledge Elementary course on (Management) Information Systems (for example: Laudon, K.C. & Laudon, J.P. (2016). Essentials of MIS (12 th edition).

Basic knowledge on statistics and Microsoft Excel.

BK: 2.1 Business Information Technology

IBA: 2.1 Business Information Systems

## Business Model Assessment

<b>Vakcode</b>	E_MB_BMA ()
<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. L. Lu
<b>Examinator</b>	dr. L. Lu
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	200

## Doel vak

A basic understanding about corporate finance is required to assess the efficiency and efficacy of a company's business model. Would it be possible for companies like Google, Microsoft and Uber to develop (new) strategies and business models without insight in the present and future financial viability of the company? Corporate finance pertains to the sources of funding, the capital structure of corporations, and the actions that managers take to increase the value of the firm, as well as the tools and analysis used to allocate financial resources. The course Business Model Assessment provides an introduction in corporate finance for students in the program. This course has three main learning objectives:

1. Gain knowledge of basic concepts and theories pertaining to firm behaviors in the area of corporate finance in order to assess the business (Knowledge)
2. Provide standard answers to hypothetical cases, e.g. through solving exercises from the textbook (Quantitative skills)
3. Apply obtained knowledge in corporate finance to real life cases, e.g. interpret financial information, formulate them into standard framework, and provide comments and remarks for corporate decision makers (Bridge theory and practice)

After participating in this course, you should:

- Understand corporate finance concepts, including their strengths and limitations in explaining the realities
- Understand unique features of these concepts and their interrelationship, and the relevant corporate finance theories for firm behaviors
- Have quantitative skills to apply these concepts, e.g. solve exercises in the textbook
- Be able to choose between various concepts and apply them in real life

cases, e.g. provide advice and remarks for corporate decision makers

### **Inhoud vak**

The course will start with an introduction of business assessment approaches and basic concepts. We will start with an introduction to corporations, and proceed with financial statement analysis, financial decision making, investment decision rules, capital budgeting, and raising equity capital, etc. The focus is on applying concepts and theories to real-life situations during lectures, and providing students with feedback on their exercises and cases in the tutorials. We will explain the basic concepts and theories in the lectures, and apply to relevant exercises and cases in the tutorials. Students need to solve two cases in groups of 4 or 5 members, and present their reports in the tutorials.

### **Onderwijsvorm**

lectures and tutorials

### **Toetsvorm**

Individual and group assessment

### **Literatuur**

The case materials and exercises will be posted on Canvas

## **Business Model Innovation**

<b>Vakcode</b>	E_MB_BMI ()
<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. J. Du
<b>Examinator</b>	dr. J. Du
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	200

### **Doel vak**

The past few years have witnessed the emergence and success of several pioneering new types of companies, such as Uber, Airbnb, facebook, Tesla, and Amazon. While many long-established, resource-abundant and technologically-advanced firms gradually lose profit margins in their traditional markets, these new types of companies have achieved extraordinary performance. The main objective of the course 'Business Model Innovation' (BMI) is to prepare students with fundamental knowledge about business models and business model innovation. This course is built on the combination of different streams of literature/theories on business strategy, innovation management, and entrepreneurship. Students are expected to be able to understand and apply the related theories and frameworks and to write a business plan. Being part of the whole Minor, this course also prepares students for the following courses "Business Model Assessment", in which they will learn how to assess their business models, and "Business Professionals", in which particular interests and skills in a specific field are developed and deepened.

In particular, after following the course students:

- Are able to critically reflect on business model innovation theories and tools
- Are able to apply theoretical perspectives from the different streams of literature to explain the observed business model innovation and their effects on corporate strategies and performance
- Are able to develop team skills, creative skills, develop cases, and communicate a business plan

### Inhoud vak

The course will start with an introduction of business models and corporate innovation strategies. It will then focus on two main paths: Business model innovation based on internal resources and capabilities, as well as business model innovation leveraging external opportunities. A wide range of topics such as business idea generation, business opportunity identification, start-up firms creation, as well as corporate venturing will be discussed in each lecture, respectively. During the lecture, the first part is related to the theories and process of business model innovation. The second part is concerned with the application of tools and models necessary to write a business plan for the business ideas of student groups.

### Onderwijsvorm

Lectures and seminars. During the lectures, the different streams of literature will be explained and illustrated with real-life examples. Throughout the seminars, the theory is applied to student business plans and case analysis. Students will have the opportunity to learn from and interact with leading business practitioners, discuss their progress through peer-review and with the support of experienced business developers.

### Toetsvorm

Business plan (group), and essay (individual)

### Literatuur

- Afuah, Allan. Business Model Innovation: Concepts, Analysis, and Cases. Routledge, 2014.
- Selection of academic papers and news articles

### Vereiste voorkennis

None

## Business Professionals

<b>Vakcode</b>	E_MB_BPROF ()
<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>	drs. A.C. Guldemond
<b>Examinator</b>	drs. A.C. Guldemond
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep, Instructiecollege
<b>Niveau</b>	300

### Doel vak

In the course Business Professionals, the focus is on the human element in the business modeling paradigm. The overall objective is gain knowledge about business models and management from the perspective of the professional.

In particular, when students complete this course, they will:

- Understand the profiles of key business professional roles such as chief executive officers, marketing, finance, human resources, operations and technology executives
- Be able to apply ideas about professionals for a reflection on their own background, personal role and career development as a (future) business professional
- Be able to formulate and analyze business modelling problems from the perspective of the business professional
- Be able to verbally and in written report on assignments

### Inhoud vak

During the course students will explore cases and theories about the contribution of professionals in management and organization. Guiding questions are: Who are the people behind the key strategic decisions for the business model of an established firm or a new business venture? What functions, behaviors and capabilities are required for successful collaboration on the design and implementation of new business models? The content of the course entails an even-handed appreciation for theory and practice.

### Onderwijsvorm

Lectures and tutorials. In the first part of the course, lectures start with an introduction to (management) professionals; their task, responsibilities, and activities. Throughout the tutorials, students have the opportunity to apply the theoretical frameworks introduced in the lectures. To this end, the tutorials combine assignments, case studies and round-table discussions. Students are expected to actively contribute to the group's experience and learning.

### Toetsvorm

Written exam, assignments, presentation

### Literatuur

- Selection of articles, cases and support materials

## Business Project

<b>Vakcode</b>	E_MB_BPROJ ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	School of Business and Economics
<b>Coördinator</b>	dr. B.V. Tjemkes
<b>Examinator</b>	dr. B.V. Tjemkes
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	300

## Doel vak

The main objective of the course 'Business Project' is to familiarize students with knowledge and challenges associated with the design, execution, and evaluation of management (change) projects. Whereas during prior Minor business Administration courses students have been acquainted with various elements of management, during this course students are asked to integrate knowledge and adopt a multi-disciplinary approach in resolving real-life business issues. As the course builds on knowledge and skills acquired in the whole Minor, it encourages an even-handed appreciation of business model thinking and management disciplines. In particular, after following the course students:

- Have an advanced understanding of the decisions (conceptual, methodological and managerial) associated with designing and conducting a business project (research, advise) in the area of business administration
- Are able to act professionally (individually and in teams) and systematically report their results, both verbally (report) and orally (presentation)

## Inhoud vak

The core of the course is based on a business venture. A real-life business which is confronted with specific challenges that demand a resolution (company visit). During the lectures students will be confronted with knowledge required to design and conduct a business project. The focus will be on knowledge and understanding associated with multi-disciplinary approaches to deal with real-life business challenges, project management approaches to deal with these challenges, and academic research to obtain and access relevant knowledge. In addition, during tutorial sessions students are challenged to explicate their decisions, and they will receive feedback. To conclude the course a presentation is given to the management team of the company.

## Onderwijsvorm

Lectures and tutorials. During the lectures, theory will be explained and illustrated with actual examples. Throughout the tutorials, the theory is applied to students business project, and teams will receive feedback. Students also discuss their progress through peer-review and in the form of written reports and/or oral presentations.

## Toetsvorm

Individual and team assignment

## Literatuur

Selection of articles.

## Calculus

<b>Vakcode</b>	X_400617 ()
<b>Periode</b>	Periode 1+2
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. C.M. Quant

<b>Examinator</b>	dr. C.M. Quant
<b>Docent(en)</b>	dr. C.M. Quant, drs. J.A. Los
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Deeltoets extra zaalcapaciteit
<b>Niveau</b>	100

### Doel vak

In deze cursus leert de student:

- vergelijkingen en ongelijkheden op te lossen,
- te werken met speciale functies (waaronder goniometrische functies en hun inversen, exponentiële functies en logaritmen),
- berekeningen en vergelijkingen op te lossen met complexe getallen,
- limieten te bepalen,
- technieken voor differentiëren en toepassingen (waaronder impliciet differentiëren, Taylorpolyomen, berekenen van extremen),
- verschillende integratietechnieken (waaronder substitutie, partiële integratie en breukspitsen),
- verschillende typen differentiaalvergelijkingen op te lossen.

### Inhoud vak

Deze cursus behandelt reële functies van één variabele, waarbij we zonder rekenmachine werken. Aan de orde komt:

- Oplossen van vergelijkingen en ongelijkheden.
- Werken met speciale functies en met inversen van functies. In het bijzonder behandelen we goniometrische functies en hun inversen (arcsinus, arccosinus en arctangens), exponentiele functies en logaritmen.
- Berekenen van limieten (ook met behulp van l'Hôpital).
- Differentiëren van functies en toepassingen: definitie met behulp van een limiet, rekenregels, afgeleiden van standaardfuncties, raaklijnen en normalen, Taylorpolynomen, extreme waarden en buigpunten.
- Integreren van functies: primitieven van standaardfuncties, integratietechnieken zoals substitutie, partiële integratie en breuksplitsen.
- Oplossen van verschillende typen differentiaalvergelijkingen. In het bijzonder eerste orde differentiaalvergelijkingen (scheiden van variabelen en integrerende factor) en lineaire tweede orde differentiaalvergelijkingen met constante coëfficiënten (ook inhomogeen). Het college bevat enkele toepassingen van differentiaalvergelijkingen op fysisch, biologisch en chemisch gebied.

Complexe getallen worden geïntroduceerd. We leren optellen, aftrekken, delen, vermenigvuldigen en machtsverheffen met complexe getallen, zowel in rechthoekige coördinaten als in poolcoördinaten. Bij dit laatste gebruiken we de modulus en argument notatie en complexe e-macht. Eenvoudige complexe vergelijkingen worden opgelost.

### Onderwijsvorm

4 uur hoorcollege per week, 2 uur werkcollege per week.

### Toetsvorm

Twee deeltentamens (elk 40%) en wekelijkse digitale toetsen (20%). De deeltentamens kunnen niet apart herkanst worden. Indien de student de cursus niet via de deeltentamens haalt, moet een hertentamen over de volledige stof gedaan worden. In dat geval telt het hertentamen voor 80% en de wekelijkse digitale toetsen voor 20%. De precieze regeling wordt in de studiehandleiding beschreven.

## Literatuur

Adams, Robert A and Essex, Christopher, Calculus: a complete course, 8th Edition, Pearson, 2013.

## Doelgroep

1SBI, 1MNW, 1FAR, Minor Bioinformatics and Systems Biology.

## Intekenprocedure

Voor deze module dien je jezelf in te tekenen op de module, het hoorcollege, het tentamen en eventuele deeltentamens via VUnet. De faculteit tekent je daarna in voor de overige onderwijsvormen.

## Overige informatie

Dit vak maakt deel uit van de Minor Bioinformatics and Systems Biology.

Bij dit vak is deelname aan de werkcolleges verplicht (de exacte regeling wordt bekend gemaakt in de studiehandleiding).

## Challenges of Food and Nutrition Security

<b>Vakcode</b>	E_MG_CFNS ()
<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. C.F.A. van Wesenbeeck
<b>Examinator</b>	dr. C.F.A. van Wesenbeeck
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	100

## Doel vak

After successfully completing this course, students will:

- have a broad understanding of the concept of Food and Nutrition Security (FNS);
- be able to identify, calculate and interpret basic indicators for FNS and judge their relevance;
- be familiar with and understand the challenges to achieve FNS;
- be familiar with and understand the challenges posed by FNS failure for societies and individuals;
- be familiar with and understand the rationale for possible interventions to improve FNS.

## Inhoud vak

Food and nutrition security is a critical input for the functioning and wellbeing in any society. At the same time, food and nutrition security remains far from guaranteed with more than 700 million people being undernourished and another billion people suffering from a lack of vitamins and minerals. In this course you will first develop a broad and deep understanding of the concept of FNS, both historically and contemporaneously. Next, the course will analyze challenges to ensure food and nutrition security for all now and in the future as well as challenges posed for societies and individuals by food and nutrition insecurity.

**Onderwijsvorm**

Lectures and workgroups

**Toetsvorm**

Exam (60%), assignments (30%), presentation (10%)

**Literatuur**

To be announced

**Vereiste voorkennis**

There is no formal entrance requirement for the minor Global Food Security Studies, and hence also not for this course. We specifically aim for a diverse group as we strongly believe that interdisciplinary research is best taught through active interaction between students from different disciplinary backgrounds. However, we expect that this course is especially of interest to students of economics, social sciences and health sciences. The minor is a university minor which implies that VU students do not need to ask for permission from the Examination Board to acquire the credits for courses for their own BSc degree.

**Doelgroep**

The minor Global Food Security Studies and hence also this course is open for students from all majors who want to acquire familiarity with the core principles of global food security and interdisciplinary methods. We are particularly interested in students who wish to contribute to food security through rigorous interdisciplinary knowledge production. The international staff that teaches in this minor program conducts research in a variety of regions around the globe. This holds great appeal to students who are keen to understand the diversity and similarity in problems and solutions related to food (in)security.

**Intekenprocedure**

To register you should enroll through VUnet. Registration is open from mid-July. Early registration is recommended. Students without access to VUnet should enroll as secondary course students ('bijvakstudent'). More information can be found on this pages:

[Dutch information about the application procedure >](#)

[English information about the application procedure >](#)

**Overige informatie**

Part of minor Global Food Security

**Climate Change Law**

<b>Vakcode</b>	R_TL-TP ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Rechtsgeleerdheid
<b>Coördinator</b>	C. Kaupa
<b>Examinator</b>	C. Kaupa
<b>Docent(en)</b>	C. Kaupa
<b>Lesmethode(n)</b>	Hoorcollege



**Doel vak**

The course analyzes climate change as a transnational legal phenomenon. Students will learn to work across different legal fields (ranging from international and human rights law to private and economic law) and different jurisdictions (including international, European, national and local regulation), and to handle legal questions in the context of complex economic, political, social and ethical debates. Students will be encouraged to participate in the course of the lectures, with the goal of developing the sort of critical and analytical skills conducive to the practice of transnational law, and to understanding transnational global developments.

**Inhoud vak**

Climate change is one of the most pressing issues the world faces in the 21st century. It is also a particularly complex and interesting problem from a legal perspective: this is because climate change affects multiple jurisdictions (from the international to the local level), numerous areas of law (ranging from international to private law) and multiple actors (ranging from governments and international organizations to multinational businesses, NGOs and private citizens). Moreover, complex scientific, economic, political, social and ethical questions feed into the legal processes.

Analyzing the interaction of different legal fields:

Greenhouse gases originate from a broad range of activities, including energy production, industry and transport to agriculture. These are regulated in, or otherwise affected by, numerous fields of law, such as international law, European and national economic law, private law, environmental law, international trade and investment law and human rights law. Tackling climate change therefore requires understanding how these various legal fields interact.

Analyzing how different jurisdictions interact:

Climate change is a transnational phenomenon, having local causes, but creating global effects: consequently, the problem must be addressed at the same time at a global scale, by regional organizations (such as the EU), at the national and at the regional level (e.g. cities). The course will look at how these different jurisdictions interact.

Understanding the role of different legal actors:

Climate change is not only a concern for national governments and international organizations. The European Union, as a regional organization, has long been an important actor in this field; moreover, non-state actors play an important role as well: multinational businesses, NGOs and private citizens aim to influence the regulatory process, most notably by bringing lawsuits. The course will analyze the activities of these different actors.

Understanding the context of climate change law:

Climate change has complex scientific, economic, political, social and ethical dimensions: for example, given that the emission of greenhouse gases is related to many different business sectors, a transition towards a low-carbon society will likely transform the existing economy in significant ways. This will inevitably create „losers“ along the way (e.g. coal and oil companies), who may aim to slow down the transition, thereby posing difficult economic and political questions. Or, to give

another example, as greenhouse gas emissions are related to consumption, they are mainly attributable to the wealthy parts of the global population; however, climate change disproportionately affects poor populations in developing countries, and therefore raises complex ethical issues. In this course, we will study how scientific, economic, political, social and ethical questions feed into the legal process.

The course will cover:

Part 1: the science, economics and politics of climate change;

Part 2: Climate change as a global issue; the international climate change regime (e.g. Paris Agreement), international law, human rights law and international trade and investment law;

Part 3: European and national legislation (e.g. Emissions Trading System)

Part 4: Lawyering for change (e.g. lawsuits against governments and businesses in the US and in Europe)

### **Toetsvorm**

Small written and oral assignments throughout the course and a final written assignment.

### **Literatuur**

The literature will be announced on Canvas.

### **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)

### **Overige informatie**

The following course objectives are only available in Dutch:

Eindtermen bachelor Rechtsgeleerdheid

De afgestudeerde bachelor beschikt over een fundamenteel academisch werk- en denkniveau;

-heeft kennis van en inzicht in de kernleerstukken van de hoofdonderdelen van het geldende recht (in het bijzonder het Nederlandse privaatrecht, staatsrecht, bestuursrecht, strafrecht en internationaal en Europees recht), alsmede de systematiek daarvan, met inbegrip van recente ontwikkelingen

-heeft kennis van en inzicht in het internationale en het Europese recht in hun verhouding tot het nationale recht

-heeft elementaire kennis van Engelse juridische terminologie

-beseft dat het recht zich ontwikkelt en manifesteert in een maatschappelijke context

-heeft kennis van de grondslagen van het (Nederlandse) recht, rechtshistorische en rechtsfilosofische aspecten en heeft besef van de eigen aard van de rechtsbeoefening

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

Analytische vaardigheden

-lezen, begrijpen en analyseren van juridische, rechtswetenschappelijke en rechtstheoretische teksten en betogen, waaronder jurisprudentie en wetgeving

-kritisch reflecteren op regelgeving, rechtspraak en literatuur, onder meer vanuit rechtshistorisch, rechtsvergelijkend en rechtsfilosofisch

perspectief; is in staat om te reflecteren op de grenzen van het vakgebied

- reflecteren op de eigen maatschappelijke verantwoordelijkheid in de maatschappelijke context waarin het recht functioneert
- is in staat om juridische argumentatiestructuren te analyseren en op te zetten

#### Probleemoplossende vaardigheden

- selecteren van juridisch relevante feiten uit een feitencomplex
- selecteren van rechtsregels die bijdragen aan het oplossen van een juridische casus
- oplossen van juridische casus, waaronder begrepen hanteren van een systematische aanpak bij het toepassen van rechtsregels op concrete gevallen

#### Communicatieve vaardigheden

- een gefundeerde en beargumenteerde positie innemen in een maatschappelijk, juridisch debat

#### Informatievaardigheden

- op een efficiënte manier juridische bronnen raadplegen en informatie verzamelen uit juridische (digitale) bibliotheken en databestanden, en de waarde, relevantie en kwaliteit van de informatie beoordelen
- op efficiënte wijze relevante ontwikkelingen bijhouden en kennis actualiseren

## Cognitive Neuroscience

<b>Vakcode</b>	AB_1056 ()
<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. S. van der Sluis
<b>Examinator</b>	dr. S. van der Sluis
<b>Docent(en)</b>	prof. dr. S. Spijker, dr. C.P.J. de Kock, dr. H.K.E. Vervaeke, dr. S. van der Sluis, M. Loos
<b>Lesmethode(n)</b>	Practicum, Computerpracticum, Werkgroep, Hoorcollege
<b>Niveau</b>	300

#### Doel vak

Introduction to the field of cognitive neuroscience: understanding the biological mechanisms underlying cognitive processes such as learning and memory, discussing recent developments in the field with leading scientists, and acquiring knowledge on how the brain, and its different cell types, function.

#### Inhoud vak

In the first course of this Minor, you will learn the basics of cognitive neuroscience through a series of introductory lectures on brain function and (dysfunctional) cognitive behavior. More specifically, we will teach you the structure and function of the major building blocks of the brain, ranging from single cells to neuronal networks, and from emotion to

motor control. We combine workshops and keynote lectures, delivered by renowned neuroscientists, to discuss recent advances in the field of learning and memory, brain plasticity, and brain disease (e.g., Angelman syndrome, OCD). Finally, you will learn about and experience various technical approaches to measure the brain (e.g., histology) in hands-on practicals.

### Onderwijsvorm

Lectures 25 hours 44% 2.6 ECTS  
 Workshops 16 hours 28% 1.7 ECTS  
 Practicals 6 hours 11% 0.7 ECTS  
 Keynote lectures 8 hours 14% 0.8 ECTS  
 Quiz 2 hours 3% 0.2 ECTS

Total 57 hours 100% 6.0 ECTS

### Toetsvorm

Written exam & assignments

### Literatuur

Recent literature, to be announced at the start of the course.

Foundations of Behavioral Neuroscience  
 Carlson, Neil R.  
 (9th edition)

Exam material:  
 CH2, CH3, CH5, CH6 (pg. 136 - 146), CH7 & CH12

### Vereiste voorkennis

No special requirements.

### Doelgroep

Open to students from all educational backgrounds (e.g., exact, social, life and economic sciences) with an interest in the brain and mind.

### Overige informatie

Coordinators: Christiaan de Kock and Sophie van der Sluis.  
 No special requirements to be met.  
 Part of minor Brain and Mind. This minor course requires a minimum of 25 participants to take place.

## Cognitive Neuroscience

<b>Vakcode</b>	P_BCOGNEUS ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. D.J. Heslenfeld
<b>Examinator</b>	dr. D.J. Heslenfeld
<b>Docent(en)</b>	dr. D.J. Heslenfeld
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	300

**Doel vak**

To introduce students to the multidisciplinary area of cognitive, social, clinical and emotional neuroscience.

**Inhoud vak**

The course will treat modern techniques and recent data that relate mental processes to brain functions. Techniques that will be covered are EEG, MEG, MRI, lesions. Mental functions that will be studied include perception, memory, emotion, consciousness, and social cognition. The aim of the course is to provide a sound basis for the master program.

**Onderwijsvorm**

Lectures, computer practicals and literature study.

**Toetsvorm**

Written examination, multiple choice questions. Practical have to be completed

**Literatuur**

Gazzaniga, M.S., Ivry, R.B., & Mangun, G.R. (2016). Cognitive Neuroscience: The Biology of the Mind (4th Edition). New York: Norton. ISBN: 9780393912036

**Vereiste voorkennis**

Some background in psychology and biology is recommended.

**Aanbevolen voorkennis**

Biologische en Cognitieve Psychologie

**Overige informatie**

Language: Tuition in English.

As of 2018-19 this course is no longer part of the University Minor. Students who still need to complete this course for the UM, can contact the course coordinator.

## Collective Intelligence

<b>Vakcode</b>	X_401047 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. E.W. Haasdijk
<b>Examinator</b>	dr. E.W. Haasdijk
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	300

**Doel vak**

The overall aim of this course is to provide an in-depth study of a range of ideas, theory, and techniques used in Collective Intelligence.

The module will be oriented towards (1) the modelling of real-life (biological) collective systems (Artificial Life) and (2) the

application of ideas and principles from natural Collective Intelligence and evolution to computer science in the areas of optimisation, intelligent agents, and engineering, and feedback to the biological sciences. There is a substantial practical element to the module with the students gaining experience in developing collective intelligence models.

### **Inhoud vak**

#### Aims

To enable students to:

- develop skills in the modelling Collective Intelligent systems (particularly, Artificial Life) through use of appropriate programming languages, tools and methodologies;
- investigate the application of collective intelligence techniques to optimization, to understanding biological systems, and to agent modelling;
- appreciate relevant current research topics in the theory and practice of Collective Intelligence and Artificial Life;
- appreciate a range of advanced ideas and techniques modelling the properties of living systems and the exploitation of these techniques in computer science and its applications.

#### Learning Outcomes

Knowledge and Understanding: Successful students will typically have knowledge and understanding of a variety of Collective Intelligence techniques and methods applicable across domains ranging from molecular computational biology and evolution of agents to behaviour-oriented and social robotics.

#### Skills and Attributes

Successful students will be able to critically evaluate some recent Collective Intelligence / Artificial Life paradigms for building agent systems and modelling biological systems.

### **Onderwijsvorm**

Lectures and intervision meetings.

### **Toetsvorm**

Assignment and written report in teams of 3 students

### **Literatuur**

There is no set textbook for the course; a collection of papers will be made available

### **Doelgroep**

3CS, 3IMM, 3LI

## Comparative Political Research

<b>Vakcode</b>	S_CPR ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Sociale Wetenschappen
<b>Coördinator</b>	dr. P.J.M. Pennings
<b>Examinator</b>	dr. P.J.M. Pennings

<b>Docent(en)</b>	dr. P.J.M. Pennings
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	200

### Doel vak

This course presents an overview of the field of Comparative Political Research by placing particular focus on the following aspects. This course:

- provides students an overview of the central debates within Comparative Political Research.
- teaches students to critically evaluate the premises of theories and the comparative method.
- trains students to set up a research design. Students are familiarized with key methodological issues such as internal and external validity, conceptualization, operationalization, and case- selection.
- teaches students the basic skills necessary for performing comparative research across a number of cases (e.g. countries).
- teaches students how to apply the comparative method in qualitative and quantitative research, to think about the advantages and disadvantages of both types of research, and how they can complement each other.

### Inhoud vak

In this course students will compare two contrasting case studies and make a design for a comparative case study themselves. These tasks will help students to gain the basic skills necessary for performing comparative research and to set up a research design.

### Onderwijsvorm

- The course will be taught in the form of lectures and tutorials.
- The tutorials provide students with the opportunity to discuss their preliminary answers to the assignments. The more students prepare and participate in the tutorials, the more feedback they receive in return.

### Toetsvorm

Written assignments.

### Literatuur

Main Textbook (To be purchased):

Gerring, J. (2017). Case Study Research. Principles and Practices. Cambridge: Cambridge University Press. 2nd Edition.

In addition students will read a number of articles.

### Doelgroep

Bachelor students Political Science and students of the Pre-Master Political Science.

### Overige informatie

Each week one lecture and one tutorial (and/or feedback by appointment).

## Compiler Construction

<b>Vakcode</b>	XB_0003 ()
<b>Periode</b>	Periode 3

<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	prof. dr. ir. H.J. Bos
<b>Examinator</b>	prof. dr. ir. H.J. Bos
<b>Docent(en)</b>	prof. dr. ir. H.J. Bos, C. Giuffrida
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Practicum
<b>Niveau</b>	300

### Doel vak

Get hands-on experience with the internals of modern compilers.

### Inhoud vak

This course gives an introduction to the internals of modern compilers and allows students to gather practical, hands-on experience on building compiler components with weekly assignments. The course will focus on the design of all the major components of a modern compiler pipeline: frontend (focus on lexing and parsing), intermediate representation or IR (focus on optimizations and transformations), and backend (focus on code generation). The course emphasises what compiler builders encounter in practice rather than the details of all manners of parsing algorithms. Specifically, the assignments will focus on building a simple compiler for a C-like language using the LLVM compiler framework. All the assignments build on top of the given framework and require localized extensions in Python and/or C++ to implement language features, optimizations, transformations, and code generation features.

Note: this is a very intensive, hands-on course. It is important to be able to start immediately. For this, you need access to a computer with the VirtualBox x86 virtualization environment installed.

### Onderwijsvorm

Lectures, Practical

### Toetsvorm

Assignments

### Aanbevolen voorkennis

Basic knowledge of Python and C/C++ is strongly recommended.

### Doelgroep

3CS

## Computational logic



<b>Vakcode</b>	XBU_40010 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	200

#### Inhoud vak

<http://studiegids.uva.nl/xmlpages/page/2017-2018/zoek-vak/vak/33572>

#### 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.

## Computational thinking

<b>Vakcode</b>	X_400475 (400475)
<b>Periode</b>	Periode 1
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. A. Bhulai
<b>Examinator</b>	dr. A. Bhulai
<b>Docent(en)</b>	dr. A. Bhulai
<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<b>Niveau</b>	100

#### Doel vak

After attending this course you will be able:

- to analyze problems,
- to choose a right solution strategy or a combination of solution strategies to solve problems,
- to create algorithms,
- to translate algorithms to a flowchart,
- to give an oral presentation of a project to peers,
- to reflect critically on your and others' work,
- to write a project report.

#### Inhoud vak

There are various strategies to solve everyday problems. Often a problem can be solved in different ways and there is not always a "best way".

However, sometimes one way is more efficient than the other, or you find one approach easier or more pleasant than the other.

During the lectures of this course you will be acquainted with different solution strategies (such as modeling, formulation, guess and check) and algorithms (such as search algorithms, sorting algorithms and graph algorithms) to solve problems. You will learn to solve problems by reasoning and by using knowledge from other disciplines. In the

practical sessions you will resolve various problems using the different solution strategies and algorithms that have been discussed in the lectures. Since there are many ways to solve a problem, you will also start thinking about developing algorithms yourself. In this course we encourage your problem solving and algorithmic thinking, as well as your creative and innovative skills. At the end of the course you will work together with some other students in a group on a project. You will conclude the project with a short presentation.

### **Onderwijsvorm**

Lectures, practical sessions, project, presentations, self study

### **Toetsvorm**

The final grade is based on the practicum assignments, project assignment, and the exam.

The first exam is a digital exam consisting of multiple choice questions. The resit is a paper exam consisting of open questions. The final grade is based on the practicum assignments, project assignment, and the exam. For all these three parts separately, the average grade should be at least a 5.5 to pass the course.

### **Literatuur**

Syllabus

### **Vereiste voorkennis**

No specific knowledge is required to participate in this course.

### **Aanbevolen voorkennis**

Although no specific knowledge is required to participate in this course a little mathematical understanding may be to your advantage.

### **Doelgroep**

1CS, 1IMM, 1LI

### **Intekenprocedure**

For this course, please enroll for the module, lecture, (interim)exam via VUnet. The faculty will enroll you for the other teaching methods.

Students should (also) register in Canvas for a practicum group if they want to participate in the practical sessions.

### **Overige informatie**

You should register in Canvas for a practicum group if you want to participate in the practical sessions

## **Computer Networks**

<b>Vakcode</b>	X_400487 ()
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	ir. J.J.R. Donkervliet MSc
<b>Examinator</b>	ir. J.J.R. Donkervliet MSc

<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Deeltoets extra zaalcapaciteit
<b>Niveau</b>	100

### Doel vak

The successful student will understand the principles, the structures, and the architecture of computer networks and data communication.

### Inhoud vak

The emphasis in this course is on fundamental concepts in digital communication. In modern computer networks, data communication takes place by sending data from A to B via a layered architecture where each layer implements a different abstraction. The higher layers are responsible for handling web pages, emails and similar things, that are translated into packets, bits, and eventually digital signals on physical links (e.g., lightpulses, electrical signals in copper wires, radio waves).

This layered architecture with increasing levels of abstraction and separation of concerns, is a fundamental approach that you will encounter in all aspects of computer science (and beyond). Within this architecture, we will concern ourselves with questions like: what route should the data follow through the network, what do we do when errors occur, how do we interconnect two networks that have completely different properties, etc.

Topics to be discussed include: the datalink layer, the network layer, the transport layer, and the application layer. The focus of this course will be on the Internet and the popular protocols that are used in the Internet (TCP, UDP, Ethernet, Wifi, etc. ).

### Onderwijsvorm

Lectures and (to a lesser extent) tutorials.

### Toetsvorm

Exam and practical assignment. The exam carries most of the weight.

### Literatuur

Andrew S. Tanenbaum and David Wetherall, Computer Networks, 5th ed.

### Doelgroep

1CS

### Overige informatie

Current information can be found on Canvas: [canvas.vu.nl](https://canvas.vu.nl)

## Computer Programming

<b>Vakcode</b>	XB_40011 ()
<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. ing. T. Kielmann
<b>Examinator</b>	dr. ing. T. Kielmann
<b>Docent(en)</b>	dr. ing. T. Kielmann

<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<b>Niveau</b>	100

### Doel vak

Students learn the fundamentals of computer programming. After completing the course, students will be able to write small computer programs, to test programs for correct behaviour, and to correct programming mistakes.

### Inhoud vak

We are using the C++ programming language. The course consists of seven modules:

1. Compiling from the command line, variables, data types, operators, type conversions
2. Expressions, statements, if, switch, loops, blocks, functions
3. Errors: compile-time, link-time, run-time. exceptions, logic errors, debugging and testing
4. Algorithmic thinking, structuring programs, grammars and input parsing
5. Functions, parameter passing, declarations and scope, name spaces
6. Classes, members, interfaces and implementation, operator overloading
7. Memory management: pointers, new and delete, void\*, casts, this

### Onderwijsvorm

Classroom lectures and practical exercises

### Toetsvorm

Both written exam and computer practical must be passed. The final grade is the weighted average of the exam grade (2x) and the computer practical (1x). If the grade for the exam is higher, then this will be the overall grade.

### Literatuur

Bjarne Stroustrup, Programming: Principles and Practice using C++, second edition, Addison Wesley, 2014  
(also available as eBook and kindle edition, for saving both weight and cost)

### Doelgroep

1CS

## Concurrency & Multithreading

<b>Vakcode</b>	X_401031 (401031)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	prof. dr. W.J. Fokkink
<b>Examinator</b>	prof. dr. W.J. Fokkink
<b>Docent(en)</b>	prof. dr. W.J. Fokkink
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	400

## Doel vak

This course provides a comprehensive presentation of the foundations and programming principles for multicore computing devices.

Specific learning objectives are:

- \* To provide insight into fundamental notions of multicore computing and their relation to practice: locks, read-modify-write operations, mutual exclusion, consensus, construction of atomic multi-reader-multi-writer registers, lost wakeups, ABA problem.
- \* To provide insight into algorithms and frameworks for multicore computing and their application in multi-threaded programs: mutual exclusion algorithms, spin locks, monitors, barriers, AtomicStampedReference class in Java, thread pools in Java, transactional memory.
- \* Analyzing algorithms for multicore computing with regard to functionality and performance: linearizability, starvation- and wait-freeness, Amdahl's law, compute efficiency gain of parallelism.
- \* Mastering elementary datastructures in the context of multicore computing: lists, queues, stacks.
- \* Programming in multi-threaded Java, and performing experiments with such programs.

## Inhoud vak

The course consists of the following topics: Shared memory, mutual exclusion, synchronization operations, concurrent data structures, scheduling, transactional memory, and a multithreaded programming assignment.

## Onderwijsvorm

4 hours per week HC, 4 hours per week WC.

## Toetsvorm

The written exam counts for 75% and the programming assignment for 25% of the final mark.

Both for the written exam and the programming assignment at least a 5.0 must be obtained (and the overall average mark should be at least 5.5).

Only students that achieved at least a 3.0 for their initial programming assignment are offered a resit opportunity for this assignment.

## Literatuur

Maurice Herlihy, Nir Shavit, The Art of Multiprocessor Programming, Morgan Kaufmann, 2008.

## Aanbevolen voorkennis

Datastructures & Algorithms

Programming in Java

## Doelgroep

3CS

## Overige informatie

The homepage of the course is at <http://www.cs.vu.nl/~tcs/cm/>

The lectures and written exam of the BSc and MSc variant of Concurrency

& Multithreading coincide. The difference is that the BSc variant has a smaller programming assignment than the MSc variant.

## Creative Writing

<b>Vakcode</b>	L_NNBAALG001 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. J.H.C. Bel
<b>Examinator</b>	dr. J.H.C. Bel
<b>Docent(en)</b>	dr. J.H.C. Bel
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	200

### Doel vak

Het streven is studenten inzicht te geven in literaire technieken zodat ze zelf fictie of een essay leren schrijven van een behoorlijk technisch niveau. Het

gaat hierbij om fictie of non-fictie. Aan het eind hebben de studenten een

afgeronde (fictionele) tekst geschreven, een kort verhaal, een afgerond romanfragment of een essay.

Studenten krijgen inzicht in hoe fictie en non-fictie

werkt vanuit het perspectief van de maker, zodat ze zich kunnen bekwamen in het vak en de kunst van het schrijven.

### Inhoud vak

In een reeks colleges wordt de student uitleg gegeven van verschillende technieken die in fictionele en niet-fictionele teksten worden aangewend. Dat gebeurt aan de hand van de opgegeven literatuur; verder door middel van oefeningen; en tot slot door middel van het zelf schrijven van een stuk fictie of non-fictie dat elke week in omvang groeit. Er wordt uitleg gegeven over en geoefend met essentiële literaire technieken en tactieken. De aandachtspunten zijn daarbij:

- literair taalgebruik: wat is dat en hoe werkt dat; wat maakt een metafoor succesvol; hoe zijn verschillende taalregisters (bijvoorbeeld het schakelen van meer verheven taalgebruik naar volkstaal en terug) van invloed op de inhoud van wat wordt verteld;
- literaire details: wat voor details (observaties) zijn effectief in een literaire tekst en hoe werkt dat precies;
- perspectief: wat is dat en hoe werkt het; hoe maakt een schrijver de keuze tussen de ik-vorm en de hij-vorm of waarom kiest hij eventueel voor een ander perspectief;
- het schrijven van dialogen;
- het schrijven van monologen in proza: de monologue intérieur en de stream of consciousness;
- de opbouw van een plot; en tot slot:
- wat is een literair personage.

### Onderwijsvorm

De docent geeft gedetailleerde toelichting bij de bovengenoemde onderwerpen. De kennis die de student zo verkrijgt, zal moeten worden toegepast in het verhaal of het romanfragment waaraan de student werkt.

De student krijgt feedback op zijn tekst. De eerste bijeenkomst is inleidend en informerend, tijdens de laatste bijeenkomst worden de verhalen en romanfragmenten ingeleverd (de afgesproken deadline is onverbiddelijk) en wordt er een tentamen afgenomen. De helft van de overblijvende werkgroepbijeenkomsten zal theoretisch van aard zijn en in de andere helft zal praktisch worden ingegaan op de groeiende teksten. Bovendien zullen er tijdens de bijeenkomsten oefeningen worden gedaan op het gebied van de schrijftechniek en zullen er literaire fragmenten worden gelezen, besproken en toegelicht. Bovendien vindt er een excursie plaats naar een literaire uitgeverij.

### Toetsvorm

- 1) Actieve participatie en 80 % aanwezigheid; de student moet mee kunnen discussiëren en er blijk van geven dat hij met inzicht kan praten over de in de oefeningen behandelde schrijftechnieken. Onder actieve participatie wordt ook verstaan dat de student zich aan de opgegeven deadlines houdt en dat hij / zij de tussentijdse (schriftelijke) opdrachten maakt.
  - 2) Een afgeronde fictionele tekst van ongeveer drieduizend woorden - ook als er sprake is van een romanfragment moet er worden getoond dat er naar een zekere afronding kan worden toegewerkt.
  - 3) Een tentamen waarin fictietechnieken moeten kunnen worden herkend, benoemd en toegepast.
- De verdeelsleutel bij het toekennen van het eindcijfer zal zijn:  
afgeronde fictionele tekst 60 %; tentamen 40 %. Aanwezigheid (80 %) en participatie (1) moeten voldoende zijn.

### Literatuur

Verplicht: James Wood, *How Fiction Works* (Jonathan Cape, London, 2008) of de Nederlandse vertaling *Hoe fictie werkt* (Querido, Amsterdam, 2012); zelf aan te schaffen.  
Verder zullen (fragmenten uit) andere boeken worden aangeraden in de loop van de bijeenkomsten.

### Vereiste voorkennis

Het eerste deel van het minorcollege Meesterwerken uit de wereldliteratuur moet zijn gevolgd.

### Doelgroep

De minor staat open voor alle studenten van binnen en buiten de VU.

### Overige informatie

Aanwezigheid (80%) en actieve deelname zijn verplicht.

## Critical Perspectives on Science

<b>Vakcode</b>	W_CPOS ()
<b>Periode</b>	Periode 1+2+3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. J.M. Halsema
<b>Examinator</b>	dr. J.M. Halsema
<b>Docent(en)</b>	dr. J.M. Halsema
<b>Lesmethode(n)</b>	Werkcollege, Hoorcollege

<b>Niveau</b>	200
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### Doel vak

- Knowledge of the feminist critique of science, and of critiques of science from the perspectives of race and intersectionality;
- Insight in the way in which these perspectives structure the student's own discipline;
- Developing the skills to critically question texts from the perspective of gender, race, and sexuality.
- Developing writing skills (by getting feedback) and presentation skills.

### Inhoud vak

This course introduces diverse critical perspectives upon science that are developed from feminist, race, and intersectionality theory. In the first four weeks, on the basis of key articles in these fields (such as Harding, Haraway, bell hooks, Crenshaw), the different perspectives will be introduced, as well as the most important debates in these fields that form the backbone of this minor: the sex/gender debate, the problem of the relationship between gender and race theory, the intersectional framework. The course does not only aim at introducing the perspectives theoretically, but also at self-reflection by the students. In two weekly seminars the students will work at relating these perspectives to their own discipline. The seminars aim at developing a critical perspective upon the central texts in the student's discipline. The course will start in the first period and will end in period 3. The seminars will take place every two weeks, during the entire semester. The final course assessment will take place in period 3: students will give a presentation at the closing symposium of the minor and write a paper in which they demonstrate to be able to analyze from the angle of gender and diversity a subject/text/film/book from their own discipline.

### Onderwijsvorm

Lectures and seminars (active learning groups).

### Toetsvorm

- Three reflections of 500 words (divided over the semester) (30%; 10% for each reflection)
- Presentation at closing symposium (period 3) (10%).
- Paper (end of the minor, period 3), of 2000 words in which the perspectives developed in the minor are related to the discipline of the student (60%).

### Literatuur

To be announced on Canvas

### Doelgroep

The course is at Bachelor 3 level and open for students from different disciplines.

## Current Issues in Migration Law

<b>Vakcode</b>	R_HumRCI (200994)
<b>Periode</b>	Periode 3
<b>Credits</b>	3.0



<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Rechtsgeleerdheid
<b>Coördinator</b>	T.K. Last
<b>Examinator</b>	T.K. Last
<b>Docent(en)</b>	prof. mr. T.P. Spijkerboer
<b>Lesmethode(n)</b>	Leergroep, Hoorcollege, Werkcollege
<b>Niveau</b>	300

### Doel vak

Course objectives are:

- To formulate an original research question
- To write a research paper
- To practice peer review
- To relate what is in the news to migration law scholarship
- To develop and express independent and objective opinions on current issues

### Inhoud vak

This course invites students to engage critically with a current topic in international and European migration law. Topic areas that have featured in the news in recent months will be recommended, but students must develop their own research question. Previous current issue topic areas include: family reunion, non-refoulement, immigration detention, trafficking, smuggling.

### Onderwijsvorm

One lecture on how to relate what is in the news to existing migration law scholarship and introduction to the current issue topic areas on Canvas. Another lecture on how to formulate a research question and write a research paper. Students will also attend one working group session to present their research proposals and peer review others' research proposals. Supervisors will offer office hours to guide students through the writing process if necessary.

### Toetsvorm

Written research proposal, presentation of that research proposal, and a final research paper. Students will work in pairs.

### Literatuur

Preliminary reading lists will be announced on Canvas for a range of current topics.

### 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)

## Current Issues in Transnational Law

<b>Vakcode</b>	R_CIsTrL ()
<b>Periode</b>	Periode 3
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels

<b>Faculteit</b>	Faculteit der Rechtsgeleerdheid
<b>Coördinator</b>	prof. dr. G.T. Davies
<b>Examinator</b>	prof. dr. G.T. Davies
<b>Docent(en)</b>	prof. dr. G.T. Davies
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	300

### **Doel vak**

This course introduces students to selected topics in transnational law which are of particular current importance or interest. Classes are interactive, involving some lectures, but also discussions and exercises. The aim is to help students understand the kinds of law and policy problems which are important at European and International level, and to critically evaluate the responses to these. This prepares the students for advanced courses at masters level, where they may engage with these problems in more detail.

Students will have to read and analyse academic literature and engage in active discussion of current issues, as well as formulating problems and questions in short essay(s). Oral and writing analytic abilities are therefore the major skills advanced in this course.

### **Inhoud vak**

In 2017, the course focused on the following three topics:

- International trade and investment agreements - TTIP
- Problems of the International Criminal Court
- Legal issues of geoengineering

The subjects for 2018 will be announced nearer the time, but will be similarly diverse and contemporary.

### **Toetsvorm**

Short paper and presentation. Attendance is compulsory in order to obtain a grade.

### **Literatuur**

Reading will be placed on Canvas nearer the time.

### **Aanbevolen voorkennis**

Exchange students - basics of EU law and integration, good command of English

### **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)

### **Overige informatie**

The following course objectives are only available in Dutch:

De afgestudeerde bachelor beschikt over een fundamenteel academisch werk- en denkniveau;  
 -heeft kennis van en inzicht in de kernleerstukken van de hoofdonderdelen van het geldende recht (in het bijzonder het Nederlandse

privaatrecht, staatsrecht, bestuursrecht, strafrecht en internationaal en Europees recht), alsmede de systematiek daarvan, met inbegrip van recente ontwikkelingen

-heeft kennis van en inzicht in het internationale en het Europese recht in hun verhouding tot het nationale recht

-heeft elementaire kennis van Engelse juridische terminologie

-beseft dat het recht zich ontwikkelt en manifesteert in een maatschappelijke context

-heeft kennis van de grondslagen van het (Nederlandse) recht, rechtshistorische en rechtsfilosofische aspecten en heeft besef van de eigen aard van de rechtsbeoefening

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

Analytische vaardigheden

-lezen, begrijpen en analyseren van juridische, rechtswetenschappelijke en rechtstheoretische teksten en betogen, waaronder jurisprudentie en wetgeving

-kritisch reflecteren op regelgeving, rechtspraak en literatuur, onder meer vanuit rechtshistorisch, rechtsvergelijkend en rechtsfilosofisch perspectief; is in staat om te reflecteren op de grenzen van het vakgebied

-reflecteren op de eigen maatschappelijke verantwoordelijkheid in de maatschappelijke context waarin het recht functioneert

-is in staat om juridische argumentatiestructuren te analyseren en op te zetten

Probleemoplossende vaardigheden

-selecteren van juridisch relevante feiten uit een feitencomplex

-selecteren van rechtsregels die bijdragen aan het oplossen van een juridische casus

-oplossen van juridische casus, waaronder begrepen hanteren van een systematische aanpak bij het toepassen van rechtsregels op concrete gevallen

Communicatieve vaardigheden

-schriftelijk presenteren van een (juridisch) betoog in correct en helder Nederlands

-mondeling presenteren van een (juridisch) betoog in correct en helder Nederlands

-een gefundeerde en beargumenteerde positie innemen in een maatschappelijk, juridisch debat

-met anderen samenwerken om een opdracht binnen een voorgeschreven termijn te voltooien

Informatievaardigheden

-op een efficiënte manier juridische bronnen raadplegen en informatie verzamelen uit juridische (digitale) bibliotheken en databestanden, en de waarde, relevantie en kwaliteit van de informatie beoordelen

-op efficiënte wijze relevante ontwikkelingen bijhouden en kennis actualiseren

## Data Analytics and Privacy

<b>Vakcode</b>	R_DAP ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0

<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Rechtsgeleerdheid
<b>Coördinator</b>	dr. mr. M. van der Linden
<b>Examinator</b>	dr. mr. M. van der Linden
<b>Docent(en)</b>	prof. mr. A.R. Lodder
<b>Lesmethode(n)</b>	Hoorcollege, Leergroep
<b>Niveau</b>	300

### Doel vak

Data Analytics and Privacy focuses on the role of fundamental rights and legal principles in the regulation of business analytics and data science, with a general focus on the right to privacy. The student will learn and understand the ethical and legal aspects of business analytics and data science. The student will be able to analyze the role of fundamental rights and legal principles in the regulation of these issues. The student will be able to deal with the similarities and differences between legal admissibility and ethical acceptability when working with large datasets and the application of the outcomes of the analysis.

### Inhoud vak

In the field of business analytics and data science the opportunities seem endless. Perfect enforcement of norms, excellent personally targeted advises and advertments. Outcomes of data analytics can even preceed what's on a man's mind: the cab arrives at the moment you did not even know yet you needed it, the packages are already posted before you ordered them, or the criminal behavior is predicted before it takes place. This course obviously is not about the possibilities, but about the limits we as a society want to put on those possibilities. The legal and ethical standards for this area have not yet been crystallized, but in general fundamental rights and ethical principles are well known. This course also explores the boundaries between legal admissibility and ethical responsibility.

### Onderwijsvorm

Lectures, tutorials, peer review

### Toetsvorm

Paper, presentation

### Literatuur

Made available via Electronic Learning environment

### Doelgroep

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

## Data Structures and Algorithms

<b>Vakcode</b>	X_400614 (400614)
<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. F. van Raamsdonk
<b>Examinator</b>	dr. F. van Raamsdonk
<b>Docent(en)</b>	dr. F. van Raamsdonk
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Deeltoets extra zaalcapaciteit
<b>Niveau</b>	200

### Doel vak

To obtain basic knowledge about data structures, algorithmic design, and worst-case time complexity.

### Inhoud vak

Concerning data structures:

Linear data structures:

stacks, queues, linked lists.

Tree-like data structures:

binary trees, binary search trees, heaps, red-black trees or AVL-trees.

Graphs-like data structures.

Hash tables.

Concerning algorithms:

sorting algorithms,

the divide-and-conquer programming paradigm,

dynamic programming,

greedy algorithms,

string matching.

Complexity analysis:

big-Oh notation, worst-case time complexity, amortized analysis.

### Onderwijsvorm

Lectures: 4 hours per week (in total 28 hours).

Exercise classes: 4 hours per week (in total 28 hours).

There is also obligatory practical work.

### Toetsvorm

A mid-term exam (bot obligatory) and a final exam.

The written exam contributes for at least 80% to the final grade.

Moreover, there are probably obligatory programming assignments contributing for at most 20% to the final grade.

### Literatuur

Introduction to Algorithms

third edition,

Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford

Stein, MIT Press 2009.

### Vereiste voorkennis

Concerning algorithmics:

recursive procedures, arrays, elementary Java.

For instance the course Programming (X-400554) of year I of the Bachelor Computer Science.

Concerning discrete mathematics:

some familiarity with mathematical reasoning in general and induction in particular.

For instance the course Logic and Sets (X\_401090) of year I of the Bachelor Computer Science.

Moreover elementary knowledge of graphs.

For instance the course Networks and Graphs of year I of the Bachelor Computer Science.

### **Doelgroep**

2CS, 2BA, 3IMM, 3LI, 3W, 3Ect

## Databases

<b>Vakcode</b>	X_401008 (401008)
<b>Periode</b>	Periode 5
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. H.F. Mühleisen
<b>Examinator</b>	dr. H.F. Mühleisen
<b>Docent(en)</b>	drs. J. Endrullis, dr. H.F. Mühleisen
<b>Lesmethode(n)</b>	Hoorcollege, Practicum, Computerpracticum
<b>Niveau</b>	200

### **Doel vak**

The course objective is to obtain a good knowledge and understanding of relational database systems. This includes the ability to develop conceptual database models, as well as key concepts and skills in relational database theory and practice.

### **Inhoud vak**

The course is concerned with base principles and important aspects of relational databases. Among others, we treat: ER and UML class diagrams (for the design and evaluation of database schemata), the relational model, relational algebra, functional dependencies, integrity constraints, transactions and concurrency control. In the practicum, we put emphasis on the ability to understand and formulate complex SQL queries.

### **Onderwijsvorm**

Lectures, exercise/practicum classes, individual homework and practicum tasks.

### **Toetsvorm**

Exam

### **Literatuur**

Database Systems, The Complete Book, by: Hector Garcia-Molina & Jeffrey D. Ullman & Jennifer Widom. 2nd edition.

### **Aanbevolen voorkennis**

Basic programming skills help.

### **Doelgroep**

2CS, 2IMM, 2LI, 2BA

## Decolonizing Europe

<b>Vakcode</b>	L_GCBAALG008 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	M.P. Groten
<b>Examinator</b>	M.P. Groten
<b>Docent(en)</b>	prof. dr. S. Legene, M.P. Groten
<b>Lesmethode(n)</b>	Werkcollege, Hoorcollege
<b>Niveau</b>	300

### Doel vak

Decolonizing Europe has both historical and methodological learning objectives. After the course, participants...

1. Have a good understanding of the main approaches to the postwar history of the European nation state and are able to situate leading historians in the historiographical debate on decolonization and postcolonialism
2. Are able to critically review (both in writing and speaking) a monograph and to develop, both orally and in writing an argued opinion about the issue addressed by the author(s)
3. Have been challenged to reflect on the own 'subject position' and explore the theme from various perspectives while acknowledging different experiences with respect to European postcolonial society.

### Inhoud vak

The course focuses on the impact of European imperialism on the dynamics of nation state formation within 'Postwar Europe'.\* While all around the globe countries became independent, what did that mean for Europe itself? Students will come across at least three developments that played a major role in the repositioning of Europe in the international arena after colonialism:

- The reordering of European national states in East and West and the impact of the Cold War
- The changes within Europe and between Europe and the 'Third World' as a result of decolonization.
- The gradual European integration process and, simultaneously, the emergence of major ambiguities within separate nation states concerning the concept of multicultural society.

The course investigates these developments with particular attention to a better understanding of colonialism as a history with a deep influence on notions of belonging, inclusion and exclusion with respect to citizenship at national and European level. Against the backdrop of a political history, this course will discuss how historians, philosophers, activists, politicians, have approached this history within a national, European or global frame of reference.

\* Tony Judt, Postwar, A history of Europe since 1945. New York, 2005.

### Onderwijsvorm

Two introductory lectures (week 1 and 2) supported by common reading assignments, week 3 individual assignment to write a summary and discuss a monograph selected from the course list or at your own suggestion, followed by a guest lecture in week 4; as from week 5-7 intensive sessions focusing at the topics addressed in the selected monographs. In week 8 the course ends with a forum discussion organized by the

participants.

### **Toetsvorm**

Mandatory: attendance of the seven plenary sessions and final forum discussion.

Grading elements:

1. pro-active role in class, including class notes or other prep. assignments 30%;
2. Monograph: summary and discussion paper (2.000 words) 40%;
3. ppt. presentation and discussion in class about topics addressed in the reviews 20%.
4. Contribution to final forum discussion 10%;

Instructions and criteria for the assessment of the summary and discussion paper on a selected monograph will be included in the full course description.

In order to be able to finish the course, each grading element per se has to be satisfactory. If failed, the paper can be re-submitted.

### **Literatuur**

An extensive list will be published in the full course description. The following titles will be used as common reference works:

- Elizabeth Buettner, *Europe after Empire. Decolonization, Society, and Culture* (Cambridge, Cambridge UP, 2015)
- Jan C. Jansen & Jürgen Osterhammel, *Decolonization: A Short History* (Translated by Jeremiah Riemer Princeton, Princeton UP, 2017) (or German edition)

### **Vereiste voorkennis**

Students will need a sufficient background in contemporary history, either at a general level, or specifically concerning the history of their own country, region, continent of origin.

### **Aanbevolen voorkennis**

It is strongly advised to read Jansen/Osterhammel before class starts.

### **Doelgroep**

As from the start, the course will be at 300 level and require a dedication to reading a lot. The course aims at History students in their BA3-minor semester and at those students from other disciplines who follow the full History minor-program. Other international exchange students and students from other disciplines, University colleges and VU-faculties with a sufficient level of historical knowledge, can participate after permission by the course coordinator.

### **Intekenprocedure**

The maximum number of participants for this module is 25 students. Make sure that you register in time.

### **Overige informatie**

Full course title:

Decolonizing Europe - Perspectives on Post-WW2 State Formation and the Cold War

## **Democracy: A History**

<b>Vakcode</b>	L_GABAGES212 ()
<b>Periode</b>	Periode 2



<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. D.B.R. Kroeze
<b>Examinator</b>	dr. D.B.R. Kroeze
<b>Docent(en)</b>	prof. dr. C.A. Davids, dr. F.D. Huijzendveld, dr. D.B.R. Kroeze
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	200

### **Doel vak**

Improve knowledge of the historical development of democracy and of democratization in history. Improve understanding of differences between classic, early modern and modern understandings of democracy. Being able to critically reflect on normative thinking in academic and political debates. Being able to formulate an independent opinion on historical and contemporary issues related to democracy.

### **Inhoud vak**

Since the end of the eighteenth century 'democracy' slowly but steadily has become more popular. Democracy as a mode of government and the word 'democracy' itself has by leaps and bounds found acceptance in many parts of the world. Democracy has become the standard or the rule, while other modes of government are considered as deviations or exceptions. How and why has this evolution occurred in Europe and in other parts of the world? What sorts of changes or continuities can during this prolonged evolution be discerned in the concept of 'democracy', and how can we critically assess the dominant position of democracy? Answers to these questions will be presented by giving an overview of the historical development of democracy since the time of the Athenian democracy, the 'Atlantic Revolutions' of around 1800, and the rise, fall and rise in the era around the World Wars. The history of democracy will be related to theories about democracy and democratization. The main emphasis will be on the Western and European history of democracy but guest lecturers will also discuss the non-Western development of democracy.

### **Onderwijsvorm**

Lectures and discussion.

### **Toetsvorm**

Midterm and final exam.

### **Literatuur**

Roger Osborne, Of the people, by the people. A new history of democracy (2011); D. Held, Models of Democracy (2006; 3 edition); articles and book chapters (to be announced).

### **Vereiste voorkennis**

First year completed.

### **Doelgroep**

Students BA2 Geschiedenis/ History; Dutch students and exchange students with a

Humanities or Political Sciences profile.

### Overige informatie

This course is obligatory in the second year.

## Designing Solutions for Global Sustainability

<b>Vakcode</b>	AB_1231 ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	dr. P.J.H. van Beukering
<b>Examinator</b>	dr. P.J.H. van Beukering
<b>Docent(en)</b>	dr. P.J.H. van Beukering, dr. ir. M.G. van der Meij
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	300

## Development and Globalization

<b>Vakcode</b>	S_DG ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Sociale Wetenschappen
<b>Coördinator</b>	prof. dr. D. Dalakoglou
<b>Docent(en)</b>	prof. dr. D. Dalakoglou
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	300

### Doel vak

The aim of this course is to introduce students to development sociology and more in particular to gain insight into issues of poverty, global inequality and development. Students will develop an anthropological perspective on developmental issues in the Global South.

### Learning Objectives

Knowledge and Understanding. The student has acquired knowledge and understanding of:

(1) the development and globalisation related phenomena and their global effect on health, gender, urbanisation, migration, etc.

Application. The student has acquired the competences to:

(2) understand and analyse the historical, sociocultural and political dimensions of international development and globalisation and their role in shaping contemporary world.

Attitude. The student demonstrates:

(3) a critical attitude towards ideas on globalisation and development.

### Inhoud vak

The development of a capitalist economy in the North and the ongoing, global restructuring of the economy have impacted on economic and social development of the global South. Policies of states, supranational development agencies, and local NGOs to raise the standard of living in the so-called less developed countries have not attained the success levels hoped for. In fact, growth-oriented policies may have negative side effects, such as increased inequality, both within and between states, and ecological degradation. In this course, we analyse the interactions between (inter)national stakeholders and local populations, substantiating how particularly the so-called "poor" people experience inequality and poverty. We also highlight potential and experienced gaps between intentions and outcomes of development policies and look at what anthropology can contribute to 'development' debates and policy implementation.

### Onderwijsvorm

Lectures.

### Toetsvorm

Final exam.

### Literatuur

To be announced on CANVAS

### Doelgroep

2nd year bachelor students in Cultural Anthropology and Development Sociology  
Students in the minor Development and Global Challenges  
Students in the minor Anthropology  
The course is also open as an elective course

## Development of Macroeconomic Thought

<b>Vakcode</b>	E_ME_DMT ()
<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>	prof. dr. C.A. Davids
<b>Examinator</b>	prof. dr. C.A. Davids
<b>Docent(en)</b>	prof. dr. C.A. Davids, J. Chen MPhil
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	200

### Doel vak

The objective of this course is to introduce core concepts and theories of modern macroeconomic analysis including their development within the economic and social context of the past centuries.

Specific learning outcomes upon completion of this curricular item are:

- understanding of macroeconomic theories about growth, inequality and unemployment within their historical contexts;
- a basic knowledge of core macroeconomic concepts

- familiarity with recent empirical macroeconomic work on growth, inequality and unemployment.

### Inhoud vak

The course starts with discussing the historical development of macroeconomic theories about growth, inequality and unemployment.

Next the course proceeds with the introduction of core macroeconomic concepts and theories including illustrations from recent empirical macroeconomic work on growth, inequality and unemployment:

- Circular flows and national accounts;
- Aggregate incomes and inequality;
- Growth accounting: labor productivity, technological progress, human capital, Solow model;
- Institutions and economic development;
- Unemployment: measurement, types, costs of unemployment, wage rigidity.

### Onderwijsvorm

Lectures and tutorials

### Toetsvorm

Grade is average of problem sets (30 %) and written examination (70%), with written exam grade of at least 5.0.

### Literatuur

Acemoglu, Daron, David Laibson and John A. List, 2016, Economics, Harlow, Essex, Pearson Education Ltd. ISBN 13: 978-1-292-07920-2, incl. access code MYECONLAB.

### Vereiste voorkennis

Basic knowledge of math and statistics, as provided in the academic core of any academic program at the Vrije Universiteit Amsterdam or equivalent.

### Doelgroep

Remarks: this course is an integral part of the University Minor Economics; participants gain strongly from attending the entire minor program.

## Digital Humanities and Social Analytics in Practice

<b>Vakcode</b>	L_AABAALG048 ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. L.M. Aroyo
<b>Examinator</b>	dr. L.M. Aroyo
<b>Docent(en)</b>	dr. L.M. Aroyo
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	300

**Doel vak**

The goal of the course is to get acquainted with digital humanities research, by collaborating in current project through an intensive internship of one month. Students learn to put digital theory into practice, applying the knowledge gained from previous minor courses to a real-world project.

**Inhoud vak**

Throughout the Digital Humanities minor, you have learned about the field of digital humanities, you have engaged in critical reflection on the tools and methods used, and explored the way digital techniques influence current research. The goal of the course is to put theory into practice, applying the knowledge gained from the minor to a real-world project. The course is set up as an internship at a current digital humanities project. Students can choose a digital humanities project that is close to their field of study and interest, The projects are housed by cultural heritage institutions, or research labs. You will be guided by one tutor from UvA or VU and one cultural heritage professional. Through these intensive "collaboratories" students learn practical application of digital humanities knowledge, tools and methods.

**Onderwijsvorm**

Project-based learning. Group work, weekly tutor meeting per group, final group presentation.

**Toetsvorm**

Final grade is based on assessment of (1) final report, (2) final presentation, (3) self-assessment, (4) final product.

**Literatuur**

Depending on the chosen project, t.b.a.

**Vereiste voorkennis**

The Digital Humanities minor is an interdisciplinary minor, welcoming both computer science students and humanities students of all disciplines: linguistics, media, communication, history, literature and arts. In order to participate in the course "Digital Humanities in Practice" you have at least completed two courses of the minor, as this course is set up as a practical application of knowledge, tools and methods discussed in the previous courses.

**Doelgroep**

Minor Digital Humanities, BA Media and Information (UVA), BA specialisation e-humanities

**Intekenprocedure**

For UvA students: For registering for the VU-courses, you need to enrol as a guest student at VU for the BA History.

Read how to in Dutch:

<http://www.vu.nl/nl/opleidingen/toelating-en-inschrijving/bijvakken>

or in English: <http://www.vu.nl/en/programmes/short/secondary/index.aspx>

**Overige informatie**

This module is taught at the VU. Module registration at the VU is required.

**Digitization: from Life to Data (UvA)**

<b>Vakcode</b>	L_AABAUVA008 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. H.M.E.P. Kuijpers
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	200

### Doel vak

At the end of this course the student is able to:

- understand the complexity and challenges of (global) data developments.
- understand the relevance of data-oriented research for humanities and social sciences.
- apply their knowledge by developing their own research projects.
- apply various computational techniques such as structuring and parsing digital data.
- critically reflect on the implications of the selection, structuring and manipulation of data for the outcome of their work.

### Inhoud vak

The humanities and social sciences are confronted with more and more digital material. Digital methods allow researchers to study relations between objects from a different perspective and on a larger scale. How can humanities researchers and social scientists use digital data to support their research? What are the digital tools at their disposal and how can these tools provide new perspectives and research questions? This tutorial looks at the Humanities from a data-oriented perspective; it introduces students to the different stages of data-driven research in the Humanities: how to obtain data (e.g. scraping), extract information (parsing), and find patterns (mining). Students will apply their knowledge of these techniques (and their associated tools) by developing their own research project.

### Onderwijsvorm

Tutorial

### Toetsvorm

Assignments and final paper. For dates and deadlines see the timetable and/or the course manual.

### Literatuur

All material will be made available via Canvas.

### Doelgroep

This course is part of the UVA/VU Minor Digital Humanities and Social Analytics

<https://minor.vu.nl/nl/minoren/digital-humanities-and-social-analytics/>

### Intekenprocedure

Module registration at the UvA is required. Note that registration will take place from 13 juni t/m 27 juni.

For more information see:

<http://coursecatalogue.uva.nl/xmlpages/page/2017-2018-en/search-minor/pr>

or: Onderwijsadministratie BG2 +31 20 5254952

### Overige informatie

This module is taught at the UvA, Capacity group Media Studies, dr. K. Beelen (coördinator)

## Economics and Politics for Food and Nutrition Security

<b>Vakcode</b>	E_MG_EPFNS ()
<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>	drs. G.J.M. van den Boom
<b>Examinator</b>	drs. G.J.M. van den Boom
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	300

## Environment and Development

<b>Vakcode</b>	S_ED ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Sociale Wetenschappen
<b>Coördinator</b>	drs. W.A.M. Tuijp
<b>Examinator</b>	drs. W.A.M. Tuijp
<b>Docent(en)</b>	drs. S.L. Di Prima MSc, drs. W.A.M. Tuijp
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	200

### Doel vak

This course aims to help the student to examine and critically reflect on the relationships between economic and social development, and the environment.

### Inhoud vak

What do we mean by the concepts of environment and development and how are the two related? What are the causes and consequences of global environmental change? How is the global community dealing with ecological problems? How can smallholder farmers in the developing world adapt to climate change? How can the world adequately feed more than 9 Billion people by 2050? Is sustainable development, with its notions of environmental 'friendliness', really achievable?

These and many other questions will be discussed during this interdisciplinary course. After the introductory overview the course will discuss two overall aspects of the international E&D framework: (1) Global Issues - which considers the links between development on the one hand and environment, trade and poverty on the other; (2) Local Issues - which focuses on the increasingly serious problem of land degradation, deforestation and growing water shortages, and asks key questions of how

these are related to aspects of human development in poor countries. Illustrated case studies from all over the world provide the basis for teaching. Through this course students learn to recognize and analyze the current and potential impact of the major international environmental concerns; to appreciate the complexities of environmental issues related to development at a global level; to take into account different perspectives on environmental problems and possible solutions; and learn lessons from international case studies.

### Onderwijsvorm

Lectures, group discussions and tutorials.

### Toetsvorm

Group presentations (40%) and exam (60%).

### Literatuur

Clapp, J., & Dauvergne, P. (2011) Paths to a Green World: the political economy of the global environment. 2nd edition. Cambridge: MIT Press.

Additional literature to be announced in the course manual (see CANVAS).

### Doelgroep

Students in the Minor Development Studies;  
 Students in the Minor Development and Global Challenges;  
 Open as an elective course for Exchange students;  
 Open as an elective course for VU students.

### Overige informatie

Some comments from former students:  
 "Many case studies, examples and pictures from own experiences presented by enthusiastic teachers"  
 "Eye-opening to very important topics and a lot of additional info"  
 "I liked the broadness of the course. I really have an overview now of the main environmental issues"  
 "Thanks a lot for the course, I have learned a lot and will recommend it to others!"

## Equational Programming

<b>Vakcode</b>	X_401011 (401011)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. F. van Raamsdonk
<b>Examinator</b>	dr. F. van Raamsdonk
<b>Docent(en)</b>	dr. F. van Raamsdonk
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Practicum
<b>Niveau</b>	300

### Doel vak

To obtain basic knowledge of functional programming (using Haskell) and its foundations via lambda calculus and equational reasoning.



### **Inhoud vak**

In the practical work we use the functional programming language Haskell.

We practice with the basics such as lists, recursion, data-types, and a bit of monads.

The theoretical part is concerned with the foundations of functional programming in the form of lambda calculus and equational reasoning. We study in untyped lambda calculus beta reduction, reduction strategies, confluence, encoding of data-types, fixed point combinators and recursive functions. In addition we study the lambda-calculus with simple types, its typing system and a type inference algorithm, and possibly strong normalization of simply typed lambda-calculus. In equational reasoning we work towards the results that all initial models are equal up to isomorphism, and that the term model is an initial model.

### **Onderwijsvorm**

The theoretical part is taught in the lectures and exercise classes. In addition, there is a programming lab for programming in Haskell.

### **Toetsvorm**

Written examination, programming assignments in Haskell, and (possibly obligatory) hand-in theory exercises.

### **Literatuur**

Course notes.

### **Aanbevolen voorkennis**

It helps to be familiar with formal reasoning as for example taught in the course Logic and Modeling.

### **Doelgroep**

3CS, 3LI, 3IMM, 3W

### **Intekenprocedure**

The registration procedure is the standard one.

### **Overige informatie**

This course is part of the minor Deep Programming.

## Ethics I

<b>Vakcode</b>	W_BA_ETH1 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. P. Robichaud
<b>Examinator</b>	dr. P. Robichaud
<b>Docent(en)</b>	dr. P. Robichaud
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	100

### Doel vak

- Develop a basic understanding of the most important theories in moral philosophy—this includes normative ethics and metaethics.
- Understand the relative strengths and weaknesses of distinct theories.
- Learn how to use concepts and insights from various theories in normative ethics to analyze contemporary moral problems
- Learn how to argue for a particular position in applied ethics debate.

### Inhoud vak

Ethics is a branch of philosophy that focuses on questions such as “In virtue of what are actions right or wrong (morally obligatory, morally permissible, or morally impermissible)?”, “What makes a certain state of affairs good or bad?”, and “What constitutes a good life?”. In this course we will critically explore different theories that offer answers to these questions. These theories include consequentialism, deontology, virtue ethics, care ethics, and contract theory. We will also spend time examining how these ethical theories apply to contemporary moral issues, such as abortion, animal welfare, famine relief, and human enhancement.

### Onderwijsvorm

Lectures and workgroups

### Toetsvorm

Written exams (60%); Writing assignments (20%); Group Debate (20%)

### Literatuur

- Russ Shafer-Landau, The Fundamentals of Ethics (3rd edition), Oxford: Oxford University Press, 2015
- Readings in Canvas

### Doelgroep

First year philosophy BA, philosophy premaster, philosophy minor.

### Overige informatie

This is a required first year course. It serves as a pre-requisite for the second year course Ethics II.

## Ethics of Algorithms

<b>Vakcode</b>	E_MM_ETHA ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	School of Business and Economics
<b>Coördinator</b>	dr. ir. M. van Otterlo
<b>Examinator</b>	dr. ir. M. van Otterlo
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege

### Doel vak

After completing this course, students will  
Understand the role of smart algorithms for big data, in digital interactions, and in physical manifestations such as robots and the internet-of-things.  
Know broad classes of algorithms and how they are used for prediction,

social sorting, curating, recommending, gatekeeping, experimentation, and profiling

Be familiar with some of the main contemporary thinkers and issues in the ethics of algorithms

Know and understand the ethical implications of (classes of) algorithms on privacy, surveillance, discrimination, access to information, security, free will, human rights, social norms, etc.

Be able to identify stakeholders and ethical implications in healthcare, design, crime, education, science, job markets, business, journalism, warfare, etc.

### **Inhoud vak**

Digital innovation involves both the accumulation of large amounts of data (so-called Big Data) through various new sensors (such as smartphones and social networks) as well as artificially intelligent algorithms (software, but also robots) that can analyze and interpret that data (i.e. analytics) and act upon it. The main objective of this course is to develop “algorithmic literacy” which is an understanding of how (intelligent and adaptive) algorithms influence the way we communicate, work, obtain information, date, travel, and so on, but also how we can tackle grand challenges such as crime, healthcare and education in new, innovative ways. Algorithms are not neutral or objective, but come with many biases, choices, and political influences built-in, which heavily determine how people are “seen” by these algorithms, and how they are treated.

The course covers specifically the various implications algorithms have on fundamental values in society dealing with privacy, surveillance, free will, and so on. For each implication typically several competing stakeholders are involved with opposing viewpoints, value systems or business models. This requires a delicate balancing of interests. Ethics deals with finding this balance, with identifying issues and stakeholders, with employing social and legal solution frameworks, and possibly with judging whether some developments are good or bad.

The course features lectures on algorithms, ethical issues and domains. In addition we will read and discuss relevant literature, for which active participation is required. Each student needs to write an individual essay about a (self-chosen) ethical problem in a particular domain. Furthermore, each student participates in a multidisciplinary design team consisting of students to find a practical solution for an ethical issue caused by the use of intelligent algorithms.

### **Onderwijsvorm**

Lectures and (interactive) literature discussions.

### **Toetsvorm**

Individual essay, team design project, active participation in group sessions, and a digital exam.

### **Literatuur**

Various articles that will be made available through Canvas.

## **EU Governance in an International Context**

<b>Vakcode</b>	S_EUGIC ()
<b>Periode</b>	Periode 2

<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Sociale Wetenschappen
<b>Coördinator</b>	H.L.M. Muehlenhoff
<b>Examinator</b>	H.L.M. Muehlenhoff
<b>Docent(en)</b>	H.L.M. Muehlenhoff, H. Mercenier
<b>Lesmethode(n)</b>	Hoorcollege, Studiegroep
<b>Niveau</b>	300

### Doel vak

- Gain a basic knowledge of the history of European integration, of the institutional structure of the European Union, and of the key issues in the most important policy fields.
- Introduction to the key approaches to European integration and their application to an understanding of the history and contemporary themes of European Union politics and governance.
- Gain insight into how the European Union affects domestic politics, whilst at the same time being situated in a global context.

### Inhoud vak

The European Union has an ever growing influence on political decision-making and policy-making in Europe and its nation-states. This course introduces students to the way the EU operates, its institutional architecture, its history, and its modes of decision-making. The course highlights how EU decision-making affects domestic politics, whilst it is at the same time situated in a broader, international context. Besides attention for the main characteristics of EU decision-making, the course familiarizes students with key theories of European integration (more intergovernmental versus more supranational approaches) and with the interaction between different levels of governance (Multilevel Governance, Europeanisation). These insights are applied in a number of selected policy domains that touch both upon the EU's internal politics (e.g. competition, agriculture, environmental policy) as well as upon its engagement in the global realm (e.g. military interventions).

### Toetsvorm

Exam and written assignment.

### Literatuur

M. Cini & N. Pérez-Solórzano Borragán (eds.) (2016), European Union Politics. Fourth Edition, Oxford: Oxford University Press  
+ articles.

### Doelgroep

2nd year Bachelor students Politicologie and Bestuur & Organisatie (Afstudeerrichting Bestuurswetenschappen); Exchange students.

### Intekenprocedure

In this course you can not enroll yourself for the tutorials, but you will be assigned by the course coordinator. At the latest in the first week of the course you will find to which tutorial you are assigned in your personal schedule in VUnet.

Note: You do have to register for the course, with the corresponding parts!

## Evolutionary Genetics

<b>Vakcode</b>	AB_1022 ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	dr. J.M. Kooter
<b>Examinator</b>	dr. J.M. Kooter
<b>Docent(en)</b>	dr. J.M. Kooter, dr. ir. T.F.M. Roelofs
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Computerpracticum
<b>Niveau</b>	300

### Onderwijsvorm

- Lectures and literature discussions by students (ca 50 hr)
- Working groups (ca 8 hr, mandatory)
- Literature presentation (ca 10 hr, mandatory)
- Computer practical (ca 12 hr, mandatory)
- Weblectures on specific topics
- Self study (ca 85 hr)

### Literatuur

- Book: 'Evolutionary Analysis', Scott Freeman and Jon C. Herron, Fifth Edition, 2015, Pearson, Prentice Hall
- Research and overview articles of subjects that are not thoroughly discussed in the book. These will be provided via the Canvas site of the course.

### Doelgroep

Students of the Minor 'Evolutionary Biology and Ecology', and other third-year BSc students Biology, Biomedical Sciences, Bioinformatics and systemsbiology

## Food and Quality of Life

<b>Vakcode</b>	E_MG_FQL ()
<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. D.R. Essink
<b>Examinator</b>	dr. D.R. Essink
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep, Practicum, Computerpracticum
<b>Niveau</b>	200

### Doel vak

- Be familiar with main concepts of nutrition science relevant for FNS analysis
- Understand what a healthy diet is
- Understand the relation between diets and quality of life outcomes:

physical, mental and social

- Understand (behavioural/environmental reasons for food choices
- Understand differences in food intake/outcome between social groups
- Be able to collect and analyze data regarding food intake and outcomes
- Be able to critically reflect and communicate on contemporaneous FNS quality of life issues, such as the 'balanced diet'

### **Inhoud vak**

Food and nutrition security are quintessential to quality of life. This course introduces basic health and nutrition science principles to zoom in on the effect of food on individual wellbeing: a balanced diet can contribute to prevent diseases and improve cure rates, improve productivity and nutrition is an important aspect of social relations and wellbeing. The course starts by understanding the composition of nutrition (e.g. what are macro/micro nutrients) and the basic metabolism processes in the body. Thereafter we relate food intake to the concept of a healthy diet and quality nutrition. This student will learn to conduct research into food intake (food frequency questionnaires / 24 hour recalls/food diaries). Thereafter we will relate the food intake to specific health outcomes and conduct basic quantitative analysis into these. The emphasis is on outcomes in relation to health, here we will go into basic measurements such as BMI, stunting, wasting. We will also assess how food intake will contribute to improved educational attainment and labor productivity. Students will further understand how foods, even those that contribute to ill health, may positively affect individuals social life's and their quality of life. Lastly we will also explore how individuals make decision in relation to food intake.

### **Onderwijsvorm**

Lectures, workgroups, practicals, peer review

### **Toetsvorm**

Exam (60%), assignments (30%), presentation (10%)

### **Literatuur**

Book chapters, articles, lectures and other literature made available on Canvas

### **Vereiste voorkennis**

The minor is designed for students from all disciplines. The interdisciplinary nature of the minor broadens the 'more disciplinary' perspective taught to students in the major.

### **Aanbevolen voorkennis**

Preferably students either have followed the first two courses of the minor or have Insights into nutrition sciences and basic statistical skills

### **Doelgroep**

The main target population is all third year VU bachelor students. Students outside the VU will also be targeted, such as at UvA. Because the minor is interdisciplinary, the minor should also be of interest for economics and health sciences students. We specifically aim for a diverse group as we strongly believe that interdisciplinary research is best taught through active interaction between students from different disciplinary backgrounds.

### **Overige informatie**

Food and nutrition security are quintessential to quality of life. This course introduces basic health and nutrition science principles to zoom in on the effect of food on individual wellbeing: a balanced diet can contribute to prevent diseases and improve cure rates, improve productivity and nutrition is an important aspect of social relations and wellbeing.

## Foundations of Business Administration

<b>Vakcode</b>	E_MB_FBA ()
<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. V. Duplat
<b>Examinator</b>	dr. V. Duplat
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	100

### Doel vak

Have you ever asked yourself why organizations such as Uber or Airbnb grow so fast? How do newspaper publishers or bookstores take advantage of the digital revolution? Why do some clothing brands opt for the franchise for internationally expanding and others like Zara don't? What makes the success of Tesla cars wider in some countries than in others? Searching for answers to questions like those is the main challenge of managers nowadays. Managers must deal with the sustained pace of changes characterizing current economic, legal and technological environments throughout the world. This requires them to think out of the box and to continuously adapt the design of their organizations. New approaches to business and management constantly emerge. The course 'Foundation of Business Administration' provides insights in traditional and new approaches, while adopting an even-handed appreciation for theory and practice. The students learn to apprehend real-world business situations by applying specific theoretical perspectives or using related analytic tools. To do so, the course familiarizes the students with the three main theoretical perspectives on organizations (Modern, Symbolic-interpretative and Post-modern perspectives) and presents analytical tools and framework rooted in those perspectives. After following the course students:

- Have an advanced understanding of the traditional and emerging theoretical frameworks and concepts developed for studying organizations
- Are able to adopt theoretical frameworks and apply tools and framework to real-world situations and organizations
- Are able to report, expose and defend their analyses and business recommendations, both verbally (report) and orally (presentation and video)
- Are able to work in small teams and efficiently allocate tasks among team members under time pressure

### Inhoud vak

The course is devoted to the study of organizations. During the lectures, three main theoretical perspectives and related sets of assumptions are introduced. These lectures are organized in five parts:

(1) introduction of the three perspectives and their assumptions over time, (2) interdependency between organizations and their environment, (3) organizational social structure and organizational culture, (4) technology and physical structure of organizations, and (5) organizational power, control and conflict. Throughout the lectures, each perspective, concept and analytical tool is presented by referring to real-world and current business situations. Business and managerial articles from Harvard Business Review, McKinsey Quarterly and MIT Sloan Management are associated with each lecture to enrich students' learning and bridge theory with practice. In addition, lectures are combined with a company visit, business case studies and a consulting project. Students are challenged to mobilize the content of the lectures for building their own understanding of choices made by organizations. This course is relevant for students wishing to appreciate challenges that organizations face and how those challenges can be approached and dealt with. The different fields of expertise of the students who attend the course represent a key asset. This diversity is used as a means to strengthen the learning experience!

### Onderwijsvorm

Lectures, tutorials and a company visit. Lectures start with a practice-oriented question, which is addressed by introducing theory. A company visit will offer students an opportunity to understand how firms must quickly adapt their business model and physical structure to the rapidly changing technological environment and worldwide competition. Throughout the tutorials, students will apply the theoretical frameworks and analytical tools introduced in the lectures to real-world organizations and situations. To this end, the tutorials combine two case studies and a consulting project. Via lectures and tutorials, students are encouraged to develop and expose their personal position on choices made by existing organizations. They are also expected to actively contribute to the group's experience and learning.

### Toetsvorm

Three group assignments under the form of a consulting project (oral presentation, video-making, and written reports), one individual assignment (essay), and a final written exam.

### Literatuur

- Required reading: Hatch & Cunliffe, Organization Theory. Modern, symbolic and postmodern perspectives. 3rd edition. Oxford: Oxford University Press, 2012.
- Selection of business and managerial articles that will be posted on Canvas.

## Foundations of Microeconomics

<b>Vakcode</b>	E_ME_FM ()
<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>	prof. dr. P.A. Gautier
<b>Examinator</b>	prof. dr. P.A. Gautier
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	100



### Doel vak

This course introduces you to modern microeconomics. At the end of the course you:

- (1) can abstract from irrelevant details.
- (2) can apply economic concepts and theory to analyze concrete problems;
- (3) are able to interpret economic news.

### Inhoud vak

Topics to be discussed are:

- Consumers, sellers and Incentives;
- Perfect competition, Trade;
- Externalities and public goods;
- Labor market/ human capital/unemployment;
- Economics of Information;
- Game theory/ Auctions;
- Socio/behavior economics.

### Onderwijsvorm

Lectures and working groups

### Toetsvorm

Grade is average of problem sets (30 %) and written examination (70%), with written exam grade of at least 5.0.

### Literatuur

Acemoglu, Daron, David Laibson and John A. List, 2016, Economics, Harlow, Essex, Pearson Education Ltd. ISBN 13: 978-1-292-07920-2, incl. access code MYECONLAB.

### Vereiste voorkennis

Basic knowledge of math and statistics, as provided in the academic core of any academic program at the Vrije Universiteit Amsterdam or equivalent.

## From Cell to Society

<b>Vakcode</b>	W_FCTS ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. P. Verdonk
<b>Examinator</b>	dr. P. Verdonk
<b>Docent(en)</b>	dr. P. Verdonk
<b>Lesmethode(n)</b>	Hoorcollege, Practicum, Studiegroep
<b>Niveau</b>	300

### Doel vak

Overall aims of the course (scientific and clinical):

Aim of the course is to offer an in-depth overview of sex/gender and diversity aspects in medicine from cell to society, to provide an overview of sex/gender and diversity and their implications across a wide range of disciplines (e.g. basic science, pharmacology, cardiology,

mental health, social medicine) and health conditions. The students practice a critical approach to existing evidence and learn the tools to apply this knowledge to medical practice. Professional development specifically aims towards the integration of learning pathways in particular: development of reflexivity, ethics (social justice), academic development (critical analysis), patient safety (drug development), professional communication.

Learning goals: after the course students are able to

- Describe the meaning of sex/gender and other aspects of diversity for health and illness
- Explain the role of sex/gender and other aspects of diversity for diagnose and therapy and present examples
- Describe and explain the role of diversity in major health issues such as coronary heart disease and lifestyle and mental health problems and apply this knowledge to patient cases
- Describe theoretical developments and concepts in the field of gender and diversity medicine including cultural competence, bias, gender awareness, diversity
- Explain the intersections of aspects of diversity in health and illness (intersectionality perspective)
- Recognize and explain gender and diversity bias in research and practice and its consequences for clinical practice
- Apply a gender and diversity lens to academic papers, research proposals, presentations

### **Inhoud vak**

General background

Health disparities and inequalities exist between men and women across (socio)cultural backgrounds, class, sexual orientation, abilities and age (intersectionality framework). To date, a sex/gender and diversity perspective is insufficiently incorporated in research from fundamental research to drug trials and in medical practice. Understanding the antecedents of differences and inequalities and their connections to biological and social processes is important to improve quality of health and health care for both women and men across their intersections. In this course, we will give an in-depth overview of the relevance for clinical practice of these issues across a number of disciplines and health conditions. In week 1, we address sex (biological) differences in basic sciences (e.g. clinical conditions, coronary heart disease) and musculoskeletal diseases and we address sex/gender and research, including women's exclusion from drug trials. In week 2, we address how gender (sociocultural aspects) and cultural background are related to public health issues in particular lifestyle, cardiology and we discuss sex/gender and ethnicity in pharmacological treatment. In week 3, we will focus on gender and class (incl. poverty and education) in relation to mental health particularly depression and stress. In week 4, we focus on the intersections between sex/gender, sexual orientation, and cultural/religious background and how they relate to health and health care.

### **Onderwijsvorm**

Lectures and small group practicals

### **Toetsvorm**

- Presentation of an article from the literature list
- Writing a paper on gender and diversity in medicine, topic of choice
- Final examination (open book, open questions)

## Literatuur

Articles. A full literature overview will be placed on Canvas

## Vereiste voorkennis

Students have to fulfill the requirements of participation in a VUmc School of Medicine minor Bacheloryear 3

## Doelgroep

All students with an interest in gender and diversity in medicine from an intersectional perspective

## From Protein to Cell

<b>Vakcode</b>	AB_1052 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	dr. D. Bald
<b>Examinator</b>	dr. D. Bald
<b>Docent(en)</b>	ing. H.W.J. Hakvoort, dr. D. Bald
<b>Lesmethode(n)</b>	Practicum, Computerpracticum, Hoorcollege, Deeltoets extra zaalcapaciteit
<b>Niveau</b>	300

## Doel vak

Final attainment:

The student knows:

- Principles and applications of protein over-expression, purification, structure, function, and inhibition as well as the function of antibiotics as protein inhibitors.

The student can:

- Apply protein bio-chemistry methods (protein over-expression, affinity chromatography, spectro-photometry, fluorescence, protein labeling methods, gel electrophoresis, activity tests).

## Inhoud vak

The course consists of a mixture of lectures, practicals, computer sessions and individual study. We will cover concepts/methods/techniques that you can use to study a broad range of relevant questions, e.g:

- How can I produce a protein using bacteria?
- How can I purify a protein?
- How can I investigate structure and function of a protein?
- How can I predict structure and function of a protein?
- How do antibiotics work as protein inhibitors?
- How can I design my experimental strategy?
- Which factors I have to think about to make my experiment successful?

## Onderwijsvorm

The course consists of a mixture of lectures (8h), practical's (36h), computer sessions (3h) and individual study.

**Toetsvorm**

Reports (50 %), oral presentation (50 %).

**Literatuur**

Lecture slides and experimental protocols. Any biochemistry textbook can be used for repetition.

**Aanbevolen voorkennis**

Participation in the Portal Courses Experimental Cell Biology I and II.

**Doelgroep**

Students in the Minor Biomolecular Sciences & Neurosciences, Track Biomolecular Sciences.

**Overige informatie**

Part of the Minor Biomolecular Sciences & Neurosciences, Track Biomolecular Sciences.

This course is scheduled in the first half of period 2.

This minor course requires a minimum of 25 participants to take place.

A lab coat is mandatory for the lab practical lab work. Participation in the Portal Courses Experimental Cell Biology I and II.

## General History

<b>Vakcode</b>	L_GABAALG013 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. S.W. Verstegen
<b>Examinator</b>	dr. S.W. Verstegen
<b>Docent(en)</b>	dr. S.W. Verstegen
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	100

**Doel vak**

Knowledge and insight in the development of world history and civilizations from antiquity to the present day from a cultural, religious, political, economic and social perspectives.

Acquire basic knowledge necessary for a better understanding of the historical background of different civilizations and their interacting.

**Inhoud vak**

The course 'general history offers a brief orientation in global history, its general trends from the Antiquity to the present, and its current methods and historiography. The course focuses on the main trends in the history of civilizations all over the world and deliberately avoids an European centred world view. Working from the heritage available in Dutch museums the lectures elucidates what we know and what we don't know of our common past. We approach world history by looking at the world of Antiquity, world religions, cultural and scientific history, political, social and economic history and world history from an anthropological perspective.

**Onderwijsvorm**

Lectures in the English language.

**Toetsvorm**

Assignments and final exam. Class participation is mandatory (80%).

**Literatuur**

Eric Vanhaute, World History. An introduction (Londen, 2012).

**Vereiste voorkennis**

First year completed.

**Doelgroep**

This minor is open to third year BA students from all disciplines.

**Overige informatie**

This course is the first course in the minor History. It offers an introduction to the minor and to the study of world history.

## Global English

<b>Vakcode</b>	L_ETBAETK209 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. L.M. Rupp
<b>Examinator</b>	dr. L.M. Rupp
<b>Docent(en)</b>	drs. E. Akkerman, dr. L.M. Rupp
<b>Lesmethode(n)</b>	Werkcollege, Hoorcollege
<b>Niveau</b>	200

**Doel vak**

Knowledge

You are able to describe the salient features of major varieties of English, and the way in which these varieties have evolved. You are able to describe theories of language variation and change, language acquisition, and language and identity, as well as methods in teaching English as a second or foreign language/lingua franca. You are able to describe the use of corpus analysis as an empirical method for linguistic research. You are also able to name and describe some of the most important corpora that can be used for research in the area of Global English and research in the area of English linguistics more broadly.

Skills

You are able to apply this knowledge in analyses of concrete situations of the globalization of English, for instance English language-teaching or language policy-making in the domains of education, government and business. You are able to apply corpus linguistic techniques to the analysis of a number of issues in Global English.

Attitude

You are able to present a well-informed perspective of the nature of

different Englishes and the impact of the globalization of English on speakers of English around the world.

#### Communication

You are able to present results of a small linguistic research project of your own on a Wiki page.

#### Competence

You are able to identify situations in which corpus analysis is useful.

### **Inhoud vak**

In the lecture, we consider the world-wide spread of the English language. We begin with areas where English is spoken as a first language (England, the Celtic countries, the US, Australia, etc.). We then move on to regions where English is spoken as a second language (Africa and Asia) and from there to regions where English is used as a foreign language or lingua franca (e.g. Europe, the Netherlands). We will explore different issues in the globalization of English. These include linguistic aspects (variation in English, World Englishes), social issues (dialect perception, attitude to language, and language and identity), literary concerns (postcolonial literatures), and the impact on education, business and other domains (language policy).

In the seminar, we address issues that have arisen from the lectures or the reading, and we discuss assignments.

In the practicum you will be introduced to the field of corpus linguistics as a research method for analysing linguistic data. You will apply this to the study of Global English.

### **Onderwijsvorm**

Lecture (2 hours per week), seminar (2 hours per week) and practicum (2 hours per week).

### **Toetsvorm**

Exam (50%, individual mark) and a Wikipage on a variety of English (50%, group mark).

### **Literatuur**

Schneider, E.W. 2001. English Around The World. Cambridge.  
Other literature and materials will be made available in class and on Canvas.

### **Vereiste voorkennis**

Students must have followed Academic English CIS-L&S Grammar (L\_EABAALG103) and Academic English CIS-L&S Writing (L\_EABAALG104). Students Minor English should contact the Education Office of FGW for course registration.

### **Doelgroep**

Second-year students CIW and Literature & Society, third-year minor students, and international students.

### **Overige informatie**

Class attendance is obligatory (80%). Participants will also need to have submitted 80% of the weekly assignments set in order to be assigned a grade for the course.

# Global Political Economy

<b>Vakcode</b>	S_GPE ()
<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. M. Hoijtink
<b>Examinator</b>	dr. M. Hoijtink
<b>Docent(en)</b>	dr. M. Hoijtink
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	300

## Doel vak

- Acquiring knowledge of and insight into the contemporary global political economy, in particular how the contradictory process of globalization reshapes the relationship between states and markets;
- Introduction to and an understanding of rival concepts and theories within International Political Economy and their application to issues in contemporary global political economy.

## Inhoud vak

This course offers students an introduction to the subject of International Political Economy (IPE). Throughout, the course will be guided by the question to which extent, and how, the current process of globalization is changing the relationship between states and markets, between public regulation and the private economy, between state and capital. Traditionally IPE studies the relationship between 'the economic' and 'political' within the interaction of – patterns of co-operation and conflict between – national states. If anything, the global financial and economic crisis of 2008 and beyond has made clear that this state-centric perspective is no longer adequate. At the same time the crisis has also shown that states, although apparently vulnerable in the face of global market forces, are also crucial when it comes to protecting the workings of global capitalism. This shows that indeed the relationship between states and markets is not a one-way street. In other words, politics and policies are shaped by the interests and activities of transnational (market) actors and by economic globalization but the latter is also driven by politics, and shaped (indeed enabled) by the policy choices that states make. It is from this perspective that this course will examine the various approaches within international political economy; the historical evolution of the global political economy; the globalization of production and the role of transnational corporations; the international monetary system and the globalization of finance; the global financial crisis and the eurozone crisis; the political economy of development; the rise of China and other emerging powers, and the political economy of energy and the environment.

## Onderwijsvorm

Lectures.

## Toetsvorm

Written Exam.

### Literatuur

Balaam, D.N. and B. Dillman (eds). (2014). Introduction to International Political Economy. Pearson New International Edition (Latest edition). Harlow: Pearson Education.

### Aanbevolen voorkennis

Some introductory-level knowledge of political science and International Relations as well as of basic (macro-)economics is recommended but relevant concepts will also be explained in class.

### Doelgroep

Students Bachelor Political Science; Minor Political Science; exchange students

## Governance and Regulation of Emerging Technologies

<b>Vakcode</b>	R_GRET ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Rechtsgeleerdheid
<b>Coördinator</b>	prof. mr. A.R. Lodder
<b>Examinator</b>	prof. mr. A.R. Lodder
<b>Docent(en)</b>	prof. mr. A.R. Lodder
<b>Lesmethode(n)</b>	Hoorcollege, Leergroep
<b>Niveau</b>	200

### Doel vak

The aim of this course is explore various ways to regulate and govern societal changes caused by new technological developments. After this course the student knows and understands the various regulative and governance instruments, such as laws, regulation via technology, self-regulation, standardisation, and how and when to apply these to new technologies, including so-called disruptive technologies like Ueber, whole genome sequencing, Airbnb, block chain technology.

### Inhoud vak

This introductory course of the Minor Technology, Law and Ethics offers an introduction into and overview of ways technology can be regulated.

Important general concepts to be discussed are the economy (market powers), the law (regulation and case law), social conventions and ethics, and the architecture (e.g. the software). Basically three angles can be used to approach a technological development:

1. The Possible: what is technically feasible? (Technology)
2. The Desirable: do we like it, do we want it? (Ethics)
3. The Permissible: do we allow it? do we permit it? (Law)

For all emerging technologies we have to think about these three questions. The answers can roughly be categorized as:

White: It is possible, desirable, and permissible.

Grey: It is possible and permissible, but desirable?

Black: It is impossible, or possible but not permissible.

We will analyze different kinds of emerging technologies, and discuss in what categories we believe they belong (white/grey/black)



**Onderwijsvorm**

Lectures and tutorials

**Toetsvorm**

Written exam

**Literatuur**

Material will be made available via the electronic learning environment

**Doelgroep**

Apart from regular students, the course is also available for:

Students from other universities/faculties

Contractor (students who pay for one course)

**Governance of Global Sustainability**

<b>Vakcode</b>	AB_1229 ()
<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>	prof. dr. P.H. Pattberg
<b>Examinator</b>	prof. dr. P.H. Pattberg
<b>Docent(en)</b>	prof. dr. P.H. Pattberg, prof. M. van Vugt
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	300

**Doel vak**

After this course students:

1. can explain key concepts from social and behavioral sciences relevant for the study of sustainability;
2. can characterize main modes of governance and behavioral triggers;
3. can explain the role of the social system in socio-environmental systems;
4. are aware of methods to quantify/qualify the state of governance and institutional/organizational change;
5. can identify Strengths, Opportunities, Threats and Weaknesses (SWOT) related to specific transitions strategies.

**Inhoud vak**

How can we govern the transition towards a more sustainable society?

What are the mechanisms, interventions and governance approaches that are able to change unsustainable patterns and structures? The course addresses these questions related to people at various levels of aggregation: at the individual and social group level, at the level of organizations (such as the United Nations or the World Trade Organization), and at the level of political institutions (such as the state/government, cities/regions and private/transnational regimes). Our course will consequently survey the existing modes of governance towards behavioral and institutional change: authority, markets and networks.

Methods to assess governance and transformative change are addressed and students identify for their specific case studies what strengths, opportunities, weaknesses, and threats are associated to the 'people dimension'. The course comprises lectures, workshops and a negotiation

simulation and is evaluated through written assignment and a written exam.

### Toetsvorm

The course will be evaluated through

- 1) an assignment, consisting of a) a presentation (10%) and b) a short student report (1500 words) regarding the governance/behavioral aspects of their topic and associated SWOTs (20%).
- 2) an exam (70%), which will be composed of multiple choice and open questions.

### Literatuur

For each week, a selection of articles will be made to be studied in advance. For background reading on the key concepts and empirical issues covered in this class, we will use Encyclopedia of Global Environmental Governance and Policy (edited by P. Pattberg and F. Zelli), Edward Elgar Publishing. There is an affordable paperback version available from the VU bookstore. Individual chapters can also be assessed via the VU library's electronic sources.

### Aanbevolen voorkennis

Interest in sustainability issues and social questions

## Grand Challenges for Sustainability

<b>Vakcode</b>	E_IBA3_GCS ()
<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. G.C. van der Meijden
<b>Examinator</b>	dr. G.C. van der Meijden
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	300

### Doel vak

Academic skills / Knowledge

- the biophysics behind global environmental problems such as climate change and biodiversity loss;
- the importance of the 17 Sustainable Development Goals (as agreed upon in 2012 by the UN General Assembly) for achieving sustainable development;
- the determinants of economic growth and development;
- why the management of natural resources cannot be left to the free market;
- the role of good governance, both by governments and multinational firms, for achieving sustainable development;
- whether the government can, and, if so, how the government should intervene to obtain sustainable development and how to combat poverty, climate change, biodiversity loss, and resource depletion;
- the role of cities, in which more than half of the world population currently lives, for achieving sustainable development

Research skills / Quantitative skills

After successfully completing this course, you are able to explain:

- will be acquainted with theoretical and empirical methods necessary to study economic growth, the effects of market failures, the optimal management of natural resources, the potentially adverse effects of resource abundance, and the effects of different policy interventions

#### Bridging theory and practice

- you can explain how the management of renewable natural resources, such as fisheries, works in practice (through the experiences you have gained from a game you have played in an interactive in-class setting)

#### Social skills

After successfully completing this course, you are able to

- present and actively discuss themes relevant to this course

#### Broadening your horizon

After successfully completing this course, you are able to explain

- the interactions of the world economy, global society, and the natural environment that are important for sustainable development;
- why sustainable development calls for socially inclusive and environmentally sustainable economic growth.

#### **Inhoud vak**

Sustainable development is the central challenge of our days. Currently, the Earth is inhabited by 7.2 billion people (9 times more than at the start of the Industrial Revolution in the 18th century) who together produce more than 90 billion US dollars of output (200 times more than at the start of the Industrial Revolution). Both population and output are projected to keep on growing during the next decades. Furthermore, our world is increasingly interconnected through trade, migration, technology diffusion, knowledge flows, and social networks. As a result, human influence on the Earth's physical processes has been increasing. Nowadays, in the Anthropocene, human activity is even deemed to be the dominant influence on the Earth's climate and natural environment. Although two decades of economic development have brought widespread prosperity, more than a billion people are still living in extreme poverty. Moreover, by crossing planetary boundaries human activities may plunge the world into a gigantic environmental crisis caused by climate change and biodiversity loss. In order to eradicate poverty and to prevent environmental catastrophes, a transition needs to be made from the business as usual (BAU) to a sustainable development (SD) path. Making this transition requires good governance, not only by governments, but also by citizens and businesses. The objective of this course is to characterize a path of sustainable development and to identify the Grand Challenges that the world faces in making the transition from BAU to the SD path.

The course is organized around the Sustainable Development Goals as adopted by the UN in 2015. The first week will start with a general introduction that sketches several important sustainability issues, illustrated by empirical evidence. During the course, we pay attention to the scientific as well as to the economic and societal dimensions of the identified challenges for sustainability. Furthermore, both the positive or analytical side (i.e., how to make sense of the interactions of the economy, society and the environment?) and the normative or ethical side (i.e., what should be the objectives of a well-functioning society?) of sustainable development will be discussed during the course. The topics that will be dealt with during the course are:

1. Growth and development: capital accumulation and technological change;

2. Ending global poverty, education, and health;
3. Management of natural resources and planetary boundaries;
4. Climate change: climate science and environmental policies;
5. Biodiversity and land-use change; 6. Global governance and resilient cities.

### Onderwijsvorm

Lectures (with interactive elements)  
 Tutorials (including presentation and discussion sessions)  
 MOOC (to prepare at home for the lectures and tutorials)

### Toetsvorm

Written exam – Individual assessment  
 Interim Assignments – Group assessment

### Literatuur

Sachs, Jeffrey D., The Age of Sustainable Development, 2015, Columbia University Press, New York.  
 Collection of articles.

### Aanbevolen voorkennis

Microeconomics

## Hadith-wetenschappen

<b>Vakcode</b>	G_HADITHW ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Godgeleerdheid
<b>Coördinator</b>	dr. Y. Ellethy
<b>Examinator</b>	dr. Y. Ellethy
<b>Docent(en)</b>	dr. Y. Ellethy
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	300

### Doel vak

De student kan:

- de terminologie op het gebied van de hadithwetenschappen benoemen en definiëren, uitleggen en toepassen.
- vergelijkingen maken tussen westerse historische methodologie en Hadithmethodologie.
- de niet-islamitische en islamitische kritiek tegen de autoriteit van de Soenna en de betrouwbaarheid van de Hadithmethodologie weergeven, bediscussiëren en hierover argumenteren
- uitleg geven over de belangrijkste concepten van de principes van de hadithwetenschappen [ul al-adth].
- de inhoud van een aantal in het college behandelde Koran- en Hadithteksten weergeven en deze teksten analyseren en uitleggen volgens de methode van de Koran- en hadithwetenschappen.
- in hoofdlijnen iets vertellen over de hedendaagse discussies en problematiek van de hadith in de moderne tijd.

- de belangrijke Soenna-hadithliteratuur benoemen en hierover uitleg geven.
- de hadiths classificeren en toeschrijven aan een bepaalde autoriteit en deze classificeren.

### **Inhoud vak**

Hadith-wetenschappen is een vervolg op en en verdieping van Inleiding in de Koran en Soenna. De inhoud wordt verdiept met meer aandacht voor: hadithwetenschappen/methodologie, terminologie van de hadithwetenschappen usul/mustalah al-hadith, en de hedendaagse discussies over de autoriteit van de Soenna. Het gaat dus om: geschiedenis van usul al-hadith, classificatie van de hadiths, analyse van isnâd/sanad en matn, relatie tussen Koran en Soenna, deconstructie en beoordeling van een sanad, leeswijze van een sanad, criteria van betrouwbaarheid van een overlevering/overleveraar, aanvaardbaarheid en onaanvaardbaarheid van een hadith, aantasting van een isnâd of matn, hadith commentaar (sharh) en methodes van takhrij van een hadith.

### **Onderwijsvorm**

Hoor- en werkcolleges met schriftelijke opdrachten en tussentijdse papers. Een klassieke bron-tekst (matn) van de hadithmethodologie wordt uitgelegd en geanalyseerd; een aantal relevante artikelen, boekhoofdstukken en hadith teksten worden behandeld. Er wordt aandacht gegeven aan de interactieve deelname van de studenten. Vragen worden aan het begin van het college beantwoord en besproken. Aan het eind van de serie hoorcolleges wordt een werkstuk gepresenteerd, in werkgroep besproken en beoordeeld.

### **Toetsvorm**

schriftelijk tentamen (80%) + schrijfopdracht' (20%)

### **Literatuur**

Verplicht:

- Azami, M., Studies in Hadith Methodology and Literature, Indianapolis: American Trust publications, 1977
- Brown J., "The rules of Matn criticism: There are no rules", Islamic Law and Society 19 (2012), pp. 356-396 (Canvas)

Aanbevolen:

- Ibn Al-Salah, An Introduction to the Science of the Hadith, trans. Dickinson E., Reading: Garnet Publishing Ltd, 2006
- Kamali M., A Textbook of Hadith Studies, Leicestershire: The Islamic Foundation, 2009
- Maloush T., Early Hadith Literature and the Theory of Ignaz Goldziher, Phd thesis, University of Edinburgh, 2000
- Siddiqi, M., Hadith for Beginners, New Delhi : Goodword Books, 2000 (VU Bibliotheek)

### **Aanbevolen voorkennis**

Inleiding in de Koran Soenna, Arabisch VI, Geschiedenis van de Islam tot 1800.

### **Overige informatie**

Aanwezigheid 80%.

Het boek: papier en digitaal

<b>Vakcode</b>	L_AABAALG067 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. P.H. Moser
<b>Examinator</b>	dr. P.H. Moser
<b>Docent(en)</b>	dr. P.H. Moser
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	200

### Doel vak

Deze cursus biedt inzicht in actuele ontwikkelingen in het boekenbedrijf. Je krijgt antwoord op de volgende vragen: Welke invloed hebben nieuwe media op de productie, distributie en receptie van het boek? Wat verandert er in de uitgeverspraktijk met Printing on Demand en self-publishing? Als artikelen en boeken via Open Access toegankelijk worden, wie betaalt dan de rekening? Welke nieuwe mogelijkheden bieden digitale edities voor wetenschappers en voor het brede publiek, en welke eisen stellen ze aan makers en gebruikers? Zijn digitale ontwikkelingen een bedreiging of een kans voor boekhandels en bibliotheken? Gaan mensen anders lezen als ze een e-book gebruiken? Je leert de verschillende argumenten te wegen. Aan het eind van de cursus ben je in staat om weloverwogen deel te nemen aan het debat over de impact van digitalisering op boekenbedrijf en leesgedrag.

### Inhoud vak

De cursus belicht de digitalisering van het boek aan de hand van zeer recente studies. Op basis van wetenschappelijke achtergrondliteratuur (overwegend in het Engels), discussies in de media en praktijkvoorbeelden (bijv. bestaande edities) krijg je inzicht in de problematiek. Aan de hand van prikkelende stellingen (die aangereikt worden door onderzoekers en professionals) leer je een eigen visie hierop te formuleren. Door de cursus heen verzamel je argumenten om je standpunt te onderbouwen; je legt hiervan een leesdossier aan. De cursus wordt afgesloten met een debat over de stellingen. Er is aandacht voor zowel de wetenschappelijke als de maatschappelijk-culturele aspecten van het vakgebied en de beroepspraktijk. Hiermee is het vak tegelijk onderzoeksgelateerd en biedt het mogelijkheden voor loopbaan- en arbeidsmarktoriëntatie.

### Onderwijsvorm

Werkcolleges

### Toetsvorm

De toetsing bestaat uit de volgende onderdelen: portfolio/leesdossier (50%), deelname aan slotdebat (50%).

### Literatuur

Het onderstaande is een voorlopige indicatie van het studiemateriaal. De definitieve literatuurlijst wordt minimaal twee weken voor de cursus via Canvas bekend gemaakt. Het studiemateriaal omvat onder meer (delen van):  
XXX

**Vereiste voorkennis**

Geen.

**Aanbevolen voorkennis**

Geen.

**Doelgroep**

Verplichte module voor studenten van de minor Aan de slag met literatuur; keuzemodule voor andere geïnteresseerde studenten.

**Overige informatie**

Je mag één college missen. Wie twee colleges mist, moet een vervangende opdracht maken. Wie meer dan twee keer in deze periode afwezig is, kan de cursus niet afronden. Als je een college niet kunt bijwonen, laat dat dan van tevoren weten aan de docent.

**Heuristics**

<b>Vakcode</b>	X_401012 (401012)
<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.G. Hubert
<b>Examinator</b>	prof. dr. A.E. Eiben
<b>Docent(en)</b>	prof. dr. A.E. Eiben
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Werkgroep
<b>Niveau</b>	200

**Doel vak**

The overall objective of the course is to expose students to a "real life" problem solving situation, where the supervisor gives no hints about suitable algorithmic approaches to solve a given problem. Students will learn to understand the problem requirements and invent or find an appropriate algorithm to solve it. Bottom-line is: anything goes, as long as it works. Specific objectives include: identifying an algorithm for solving a given problem, implementing and testing this algorithm, summarising the results and self-assessing the whole approach.

**Inhoud vak**

Students have to form teams of three and choose one of the four predefined problems to solve. The problems range from combinatorial optimisation (airline scheduling) to game playing (free cell). The course offers software support for each problem, including user interface and quality assessment procedures for candidate solutions. The "only" missing part is the problem solving algorithm. These must be implemented and tested in Java or Python.

**Onderwijsvorm**

Working groups

The course combines a free setup with intensive coaching. After two introductory lectures about heuristics and experimental methodology, the student teams are completely free to choose their algorithmic approach as was their working hours. Twice a week we have COMPULSORY coaching sessions (a.k.a. "brainstorming workshops") where teams

discuss their ideas and progress. Reflecting on other teams' work is an important element during these sessions. The course is concluded by a one day symposium where each team presents its solution.

### **Toetsvorm**

The final grade depends on the quality of the solutions found by the team, the written report, the oral presentation, and the level of activity / involvement during the coaching sessions.

### **Literatuur**

N.a.

### **Vereiste voorkennis**

Java or Python programming skills are necessary to implement and test the algorithms students use.

### **Doelgroep**

3BA, 3CS, 3IMM, 3LI

## History of Science

<b>Vakcode</b>	X_400318 (400318)
<b>Periode</b>	Periode 5
<b>Credits</b>	3.0
<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
<b>Niveau</b>	200

### **Doel vak**

Students acquire knowledge about the history of computing from various perspectives: computing as a scientific goal, computing as a government (administrative or military) objective / ideal, computing as an economic enterprise. Students acquire knowledge about the meanings digital culture has for various people in contemporary society. Thereby students will be better equipped to reflect on their subject of study.

### **Inhoud vak**

Various subjects from the history of computing will be treated. Several highlights will be discussed and placed within the social context of its time. By discussing these highlights from several points of view the history of computer or information science will serve as a way to illustrate the various roles of computing in society. The book by Campbell-Kelly will serve as an outline, and during the lectures this story will be complemented by presenting a European version of the same history.

### **Onderwijsvorm**

Lectures and short assignments.

### **Toetsvorm**



Written exam (90%); assignments (10%)

### Literatuur

Martin Campbell-Kelly, Computer: a history of the information machine, Westview Press (2014)

### Aanbevolen voorkennis

none

### Doelgroep

Bachelor students in Computer Science, Lifestyle Informatics and IMM.

### Overige informatie

More information with the course coordinator: room U-252, [d.j.beckers@vu.nl](mailto:d.j.beckers@vu.nl)

## Human Rights and Citizenship

<b>Vakcode</b>	R_HumRC (200995)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Rechtsgeleerdheid
<b>Coördinator</b>	mr. dr. M.C. Stronks
<b>Examinator</b>	mr. dr. M.C. Stronks
<b>Docent(en)</b>	mr. dr. M.C. Stronks, dr. P. Cuttitta
<b>Lesmethode(n)</b>	Leergroep
<b>Niveau</b>	300

### Doel vak

After successfully taking this course you will be able to:

- Analyse and evaluate the multi-faceted and changing character of citizenship and nationality;
- Recognise and explain the variety of rights that are connected to (European) citizenship and/or national membership;
- Critically engage with the concept of 'integration' and analyse the assimilationist shift of mandatory integration measures;
- Scrutinize the temporal dimension of citizenship and the assumed relation between the migrant, the citizen and time;
- Thoroughly scrutinise the reading material and being able to engage with the literature in essays.
- Formulate your own opinion on the central issues of this course, well-informed by the literature and case-law.

### Inhoud vak

What and who is a citizen? How does a migrant become a citizen? Which rights do migrants have? And how do these rights develop over time? These are seemingly simple questions, but upon close scrutiny the relation between the citizen and an alien appears to be rather puzzling. Migrants might for example enjoy all kinds of civil rights, while certain citizens might feel treated as aliens.

In this course we investigate which rights can be invoked by nationals and by migrants. We will address the different understandings of citizenship and nationality, the concept of and the rights attached to European citizenship, the difference that having or not having national

membership makes, the possibility of being joined by family members from abroad, the concept of 'integration' and the relation all these different aspects of citizenship have with time. These issues will be addressed in weekly lectures and assignments.

### Onderwijsvorm

Weekly lectures, obligatory weekly assignments.

### Toetsvorm

Written exam. Re-examination might be an oral exam, depending on the number of participants. Submission of weekly assignments is required for taking the exam.

### Literatuur

Will be announced on Canvas.

### Doelgroep

Apart from law students of the VU, the course is also available for:

Students from other universities/faculties

Exchange students

Contractor (students who pay for one course)

## Human Rights and the Border

<b>Vakcode</b>	R_HumRB (200996)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Rechtsgeleerdheid
<b>Coördinator</b>	mr. dr. E.R. Brouwer
<b>Examinator</b>	mr. dr. E.R. Brouwer
<b>Docent(en)</b>	mr. dr. E.R. Brouwer
<b>Lesmethode(n)</b>	Leergroep
<b>Niveau</b>	200

### Doel vak

The course aims at increasing your knowledge of the law concerning borders and your understanding of the changing meanings of borders. In particular, you will broaden your knowledge of the different categories of 'migrants' created by the law and the attaching differences with regard to the right to cross borders and the sanctioning of illegal border crossing. You will be able to identify relevant domestic, European and international law and to deal with conflicts among them. You will improve your ability to critically reflect on legislation, case-law, and practice concerning borders.

### Inhoud vak

The operation of borders and border control in practice may differ greatly from how it may be understood to operate in theory. In this course, the knowledge of the law on borders will be connected to societal reality. In the course Human Rights and the Borders, you will learn to connect knowledge of the law on borders to societal reality. Aside from general topics including the law on asylum, internal and external border controls, we will address current issues such as the safety of boat migrants, the role of private

actors, and the use of technologies at the borders. The precise content of the course will be announced on Canvas.

### Onderwijsvorm

The course contains of 7 lectures, each lecture is given twice a week. During the course excursions may take place, enabling students to learn how borders work in practice.

### Toetsvorm

The course will be concluded with an examination: a written exam which counts for 75%, and an oral presentation which counts for 25% of the final mark.

### Literatuur

Will be announced on Canvas.

### Doelgroep

This course is open to students of various disciplines who have completed their first year of their Bachelor program. Includes exchange students.

### Overige informatie

This course is open to students from various disciplines who have completed their first year of their Bachelor program and exchange students.

## Human-Computer Interaction

<b>Vakcode</b>	X_400432 (400432)
<b>Periode</b>	Periode 6
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	O.W. Schrofer
<b>Examinator</b>	O.W. Schrofer
<b>Docent(en)</b>	dr. L.M. Aroyo
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	200

### Doel vak

Learn the fundamental concepts of human-computer interaction and user-centered design through hands- on experience in course projects, and supported by lectures and practicum sessions. Learn to evaluate and design usable and effective graphical user interfaces for interactive systems.

### Inhoud vak

The lectures in this course will discuss and present examples of concepts and methods in the field of human-computer interaction. The course will outline general usability challenges associated with existing case studies. It will also cover in detail the most important methods used in requirements gathering, iterative testing of interfaces, and summative evaluation phases of the user-centered design process. In practicums, students will be able to practice the use of relevant methods within the context of the case study systems. Some of

the topics covered in the course are: User Needs Analysis, Conceptual Design, Mockups and Prototypes, Usability Evaluation of Prototypes.

### **Onderwijsvorm**

Lectures, practice sessions

### **Toetsvorm**

Course assignments and examination.

The final grade is composed of the following sub-assessments:

- Participation in lecture discussions (individual)
- Peer-assessment from group members (individual)
- Peer-assessment from course members (group)
- Presentation of final assignment (group)
- 3 course assignments (group)
- exam (individual)

All the group submissions will be altered with individual grades, in case some members of the group have not attended practicums or have not contributed equally to the group work.

### **Literatuur**

Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days, by Jake Knapp, John Zeratsky, Braden Kowitz, 2016 (required), <http://www.thesprintbook.com/>

User Interface Design and Evaluation by Debbie Stone, Caroline Jarrett, Mark Woodroffe, and Shailey Minocha (optional, recommended)

The course book is required from the very beginning of the course.

Lecture notes and study guide in <http://bb.vu.nl>

For each lecture, online video and related material is provided, which are required to be studied before each lecture. Discussion based on questions related to this material will be done during lectures and will be part of the final grading for the course.

### **Aanbevolen voorkennis**

Knowledge of statistics, data collection, and requirements gathering is desirable, but not required

### **Doelgroep**

2CS, 2IMM, 2LI

### **Intekenprocedure**

You need to be enrolled in BB and at VUNet before the course. You will be provided a group registration link at the start of the course (1st lecture) so that you can then indicate your preferences for group distribution. If you do not indicate any preferences, you will assign a group of 4 students to work with during the course. Each student should check their group number and get in touch with the rest of the group members during the first lecture of the course.

No late enrolments will be allowed.

### **Overige informatie**

The course is very intensive and requires full-time work during the three weeks of lectures and practicums, as well as very good preparation before lectures and practicum sessions (through studying the provided material for each lecture). The presence for all practicum sessions is required and for lectures is strongly recommended. Students will work in

groups of 4-5, and the groups need to be formed and finalized on the first day of the course. Students that are not enrolled in a group on the first day of the course will not be able to follow the course further. This construct also does not allow for late enrollement in the course or groups.

## Identity, Diversity and Inclusion

<b>Vakcode</b>	S_IDI ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Sociale Wetenschappen
<b>Coördinator</b>	prof. dr. S. Saharso
<b>Examinator</b>	prof. dr. S. Saharso
<b>Docent(en)</b>	prof. dr. S. Saharso, dr. M.C. de Regt
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	300

### Doel vak

This course is part of both the bachelor program Sociology and Social and Cultural Anthropology & Development Sociology. Also, this course is part of the Minor Sociology, the Minor Anthropology, the Minor Development and Global Challenges and the Minor Gender and Diversity. Finally, the course is open as an elective for (international) students.

This course is designed to introduce students to the various issues concerning diversity and inclusion in an increasing globalizing world. The course focuses in particular on contemporary issues concerning processes of inclusion and exclusion in the Dutch/European context. The central questions in this course are:

1. How and why are identities based on ethnicity, gender, class and sexuality constructed by both insiders and outsiders?
2. How do (groups within) European/Dutch societies respond to diversity?
3. What are the relevant mechanisms of inclusion or exclusion?
4. How should we contextualize current debates and practices related to inclusion/exclusion processes in relation to Dutch/European historical developments?

### Learning objectives

After having completed this course the student has acquired knowledge and understanding of:

- (1) the relevant forms and dimensions of social identities;
- (2) theories of identity construction inclusion and exclusion;
- (3) the questions, debates and policies on diversity in con-temporary Western societies, and the differences between societies thereof;
- (4) the challenges of contemporary developments - such as globalization and individualization- on contemporary forms of diversity.

After having completed this course the student has acquired the competences to:

- (5) apply acquired knowledge in the analysis of contemporary forms of diversity.

After having completed this course the student is able to:  
(6) take a critical stance in contemporary debates over identity, diversity and inclusion.

### **Inhoud vak**

Identity issues have become very prominent in our globalizing world. While migration is often presented as one of the main causes of the increasing emphasis on identity, other developments, such as those related to (cultural) globalization and economic transformations, have had a strong impact as well. In addition to ethnic and religious diversity, gender inequalities, class differences and issues related to sexual diversity have changed The Netherlands, and other European societies. Ethnicity, gender, class and sexuality are markers of identity, but have also become axes of inclusion and exclusion in contemporary European societies.

This course discusses how ethnic and religious diversity intersect with other forms of diversity. While historical constructions of the nation were already gendered, in contemporary discourses on national identity gender (women) and (homo)sexuality have become more prominent as markers of national inclusion and exclusion. Or, as in Europe ethnic diversity largely coincides with class distinctions, how does this affect feelings of belonging and inclusion? Islamophobic rightwing radicalization and Islamic radicalization are studied as possible reactions to experienced threats to identity and/or social exclusion. The course will also zoom in on cases of local conflict and on related contemporary debates, such as feminist solidarity in an age of diversity.

### **Onderwijsvorm**

Lecture.

### **Toetsvorm**

Digital exam.

### **Literatuur**

TBA, a reader including texts by Alba & Foner (2015), Crenshaw (1991) and others.

### **Doelgroep**

Bsc2 SOC, Min SOC, Min SCA Bsc2 CAO, Min G&D, Min D&GC; Exchange

### **Overige informatie**

This course is part of both the bachelor program Sociology and Social and Cultural Anthropology & Development Sociology. Also, this course is part of the Minor Sociology, the Minor Development and Global Challenges and the Minor Gender and Diversity. Finally, the course is open as an elective for (international) students.

## **Imagining the Dutch: themes Dutch History**

<b>Vakcode</b>	L_GCBAALG003 ()
<b>Periode</b>	Periode 1+2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	W.J. de Vries MA

<b>Examinator</b>	W.J. de Vries MA
<b>Docent(en)</b>	M.P. Groten, W.J. de Vries MA
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	200

### **Doel vak**

Learn about the characteristics and dilemma's of Dutch national history by discussing chapters from handbooks, articles and lectures.  
 Improve knowledge of Dutch modern history (writing) in general and more particularly learn about important themes, such as national history, political history, colonial history and different representations of Dutch history and identity in museums and media.  
 Throughout the course we will discuss these themes in relation to important concepts such as nationalism, democracy, pillarization and (religious) tolerance.  
 Being able to integrate information of case studies and guest lecturers into the broader scientific framework that is discussed.  
 Being able to critically review and discuss mandatory literature, used theories, dominant opinions and information on public websites.  
 Being able to recognize normative thinking in scientific literature and in the work of historians.

### **Inhoud vak**

A country of cheese and herring, that experienced an extraordinary Golden Age in the seventeenth century. And a country of tolerance, pillarization and consensus democracy. These are just a few examples of how the Netherlands has been imagined in the past and in recent periods by foreigners and by Dutch citizens themselves. These images tell a story of the Netherlands and are informed by both past and contemporary experiences.  
 Over the years questions about the true meaning of these images of the Netherlands have been raised. Who are the Dutch? What is 'typically Dutch' about the Dutch from an international perspective? What are the differences between how the Dutch themselves and how foreigners have imagined the Netherlands? And how should we deal with these images from an academic perspective?  
 The course will offer an introduction on Dutch history that is explicitly related to contemporary debates. The lectures of the course focus on themes in Dutch history and will cover a wide range of topics. The historical reasons for the extraordinary economic growth and cultural richness of the Netherlands in the 17th century; the development of the Dutch as a maritime nation in the 18th century; the rise of democracy in the 19th and 20th century; recent debates about the colonial past and immigration.  
 Discussion among students about the content of the lectures and the course literature is part of this course. Students have to read the literature in advance and have to make exercises. The course is finished with a written exam.

### **Onderwijsvorm**

Lectures (two periods every week one lecture)

### **Toetsvorm**

Written Exam and assignments

### **Literatuur**

To be announced on Canvas.

### Doelgroep

Students taking part in program 'Semester in Amsterdam'; International Students; Dutch students interested in Dutch History.

### Overige informatie

This course will be provided two times: in periods 1&2 (L\_GCBAALG003) and in periods 4&5 (L\_GCBAALG004).

## Information Retrieval

<b>Vakcode</b>	X_400435 (400435)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. T. Kuhn MSc
<b>Examinator</b>	dr. T. Kuhn MSc
<b>Docent(en)</b>	dr. T. Kuhn MSc
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Deeltoets extra zaalcapaciteit
<b>Niveau</b>	300

### Doel vak

The goal of this course is to learn how search engines and other information retrieval systems work, to understand their principles and methods, and to acquire some basic skills in programming important aspects of such systems.

### Inhoud vak

This course covers the aspects of indexing, Boolean retrieval, query types, query execution, the vector space model, web crawling, networks, link analysis, PageRank, classification, clustering, and more.

### Onderwijsvorm

Lectures and practical work

### Toetsvorm

Midterm exam, final exam, and assignments

### Literatuur

Introduction to Information Retrieval

### Vereiste voorkennis

Programming skills will be an advantage.

## Inleiding in de Koran en Soenna

<b>Vakcode</b>	G_INLKOSO ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Godgeleerdheid



<b>Coördinator</b>	dr. Y. Ellethy
<b>Examinator</b>	dr. Y. Ellethy
<b>Docent(en)</b>	dr. Y. Ellethy
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	100

### Doel vak

De student kent op hoofdlijnen de ontstaansgeschiedenis, de indeling en de thematiek van de Koran en de Hadith. Dat wil zeggen dat de student:

- beknopt uitleg kan geven over visies op de geschiedenis van de Goddelijke openbaring in het algemeen en de openbaring van de Koran aan de profeet Mohammed in het bijzonder;
- de ontstaansgeschiedenis, de verzameling en de verspreiding van de Koranische tekst in hoofdlijnen kent;
- de westerse discussies en kritiek i.v.m de historische ontwikkeling van de tekst van de Koran kent en hierop kan reageren op een wetenschappelijke manier;
- de algemene kenmerken, inhoud, stijl en historische context van de Koran in hoofdlijnen kent;
- fundamentele kennis omtrent de terminologie van de Koranwetenschappen (en basiskennis van de Soenna en Hadith terminologie) heeft;
- de geschiedenis en de ontwikkeling van de Koran- en Hadithwetenschappen en de betreffende klassieke en moderne literatuur in grote lijnen kent;
- een werkstuk van enkele pagina's kan schrijven over de positie van de Koran en de Soenna binnen de Islam.

### Inhoud vak

In deze cursus (met meer focus op de Koranwetenschappen) worden gezaghebbende visies op de geschiedenis van de openbaring, de verzameling en de ontstaansgeschiedenis van de Korantekst, de betreffende kritiek, en de belangrijkste kernpunten en terminologie binnen de Koranwetenschappen ulm al-Qur'n behandeld. De student krijgt ook basiskennis van de positie van de Soenna binnen de Islam, het ontstaan en de ontwikkeling van de Hadith wetenschappen, terminologie en klassieke literatuur. In de module Hadith-wetenschappen zal meer nadruk worden gelegd op de Soenna en Hadithmethodologie.

### Onderwijsvorm

Hoor- en werkcolleges met schriftelijke opdrachten en tussentijdse papers. Er wordt aandacht gegeven aan de interactieve deelname van de studenten. Vragen worden aan het begin van het college besproken. In aansluiting op elk hoorcollege-onderdeel wordt een werkstuk gepresenteerd, in werkgroepen besproken en beoordeeld.

### Toetsvorm

Schriftelijk tentamen (80%); 'schrijfopdracht' (20%)

### Literatuur

Verplichte literatuur:

Al-A'ami, M., The History of the Quranic Text from Revelation to Compilation, Leicester: UK Islamic Academy, 2003.

Leemhuis, F. "Koran"; "Soenna", in J. Waardenburg (ed.), Islam: Norm, Ideaal en Werkelijkheid. Houten: Fibula, 2005, pp. 54-74; 75-79. (Canvas).

Ljamai, A., Inleiding tot de Studie van de Koran, Zoetermeer: Meinema,

2005, hoofdstukken 1, 2, 3 en 4 t/m p. 71.

Watt, M. (et al.), Bells Inleiding tot de Koran, Utrecht: de Ploeg, 1986, hoofdstukken 1 en 2 t/m p. 39.  
Nederlandse Koranvertaling.

Aanbevolen literatuur:

Ali, M., Sirat Al-Nabi and the Orientalists, Madinah: King Fahd complex for the Printing of the Quran, 1997 (Section IV: Receipt of Way).

Hamidullah, M., An Introduction to the Conservation of Hadith in the Light of the Sahifah of Hammam ibn Munabbih, Kuala Lumpur: Islamic Book Trust, 2003.

Verdere literatuur wordt voor aanvang van het college bekend gemaakt via Canvas.

### Overige informatie

Maakt onderdeel uit van Academische Vaardigheden.

Aanwezigheid 80%.

## Inleiding Inspanningsfysiologie

<b>Vakcode</b>	B_IF (900115)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. J.J. de Koning
<b>Examinator</b>	dr. J.J. de Koning
<b>Docent(en)</b>	dr. H.L. Gerrits, prof. dr. H.A.M. Daanen, drs. B.L. van Keeken, dr. J.J. de Koning
<b>Lesmethode(n)</b>	Hoorcollege, Practicum, Werkcollege, Bijeenkomst
<b>Niveau</b>	100

### Doel vak

Doel van dit vak is het verkrijgen van kennis van de bouw en werking van organen en orgaansystemen die een rol spelen bij het bewegen en de energiehuishouding.

Na afloop van de cursus kan de student de belangrijkste onderdelen van deze organen en orgaansystemen benoemen, de bouw en werking van deze onderdelen benoemen en de werkingsmechanismen beschrijven. Daarnaast kan de student deze kennis toepassen tijdens het meten van verschillende variabelen tijdens rust en inspanning. Ten slotte is de student in staat de uitkomsten van de metingen te interpreteren en te verwerken.

### Inhoud vak

Tijdens de colleges wordt, na een inleiding, de bouw en de werking van cellen en weefsels besproken, waarbij het accent zal liggen op spierweefsel. Daarna wordt ingegaan op de bouw en de werking van de voor het bewegen belangrijkste fysiologische systemen, zoals de bloedsomloop, de ademhaling, het zenuwstelsel en de hormoonhuishouding. Daarbij wordt zowel het functioneren tijdens rust als tijdens fysieke inspanning besproken.

Bij de practica wordt de theoretische kennis verder uitgebreid en toegepast bij het registreren van de stofwisseling in rust, het ECG en de bloeddruk, de verschillende longvolumina en ademhalingsparameters, de hartfrequentie tijdens fysieke inspanning, het lichamenlijk

prestatievermogen, het dagelijkse energieverbruik en de dagelijkse voedselopname.

### **Onderwijsvorm**

De cursus bestaat uit hoorcolleges welke dienen ter verduidelijking van de leerstof. Deze colleges zijn niet verplicht. Daarnaast volgt iedere student een aantal practica. Deze practica zijn verplicht en worden in groepen van ca. 10-15 personen uitgevoerd. De practica dienen ter aanvulling op de collegestof en bieden bovendien de gelegenheid om de kennis van de leerstof toe te passen en te verdiepen. Voorwaarde voor deelname aan het practicum is dat de student voor elke bijeenkomst steeds de betreffende stof in het boek en de cursushandleiding bestudeerd heeft. Na elke practicumbijeenkomst wordt het practicum door iedere student uitgewerkt aan de hand van een opdracht (inhoud en tijdstip van inleveren volgens de richtlijnen in de cursushandleiding). Het is niet toegestaan een practicumbijeenkomst bij te wonen indien de opdracht van de vorige bijeenkomst nog niet is ingeleverd.

40 uur/ 20 hoorcolleges

12 uur/ 4 practica

20 uur / uitwerking, opdracht practicum

3 uur / tussentoets

3 uur/ eindtoets

90 uur / zelfstudie

### **Toetsvorm**

De tentamenstof beslaat de hoofdstukken van het boek ("Exercise Physiology: nutrition, energy, and human performance") zoals besproken tijdens de hoorcolleges, de diverse practica en de studiehandleiding.

Om deel te kunnen nemen aan het tentamen dient men aan de practicumverplichtingen te hebben voldaan. Deze verplichtingen zijn: alle practicumbijeenkomsten (actief) volgen, de bijbehorende opdrachten (voldoende) maken.

Het tentamencijfer zal bestaan uit een gewogen gemiddelde van de tussen- en de eindtoets. De tussentoets wordt halverwege de cursus gegeven. Beide toetsen worden schriftelijk afgenomen en bestaan uit meerkeuze vragen.

### **Literatuur**

De verplichte literatuur bestaat uit:

- W.D. McArdle, F.I. Katch, V.L. Katch: Exercise Physiology: nutrition, energy, and human performance , 8th edition (2014). International edition.

- De cursushandleiding

### **Intekenprocedure**

De indeling van werkgroepen/(computer)practica/tutorgroepen etc. vindt plaats via Canvas.

### **Overige informatie**

De practica zijn verplicht. Deelname aan het tentamen is alleen mogelijk als alle practicumbijeenkomsten zijn gevolgd en de betreffende opdrachten zijn ingeleverd. Bij het eventuele missen van een practicumbijeenkomst of opdracht met een geldige reden dient zo spoedig mogelijk contact opgenomen te worden met de practicumbegeleiders voor het plannen van een inhaalbijeenkomst.

## **Inleiding programmeren (Python)**

<b>Vakcode</b>	X_401096 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	ir. M.P.H. Huntjens
<b>Examinator</b>	ir. M.P.H. Huntjens
<b>Docent(en)</b>	ir. M.P.H. Huntjens
<b>Lesmethode(n)</b>	Hoorcollege, Practicum, Deeltoets extra zaalcapaciteit
<b>Niveau</b>	100

### Doel vak

Het doel van de cursus is: algoritmisch leren denken, gestructureerd leren programmeren en het verwerven van inzicht in de manier waarop computers gebruikt kunnen worden om problemen op te lossen.

### Inhoud vak

types, expressies, toekenningsopdracht, keuze-opdrachten, herhalingsopdrachten, standaardfuncties, I/O, lists, strings, objecten, class fields, object fields, global, functies maken, methodes maken, ontwerpen maken en gebruik van grafische interfaces uit een voorgeprogrammeerd package

### Onderwijsvorm

Hoorcollege met een parallel practicum.

### Literatuur

Er wordt gebruik gemaakt van een online boek te vinden op de URL:  
<http://openbookproject.net/thinkcs/python/english2e/index.html>

### Doelgroep

1LI, 1IMM, mBIO

### Intekenprocedure

Voor deze module dien je jezelf in te tekenen op de module, het hoorcollege, het tentamen en eventuele deeltentamens via VUnet. De faculteit tekent je daarna in voor de overige onderwijsvormen.

## Inleiding Psychologie (UM)

<b>Vakcode</b>	P_UINLPSY ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. W. Donk
<b>Examinator</b>	dr. W. Donk
<b>Docent(en)</b>	dr. W. Donk
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	100

**Doel vak**

Een eerste kennismaking met het vakgebied psychologie

**Inhoud vak**

Het vak geeft een overzicht van de psychologie. Wat is de genetische en biologische basis van gedrag? Hoe zien we, leren we, onthouden we en denken we? Waarom gedragen we ons zoals we doen? Naast deze fundamentele vragen zullen o.a. ook de volgende onderwerpen aan bod komen: intelligentie, sociale psychologie, de ontwikkeling, persoonlijkheidsleer, psychopathologie en psychologische behandelmethoden.

**Onderwijsvorm**

14 colleges

**Toetsvorm**

- Multiple choice tentamen

**Literatuur**

-Gazzaniga, M., Heatherton, T., & Halpern, D. (2016). Psychological Science (5th edition). Norton.

**Overige informatie**

Hoorcolleges worden Engelstalig aangeboden.

**Integratief modelleren**

<b>Vakcode</b>	X_401001 (401001)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. T. Bosse
<b>Examinator</b>	dr. T. Bosse
<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<b>Niveau</b>	200

**Doel vak**

Conceptueel modelleren van intelligente support-systemen in de menselijke leefomgeving.

**Inhoud vak**

Veel hedendaagse software omvat meer en meer specifieke inhoud m.b.t. de context waarin het functioneert; bijvoorbeeld gedetailleerde informatie over omgeving, domein, situatie, en gebruiker(s). Dit geldt niet alleen voor de toestanden, maar ook voor de processen in die context. Om deze inhoud in te kunnen bouwen zijn vaak specifieke dynamische modellen nodig, waarmee de software meer context-aware wordt. In deze cursus wordt hier aandacht aan besteed.

Integratief Modelleren is een intensieve, 8-weekse bachelorcursus waarin de student zijn modelleringsvaardigheden verdiept en leert om verschillende aspecten van het modelleren op geïntegreerde wijze te gebruiken. De nadruk zal liggen op het gebruiken van domeinmodellen als

basis voor modellen die binnen een systeem gebruikt kunnen worden om een realistisch probleem op te lossen. Het integratieve aspect komt ook tot uitdrukking in het combineren van kwalitatieve met kwantitatieve modelleertechnieken.

Tijdens de cursus komen voorbeelden uit allerlei verschillende domeinen aan de orde. Denk bijvoorbeeld aan onderwerpen uit de psychologie, zoals het modelleren van emoties en stemmingen of aandacht, onderwerpen uit de biomedische hoek, zoals het gebruiken van metingen aan het lichaam om eventuele dronkenschap te bepalen, of onderwerpen uit sociale en economische disciplines, zoals de verspreiding van informatie via sociale netwerken.

Tijdens de cursus zal de student, naast het uitvoeren van kleine opdrachten die gerelateerd zijn aan de hoorcolleges, zelf aan de slag gaan met een eigen gekozen probleem. Hiervoor zal hij/zij modellen ontwikkelen en deze met behulp van software valideren en gebruiken voor simulaties. De studenten worden uitgedaagd de modellen te relateren aan relevante en mogelijke sensorische observaties, zoals bijvoorbeeld aan de orde komen in het vak Pervasive Computing.

### Onderwijsvorm

Hoorcolleges en practicum

### Toetsvorm

Practicumopdrachten

### Literatuur

Dictaat

### Vereiste voorkennis

Inleiding Modelleren & Simuleren

### Aanbevolen voorkennis

Voorkennis: Inleiding Modelleren & Simuleren

### Doelgroep

2LI, 3IMM

## Intelligent Systems

<b>Vakcode</b>	X_401086 ()
<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. K.S. Schlobach
<b>Examinator</b>	dr. K.S. Schlobach
<b>Docent(en)</b>	dr. K.S. Schlobach
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Practicum
<b>Niveau</b>	200

### Doel vak

This course gives an overview over the theory and practice of Intelligent Systems, systems that perceive, reason, learn, and act

intelligently.

Students will acquire practical skills in developing intelligent systems building on a thorough understanding of well-understood Artificial Intelligence approaches, including Knowledge Representation and Machine Learning.

### **Inhoud vak**

The course will provide an in-depth understanding of classical AI problems and approaches, such as search, knowledge representation, machine learning, etc., by deepening the theoretical understanding and ability to apply those techniques in practice.

### **Onderwijsvorm**

The course will be centered on the practical task of designing intelligent agents that perform in a challenging competition against other agents.

There will be 12 lectures in the first 3 weeks, as well as a number of practical sessions in a lab, working groups to help with the course material and a significant amount of self-study, both to familiarise oneself with the AI theory and methods, and to program an Intelligent System using those methods.

### **Toetsvorm**

There will be an exam (probably digital) and a groups assignment.

### **Literatuur**

Russell, Norvig: Artificial Intelligence: A Modern Approach. Most recent Edition. Recommended, but not compulsory. There will be a reader.

### **Doelgroep**

2CS, 2LI, 2IMM

## **Internet Governance**

<b>Vakcode</b>	R_InternGov (200331)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Rechtsgeleerdheid
<b>Coördinator</b>	mr. T.H.A. Wisman
<b>Examinator</b>	mr. T.H.A. Wisman
<b>Docent(en)</b>	prof. mr. A.R. Lodder, mr. T.H.A. Wisman
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	200

### **Doel vak**

At the end of this course students:

- Understand the basics of the Internet;
- Understand the challenges posed by the Internet to national regulation;
- Understand and be able to apply the modalities of Lessig;
- Understand and be able to apply the models of Solum;
- Understand what Internet governance is, both in the broad and the narrow sense and explain how they relate;

- Be able to apply the Lodder & Jiminez model of jurisdiction;
- Know the materials regarding privacy, freedom of expression and copyright, and be able to apply to this Lessig's modalities and Solum's models.

### **Inhoud vak**

The first half of this interdisciplinary course the focus is on the (legal) challenges and problems introduced by the internet. The course shall first identify the special characteristics of the internet in an effort to demonstrate and discuss the associated challenges. Besides identifying and subsequently discussing (legal) challenges, this course shall also treat the different models of internet governance, both legal and non--legal, which can be used in developing a critical mind towards possible solutions. Additionally, the course shall cover modalities of regulation as introduced by Lawrence Lessig.

The second half of this course deals with specific legal subjects: freedom of expression, privacy and copyright. In this half we delve deeper in these various subjects, the specific challenges that arise in the context of the internet and the developments in case law. The models of internet governance and modalities of regulation will be used in this stage to critically reflect on these subjects and the respective challenges they bring.

### **Onderwijsvorm**

Student presentations, in class (group) exercises, discussion of the literature.

### **Toetsvorm**

The course is assessed by the following components:

Assignments: 5%  
Exam: 95%

### **Literatuur**

Amongst others: L. Lessig, Code and Other Laws of Cyberspace, (Basic Books, New York 2006)  
L.B. Solum, Models of Internet Governance

Material will be made available on Canvas before the start of 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)

## **Introduction Computer Science**

<b>Vakcode</b>	X_401087 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	prof. dr. ir. H.E. Bal



<b>Examinator</b>	prof. dr. ir. H.E. Bal
<b>Docent(en)</b>	prof. dr. ir. H.E. Bal, dr. J.C. Blanchette
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Bijeenkomst
<b>Niveau</b>	100

### Doel vak

After following the introduction part

- you will have insight in what typical modern Computer Science topics are
- you will get acquainted with academic skills, such as reading (English) scientific literature, critical/analytical thinking about CS topics, discussing and presenting papers

### Inhoud vak

In the lectures and guest lectures it will be made clear what modern Computer Science is about and which ideas and techniques are involved. You will work under guidance on a few Computer Science topics in a group. On one topic you will give a presentation. You are going to delve into these topics by searching and processing scientific literature. The groups form also the mentor group in which attention is paid to academic skills, reflection on your own learning and study.

### Onderwijsvorm

Lectures, guest lectures (2 hours per week), work groups (2 hours per week)

### Toetsvorm

The grading (pass/fail) is based on your active participation in the work group and your presentation.

### Literatuur

Articles handed out at work groups.

### Doelgroep

1CS

## Introduction Migration Studies

<b>Vakcode</b>	L_GABAALG011 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. N.F.F. Karrouche
<b>Examinator</b>	dr. N.F.F. Karrouche
<b>Docent(en)</b>	prof. dr. P.D. Nyiri, dr. N.F.F. Karrouche, prof. dr. U.T. Bosma
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	100

### Doel vak

(1) Students are introduced to the fundamentals of migration studies (including a variety of disciplinary approaches and theoretical concepts, in particular in the fields of anthropology, economics, sociology, history and law). (2) Students are able to identify and understand key theories and analytical concepts in migration studies and their relationship to history and contemporary societies, and to apply these concepts and insights to a diverse range of qualitative data. (3) Students are able to identify and understand social, cultural and economic relations and political organization in the so-called age of migration, from 1500 until present day. (4) Students are able to reproduce, summarize, interpret and critically comment on the substance of the course subject, both orally and in written form. (5) Students are able to present a clear position and personal stance in an academic essay that is substantiated with solid arguments within debates on the topic of migration studies, based on secondary sources and by referring to one or more theoretical concepts.

### **Inhoud vak**

This course introduces students to the study of migration in a wide range of academic disciplines, with special emphasis on socio-economic and cultural history, social and cultural anthropology, and migration and citizenship law. It is intended to acquaint students with theoretical and methodological insights from these disciplines and to familiarize them with old and new concepts in the broad and interdisciplinary field of migration studies. In this course, students focus on the agents of migration, the migrants themselves, as well as the international state and non-state actors and networks that are involved with and also impact the daily lives and activities of these agents of migration. Why do people migrate across borders? What are the different forms of migration and how do specific migration patterns come into being? And when and why do states aim at structuring migration? The course is divided into two sections. During the first three weeks, students tackle basic concepts and theories, such as the push-pull model, structural migration theory, transnationalism, and the concept of diaspora. They also study the global history of migration from 1500 onwards, gaining insight into colonial and postcolonial migration patterns, and the ways in these may or may not continue to influence contemporary migrations. Lastly, students look at the ways in which societies organize and respond to immigration and emigration. In this first part of the course, students not only focus on European history and society, but also gain insight into African, Asian and American migrations. These three weeks assist students in understanding and framing historical and contemporary migration processes and diverse migrant experiences.

The second part of the course departs from a case-study perspective. It does by offering in-depth views into the research of experienced migration scholars in the fields of migration and citizenship law, the anthropology of migration and identity, and socio-economic migration history. Each week, you will learn about a different topic of research into Asian, Middle Eastern and North African, and European migrations, and the different methods and concepts involved and used in each case. Each guest lecturer will tell you about her or his own experience as a migration researcher. During the seminars, students experiment with the different sources and methods from each discipline. The second part will henceforth prepare you for the experience of conducting your own independent research project.

### **Onderwijsvorm**

Lectures, seminars.

### Toetsvorm

Personal essay, written exam.

### Literatuur

Khalid Koser, International Migration. A Very Short Introduction, Oxford: Oxford University Press, 2016 (second edition). (Students are required to purchase this book.) Other literature will be announced on Canvas.

### Doelgroep

This course is open to students from various disciplines who have completed their first year of their Bachelor program. Exchange Students.

### Overige informatie

This course is part of the minor 'Migration Studies'. For history students, this course is complementary to Global Migration History (BA2).

## Introduction to Digital Innovation

<b>Vakcode</b>	E_MM_IDI ()
<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. J. Andersen
<b>Examinator</b>	dr. J. Andersen
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege

### Doel vak

After successfully completing this course, students will:

- Understand the fundamental basics of hardware, software and networking that form the basis for digital innovation
- Be able to link past, current, and emerging technologies to digital innovation
- Be able to explain recent technological developments related to big data, social media, mobile, cloud computing and the Internet of Things
- Master the technological fundamentals of designing and developing innovative digital tools.

### Inhoud vak

Digital innovation relates to “a product, process, or business model that is perceived as new, requires some significant changes on the part of adopters, and is embodied in or enabled by IT” (Fichman et al., 2014). In this course, we focus on the technological developments that have given rise to digital innovation. Topics addressed include the fundamental developments in hardware, software and networking that form the basis for digital innovation. Issues like the increasing processing and storage capacity of digital devices, the miniaturization of technology, smarter software and the increasingly interconnected nature of networks will be discussed to provide a basis for understanding where digital innovation comes from – and where it might go to. Secondly, the course addresses recent technological developments in information

technology like big data, social media, mobile devices, cloud computing and the Internet of Things. We analyze what possibilities for innovation arose from these developments, and how digital innovations have been developed and implemented in practice. Many practical examples of digital innovations will be discussed in the lectures. Next to the lectures in which these subjects are discussed, students will also put their knowledge about digital innovation into practice in developing an innovative digital tool that connects to the developments and issues discussed in the lectures.

### Onderwijsvorm

Lectures

Computer tutorials

### Toetsvorm

Individual written exam

Group project assignment

### Literatuur

Various papers that will be made available through Canvas.

## Introduction to Information and the Digital (UvA)

<b>Vakcode</b>	L_AABAUVA001 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. H.M.E.P. Kuijpers
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	100

### Doel vak

At the end of the course the student is able to:

- identify and discuss the different types and definitions of information
- understand in outline current theories of information and information use;
- determine how information is applied in different contexts within the humanities and creative industries
- identify and describe different institutional implementations of information and information systems
- recognise and discuss the differences between institutionalised information and its use, and public contexts of information and its use.

### Inhoud vak

Information is a fundamental constituent of all areas of public and private life. Whether it's in our media, cultural or economic activities of our social or professional lives, never before has information been so omnipresent. This course introduces you to the study of information as a pervasive and foundational part of public and professional practice, and its social and technical implications. You will be introduced to the concepts of information as data and resource; you will confront both the history and contemporary contexts of archives and digital archivalism; what is the relation of information and data, its

assemblage and use; information analysis and visualisation in the humanities; citizen witnessing, social media and ubiquity; and contemporary social contexts of search and discovery.

### Onderwijsvorm

Lectures, seminars.

### Toetsvorm

Assignments and final paper. For dates and deadlines see the timetable and/or the course manual.

### Literatuur

All material will be available via Canvas.

### Doelgroep

This course is part of the UVA/VU Minor Digital Humanities

### Intekenprocedure

Module registration at the UvA is required. Note that registration will take place from 13 juni t/m 27 juni.

For more information see:

<http://coursecatalogue.uva.nl/xmlpages/page/2017-2018-en/search-minor/pr>

or: Onderwijsadministratie BG2 +31 20 5254952

### Overige informatie

This module is taught at the UvA; UVA code 118211006Y.

## Islam en Europese cultuur

<b>Vakcode</b>	G_ISLEURCUL ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Godgeleerdheid
<b>Coördinator</b>	dr. M. Aulad Abdellah
<b>Examinator</b>	dr. M. Aulad Abdellah
<b>Docent(en)</b>	dr. M. Aulad Abdellah
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	300

### Doel vak

De student:

- kent de belangrijkste verschillen en overeenkomsten tussen islamitische en westerse jurisprudentie;
- kan de wederzijdse beeldvorming van westerse en islamitische zijde omtrent de positie van de islam in het Westen onderscheiden en kritisch evalueren en zelf genuanceerde standpunten uitwerken waarbij rekening wordt gehouden met beide perspectieven;
- is in staat bepaalde religieuze vraagstukken in de westerse context op een kritische en wetenschappelijke manier te benaderen;
- is in staat jurisprudentie (Fiqh) toe te passen in de westerse samenleving inzake bepaalde kwesties.

### Inhoud vak

De module focust op de islamitische visies vanuit de fiqh ten aanzien van kwesties waaromtrent moslims in het Westen een positie proberen te bepalen. Het gaat over kwesties als Islamitische ethiek en jurisprudentie, de geschiedenis van de islam en moslims in Europa; het recht van minderheden (fiqh al-aqalliyat); Islam als minderheidsgodsdienst: confrontatie en consensus; de westerse beeldvorming over de Islam; afvalligheid binnen de Islam; de scheiding tussen religie en staat; het ritueel slachten; de jihād, godsdienstvrijheid, Gelijkheid tussen man en vrouw in de islam, de relatie tussen moslims en niet moslims in het westen. De voorbeeldfunctie van Al Andalusië (Spanje) als ontmoetingsplaats voor verschillende religies en culturen in het Westen komt eveneens aan de orde.

### Onderwijsvorm

Hoor- en werkcollege.

### Toetsvorm

schriftopdracht (20%), schriftelijk tentamen (80%)

### Literatuur

Saeed, A., en Saeed H., Freedom of Religion: Apostacy in Islam. Hampshire: Ashgate Publishing LTD., 2004;  
 Koningsveld, P.S. van, Sprekende over de Islam en de moderne tijd. Utrecht: Prometheus, 1993, 9-33;  
 Fetzer, Joel S., en Soper, J. Christopher, Muslims and the State in Britain, France and Germany. Cambridge: Cambridge University Press, 2005;  
 Roy, Oliver, De islam en de scheiding van kerk en staat. Amsterdam: Van Genneep, 2006, 7-71;  
 Rutger De Reu, Jihadistische rekrutering in Europa. Gent: Universiteit Gent, 2004-2005, 14-126;  
 Marzouk Aulad Abdellah, Burgers en barbaren: Over oorlog tussen recht en macht, in: Rechtvaardige oorlog in de Klassieke islam, Amsterdam: Boom, 2007, 307-316.  
 Powerpoints.

### Aanbevolen voorkennis

Usul al-Fiqh (G\_USULUFIQH) en Arabisch.

### Overige informatie

Als een derdejaars vak is deze module een vervolg op fiqh (islamitische ethiek) modules en behandelt usul al-fiqh kwesties van hoog niveau. Aanwezigheid 80%.

## Islamitische ethiek

<b>Vakcode</b>	G_ISLAMET ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Godgeleerdheid
<b>Coördinator</b>	dr. M. Aulad Abdellah
<b>Examinator</b>	dr. M. Aulad Abdellah
<b>Docent(en)</b>	dr. M. Aulad Abdellah
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege

<b>Niveau</b>	300
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### Inhoud vak

De module focust op de volgende onderwerpen:

Usul al fiqh; een historisch overzicht van de Usul Al-fiqh; onderzoeksmethoden van Usul Al-Fiq; definitie van Usul Al-Fiqh; technische begrippen van deskundigen op het gebied van Usul al-Fiqh de vijf categorieën van Al-ahkam al-taklifia ; Categorieën van Waadjib plichten; de categorieën van al-Hukm al-Wad'io; omschrijving van de Koran en zijn categorieën; de plaats van de Koran binnen de Usul Al-Fiqh;(consensus) al-Idjma; de redenering bij al-qiyas (analogie); concept van almaslahatul Mursalah (algemeen belang); urf (het gewoonterecht ); Sadd Adzaraai (blokkeren van de middelen ); en de Al-istihsan (voorkeur).

### Onderwijsvorm

Hoor- en werkcollege

### Toetsvorm

Schriftelijk tentamen:(65 %); Schrijfopdracht (20 %); Participatie tijdens colleges:(15 %)

### Literatuur

Verplichte literatuur

- Mohammad Hasim Kamali, Principles Islamic Jurisprudence, The Islamic Texts Society, 1989.

- Michael Mumisa, Islamic Law Theory Interpretation (first edition), Omana publications, 2002 ( pp.1-141).

- Dr. Mohammed Wahba Zohayli, Usul Al-Fiqh Al-Islami, Daar Al-Fikr, Beirut 1989 ( pp.46-60, pp.67-87 en pp.72-107).

-Marzouk Aulad Abdallah PowerPoint

Aanvullende literatuur

- T.H.W. Juyanboll, Handleiding tot de kennis van de Mohammedaanse wet volgens de leer der Sjafi'itische school, Leiden 1930 (pp. 16-51).

- Ruud Peter, Inleiding tot Usul Al-Fiqh en rechtsscholen: Eigen karakter van de sjarie'a in Islam: Norm Ideaal en Werkelijkheid, plaats: geen, 1984 (pp. 167-176).

- J.J.G. Jansen, Nieuwe inleiding tot de Islam, uitgeverij Coutinho, 1987 (pp. 27-31).

### Aanbevolen voorkennis

Islamitische ethiek en Arabisch VI

## Islamitische theologie/Kalam

<b>Vakcode</b>	G_ISLMTHKAL (100037)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Godgeleerdheid
<b>Coördinator</b>	dr. M. Ajouaou
<b>Examinator</b>	dr. M. Ajouaou
<b>Docent(en)</b>	dr. M. Ajouaou
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	200

## **Doel vak**

- De student kan het ontstaan, de ontwikkeling en de fundamenteën van de pre-Kalam scholen (al-Murji'a, Khawāridj, Quadarriya en Djabriyya) en de Kalam (Mu'tazilla, Asj'ariyya en Maturdiyya) beschrijven;
- Kan de methodologische en theoretische wortels van de Kalam in de islamitische traditie identificeren;
- Kan de islamitische religiositeit vanuit het oogpunt van de mutakallimun (oprichters van Kalam scholen) doorgronden;
- Maakt kennis met belangrijke vraagstukken van de 'ilm al-Kalam zoals: wat is de meetlat van het geloof en ongeloof is? Wat is de positie van de ongelovige? Hoe te debatteren met andersgelovigen binnen en buiten de islam? Hoe vrij is de mens? Wie heeft het primaat: rede of de schrift en waarom? Enzovoort.
- Is in staat het huidige religieuze islamitische discours aan de hand van de discussie van 'ilm al-Kalam in grote lijnen te analyseren;
- Is in staat om eigen standpunten inzake de behandelde materie te formuleren, onderbouwen en verdedigen in mondelinge en schriftelijke presentaties.

## **Inhoud vak**

- Waarom is 'ilm al-Kalam ontstaan en wat betekende het toen en nu voor het islamitische geloof en het islamitische denken?
- Welke plaats neemt 'ilm al-Kalam in het islamitische denken en hoe verhoudt het zich tot de klassieke islamitische wetenschappen zoals Koran- en Hadith wetenschappen en de rationele disciplines zoals islamitische filosofie?
- Wat was het antwoord van 'ilm al-Kalam op religieuze vraagstukken zoals God en goddelijke eigenschappen, profeetschap, hiernamaals, de predestinatieleer, vrije wil, majeure zonden en de meetlat van geloof en ongeloof?
- Wat is goed en kwaad (islamitisch ethiek) volgens mutakallimun en wat kunnen moslims hedendaags leren van hun visies?

De module tracht antwoord te geven op deze vragen. Centraal staat hierbij de betekenis van 'ilm al-Kalam voor de hedendaagse islamitische theologie en religiositeit.

## **Onderwijsvorm**

Hoor- en werkcollege met schriftelijke opdrachten, praktijkopdrachten in het veld en presentaties (20%), schrijfofdracht (20%) en afsluitend schriftelijke toets (60%).

## **Toetsvorm**

Active participatie middels collegevoorbereiding, het maken van opdrachten (waaronder schrijfofdracht 20%), het geven van presentaties en het deelnemen aan discussie; afsluitend schriftelijk tentamen over de stof.



## Literatuur

Verplicht:

Ajouaou, M. Wie is moslim? Geloof en secularisatie onder westerse moslims. Zoetermeer: Meinema, 2014.

Reeth, Jan M.F. van, Kalâm. Arabisch denken over God en wereld.

Antwerpen / Apeldoorn: Garant, 2011.

Winter, Tim (ed.) Classical Islamic Theology. Cambridge: Cambridge University Press, 2008.

Additioneel:

Wolfson, H. Austryn, The Philosophy of the Kalam. Cambridge, MA / London: Harvard University Press, 1976.

## Vereiste voorkennis

Geen

## Doelgroep

Studenten traject Islam, Islam studies, Theologie en religiestudies en studenten die geïnteresseerd zijn in het islamitisch denken, islamitische ethiek, islamitische religiositeit en de leefwereld van moslims.

## Overige informatie

Aanwezigheid 80%.

## Knowledge and Data

<b>Vakcode</b>	X_400083 (400083)
<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. K.S. Schlobach
<b>Examinator</b>	dr. K.S. Schlobach
<b>Docent(en)</b>	dr. R.J. Hoekstra
<b>Lesmethode(n)</b>	Computerpracticum, Werkgroep, Hoorcollege
<b>Niveau</b>	300

## Doel vak

The objective of the Knowledge and Data course is to make students acquainted with methods and technologies used for expressing knowledge and data, in particular on the Web. At the end of this course, students will have built an intelligent web application that queries and reasons over integrated knowledge from various sources obtained from the Web. All this will be based on the formal logical theory.

## Inhoud vak

In this course we will study formalisms that are useful and necessary to represent knowledge and data, in particular when this knowledge and data is to be reused, e.g. published on the web. We introduce the technologies and representation formats (RDF, RDFS, OWL) for expressing semantics and linked data in a web-accessible format, use the SPARQL query

language  
to query over this data, and build a Web application that uses the data  
for  
some intelligent task.

Even though content on the web is generally produced from structured data sources (databases), its representation is in a form that is meant for human consumption. Linked Data allows to scale the walls of this siloed information space, by reusing identifiers and vocabularies across these datasets, and presenting that information in a way that is appropriate for machine consumption. Google, Bing and Yahoo already use this type of linked, structured information to improve web search and information retrieval. But it also helps content providers, such as the BBC, to better augment their content with content from other sources (e.g. from Musicbrainz).

### Onderwijsvorm

The course consists of interactive lectures and lab sessions. Students will work on individual assignments. They will also collaborate in groups for a final project assignment.

### Toetsvorm

The final grade will be determined by the grades for the individual assignments and the final group project (report).

### Literatuur

A Semantic Web Primer (3rd edition)  
Grigoris Antoniou, Paul Groth, Frank van Harmelen and Rinke Hoekstra,  
MIT Press, September 2012

### Aanbevolen voorkennis

Basic programming (Python, Javascript)  
Web development  
(Formal) Modeling (Basic propositional and predicate logic)

### Doelgroep

BSc Informatie, multimedia en management (2e jaar), BSc Lifestyle Informatics (2e jaar)  
Flexible Minor (voor CS, LI en IMM), Minor Web Services and Data, Minor Artificial Intelligence, unless it was already part of the obligatory curriculum of this study.

## Kopstukken I

<b>Vakcode</b>	W_BA_KOPI ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	prof. dr. M. Martijn
<b>Examinator</b>	prof. dr. M. Martijn
<b>Docent(en)</b>	prof. dr. M. Martijn
<b>Lesmethode(n)</b>	Hoorcollege

<b>Niveau</b>	200
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### Doel vak

Het doel van deze collegereeks is het verwerven van kritische kennis van een aantal hoogtepunten uit de antieke en middeleeuwse wijsbegeerte. Dat wil zeggen dat je na dit college (1) kennis hebt van het gedachtengoed van een aantal grote denkers uit de westerse wijsbegeerte in Oudheid en Middeleeuwen, (2) inzicht hebt in de vragen waarop die wijsbegeerte een antwoord probeert te zijn.

Na dit college ben je in staat (1) filosofische teksten uit Oudheid en Middeleeuwen te interpreteren, (2) een aantal filosofische kernbegrippen te hanteren, (3) in eigen woorden de ontwikkeling van de antieke en middeleeuwse wijsbegeerte te schetsen.

### Inhoud vak

Dit college bestrijkt de westerse wijsbegeerte van de 6e eeuw v.Chr. tot en met de 14e eeuw n.Chr. en beoogt een inleiding te zijn in de Antieke en Middeleeuwse wijsbegeerte aan de hand van het gedachtegoed van Plato, Aristoteles, Boethius, Thomas van Aquino en Ockham. We zullen ons concentreren op de relatie tussen wereld, denken en taal (metafysica, epistemologie, logica).

### Onderwijsvorm

Interactief hoorcollege; werkcollege tekstanalyse.

### Toetsvorm

Wekelijkse opdrachten ter voorbereiding op de werkcolleges; afsluitend tentamen. De opdrachten moeten voldoende zijn, het tentamen bepaalt het eindcijfer.

### Literatuur

- Reader Kopstukken I 1617

### Doelgroep

Minorstudenten Filosofie; verplicht voor Premasterstudenten Wijsbegeerte.

## Kopstukken II

<b>Vakcode</b>	W_BA_KOPII ()
<b>Periode</b>	Periode 2+3
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. J.M. Halsema
<b>Examinator</b>	dr. J.M. Halsema
<b>Docent(en)</b>	dr. J.M. Halsema, dr. C.H. Krijnen
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	200

### Doel vak

Studenten verwerven: 1. kennis en inzicht in grondvragen van de filosofie; 2. kennis en inzicht in de grondgedachten van een aantal hoofdfiguren uit de filosofische geschiedenis van de 17e-20e eeuw; 3.

inzicht in verbanden en verschillen tussen de belangrijkste stromingen in de moderne en hedendaagse wijsbegeerte.

Studenten oefenen: 1. de vaardigheid om teksten uit de filosofische geschiedenis te bestuderen en kritisch te beschouwen; 2. academisch oordeelsvermogen; 3. argumentatieve vaardigheden; 4. mondelinge en schriftelijke uitdrukkingsvaardigheden.

### Inhoud vak

In dit vak worden een aantal grote denkers uit de filosofische geschiedenis van de 17e tot en met de 20e eeuw behandeld die een onuitwisbare invloed hebben uitgeoefend op het filosofische denken in het algemeen en het denken over wetenschap en cultuur in het bijzonder. Achtereenvolgens komen aan de orde: Descartes, Hume, Kant, Hegel, Nietzsche, Heidegger, Arendt, Wittgenstein en Foucault.

### Onderwijsvorm

Hoor- en werkcolleges

### Toetsvorm

Protocol over de primaire literatuur (20%); tussentoets over moderne filosofie met essayvragen (40%); eindtoets over hedendaagse filosofie met essayvragen (40%). Er geldt een verplichte aanwezigheid van 80% bij de colleges in deel I en 80% in de colleges van deel II omdat anders de leerdoelen niet kunnen worden bereikt.

### Literatuur

Handboek: Selectie uit A. Braeckman, B. Raeymakers, G. van Riel, Wijsbegeerte. Leuven: Lannoo Campus, 2010 of latere editie. H.J. Störig, Geschiedenis van de filosofie (editie 2000 of later). Primaire literatuur (ongeveer 30 pagina's per werkcollege). Nadere informatie volgt via Canvas.

### Doelgroep

Minor studenten; premasterstudenten

### Overige informatie

Deze module maakt onderdeel uit van de Universiteitsminor Filosofie.

## Law and Ethics of Reproductive Technologies

<b>Vakcode</b>	R_LERT ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Rechtsgeleerdheid
<b>Coördinator</b>	mr. B.C. van Beers
<b>Examinator</b>	mr. B.C. van Beers
<b>Docent(en)</b>	mr. B.C. van Beers
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	300

### Doel vak

This interdisciplinary course explores the bioethical, biolegal and biopolitical dilemmas that are raised by technological developments at the intersection of reproductive medicine and genetics.

This course will enable the student to critically reflect upon legal and ethical dimensions of current public debates on the regulation of assisted reproductive technologies. This course will teach the student to come to an understanding of the key concepts and categories within legal regulation of reproductive technologies, and to connect these with various normative ethical theories. Through an examination of the existing legal frameworks surrounding reproductive and genetic technologies from the perspectives of law and bioethics against the background of ongoing contemporary political and societal discussions, the student will be trained to integrate ethical reasoning, daily practices and legal rules and regulations into a normative evaluation of these technologies. In this process the student will be encouraged to take a legally and ethically argued position in scientific debates on current developments in the field of assisted reproductive technologies through written and oral presentations of a legal and philosophical nature.

### **Inhoud vak**

Technologies at the intersection of reproductive medicine and genetics offer new ways of creating human life. These technologies make it possible to assemble, genetically screen, choose and, possibly, even design one's future children. How can societies decide who may access these technologies to create what kind of children? Which rights, whose rights and which public values should be taken into account within the regulation of this complex field? And what are the legal and ethical limits to these currently emerging forms of 'liberal eugenics'?

The general focus in this course will be on the role and meaning of human rights and human dignity for the regulation of assisted reproductive technologies.

Topics in this course include:

- law and ethics of prenatal testing
- selective reproduction and 'designer babies'
- reproductive markets and reproductive tourism
- reproductive rights
- gestational and commercial surrogacy
- wrongful life
- the welfare of future children
- sperm and egg cell donation
- eugenics and human enhancement
- the status of embryos and gametes

### **Toetsvorm**

Paper and/or written exam (to be announced).

### **Literatuur**

All literature will be made available online, and will include legal and philosophical academic literature, legal and political documents, policy reports, news articles and audiovisual materials.

### **Vereiste voorkennis**

No special knowledge of law, philosophy or bioethics is required to be able to participate in this course. A basic knowledge of human rights

and a keen interest in the contemporary dilemmas surrounding reproductive technologies are a plus.

### Doelgroep

Because this course is also part of a university minor (Technology, Law and Ethics), it is open to students from various academic backgrounds.

Apart from regular students, the course is also available for:

Students from other universities/faculties

Exchange students

Contractor (students who pay for one course)

## Linear Algebra

<b>Vakcode</b>	X_400649 ()
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. R. Hindriks
<b>Examinator</b>	dr. R. Hindriks
<b>Docent(en)</b>	prof. dr. S. Bhulai
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Practicum
<b>Niveau</b>	200

### Doel vak

The goal of the course is to learn the concepts and methods of linear algebra, and how to use them to think about computational problems arising in computer science. Linear algebra provides concepts that are crucial to many areas of computer science, including graphics, image processing, cryptography, machine learning, computer vision, optimisation, graph algorithms, quantum computing, computational biology, information retrieval and web search. In this course, you will see how to use Python to implement basic algorithms using linear algebra, and use these to process real-world data in the above mentioned areas.

### Inhoud vak

Subjects that will be discussed during the course are: functions, fields, vectors and vector spaces, matrices, the basis, dimensions, Gaussian elimination, inner products, orthogonalisation, special bases, singular value decomposition, eigenvectors, and linear programs. These subjects will be related to application areas, such as computer imaging, 3D graphics, machine learning, data science, compression, classification problems, ranking algorithms, and optimisation.

### Onderwijsvorm

The course is spread over a period of seven weeks. Each week of the course consists of several hours of lectures and practical work.

### Toetsvorm

There is a written exam at the end of the course. The final grade of the course will possibly be based on practical work as well.

**Vereiste voorkennis**

Students are required to have some experience in programming.

**Aanbevolen voorkennis**

Knowledge of Python is advantageous but not a necessity.

**Doelgroep**

IMM2, LI2, and CS2

## Logic and Modelling

<b>Vakcode</b>	X_401015 (401015)
<b>Periode</b>	Periode 5
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	drs. J. Endrullis
<b>Examinator</b>	drs. J. Endrullis
<b>Docent(en)</b>	drs. J. Endrullis
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Practicum, Deeltoets extra zaalcapaciteit
<b>Niveau</b>	200

**Doel vak**

The course objective is to obtain a good knowledge and understanding of the most important logical systems: propositional logic, predicate logic and modal logic.

The students learn to use these systems to model data, knowledge and actions.

An important aspect of the course is the ability to reason using these logics and reason about these logics:

what can and what can not be expressed with a logic system, and what are the differences between the systems with respect to expressive power or the existence of decision procedures.

**Inhoud vak**

The focus of the lecture is on propositional logic and first-order predicate logic. We work with natural deduction as proof system. The relation between semantic and syntactic methods is important; the central keywords are correctness, consistency and completeness. Moreover, we pay attention to expressive power, for example when formulating queries. A fundamental tool, for this purpose, is the compactness theorem.

Algorithmically there the contrast between the decidability of propositional logic and the undecidability of predicate logic (for example, seen by a coding of the Post Correspondence Problem).

As a variation of the mentioned logics, we consider modal logic with Kripke models as semantics.

**Onderwijsvorm**

Lecture, exercise classes and computer practicum.

**Toetsvorm**

Exam, and computer assignments.

**Literatuur**

Michael Huth, Mark Ryan, Logic in Computer Science (tweede druk)  
Cambridge University Press, 2004 ISBN 0 521 54310 X

**Aanbevolen voorkennis**

Logic and Sets (Logica en Verzamelingen)

**Doelgroep**

2CS

## Logic and Sets

<b>Vakcode</b>	X_401090 ()
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	prof. dr. W.J. Fokkink
<b>Examinator</b>	prof. dr. W.J. Fokkink
<b>Docent(en)</b>	prof. dr. W.J. Fokkink, dr. W. Kager
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Deeltoets extra zaalcapaciteit
<b>Niveau</b>	100

**Doel vak**

After completing this course, the student can

1. express logical statements in propositional and predicate logic
2. reason about the meaning of such formulas through truth tables and models
3. argue formally whether one formula implies another one
4. reduce a propositional formula to disjunctive or conjunctive normal form
5. express propositional formulas in logic circuits and OBDDs

Furthermore, the student is able to

6. use the algebra of sets to prove that two sets are equal
7. draw graphic and matrix representations of sets, relations and functions
8. use such representations and (formal) reasoning to
  - a. determine properties of sets, relations and functions
  - b. determine and show whether a relation is an ordering relation, equivalence relation or a function
  - c. determine the result of operations on sets, relations and functions
9. express a relation (function) in terms of given relations (functions) by means of the fundamental operations on relations (functions)
10. construct a proof by mathematical induction

**Inhoud vak**

The sets part of the course starts by introducing the concepts of sets, Venn diagrams, product sets and relations. The student then learns the main characteristics and properties of three particular types of relation: ordering relations, equivalence relations and



functions. The sets part concludes with a study of the principle of mathematical induction.

The logic part focuses in the first place on propositional logic: truth tables, boolean operators, functional completeness, logical puzzles, SAT-solving, logic circuits and OBDDs. In addition the student will learn the meaning and use formulas of predicate logic, to express mathematical properties and sentences from natural language.

### Onderwijsvorm

Every week, there is one 2-hour lecture and one 2-hour tutorial for the logic part of the course, and one 2-hour lecture and one 2-hour tutorial for the sets part of the course.

### Toetsvorm

One written midterm exam (50% of the grade) and a written final exam (50% of the grade).

The resit exam covers all material of the course. It is not possible to resit only the midterm exam or only the final exam of the course.

### Literatuur

All course materials will be provided via Canvas.

### Doelgroep

1CS, 1LI, 1IMM

## Machine Learning

<b>Vakcode</b>	X_400154 (400154)
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. P. Bloem
<b>Examinator</b>	dr. P. Bloem
<b>Docent(en)</b>	dr. P. Bloem
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	300

### Doel vak

The goal of this course is to present the dominant concepts of machine learning methods including some theoretical background. We'll cover established machine learning techniques such as Decision Trees, Neural Networks, Bayesian Learning, Instance-based Learning and Evolutionary Algorithms as well as some statistical techniques to assess and validate machine learning results.

### Inhoud vak

Machine Learning is the study of how to build computer systems that learn from experience. It is a very active subfield of Artificial Intelligence that intersects with statistics, cognitive science, information theory, and probability theory, among others. Recently, Machine Learning has gained great importance for the design of search engines, robots, and sensor systems, and for the processing of large

scientific data sets. Further applications include handwriting or speech recognition, image classification, medical diagnosis, stock market analysis, bioinformatics, etc.

### Onderwijsvorm

The course will be taught in two parts; the first part consists of lectures with written examination. The second part of the course will have a more do-it-yourself character (e.g., practical assignment and/or literature research) and result in a report.  
The course will be taught in English.

### Toetsvorm

Exam and assignment with a written report in teams of 5 students

### Literatuur

TBA

### Doelgroep

2BA, 2BA-D, 3CS, 3LI, 3IMM, mBio

## Mechanics and Thermodynamics in the Cell

<b>Vakcode</b>	X_422589 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	prof. dr. ir. E.J.G. Peterman
<b>Examinator</b>	prof. dr. ir. E.J.G. Peterman
<b>Docent(en)</b>	prof. dr. ir. E.J.G. Peterman, prof. dr. ir. G.J.L. Wuite
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	400

### Doel vak

- To provide insight in how the basic tools and knowledge of physics and physical chemistry (in particular mechanics, statistical physics and thermodynamics) and mathematics can be used to better understand biology on the cellular and molecular level.
- To be able to understand and build quantitative models that provide a deeper insight in living systems.
- To provide insight in how quantitative data obtained from microscopic imaging methods can be used to increase the understanding of biological systems.

### Inhoud vak

- Biology by Numbers
- Mechanical and Chemical Equilibrium in the Living Cell
- Entropy Rules!
- Two-State Systems: From Ion Channels to Cooperative Binding
- Random Walks and the Structure of Macromolecules
- Beam Theory: Architecture for Cells and Skeletons
- The Mathematics of Water
- A Statistical View of Biological Dynamics
- Rate Equations and Dynamics in the Cell

**Onderwijsvorm**

Lectures (4h per week) & Tutorials (2h per week)

**Toetsvorm**

Written exam + 2 or 3 witten tests on parts of the course contents.

**Literatuur**

Phillips, R., Kondev, J., and Theriot, J., Physical Biology of the Cell. 2nd Edition New York: Garland Science, 2012 (ISBN 0815344503). (1st edition is also fine)

**Aanbevolen voorkennis**

Mathematics: Calculus & Mathematische Methoden (or comparable)

Physics: basics of mechanics & thermodynamics

**Doelgroep**

3N, 3MNW mi-BB, 3WN, 3S

**Meesterwerken uit de wereldliteratuur**

<b>Vakcode</b>	L_AABAALG020 ()
<b>Periode</b>	Periode 1+2
<b>Credits</b>	12.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. M.J.E. van Tooren
<b>Examinator</b>	dr. M.J.E. van Tooren
<b>Docent(en)</b>	dr. M.J.E. van Tooren, dr. J.F. van der Meulen, dr. J.H.C. Bel, dr. M.H. Koenen, dr. P.H. Moser, prof. dr. D.H. Schram
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	200

**Doel vak**

Kennismaking met de belangrijkste periodes en stromingen binnen de West-Europese literatuur vanaf de Oudheid tot heden aan de hand van klassiek geworden meesterwerken.

**Inhoud vak**

Elke week, dat wil zeggen voor elk college, leest de student een literair 'meesterwerk' en een kleine hoeveelheid toegankelijke secundaire literatuur. Op college zal de docent naast het te lezen meesterwerk ook enkele fragmenten uit andere canonieke teksten uit de betreffende periode/stroming bespreken.

**Onderwijsvorm**

Hoorcollege met discussie (3 uur per week).

**Toetsvorm**

Verplichte aanwezigheid (80%) en een schriftelijk tentamen aan het eind van periode 1 en periode 2. Het gemiddelde van beide tentamencijfers is het eindcijfer; het minimum cijfer voor elk van beide tentamens is een 5.0.

## Literatuur

Na een algemene inleiding over theoretische kwesties als periodisering, classificering en canonvorming wordt een dertiental teksten besproken. NB. Deze opgave is onder voorbehoud, omdat bij het publiceren van de studiegids nog niet alle docenten en hun keuze voor een meesterwerk bekend waren. De definitieve lijst zal zo snel mogelijk op Canvas bekend worden gemaakt.

Lucretius (selectie uit zijn werk);

Tristan en Isolde;

Milton, Het paradijs verloren (Paradise Lost)

Defoe, Robinson Crusoe

Hugo, De klokkenluider van de Notre Dame (Notre Dame de Paris)

Flaubert, Madame Bovary

Oscar Wilde, Het portret van Dorian Gray (The Picture of Dorian Gray)

Couperus, De stille kracht

Thomas Mann, De dood in Venetië (Der Tod in Venedig)

Franz Kafka, De gedaanteverwisseling (Die Verwandlung)

Nabokov, Lolita

Hafid Bouazza, Paravion

Michel Houellebecq, Onderworpen (Soumission)

De teksten mogen zowel in de oorspronkelijke taal als in vertaling gelezen worden. De te lezen secundaire literatuur wordt via Canvas bekend gemaakt.

## Vereiste voorkennis

Geen

## Doelgroep

De minor staat open voor alle studenten.

## Overige informatie

Deze module is een verplicht onderdeel van de minor Literatuur.

Daarnaast volgt de student Het boek: papier en digitaal,

Schrijvershuisbezoeken en Creative Writing (alle drie 6 studiepunten).

## Migration, Ethnicity and the Economy

<b>Vakcode</b>	L_GWBAALG002 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	R. Gowricharn
<b>Examinator</b>	R. Gowricharn
<b>Docent(en)</b>	R. Gowricharn
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	200

## Doel vak

To familiarize oneself with and critically reflect on the ways immigrants have been incorporated and how their exclusion has been legitimized in social and public debates. To gain knowledge of and understand the relation between culture and economics as applied in integration studies. To gain knowledge of and insight into the ways

culture generates economic forces and fosters or impedes immigrant incorporation. To learn how to write a position paper in which a personal stance is developed that addresses one of the key debates at the centre of the course.

### **Inhoud vak**

Failing immigrant incorporation in many Western societies has been attributed to immigrant culture. Although an increasing proportion of immigrants are incorporated in society, they are blamed for their deficient attitudes, ethnic networks and incompatible values. Immigrants are urged to adopt the host society's culture to equalized their own culture and establish equal chances. This message of assimilation had been strongly recommended in public debate and scholarship. Failure to become integrated is often attributed to the persistence of immigrants' cultures. In this reasoning, two issues are downplayed. The first is that the causes of incorporation are determined in the realm of 'culture'. Culture becomes a master concept to explain every negative outcome concerning migrants. Culture also accounts for positive outcomes, since the incorporated migrants allegedly have adopted the host culture. In contrast, as it concerns the native population, the market accounts for incorporation—specifically the labour and housing market. The market is supposedly devoid of culture, as major players are rationally driven to maximize their gains. The second issue consists of a denial of the way culture frames and determines economic forces, including markets. The dominant concept is that economics determine culture (rather than culture determining economics) and that culture is something located outside the economic realm. This conception misrepresents that culture is often constitutive of economics and that the economic actor's culture enables incorporation. This course addresses the relationship between culture and economics. It discusses the current (mis)conceptualization of culture in the field of economics and the related consequences. It exemplifies these issues by discussing the incorporation of immigrants. Basic concepts:

- Labour selection and productivity
- Ethnicity and entrepreneurship
- Consumption of ethnic commodities

### **Onderwijsvorm**

Seminars, guest lectures and an excursion.

### **Toetsvorm**

Weekly assignments (20%), a mid-term essay (20%), presentations (10%) and a position paper (50%).

### **Literatuur**

To be announced.

### **Doelgroep**

This course is open to students from various disciplines who have completed their first year of their Bachelor program. Exchange Students.

### **Overige informatie**

This course is part of the minor 'Migration Studies'.

## **Mind and Machine**

<b>Vakcode</b>	AB_1060 ()
<b>Periode</b>	Periode 3

<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	dr. L.N. Cornelisse
<b>Examinator</b>	dr. L.N. Cornelisse
<b>Docent(en)</b>	dr. K. Linkenkaer Hansen, dr. L.N. Cornelisse
<b>Lesmethode(n)</b>	Computerpracticum, Werkgroep, Hoorcollege, Excursie
<b>Niveau</b>	300

### Doel vak

To provide students with a broad insight in the rapidly developing field of brain modelling, artificial intelligence, brain computer interfacing and machine learning.

Specifically, at the end of the course the student should be able to:

1. explain the meaning of key concepts treated in the course and to give examples of where key concepts are already applied (services or products).
2. describe most commonly used forms of, as well as the state-of-the-art and trends in, brain modeling, AI and BCI as discussed in the course.
3. reproduce the underlying principles of brain modelling, AI and BCI at the level discussed in the course.
4. reproduce and present with a group of students the content of a scientific paper at the level of a science journalist for a layman audience.
5. provide constructive feedback to fellow students with the aim of improving their oral presentation and is able to use received feedback to improve his/her own oral presentation.
6. develop, present and defend a business proposal, i.e., an idea for a product or service that exploits state-of-the-art technological advances within the themes of the course, or advances that may be anticipated in the coming years.
7. formulate a scientifically informed opinion about the ethical aspects of AI and BCI.

### Inhoud vak

People have always been fascinated with the idea to create intelligent computers and robots and to integrate computers in the brain to manipulate or enhance

its performance. In this course, the current status is discussed of brain inspired artificial intelligence, realistic computer simulations of the brain and brain-computer interfacing. To

investigate how close science has come to science fiction students work in groups to prepare a business proposal in which they describe a new commercial application of artificial intelligence or brain computer interfacing. Students will present with their group a scientific paper describing the key technology of their project. The business proposal is presented to peers and a reviewer during a poster session at the end of the course. In addition, students will discuss the ethical, legal, and philosophical aspects of artificial intelligence and brain-computer-interfacing.

### Onderwijsvorm

Lectures 40 hrs

Practicals 12 hrs

Business project 60 hrs

**Toetsvorm**

Exam 50%  
 Business project 40%  
 Discussion 10%

Weighted average of exam and business project need to be 5.5 or higher to pass the course and cannot be compensated by the Discussion grade.

**Literatuur**

To be decided

**Aanbevolen voorkennis**

Two years of study at bachelor's level.

**Doelgroep**

All students with an interest in the computational abilities of the brain and brain-inspired technology

**Overige informatie**

Part of minor Brain and Mind.

This minor course requires a minimum of 25 participants to take place.

Central Academic Skills:

Think out of the box: imagination may push basic science into applications and create business opportunities.

**Minor English: English in my own Discipline**

<b>Vakcode</b>	L_ETBAALG008 ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. G.A. Dreschler
<b>Examinator</b>	dr. G.A. Dreschler
<b>Docent(en)</b>	dr. G.A. Dreschler
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	300

**Doel vak**

You gain insight into the language used in various text types which are common in your own academic discipline and the professional domains associated with your specialization. After successfully completing this course you will have (i) knowledge of the different types of texts written in your own discipline, either on an academic level or in the professional domain; (ii) insight into linguistic features related to structure, formality and stance in one or two text types in your discipline; and (iii) knowledge of several types of analysis and methods used in genre analysis and corpus linguistics. You will be able to apply these methods independently to a selection of texts from your discipline and use the knowledge gained from these analyses in your own writing.

**Inhoud vak**

In the first couple of sessions, we will discuss different methods of analysis used in linguistics for analyzing characteristics of texts and

apply them to texts. You will then choose one of these methods and apply this in an analysis of a collection of texts in your own discipline, present the preliminary results of your analysis, and write a final research article in which you report on the analysis, following conventions from linguistic papers.

### Onderwijsvorm

2 seminars of 2 hours per week in weeks 1 - 3.

### Toetsvorm

The grade for this course will be based on the final report (after rewriting) (75%); and the grade for the presentation (25%). To pass the course, you need a minimum grade of 5.5 for both assignments.

### Literatuur

Materials will be made available or listed on Canvas.

### Vereiste voorkennis

This course is only available as part of the <Minor Engels/Minor in English>. Students must have completed Writing 2 before embarking on this course.

### Doelgroep

The <Minor Engels/Minor in English> as a whole is aimed at bachelor and premaster students across the university who want to improve their written English in an academic context. The Minor is not open for students in the BA programme CIW who are following the specialization in English and International Communication.

### Overige informatie

The course has obligatory attendance.

## Minor English: Grammar and Writing 1

<b>Vakcode</b>	L_ETBAALG007 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. G.A. Dreschler
<b>Examinator</b>	dr. G.A. Dreschler
<b>Docent(en)</b>	drs. I.M.W. 't Hart MPhil, dr. G.A. Dreschler, dr. C.A.M. de Jong
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Instructiecollege, Werkgroep
<b>Niveau</b>	100

### Doel vak

After successfully completing this course you will have knowledge of and insight into the language which typifies academic writing in English and into English requirements of text structure, as well as into how these aspects are different from other languages, most importantly Dutch. You have knowledge of and insight into the most important aspects of English grammar, particularly those which typically cause students problems when writing formal English.



You will also be able to write a well-structured English text in a formal style about a subject related to your own study programme, free of serious lexical and grammatical error which would have an adverse effect on the readability of the text. In terms of the Common European Framework of Reference [CEFR], successful completion of this course will bring you to level B2 in terms of communicative competence and B2i in terms of grammatical accuracy and vocabulary control. You will have greater insight into the strengths and weaknesses of your English writing skills, and knowledge of how to further develop your strengths and reduce your weaknesses.

### **Inhoud vak**

The course consists of a writing and a grammar component. In the writing component of the course the emphasis is on (a) identifying the paragraph structures, sentence structures and kind of language used across a range of academic texts in all kinds of disciplines, and (b) getting to grips with the basic problems involved in writing good, formal English (e.g. differences between English and Dutch, the essentials of English punctuation, formal style). The grammar component consists of a practical introduction to basic aspects of the grammar of contemporary English, with special attention for the problems that students typically have when writing formal English.

### **Onderwijsvorm**

For the writing component: 1 hr per week lecture; 2 hrs per week seminar.

For the grammar component: 1 hr per week lecture; 2 hrs per week seminar.

### **Toetsvorm**

(i) a text of 1000-1200 words on a subject related to the student's own discipline (50%); (ii) a multiple choice computer test on grammar (50%). In order to pass the course students must score a minimum of 5.5 on each component.

### **Literatuur**

Hannay, M. & J.L. Mackenzie (2009). *Effective Writing in English*. 2nd edition. Bussum: Coutinho.

Book for grammar: to be announced.

Additional materials will be made available on Canvas.

### **Vereiste voorkennis**

At least one year of university study, including experience in writing academic text; premaster students may also follow this course as long as they have completed an academic skills course.

### **Doelgroep**

Bachelor students across the university who want to improve their written English in an academic context; the course is not open for students who have done academic English in their academic core. The course is part of the [Minor Engels/Minor in English] but can also be followed separately.

### **Overige informatie**

The course has obligatory attendance. Note that this is an English writing course rather than simply a writing skills course. The assumption is that participants have already successfully completed an academic skills course in their first two years of university study.

## Minor English: Pronunciation and Presentation

<b>Vakcode</b>	L_EABAALG006 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. L.M. Rupp
<b>Examinator</b>	dr. L.M. Rupp
<b>Docent(en)</b>	dr. L.M. Rupp, dr. T. Krennmayr
<b>Lesmethode(n)</b>	Werkcollege, Hoorcollege
<b>Niveau</b>	200

### Doel vak

Regarding pronunciation, you will be able to describe the 10 most common English pronunciation difficulties. You will also be able to describe the effects of particular accent features on intelligibility and credibility in professional situations. Regarding presentation, you will be able to strategically apply prosodic features and conversational patterns in such a way that they will help you structure and enliven your talk.

By the end of the course, you will be able to fix the 10 most common English pronunciation difficulties in your own pronunciation and you are able to confidently give an oral presentation.

### Inhoud vak

In the pronunciation component, we will set goals for the English accent that you wish to develop. We will analyse the 10 most common English pronunciation difficulties (including commonly mispronounced words), and the effects that these difficulties may have on the intelligibility and credibility of your accent. You will be given tools that help you analyse English pronunciation features and fix features of your own pronunciation accordingly.

As far as the presentation component is concerned, we will focus on those aspects of speech (based a.o. on corpus linguistic research) that help you catch your listener's attention. Many of these aspects come naturally in everyday speech, but seem to be forgotten during more strenuous activities, such as speaking and presenting in a foreign language. This course will make you more aware of those prosodic features (intonation, voice quality) and conversational patterns (questions, pauses, repetition) of speech that you can use to get your message across.

### Onderwijsvorm

Pronunciation: Lectures (2 hrs a week) and seminars (1 hr a week)

Presentation: seminars (2 hrs a week)

Lectures and seminars are supported by audiomaterial.

Students are expected to do weekly readings and assignments.

### Toetsvorm

Two recordings of your own pronunciation (50%) and a presentation on an academic subject (50%).

## Literatuur

Rupp, L. 2013. Uitspraakgids Engels voor professionals. Amsterdam: VU Uitgeverij. International students can use the website accompanying the course book. <https://vuuitspraakengels.wikispaces.com>

## Doelgroep

Students across the university who wish to improve their English pronunciation and presentation skills.

## Overige informatie

Class attendance is obligatory (80%). Participants will also need to have submitted 80% of the weekly assignments set in order to be assigned a grade for the course.

## Minor English: Writing 2

<b>Vakcode</b>	L_ETBAALG005 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. G.A. Dreschler
<b>Examinator</b>	dr. G.A. Dreschler
<b>Docent(en)</b>	dr. G.A. Dreschler
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	300

## Doel vak

After successful completion of the course students will feel confident that they can write a bachelor dissertation in English and embark on a Master's degree where English is the language of tuition. In terms of the Common European Framework of Reference [CEFR] you will be at level B2 for linguistic accuracy and at the high end of B2 for relevant communicative competence. Specifically, the course aims to help students in:

- getting more practice in writing formal, academic English.
- developing reading skills which will allow them to note linguistic and structural features of relevant academic text types in their own discipline;
- gaining insight into how specific linguistic structures can contribute to text coherence and text cohesion;
- acquiring greater knowledge of the stylistic and rhetorical aspects of written formal texts;
- getting greater insight into the strengths and weaknesses of their English writing skills, and knowledge of how to further develop strengths and reduce weaknesses;

## Inhoud vak

The main aim of this course is to further develop your writing skills in English. For this course we focus on your position as a writer in the academic world, i.e. as someone who is engaged in academic discourse. This means that you need to be aware of appropriate structures at sentence level as well as at text level, at ways of using language to refer to other writers, and at ways of using academic language

effectively. The emphasis in this course is on (a) gaining more insight into the language and style of your own academic discipline, (b) improving coherence, compactness and readability, and (c) expanding your grammatical repertoire.

### Onderwijsvorm

2 hrs per week lecture; 2 hrs per week seminar.

### Toetsvorm

There are three assignments for this course: a short comparative essay (30%), a term paper on linguistic and stylistic features of academic texts in one's own discipline (30%), plus a paper of 2000 words on a subject related to your study (40% of the mark).

### Literatuur

Hannay, M. & J.L. Mackenzie (2009). *Effective Writing in English*. 2nd edition. Bussum: Coutinho.

Separate materials available via Canvas.

### Vereiste voorkennis

Students must have either (a) completed an introductory academic English course earlier in their university studies or (b) already completed

Minor English: Grammar and Writing 1.

### Doelgroep

Bachelor and premaster students across the university who want to improve their written English in an academic context, with the exception of students of CIW who are following the specialization in English and International Communication.

### Overige informatie

The course has obligatory attendance. If you miss more than two weeks you will not be allowed to complete the course.

## Minor's Tutorial in Development and Global Challenges

<b>Vakcode</b>	S_MWDCG ()
<b>Periode</b>	Periode 1+2+3
<b>Credits</b>	0.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Sociale Wetenschappen
<b>Coördinator</b>	dr. E.W. Bal
<b>Examinator</b>	dr. E.W. Bal
<b>Lesmethode(n)</b>	Studiegroep, Hoorcollege
<b>Niveau</b>	300

### Doel vak

The Minorwerkline Development and Global Challenges is a series of tutorials in preparation to the course Urban Studies. These tutorials are meant for students in the Minor Development and Global Challenges only. The tutorials also aim to facilitate the integration of the five courses that constitute the minor.

### Inhoud vak

During the entire track (P1 and p2) students will take part in excursions, attend expert lectures and prepare (in teams of 4 students) the short research project that they carry out in P3 as part of the Urban Studies course. During P1, all activities carried out in the will be closely linked to the first two courses taught in the Minor. In P2 students will begin the preparations for their short research projects in Urban Studies.

### Onderwijsvorm

Guestlectures, excursions and tutorials

### Toetsvorm

To be announced in the course manual (see CANVAS).

### Literatuur

To be announced in the course manual (see CANVAS).

### Vereiste voorkennis

Active participation in the parallel courses in this Minor

### Doelgroep

Students in the Minor Development and Global Challenges

## Molecular Cell Biology

<b>Vakcode</b>	AB_1053 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	dr. R.J.M. van Spanning
<b>Examinator</b>	dr. R.J.M. van Spanning
<b>Docent(en)</b>	prof. dr. J.L. Snoep, prof. dr. H.V. Westerhoff, dr. R.J.M. van Spanning, M.J. Wagner, prof. dr. B. Teusink, dr. J.R. Haanstra
<b>Lesmethode(n)</b>	Practicum, Werkgroep, Hoorcollege, Computerpracticum
<b>Niveau</b>	300

### Doel vak

To obtain a basic understanding of the functioning of living cells at the molecular level, and introduction to qualitative and quantitative methods applicable inside and outside the living cell. To learn to design and execute studies where these methods are applied, and to interpretate the results.

Specifically, the students will be trained in:

- The use and interpretation of information about cellular processes such as energy metabolism, regulation of gene expression, oxygen damage, apoptosis and signal transduction.
- The design and execution of simple experiments concerning gene expression, signal transduction, growth and metabolic processes.
- Application of Metabolic Control Analysis to quantify distribution of control and regulation of cellular processes by individual cellular reactions.
- The use of existing computer models of molecular systems in the cell to explore the behaviour of these systems.

### **Inhoud vak**

- Introduction to Metabolic Control Analysis and its basis in enzyme kinetics.
- Laws and practical applications of Metabolic Control Analysis, and extension of this method to include gene expression.
- Modular kinetic analysis of cellular networks.
- Structure and function of respiratory networks, with *Paracoccus denitrificans* as example.
- Regulation of gene expression during nitrification and denitrification in microorganisms.
- Use of a depository of mathematical models to explore reaction systems in the cell.
- Control Analysis of signal transduction as a key in the understanding of cancer..
- Application of the presented methods to a case study: fighting the parasite that causes sleeping sickness.

### **Onderwijsvorm**

Lectures (16.5 contact hours); workgroups (3 contact hours, obligatory); computer practical(1.5 contact hours, obligatory); practical project in the department of Molecular Cell Physiology (depending on the project ca. 20 contact hours, obligatory)

### **Toetsvorm**

Written exam (70%)  
Presentation (30%)

### **Literatuur**

A syllabus is available on the Canvas site.

### **Vereiste voorkennis**

Participation in the course "From Protein to Cell" (1st half of period 2)

### **Doelgroep**

Part of the minor Biomolecular Science and Neuroscience, track Biomolecular Science.

### **Overige informatie**

For the practical a laboratory coat will be supplied. After the course, the coat will be sterilised.

Participation in the course "From Protein to Cell" (1st half of period 2) is compulsory.

## **Nation and Migration**

<b>Vakcode</b>	S_NM ()
<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. A. Hossain
<b>Examinator</b>	prof. dr. P.D. Nyiri
<b>Docent(en)</b>	prof. dr. P.D. Nyiri, dr. A. Hossain
<b>Lesmethode(n)</b>	Hoorcollege

**Doel vak**

This course introduces students to the study of international migration and how the phenomena, perceptions, and policies towards migration reflect and shape the governance and self-perception of nation-states. It is part of the curriculum strand 'World Making' and complements the course Identity, Diversity and Inclusion.

Learning objectives:

Knowledge and Understanding. Students have acquired knowledge and understanding of:

(1) key theories, concepts and methods for the study of migration in the social sciences.

Application. Students have acquired the competences to:

(2) apply these to analyse migration dynamics in selected case-studies.

Attitude. Students can demonstrate:

(3) a critical perspective on current events surrounding migration.

**Inhoud vak**

Today's debates on migration are often inseparable from nations' perceptions of themselves and each other. This course discusses the relevance of migration in today's global world, particularly in relation to: identity concerns (diasporas, transnationalism, nationalism, multicultural societies), development (migration and development) and international political issues (migration governance and ethnography of the state).

The course introduces students to major theories to understand migration, but privileges the adoption of constructivist approaches. It invites students to look at migration from the perspectives of people engaging in migration directly, of people encountering migrants as new neighbours, or of people tasked with the function of controlling and governing migration. Through this perspective, students engage with processes of community building and belonging, and with the power struggles associated with migration. They acquire a thorough theoretical knowledge and critical understanding of these phenomena and key concepts that can help understand them:

- (1) How do migrants construct their identities on the move?
- (2) How do transnational communities and diasporas develop?
- (3) How do national communities respond to migration and deal with the diversity that derives from it?
- (4) How is migration governed and controlled by state apparatuses in migrant countries of origin and destination?
- (5) How do the bureaucrats and professionals dealing with migration translate migration policies into everyday practices?
- (6) What are the implications of migration for development and social transformation in both origin and destination societies?

**Onderwijsvorm**

Lectures, case-study presentations, peer discussions

**Toetsvorm**

Final exam (digital)

## Literatuur

To be announced in Canvas

## Doelgroep

2nd year bachelor students in Cultural Anthropology and Development

Sociology

Students in the Minor Anthropology

## Nature versus Nurture

<b>Vakcode</b>	AB_1057 ()
<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. J.C. Polderman
<b>Examinator</b>	dr. J.C. Polderman
<b>Docent(en)</b>	dr. P. van Nierop, dr. J.C. Polderman
<b>Lesmethode(n)</b>	Practicum, Computerpracticum, Werkgroep, Hoorcollege
<b>Niveau</b>	300

## Doel vak

Students learn how individual differences in human complex behavior can be explained by genetic variation and environmental factors.

## Inhoud vak

Human traits show considerable individual differences, which are due to differences in the individual's genes and/or the environment. In the Nature vs. Nurture course the influence of genes and the environment on human behavior will be discussed. Empirical evidence based on experiments with human subjects will guide these discussions. During the course many important topics from modern day society will be discussed, such as the influence of violent gaming on juvenile behavior, the role of parents in personality development of children, and the causes of mental disorders.

The genetic information contained in our DNA, represents the nature component that influences human behavior. An important aspect of the course is to show how research on genetic information is conducted. Students are introduced to various molecular biological techniques used to study the genome, such as DNA collection, isolation, and genotyping, and (statistical) methods to link variation in DNA to variation in behavior. The ultimate goal of this course is to understand the 'nature' and 'nurture' causes of individual differences in human cognitive and social behavior, and to be able to critically evaluate the nature-nurture debate.

## Onderwijsvorm

Practicals (10%), lectures (80%), debates + workshop presenting (10%)

## Toetsvorm

The final grade of Nature vs. Nurture is based on participation in debate sessions (5%), and the DNA practical (5%), and a written exam (90%). Of note: 55% of the written exam must be correct to obtain a final grade. Nature vs. Nurture is successfully completed with a final



grade > 5.45.

### Literatuur

Text book "Behavioral Genetics" 7th edition, by Plomin et al.

Scientific papers, TBA during course

### Vereiste voorkennis

None

### Aanbevolen voorkennis

Broad interest in brain, behavior, psychology, genetics and neuroscience

### Doelgroep

Third year BSc students alpha and gamma topics (Sociology, Psychology, Economics, Law, Artificial Intelligence etc.) and students from Lifesciences (Biology, Fysics, Chemistry, Medicine, Movement Science, Nutrition etc.) with a broad interest in neuroscience.

Students of Biomedical Sciences and Health and Life Sciences as well as students that plan to pursue a career in Neuroscience can follow the more specialised minor "Biomolecular/Neurosciences".

### Overige informatie

Guest lecturers:

Prof Bartels (VU-FGB)

Dr. Lewis (University of London, UK)

Dr. van Dongen (VU-FGB)

Dr. Stringer (VU-CNCR)

Prof. Dr. Konijn (VU-Social Sciences)

Prof. Dr. Van Straalen (VU-FALW)

Prof. Dr. Schuengel (VU-FPP)

## Networks and Graphs

<b>Vakcode</b>	X_401010 ()
<b>Periode</b>	Periode 5
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	J. Urbani
<b>Examinator</b>	J. Urbani
<b>Docent(en)</b>	J. Urbani
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Deeltoets extra zaalcapaciteit
<b>Niveau</b>	200

### Doel vak

After taking this course, you will be able to describe what the science of networks is all about, making use of terminology from graph theory and basic probabilities. You will also be able to use (simple) discrete math for notations and proofs. In particular, you can

- model simple real-world situations expressed in graphs/networks
- show the (in)correctness of mathematical statements about graphs
- construct networks and conduct simple analyses of existing ones
- read and understand introductory, popular texts on networks

## Inhoud vak

The world around us is becoming increasingly connected. This increased connectivity is leading to new phenomena that are not that easy to understand:

- why is it difficult, if not impossible, to remove data from the Web?
- why does the Internet continue to function despite big disasters?
- why is Google so effective and efficient?
- why are navigation systems so responsive to traffic jams?
- why do certain diseases spread so rapidly and others not?

The core of the answers to these questions is formed by the notion of "network:" a mathematical concept consisting of nodes that are joined by edges. Networks are also called graphs. In the last 15 years we have seen an increase in interests for networks/graphs. Many real-world phenomena turned out to be conveniently modeled by networks, and in such a way that it allowed us to better understand those phenomena.

In this course, graph theory and its applications are the main focus point. We'll be paying attention to the math that underlies graphs and networks, as well as the application to real-world situations. In particular, you will be conducting simple experiments dealing with the construction and analyses of networks. Application domains that are discussed are selected from:

- the Internet
- the Web
- peer-to-peer computer systems
- biological networks
- social communities and online social networks

We'll putting emphasis on:

1. Standard mathematical terminology and techniques, including:

- directed and undirected graphs
- planar graphs
- graph embeddings
- edge and vertex coloring
- optimal routing
- trees

2. Experimental analyses of networks.

To this end, we'll be discussing various ways to measure network properties, like the relative position of (important) nodes, clustering coefficients, diameter, eccentricities, and so on.

## Onderwijsvorm

The course takes the form of lectures, exercise classes and homework assignments.

## Toetsvorm

A combination of exams and homework assessments.

## Literatuur

Van Steen, M., Graph Theory and Complex Networks: An Introduction. 2010. Online available through [www.distributed\\_systems.net](http://www.distributed_systems.net) .

**Doelgroep**  
1CS, 1-IMM.

## Neuro- en Revalidatiepsychologie

<b>Vakcode</b>	B_NEURREVPSY (900502)
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. A. Ledebt
<b>Examinator</b>	dr. A. Ledebt
<b>Docent(en)</b>	dr. A. Ledebt, dr. J.F. Stins
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	200

### Doel vak

Na deze cursus kunnen studenten:

- Een overzicht geven van de neuropsychologische aspecten van gedrag en van de motorische problemen en hogere-functiestoornissen na een hersenbeschadiging.
- Van enkele factoren (zoals motorische en sensorische stimulatie en/of motorische oefening) beschrijven welke invloed deze uitoefenen op de plasticiteit van de hersenen.
- Bij elk van de genoemde factoren interventies/onderzoeken beschrijven en verklaren wat het effect daarvan is op de revalidatie na een hersenbeschadiging.

### Inhoud vak

In deze cursus staat de vraag centraal welk effect hersenbeschadiging kan hebben op motorisch handelen. We hanteren hierbij een ruime definitie van 'motoriek'; succesvol bewegen omvat meer dan alleen het bewegen van een ledemaat. Ook processen als aandacht, executief functioneren, emotie, lichaamsrepresentatie, en ruimtelijke oriëntatie zijn noodzakelijke factoren. Met andere woorden, allerlei 'hogere' mentale processen participeren in, en ondersteunen, selectie en uitvoering van motorische handelingen. Aangezien deze mentale processen ook op hun beurt kunnen zijn aangedaan tgv. hersenbeschadiging, zal dit ook leiden tot een verminderde kwaliteit van motorisch handelen. Typische syndromen die we zullen bespreken zijn apraxie, neglect, aandachtsstoornissen, en zgn. 'frontale' syndromen.

### Onderwijsvorm

De cursus bestaat uit hoorcolleges.

### Toetsvorm

Schriftelijk tentamen met open- eindvragen en meerkeuzevragen

### Literatuur

Losse artikelen. De literatuurlijst en de Cursushandleiding worden tzt online bekendgemaakt.

### Aanbevolen voorkennis

Van de deelnemers wordt verwacht dat zij globaal kennis hebben van neuroanatomie en neurofysiologie zoals bijvoorbeeld behandeld in het boek "Neurowetenschappen, een overzicht" van Ben van Cranenburgh.

## New Ways of Working

<b>Vakcode</b>	E_MM_NWW ()
<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. A. Sergeeva
<b>Examinator</b>	dr. A. Sergeeva
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege

### Doel vak

After completing the course, students will:

- Understand how the properties of digital technologies require, as well as enable new approaches to working and organizing
- Have knowledge of relevant theories of how working, coordinating, and managing in these new environments is different from traditional workplaces and critically reflect upon the underlying assumptions
- Understand the interplay between technology and work practices and be able to analyze and demonstrate that interplay
- Be able to apply academic insights to analyze and develop solutions for a real life case

### Inhoud vak

In this course we focus on the demands digital technologies put on organizations and society, and on how new ways of working and organizing help adapt to these challenges. Topics addressed in this course include, amongst others, how new ways of working (for example workers as digital nomads, expert systems as alternative for legal workers, or production done by 3d-printers) and new distributed and networked organizational forms (for example peer to peer communities or crowdsourcing) have advantages and disadvantages over traditional organizational practices and structures. In addition to learning about these topics in interactive lectures, students will also be required to fulfill a number of assignments related to "real-life" challenges of new ways of working and organizing. The assignments are related to a particular organizational problem and will require students to apply theories discussed during the lecture to a particular case. These "hands-on" assignments are aimed to get a better understanding of the connection between theory and practice. With the assignments, students become academically prepared to understand and support the design, introduction and use of digital innovation and its implications for new ways of organizing and working in new distributed environments.

### Onderwijsvorm

The course will consist of a combination of interactive lectures, guest lectures, seminars, and assignments. The lectures will also include a critical discussion of selected readings, stimulated by obligatory individual reflections on the literature. The seminars will be used to have students present, discuss, and further develop the assignments.

**Toetsvorm**

Individual assignments and Group project assignment

**Literatuur**

A selection of readings (mostly academic papers, but also book chapters and thoughtful business magazine articles) will be made available before the start of the course.

**Vereiste voorkennis**

None

## Operating Systems

<b>Vakcode</b>	X_405067 (405067)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	C. Giuffrida
<b>Examinator</b>	C. Giuffrida
<b>Docent(en)</b>	prof. dr. ir. H.J. Bos, C. Giuffrida
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	200

**Doel vak**

Get an insight into the internals of modern operating systems.

**Inhoud vak**

This course gives an introduction to the internals of operating system.

The following topics

are covered: operating systems architectures, processes, threads, synchronization, memory

management, file systems, input/output, virtualization. The course uses real-world operating

systems such as Linux and MINIX 3 as examples, providing insights into both the theory and practice of modern operating systems.

**Onderwijsvorm**

Lectures

**Toetsvorm**

Written exam

**Literatuur**

Tanenbaum, A.S., Bos, H.J., "Modern Operating Systems", Fourth Edition. Prentice-Hall, 2015.

**Doelgroep**

2CS

## Philosophy

<b>Vakcode</b>	X_400433 (400433)
<b>Periode</b>	Periode 5
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. ir. G.J.E. Rutten
<b>Examinator</b>	dr. ir. G.J.E. Rutten
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	200

### Doel vak

Introduction into four main areas of systematic philosophy.

### Inhoud vak

In this course we will explore four fundamental subjects within systematic philosophy:

1. Logic ("laws of reason"),
2. Epistemology ("theory of knowledge"),
3. Metaphysics ("theory of being"),
4. Worldviews ("life orienting narratives").

Each subject will be structured around a key question:

1. What's the origin and nature of the laws of logic?
2. What's knowledge? How to define this concept?
3. Is there an ultimate ground or first cause of reality?
4. Is it possible to rationally compare different worldviews?

### Toetsvorm

Multiple choice examination.

### Literatuur

All literature for this course will be made available on Canvas in Course Documents. So there is no need to acquire books or readers.

### Doelgroep

Bachelor students from 'VU Faculteit der Exacte Wetenschappen (FEW)'.

### Intekenprocedure

Vu-net and Canvas

### Overige informatie

Een meer uitgebreide beschrijving is te vinden op Canvas.

## Philosophy and Neuroethics

<b>Vakcode</b>	W_BA_PNEU ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. G. Meynen

<b>Examinator</b>	dr. G. Meynen
<b>Docent(en)</b>	dr. G. Meynen
<b>Lesmethode(n)</b>	Hoorcollege, Werkgroep
<b>Niveau</b>	200

### Inhoud vak

In this course students are introduced to the most important schools of thought and key concepts in philosophical and ethical debates on the impact of neurotechnologies on society, more specifically, on healthcare and criminal law. Topics include: the problem of mind and brain, history and philosophy of neuroscience, and assessments of criminal responsibility in light of neuroscientific developments.

### Onderwijsvorm

(Interactive) lectures

### Toetsvorm

Written exam

### Literatuur

See the course manual

### Overige informatie

This course is part of the Universiteitsminor Technology, Law and Ethics

## Philosophy of Mind II

<b>Vakcode</b>	W_BA_PHMII ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	prof. dr. L.B. Decock
<b>Examinator</b>	prof. dr. L.B. Decock
<b>Docent(en)</b>	prof. dr. L.B. Decock
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	300

### Doel vak

De student:

- krijgt inzicht in de evolutie van het menselijke denken
- oefent vaardigheden zoals het presenteren van een opdracht en het leiden van de discussie daarover

### Inhoud vak

Het doel van dit vak is om een centraal thema in de philosophy of mind aan de orde te stellen. We bestuderen Dennetts nieuwste boek over de evolutie van het menselijke denken.

### Onderwijsvorm

Hoor- en werkcollege

**Toetsvorm**

Presentatie (20%), schriftelijk tentamen (80%).

**Literatuur**

Daniel Dennett, From Bacteria to Bach and Back, Norton, 2017.  
Geselecteerde aanvullende teksten

**Aanbevolen voorkennis**

Afronding van het eerste Bachelor jaar van de opleiding wijsbegeerte. Studenten uit andere studierichtingen moeten blij kunnen geven van enige filosofische voorkennis, b.v. door het hebben gevolgd van een college wijsgerige vorming.

**Doelgroep**

Bachelor studenten wijsbegeerte, bijvak studenten

**Overige informatie**

Voor meer informatie, zie t.z.t. de studiehandleiding van dit vak.

## Physical Computing

<b>Vakcode</b>	XB_40008 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. N. Silvis-Cividjian
<b>Examinator</b>	dr. N. Silvis-Cividjian
<b>Docent(en)</b>	dr. N. Silvis-Cividjian
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	100

**Doel vak**

We expect that by the end of this course, students will be able to:

- Design a realistic smart system with the potential to benefit human lives. The system acquires and processes data from video, audio, acceleration, or EEG sensors and uses pattern recognition to take decisions that affect the environment accordingly.
- Build a simplified version of the real system and program a software agent to control it.
- Work together in a team, collaboratively identifying not only the technical but also the safety or ethical issues with their designs, and then sharing their challenges and discoveries through reports, presentations, and in-class demonstrations.

**Inhoud vak**

Pervasive (or ubiquitous) computing is a trend based on the Mark Weiser's vision of computers available "always and everywhere", embedded in everyday life. This course is an introduction to pervasive computing



systems that assist people in their daily life. Think about a fall-detection system, a self-driving car, a brain-controlled wheelchair or a navigation system for a blind pedestrian. These systems:

1. sense the context (time, user's location, emotions, acceleration, environment, etc)
2. recognize data patterns, reason and take intelligent decisions
3. act upon the environment, by controlling the wheels, suggesting the best route, or just notifying a caretaker.

The main components of such a system are: sensors, controllers and actuators. In this course the students will learn different techniques to acquire signals from the environment, to process these raw signals in order to infer context by using machine learning, and to write software agents for control. During the practical lab the students will experiment with these techniques and build their own smart system. Guest lectures given by researchers working in relevant fields are planned as well.

### Onderwijsvorm

Lectures, practical lab sessions and mini-project

### Toetsvorm

Compulsory practical lab assignments and written exam. The final grade is calculated as  $\text{Final grade} = (0.5 \cdot \text{PRAC}) + (0.5 \cdot \text{EXAM})$ . A pass requires both components to be  $\geq 5.5$ . There is possible to resit the exam, but not the practical.

### Literatuur

Silvis-Cividjian, N. (2017), Pervasive Computing - Engineering Smart Systems, Springer International Publishing, ISBN 978-3-319-51654-7

### Doelgroep

1 CS

## Principles of Bioinformatics

<b>Vakcode</b>	X_401094 ()
<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. S. Abeln
<b>Examinator</b>	dr. S. Abeln
<b>Docent(en)</b>	dr. S. Abeln, prof. dr. J. Heringa
<b>Lesmethode(n)</b>	Hoorcollege, Practicum, Computerpracticum
<b>Niveau</b>	300

### Doel vak

Are you interested in bioinformatics? Would you like know how huge amounts of data can be analysed in order to discover new biology? Would you like to solve open questions in scientific research?

This course is open for any Bachelor student in a Science Degree (including Biology or Biochemistry).

Principles of Bioinformatics is the starting course for bioinformatics at an Academic level. It aims to give a broad overview of important

topics relevant to the field, with a focus on current (open) problems in bioinformatics research.

During the lectures and practical sessions you will become familiar with practical solutions, but also discover that there is still a lot of room for improvement in this rapidly advancing field of research.

Goals:

- To make the students aware of gaps in their own background knowledge.
- The student will be aware of the major issues, methodology and available algorithms in bioinformatics.
- To work together in a group of diverse backgrounds.
- To gain hands-on experience in scripting and handling basic mathematical equations as a means of solving bioinformatics problems.
- To develop a basic understanding of major concepts in genomics and molecular cell biology or to develop a basic scripting skills in python that are relevant to current topics in bioinformatics

### **Inhoud vak**

Theory:

- Evolution, Genomes, Sequences, Biomolecular Structure, Biological Databases BLAST & PSI-BLAST, Protein domains & evolution, Next Generation Sequencing (NGS) or Massively Parallel Sequencing (MPS) and analysis

Practical:

There are practicals sessions that aim to show you both existing solutions as well as open problems within the field of Bioinformatics. In the practicals you use existing databases and (web-server) solutions to solve biological problems. You will also use python scripts to automate queries to databases and web servers to investigate the value of current Bioinformatics Algorithms. We aim to organise the group project(s) in teams containing students with different BSc backgrounds.

The following topics are covered:

- Gene Ontology Database (GO) (python scripts)
- Homology Searching (web-based)
- BLAST / PSI-BLAST (python scripts)
- Benchmarking (python scripts)
- NGS (web-based)
- Network analysis

### **Onderwijsvorm**

- 10 Lectures (two hour lecture in the morning, two days per week)
- 12 Project practicals (two hour sessions following the morning lectures, two days per week), partially supervised.
- 12 optional conversion classes in biology (four hour sessions on Friday at the UvA) or python scripting (two hour sessions in the afternoon at the VU)

### **Toetsvorm**

- [50%] Project (group work)
- [50%] Oral or written exam (depending on number of course students) to

assess:exercises, topics covered by the project and lecture topics

### Literatuur

- Course material (slides, scientific papers) on bb.vu.nl
- Essential Bioinformatics methods are covered by the following books:
- Essential Bioinformatics, Jin Xiong, Cambridge University Press, ISBN978-0-521-60082-8 (this is a very basic book, for BSc level only)
  - Marketa Zvelebil and Jeremy O. Baum Understanding Bioinformatics Garland Science 2008 ISBN-10: 0-8153-4024-9 (if you are planning to take any further courses in bioinformatics, we would advise you to get this book)

### Aanbevolen voorkennis

An interest in programming and biological problems.

### Doelgroep

3CS, 3IMM, 3LI and:  
3BIO, 3MNW, 3BMW, 3FAR

### Overige informatie

This course is part of the Minor Bioinformatics and Systems Biology

Depending on the number of students, a large part of this course may be given together with the MSc course "Fundamentals of Bioinformatics". The assessment is at third year BSc level.

This course is open for any Bachelor student in a Science Degree (including Biology or Biochemistry).

## Programming

<b>Vakcode</b>	X_400554 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	6.0
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. ing. T. Kielmann
<b>Examinator</b>	dr. ing. T. Kielmann
<b>Niveau</b>	100

## Programming for Humanities and Social Sciences

<b>Vakcode</b>	L_AABAALG069 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. H.D. van der Vliet
<b>Examinator</b>	dr. H.D. van der Vliet
<b>Docent(en)</b>	dr. H.D. van der Vliet, M.C. Postma MA, F. Ilievski, C.M. van Son
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	300

## **Doel vak**

Goals of this course:

Get to know the basics of the Python programming language  
Become an independent programmer, who is able to find solutions to new problems

Skills you will acquire during this course:

Learn how to deal with unstructured and structured data  
Learn how to extract relevant statistics from large amounts of data  
Learn how to share your code and results

## **Inhoud vak**

As many humanities researchers use textual resources as their primary object of inquiry, you learn how to analyze the growing amount of digital text using the Python programming language. No programming knowledge is required; we believe that anyone can learn how to program.

You will learn how to extract information from text corpora; deal with different file types (plain text, CSV, JSON); deal with large amounts of data; and visualize and share your results. We will focus on readability and understandability of your code, so that you will be able to share it with others, and reuse your code in the future.

This is a practical course, in which you will get a lot of hands-on experience. Due to the nature of this course, active participation is required.

## **Onderwijsvorm**

Interactive practical sessions.

Although parts of the lectures will be about programming and language processing theory, the focus is on having interactive and practical sessions. Students are expected to actively participate and ask questions.

## **Toetsvorm**

Bi-weekly assignments (60%): The assignments are designed to practice your programming and problem solving skills. Moreover, they allow us to keep track of your progress, and identify topics that require more attention in class.

Midterm exam (40%): The midterm exam is designed to test your knowledge of Python. To pass this course, you need a passing grade (at least 5.5) on the midterm.

## **Literatuur**

To be announced on Canvas. All materials are freely available online. The course materials for 2016/2017 can be found here:  
<https://github.com/ctl/python-for-text-analysis>

## **Vereiste voorkennis**

none

## **Doelgroep**

Students of the minor Digital Humanities and Social Analytics. Open to all other Bachelor students.

## **Overige informatie**

This course is part of the minor Digital Humanities and Social Analytics and open for all interested students. Students are required to attend at least 80% of the classes. Students who fail to do so without a valid reason will be excluded from the course.

## Project Application Development

<b>Vakcode</b>	X_400556 ()
<b>Periode</b>	Periode 6
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	S. Österlund
<b>Examinator</b>	S. Österlund
<b>Docent(en)</b>	ir. M.P.H. Huntjens
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	200

### Doel vak

The main goal of this course is to give the student a more hands-on practical experience with programming. By implementing a larger project with a basis in material covered during the first year of the Computer Science bachelor, you will have the opportunity to gain more experience developing software and to show off the skill you have obtained during the first year.

### Inhoud vak

In this course you will implement an emulator capable of executing JVM byte-code. The implementation will be done in C. The assignment is split into several smaller parts that build up to the final deliverable.

### Onderwijsvorm

One introductory lecture in the first week. 4 weeks of practical work.

### Toetsvorm

Practical + oral examination

### Literatuur

- The course syllabus
- Extra (optional) reading:
- Ritchie, D. M., Kernighan, B. W., & Lesk, M. E. (1988). The C programming language. Englewood Cliffs: Prentice Hall.
- Andrew, S. Tanenbaum. "Structured Computer Organization." Prentice-Hall, Inc. New Jersey (1999).

### Aanbevolen voorkennis

This course is a Programming practical so we expect you to be proficient at the level of Computer Programming (XB\_40011). A good grasp of systems architecture is also recommended.

### Doelgroep

1CS

## Psychophysiological and Cogn. Appl.

<b>Vakcode</b>	P_BPCAPP ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	prof. dr. J.C.N. de Geus
<b>Examinator</b>	prof. dr. J.C.N. de Geus
<b>Docent(en)</b>	prof. dr. J.C.N. de Geus, dr. D.J. Heslenfeld, dr. ing. E. van der Burg
<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<b>Niveau</b>	300

### Doel vak

- Insight in the link between affective state and autonomic nervous system activity.
- Insight in the link between cognitive state and eye-movement, psychophysics and reaction time metrics.
- Knowledge of typical experimental approaches and research designs in psychophysiology and cognitive psychology.
- Practical skills in the laboratory measurement of autonomic nervous system activity, eye-movement, psychophysics and reaction time as windows into affective and cognitive processing in the brain

### Inhoud vak

In plenary lectures we will outline how affective and cognitive processing is reflected in observable behavioral and physiological signals. The lectures are interspersed with a series of practicals, where the students learn how to record the ElectroCardioGram (ECG), Skin-conductance Level (SCL), eye movements, psychophysics and reaction times in experimental designs aimed at isolating specific affective and cognitive processes. This will be done in a standardized laboratory setting using the Biopac system for ECG/SCL and the Eyelink system to measure the different aspects of eye movements. Amongst others, students will measure (on each other): skin-conductance responses to tonic and phasic emotional stimuli; eye-movements and reaction times when performing a xx task. Furthermore, tactile sensitivity will be measured by using a psychophysical approach. The main principles, strategies and limitations for data analysis will be covered in the lectures and then applied in the practicals to the self-recorded data-sets.

### Onderwijsvorm

Lectures and practicals.

### Toetsvorm

Written examination (50% of grade) of literature and execution of a short data collection experiment (25%) and the signal analysis on the data collected (25%).

### Literatuur

- 1) Psychophysiology Reader with selected articles
  - a) paper on SCL recording
  - b) paper on HR recording
  - c) paper illustrating the use of HR/SCL in practice (likely Critchley or Damasio)
- 2) Cognitive Psychology Reader with selected articles

- d) paper on psychophysics
  - e) paper on Eye movement recording (Van der Stighele, Meeter and Theeuwes, 2006)
  - f) paper illustrating the use of Eye-movement recording or psychophysics in research
- 3) Powerpoints of the lectures  
More details on BlackBoard

**Vereiste voorkennis**

Finished 2nd year of the Bachelor Psychology, Education sciences or Movement Sciences

**Overige informatie**

Course registration must be completed before November 1, as sufficient assistance and rooms for practicals need to be organized up front.

The course is taught in English

As of 2018-19 this course is no longer part of the University minor. Students who still need to complete this course for the UM can contact the course coordinator.

## Religions and Gender

<b>Vakcode</b>	G_RELGEN ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Godgeleerdheid
<b>Coördinator</b>	dr. L. Minnema
<b>Examinator</b>	dr. L. Minnema
<b>Docent(en)</b>	dr. L. Minnema
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	300

**Doel vak**

Learning objectives

- The student is able to describe analytically how certain aspects of gender have been or become an issue in religions
- The student is able to articulate major parallels and differences between a number of religious traditions in their approaches to gender issues in the past and present
- The student is able to switch from the religious insider view to the academic outsider view and back again

**Inhoud vak**

Course content

This course introduces students to a broad spectrum of religions in the past and present dealing with aspects of gender. Gender issues related to male and female models in religious narratives, historical shifts in the religious status of women, mother goddesses and female power, religious views of homosexuality, notions of masculinity and power in religious politics, will be addressed across cultures and religions. The variety of religious traditions under consideration illustrates religious diversity. But there is more to it. Careful comparisons enable

students to discover underlying patterns of similarity.

Six sessions will focus on the following six themes:

1. Male and female role models and stereotypes in ancient narratives: mythological and legendary couples and gender differences in the Babylonian Gilgamesh epic, the Greek Odyssey epic, the Hindu Mahabharata and Ramayana epics
2. The changing religious status of women during three crucial shifts in the world history of religions: the Neolithic, Axial Age, and Modernization breakthroughs
3. Cross-cultural comparison of mother goddesses and female power: the Shinto goddess Amaterasu in Japan, the Hindu goddess Durga in India, the Greek goddess Demeter in Minor Asia
4. The image of Mary in Christianity and Islam: virgin, Madonna, mother, heroine, virtue, saint, queen
5. Religious politics and symbols of masculinity and power in contemporary Hinduism
6. Religious rules and attitudes regarding homosexuality in Buddhism and in Islam

### Onderwijsvorm

lectures

### Toetsvorm

Assessment - written exam

### Literatuur

articles and book chapters (see Canvas)

### Vereiste voorkennis

Prerequisites - none

## Research Paper Migration Studies

<b>Vakcode</b>	L_GWBAALG003 ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. N.F.F. Karrouche
<b>Examinator</b>	dr. N.F.F. Karrouche
<b>Docent(en)</b>	dr. N.F.F. Karrouche
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	300

### Doel vak

(1) Students are able to produce a well structured and well written paper on a self-chosen topic in correct English. The paper will deal with the topic of migration and will be based on secondary scientific literature, an anthropological fieldwork, a historical study or law study, with correct references and citations. (2) Students are able to communicate and discuss their preliminary results in a presentation.

### Inhoud vak

This course aims at training and improving students' academic research and writing skills in the field of migration studies and will result in



an academic paper of 6000 - 7500 words (footnotes, bibliography and appendices not included). This course will guide students through the various stages of writing a larger academic paper, such as: selecting relevant literature and sources; phrasing a research question; planning, drafting and revising the manuscript and using references. Attention will also be paid to research ethics and scholarly integrity. Students work under the supervision of a migration scholar in the Humanities, Social Sciences or Law faculty. The seminars will outline and introduce main issues of academic writing and will support the research and writing process. The final result of this course is a well-structured research paper which answers a self-selected research question by means of a critical analysis of an anthropological fieldwork, historical study, law study and secondary literature.

### Onderwijsvorm

Seminars, independent study.

### Toetsvorm

Research paper, presentation.

### Vereiste voorkennis

Students have completed the course 'Introduction to Migration Studies'.

### Doelgroep

Students enrolled in the Migration Studies minor.

### Overige informatie

This course is part of the minor 'Migration Studies'.

## Research Project Political Science

<b>Vakcode</b>	S_RPPS ()
<b>Periode</b>	Periode 2+3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Sociale Wetenschappen
<b>Coördinator</b>	H.L.M. Muehlenhoff
<b>Examinator</b>	H.L.M. Muehlenhoff
<b>Docent(en)</b>	H. Mercenier
<b>Lesmethode(n)</b>	Studiegroep
<b>Niveau</b>	300

### Doel vak

At the end of the course students will have:

- Improved their skills to analyze and interpret political data and evaluate the quality, validity and usefulness of political science research findings;
- Successfully carried out a limited group research project, applying and refining academic, writing and research skills acquired before;
- Shown their ability to work in a team and contribute to a group product;
- Written a group research paper according to the Political Science Writing Guide, and demonstrating their ability to clearly communicate their research findings and the acquired political science knowledge;
- Shown a critical attitude towards political science literature and

established points of view;  
- Demonstrated intellectual integrity and the ability to be self-critical.

### **Inhoud vak**

This seminar will require students to apply at a more advanced level the academic and research skills they have already acquired within the first year of political science for political science bachelor students or in their own bachelor's for those who follow the minor political science, and apply these skills to a small research project of their own, to be carried out in a small group. The research project will have to address a relevant question pertaining to the content of either of two parallel courses followed in period 2 (EU Governance in an International Context and Global Political Economy in the track Mondiale Politiek or Economie van Markt & Overheid in Nationale Politiek en Bestuur). Class attendance is mandatory.

### **Onderwijsvorm**

Tutorials.

### **Toetsvorm**

Written assignments; class participation.

### **Literatuur**

To be announced.

### **Doelgroep**

Bachelor political science students and minor political science.

### **Intekenprocedure**

In this course you can not enroll yourself for the tutorials, but you will be assigned by the course coordinator. At the latest in the first week of the course you will find to which tutorial you are assigned in your personal schedule in VUnet.

Note: You do have to register for the course, with the corresponding parts!

## **Research Questions in Bioinformatics**

<b>Vakcode</b>	XB_401081 ()
<b>Periode</b>	Periode 2+3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. ir. K.A. Feenstra
<b>Examinator</b>	dr. ir. K.A. Feenstra
<b>Niveau</b>	300

### **Doel vak**

- kennismaken met 'echt' wetenschappelijk onderzoek
- formuleren van een onderzoeksvraag & hypothese
- zelfstandig 'diep' gaan in een specialistisch onderzoeksonderwerp
- het onderzoek in context plaatsen

## **Inhoud vak**

Benieuwd naar wat onderzoek nu eigenlijk is? Hier ga je echt de diepte in. Maak kennis met hoe wij onderzoek doen, hoe je relevante wetenschappelijke literatuur vindt en leest, en hoe je aan anderen uitlegt wat het onderzoek nu eigenlijk opgeleverd heeft.

Onderzoek binnen de Bioinformatica richt zich op het ontwikkelen van (computationele) methodes om biologische experimenten te begrijpen, en biologische functie te voorspellen. Je zult tijdens dit project ontdekken waarom Bioinformatica van groot belang is voor o.a. medisch onderzoek.

## **Onderwijsvorm**

Op het onderwerp van je keuze ga je de volgende vier onderdelen doen, die elk ongeveer een week tijd kosten:

1. je krijgt van een van onze promovendi een recent paper om in te duiken. Hierdoor kijkt je mee met het onderzoek waar de promovendus op dit moment mee bezig is (je gaat zelf niet mee werken). De focus is op het begrijpen van de onderzoeksvraag.
2. je duikt dieper het onderwerp in aan de hand van twee of drie extra papers. De focus is op het zien hoe de onderzoeksvraag op verschillende manieren aangepakt wordt (in de verschillende papers).
3. je schrijft een kort populair-wetenschappelijk artikel waarin je de context van het onderzoek schetst en de onderzoeksvraag uitdiept.
4. je maakt een poster om te presenteren voor de groep.

## **Toetsvorm**

- [25%] populair wetenschappelijk artikel in 1000 woorden, met daarin kort geformuleerd de onderzoeksvraag, een review van de geraadpleegde literatuur, en drie figuren: schematische samenvatting onderzoeksmethode en tenminste een met resultaten/grafiek.
- [25%] beoordeling van artikelen van de andere studenten (peer-review).
- [25%] een poster gebaseerd op het artikel, waarin de peer-review feedback meegenomen wordt.
- [25%] presentatie (10 minuten) van je poster, met discussie.

## **Literatuur**

\* Cursusmateriaal op

[www.ibi.vu.nl/wiki/?w=Research\\_Questions\\_in\\_Bioinformatics](http://www.ibi.vu.nl/wiki/?w=Research_Questions_in_Bioinformatics)

\* Geselecteerd artikelen ter bestudering en presentatie.

## **Doelgroep**

dit vak is alleen open voor studenten in de minor Bioinformatics and Systems Biology

## **Overige informatie**

Dit vak loopt in periode 2 en 3, maar is daarbinnen in principe vrij te roosteren (individueel werk). De peer review zal in Periode 2 of 3 plaatsvinden, afhankelijk van de aanmeldingen en wensen van studenten. De presentaties zullen gegeven worden aan het eind van Periode 3 (laatste week januari). Een mogelijke tweede ronde, afhankelijk van het aantal aanmeldingen, zal plaatsvinden eind Periode 2 (december, laatste week voor de kerstvakantie).

Om te starten moet een afspraak gemaakt worden met de coördinator van het vak, en in overleg met de coordinator van de minor Bioinformatics and Systems Biology. In verband met de onderzoekscomponent, zullen delen van de cursus in het Engels gegeven worden.

Dit vak maakt deel uit van de Minor Bioinformatics and Systems Biology.

Docenten: prof.dr. J. Heringa, dr.ir. K.A. Feenstra, dr. S. Abeln (en anderen).

## Research Tutorial

<b>Vakcode</b>	L_GABAALG014 ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	prof. dr. F.A. van Lieburg
<b>Examinator</b>	prof. dr. F.A. van Lieburg
<b>Docent(en)</b>	prof. dr. F.A. van Lieburg
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	300

### Doel vak

Individual deepening of your expertise in one of the fields you have studied in the other minor courses.

### Inhoud vak

Dependent on your personal choice under supervision of your teacher.

### Onderwijsvorm

Self tuition by reading and writing under supervision of your teacher.

### Toetsvorm

Paper.

### Vereiste voorkennis

Completed other courses in the minor History.

### Doelgroep

All BA3 students.

### Overige informatie

This research tutorial is part of the minor History.

## Revalidatie

<b>Vakcode</b>	B_REVAL (900412)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	prof. dr. T.W.J. Janssen
<b>Examinator</b>	prof. dr. T.W.J. Janssen
<b>Docent(en)</b>	prof. dr. T.W.J. Janssen
<b>Lesmethode(n)</b>	Hoorcollege, Practicum

**Doel vak**

Na het volgen van deze cursus

- Is de student bekend met relevante begrippen, concepten en modellen uit de revalidatie, ook in de context van arbeidsreïntegratie en hulpmiddelproblematiek.
- Toont de student inzicht in de problematiek van speciale groepen in de context van revalidatie.
- Is de student in staat tot een kritische analyse van een probleem uit de revalidatie, arbeidsreïntegratie of hulpmiddelproblematiek.

**Inhoud vak**

Revalidatie is te omschrijven als 'het gecoördineerd en gecombineerd gebruik van maatregelen op medisch, sociaal, arbeidstechnisch en onderwijskundig terrein die de gehandicapte op de voor hem/haar optimale plaats in de samenleving moet helpen'. Bij uitstek een multidisciplinaire teamprestatie. In deze cursus zullen verschillende aspecten van deze multidisciplinaire aanpak besproken worden, waarbij de verschillende disciplines aan bod komen bij het revalidatieproces van o.a. mensen met een dwarslaesie en niet-aangeboren hersenletsel. Daarnaast zal de vraag worden gesteld welke consequenties een functionele beperking heeft voor o.a. arbeidsparticipatie en hulpmiddelgebruik. De (mogelijke) rol van de bewegingswetenschapper binnen de revalidatie zal ook bediscussieerd worden.

**Onderwijsvorm**

Deze module bestaat uit twee onderdelen: enerzijds een reeks bijeenkomsten (hoorcolleges, een workshop en een bezoek aan een revalidatiecentrum) anderzijds is er een groepsopdracht. De cursusomvang is 6 erts (168u), waarvan de uren per student als volgt zijn verdeeld over beide onderdelen: collegebijeenkomsten (14x2u), workshops en bezoek revalidatiecentrum (12u), tentamen (2u), de uitwerking van de groepsopdracht (78u), plus tot slot de college- en tentamenvoorbereiding (48u). De groepsopdracht wordt uitgevoerd in viertallen, waarin de wetenschappelijke onderzoekscyclus wordt uitgewerkt en doorlopen aan de hand van een typisch probleem in de context van de revalidatie. De opdracht wordt afgerond met een werkstuk en een referaat tijdens een reeks afsluitende colleges.

**Toetsvorm**

Toetsing vindt plaats aan de hand van de praktijkopdracht (werkwijze en verslag) en een afsluitend schriftelijk meerkeuzetentamen. Beide onderdelen tellen voor 50% in het eindoordeel, waarbij de deeltijfers niet lager mogen zijn dan een 4.5 (afgerond). De collegestof en hand-outs en een aantal hoofdstukken uit het boek Revalidatie voor Volwassenen vormen het tentamenmateriaal.

**Literatuur**

J.H.B. Geertzen, G.G. Vanderstraeten & J.S. Rietman. Revalidatie voor volwassenen. Jaar 2014. ISB 9023250796.  
Handouts en reader.

**Intekenprocedure**

De indeling van werkgroepen/(computer)practica/tutorgroepen etc. vindt plaats via Canvas.

### Overige informatie

Er wordt uitgegaan van latente kennis rond revalidatie op het nivo van het 1ste & 2 de jaar van de opleiding bewegingswetenschappen (Inleiding Bewegen en Gezondheid, Pathologie van het Bewegen en de readers)

## Robot Law and Artificial Intelligence

<b>Vakcode</b>	R_RLAI ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Rechtsgeleerdheid
<b>Coördinator</b>	dr. mr. M. van der Linden
<b>Examinator</b>	dr. mr. M. van der Linden
<b>Docent(en)</b>	prof. dr. A. Lodder
<b>Lesmethode(n)</b>	Hoorcollege, Leergroep
<b>Niveau</b>	200

### Doel vak

Robot Law and Artificial Intelligence focuses on the societal impact of technological constructs such as intelligent software, robots, drones and nano-bots. The student will learn and understand the profound influence that the autonomous and intelligent technological constructs may have on society, as well as the ethical consequences and legal implications thereof. The student will be able to develop an academic, sound judgement on the future of a robotic society from an ethical and legal perspective. The student will be able to analyze and critically evaluate the legal-ethical dimensions of issues relating to the use of intelligent software, robots, drones and nano robots.

### Inhoud vak

For long Robots and Artificial Intelligence used to belong to science fiction movies and stories as well as was discussed in theoretical academic and popular articles. In recent years both Robots and Artificial Intelligence gradually but strongly is moving away from theory and entering our daily lives. This course focuses on those practical developments, and what role law and ethics play. We do not stick to present technology, but include profecies on how society may change in the not so far off future and what we can and should do about it.

### Onderwijsvorm

Lectures and tutorials

### Toetsvorm

Assignments

### Literatuur

Made available via electronic learning environment, e.g. parts of Robot Law (2016) edited by Calo, Froomkin & Kerr

### Doelgroep

Apart from regular students, the course is also available for:  
Students from other universities/faculties

Contractor (students who pay for one course).

## Schrijvershuisbezoeken

<b>Vakcode</b>	L_NNBAALG002 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. J.H.C. Bel
<b>Examinator</b>	dr. J.H.C. Bel
<b>Docent(en)</b>	dr. J.H.C. Bel
<b>Lesmethode(n)</b>	Excursie, Werkcollege
<b>Niveau</b>	300

### Doel vak

Elk van de bezoeken wordt in de daaraan voorafgaande week grondig voorbereid op basis van de lectuur van een of meer werken van deze auteur. Telkens vormt één werk, in combinatie met het zoeklicht 'poëtica', het uitgangspunt voor deze bezoeken. Vragen die aan de orde komen zijn: wat is de literatuuropvatting van deze schrijver? Welke kwesties houden hem/haar bezig? Hoe gaat de schrijver te werk? In hoeverre is het schrijven voor hem of haar een beroep?

### Inhoud vak

Onder leiding van Bas Heijne, de 'vrije schrijver' aan de VU 2017-2018, en Jacqueline Bel wordt een bezoek gebracht aan vier schrijvers.

Elk van de bezoeken wordt in de daaraan voorafgaande week grondig voorbereid op basis van de lectuur van een of meer werken van deze auteur. Telkens vormt één werk, in combinatie met het zoeklicht 'poëtica', het uitgangspunt voor deze bezoeken. Vragen die aan de orde komen zijn: wat is de literatuuropvatting van deze schrijver? Welke kwesties houden hem/haar bezig? Hoe gaat de schrijver te werk? In hoeverre is het schrijven voor hem of haar een beroep?

### Onderwijsvorm

Werkcolleges en huisbezoeken onder leiding van Bas Heijne en Jacqueline Bel. Er worden vier schrijvers bezocht. De namen worden spoedig bekend gemaakt.

### Toetsvorm

Actieve participatie en deelopdrachten (40 procent). Afrondend eindwerkstuk (60 procent). Colleges moeten altijd grondig zijn voorbereid conform de instructies uit de studiehandleiding.

### Literatuur

Een werk van Bas Heijne en van de schrijvers aan wie een huisbezoek gebracht wordt; secundaire literatuur over deze schrijvers en secundaire literatuur over poëtica-onderzoek (Van den Akker/Dorleijn, Sötemann).

### Vereiste voorkennis

Geen, maar het college Meesterwerken uit de wereldliteratuur dient tegelijkertijd gevolgd te worden.

## Doelgroep

De minor staat open voor alle Bachelor-studenten.

## Overige informatie

Aanwezigheid verplicht

# Secure programming

<b>Vakcode</b>	XB_40005 ()
<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. S. Rawat
<b>Examinator</b>	dr. S. Rawat
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	300

## Doel vak

This is an introductory course on information security. The emphasis will be on how to develop applications with security in mind. At the end of the course, students should have be familiar with the following:

1. Importance of security in modern engineering.
2. How common cryptographic primitives work, and why they are essential
3. How bugs can degrade the security of software.
4. Common memory corruptions bugs and their (security) side-effects in software.

## Inhoud vak

The course is devided into the following modules:

- A. Understanding Cryptographic primitives.
  1. Confidentiality, Integrity and authentication (CIA) properties.
  2. Symmetric/asymmetric/stream ciphers.
  3. Digital certificates/signatures.
  4. Cryptographic Hash Functions.
  5. OpenSSL engineering.
- B. Understanding (and avoiding) low-level bugs.
  1. Introduction to C (if needed) and assembly.
  2. Process memory layout.
  3. Buffer overflows.
  4. Integer overflow/format strings.
  5. Bug detection and Mitigation
5. Secure Development lifecycle (SDL).
- C. Special topics in Security (optional).

## Onderwijsvorm

Lectures and practical assignments.

## Toetsvorm

Written Exam (60%). Practical assignments (40%).



## Literatuur

1. Principles of Information Security, By Michael E. Whitman and Herbert J. Mattord.
2. Security Engineering: A Guide to Building Dependable Distributed Systems Book by Ross J. Anderson (free on-line: <http://www.cl.cam.ac.uk/~rja14/book.html>)
3. Online materials (articles)

## Vereiste voorkennis

Knowledge of computer programming, preferably in C.

## Aanbevolen voorkennis

Background in mathematics (number theory), working knowledge of web, python programming language.

## Sensomotorische Coördinatie

<b>Vakcode</b>	B_SENSOCOR ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	prof. dr. A.M.L. Kappers
<b>Examinator</b>	dr. C.E. Peper
<b>Docent(en)</b>	dr. C.E. Peper, prof. dr. A.M.L. Kappers
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Practicum
<b>Niveau</b>	200

## Doel vak

De student is bekend met het soort vragen dat in het onderzoek naar sensomotorische coördinatie wordt onderzocht. De student heeft basale kennis van de neurofysiologische en psychologische aspecten van bewegingscoördinatie, in het bijzonder in relatie tot de sensomotoriek. De student is bekend met enkele belangrijke theoretische benaderingen, experimentele bevindingen en praktische toepassingen.

## Inhoud vak

Bij bewegen staan we zelden stil. We lopen, fietsen, spreken, schrijven, vangen, springen, slaan en schoppen alsof het niets is. Toch gaat het hier, als je er even over nadenkt, om vrij opzienbarende prestaties. Het menselijk lichaam telt meer dan 600 spieren en meer dan 100 gewrichten: daar kunnen heel wat bewegingen mee gemaakt worden, maar hoe maken we juist die ene, gewenste beweging? Dankzij het zenuwstelsel zijn onze bewegingen in de regel goed gestuurd en gecoördineerd, tenzij we te veel hebben gedronken of lijden aan een ziekte die de motoriek ondermijnt. De vraag die in deze cursus centraal staat is hoe de sturing en coördinatie van bewegingen tot stand komen, en welke rol onze sensorische systemen daarbij spelen. De cursus biedt een brede en gevarieerde inleiding in dit veelzijdige onderzoeksterrein. Naast een algemene introductie in de centrale thema's, wordt met name aandacht besteed aan de neurofysiologische en psychologische achtergronden van bewegingscoördinatie. Hierbij komt ook de relatie tussen waarnemen en bewegen ruimschoots aan bod. De stof wordt geïllustreerd aan de hand van concrete voorbeelden van zowel alledaagse situaties als bepaalde ziektebeelden.

## Onderwijsvorm

28 uur/ 14 hoorcolleges  
2 uur/ 1 vragenuurtje  
2 uur/ 1 practicum  
4 uur/ 2 werkcolleges  
20 uur/ verslag schrijven  
4 uur/ voorbereiding practicum en werkcolleges  
10 uur/ 5 web-labs (incl. voorbereiding)  
95 uur/zelfstudie (incl. college- en tentamenvoorbereiding)  
3 uur / tentamen

De contacturen bestaan uit 14 hoorcolleges, 1 practicum, 2 werkcolleges en een vragenuurtje.

De hoorcolleges hebben tot doel de stof in de te bestuderen literatuur nader toe te lichten en met o.a. voorbeelden en opdrachten tot leven te brengen. Aanwezigheid bij de hoorcolleges is niet verplicht, maar de inhoud van de colleges maakt wel deel uit van de tentamenstof. Tijdens het practicum zullen een aantal coördinatiefenomenen aan den lijve worden ondervonden, en aan de hand van opdrachten worden bestudeerd. Naar aanleiding van dit practicum schrijft iedere student een verslag. Tijdens de werkcolleges worden een aantal onderwerpen uit de collegestof nader besproken. Het practicum en de werkcolleges worden uitgevoerd in groepjes van 15-20 studenten. Daarnaast wordt de student regelmatig uitgenodigd tot zelfwerkzaamheid aan de hand web-labs. Hierbij worden opdrachten uitgevoerd via Canvas. Deze opdrachten worden niet behandeld tijdens de colleges. Sommige web-labs fungeren primair als een toets van de beheersing van de gedoceerde stof, terwijl in andere web-labs deze stof verder wordt uitgediept. Iedere web-lab is gedurende ongeveer 1 week beschikbaar. Het practicum, de werkcolleges, de web-labs, en het schrijven van het verslag zijn verplichte cursusonderdelen.

## Toetsvorm

Schriftelijk tentamen met ja/nee-vragen. Het eindcijfer wordt voor 85% bepaald door de score op dit tentamen en voor 15% door het cijfer voor het verslag. Tevens dient het cijfer voor het verslag minimaal een 4 te zijn. Daarnaast zijn uitvoering van de web-labs en actieve deelname aan het practicum en de werkcolleges een voorwaarde om de cursus te kunnen afronden.

## Literatuur

Verplichte literatuur:

- J. Tresilian (2012). Sensorimotor control & learning. An introduction to the behavioral neuroscience of action. Palgrave Macmillan: H1 t/m 4, §5.3, §7.1-2, §8.1, H9, H11, H12. Nadere specificatie van verplichte paragrafen wordt aangegeven in de cursushandleiding.
- Collegedictaat

Geadviseerde literatuur:

- Uit bovengenoemd boek van J. Tresilian: §5.4.2-3, §6.3, §7.3-5 (i.h.b. §7.5.4).

## Intekenprocedure

De indeling van werkgroepen/(computer)practica/tutorgroepen etc. vindt plaats via Canvas.

## Overige informatie

De formateisen en deadline voor het werkstuk worden via Canvas bekend gemaakt.

## Service Science

<b>Vakcode</b>	X_401077 ()
<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. Gordijn
<b>Examinator</b>	dr. J. Gordijn
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	300

### Doel vak

To The overall course objectives are:

- O1. Understand the multi-disciplinary nature of Service Science
- O2. How to Analyze and Design an e-service from both business/economic and IT perspectives
- O3. Reflect through a multidisciplinary lens on the gap between business and IT perspectives as well as on the process of how a business idea is converted to a set IT service solutions.

Considering the following objective, on completion of the course, the students will gain the following competencies:

- C1. Create different e-service (business) ideas and critically assess them. In this way the student will be able to take an informed decision about the e-services based on possible risks and opportunities.
- C2. Exploration of the e-Service idea from a business perspective. In this way the student will be able to further design and develop the e-service idea using different analysis techniques. The student will be able to to analyze and design an e-services from different views.
- C3. Transform the business perspective of the e-service design into a design reflecting the IT perspective. In this way, the student will be able to fully change the perspective and analyze and design the e-service from IT-perspective.
- C4. Assess the gaps between business and IT perspectives of their e-service. In this way the students will be able to verify if the designed IT e-service realizes business idea behind the e-service.

### Inhoud vak

Service science is organized in two tracks: (i) a business track and (ii) an IT track. The business track provides the students with the knowledge of different interpretations of 'service' and economic importance of services, strategic issues related to services as well as approaches to develop services. The IT track deals with a model-based

approach to develop services, as well as service oriented IT development. Special emphasis is given to bridge the gap between business and IT. The students participate in small teams to develop and understand a service from both perspectives. In addition, experts from academia and industry are invited to give guest lectures.

### Onderwijsvorm

Lectures, individual case studies, and group assignment.

### Toetsvorm

Written exam, an integrated assignment, and case studies.

Both the exam and the integrated assignment count for 50% each.

Case studies will be marked as 'passed' or 'failed' only.

Students may fail one case study, but should pass all the others.

In order to pass the course, students should:

- 1) for the exam and the integrated assignment both score 5 or higher, and
- 2) the score for course (65% exam, 35% integrated assignment) should be 6 or higher, and
- 3) at most fail one case study

### Literatuur

Service Management, 8th international student edition, James A. Fitzsimmons, Mona J. Fitzsimmons, Sanjeev K. Bordoloi, 2014

Web Services, Gustavo Alonso, Fabio Casati, Harumi Kuno, Vijay Machiraju, 2004

Additional materials via Canvas

### Aanbevolen voorkennis

Business Modeling & Requirements Engineering

### Doelgroep

3IMM, 3CS, 3LI

### Overige informatie

The maximum number of participants in this course is 30.

## Software Design

<b>Vakcode</b>	XB_40007 ()
<b>Periode</b>	Periode 4
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. I. Malavolta
<b>Examinator</b>	dr. I. Malavolta
<b>Docent(en)</b>	dr. I. Malavolta
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	200

### Doel vak

Learn notations to model software systems. Practice with model-driven reasoning about a piece of software. Develop critical reasoning skills

to select the most appropriate modeling notation and apply it to the (software) problem at hand.

### **Inhoud vak**

Developing real-case software systems is complex; they are large, and their development often starts when it is still unclear what they should precisely do.

The goal of software modeling is to model modern, complex software systems in a systematic manner. The lectures will cover and apply a number of software modeling notations and techniques.

The students will learn which technique is the most appropriate for which problem, how to describe a (software) problem in models, how to use such models to reason about software, and finally how to use models to discuss ideas and plans with other stakeholders so that requirements are clarified and software systems are well understood and developed in a more reliable way.

### **Onderwijsvorm**

Lectures (H). Modeling exercises (W). Weekly presentations (pre).

### **Toetsvorm**

Modeling assignments (in teamwork project) contributing to the final grade, and final written exam. The specific grading rules are explained in the first lecture and are published on Canvas.

### **Literatuur**

- Software Engineering: Principles and Practice, by Hans van Vliet (Wiley & Sons, 2008).
- Learning UML 2.0 - A Pragmatic Introduction to UML, by Russ Miles and Kim Hamilton (O'Reilly, 2006).
- UML @Classroom, by Martina Seidl et al. (Springer, 2015).

### **Vereiste voorkennis**

Object-oriented programming (for instance Java or C/C++)

### **Aanbevolen voorkennis**

Object-oriented programming (for instance Java or C/C++)

### **Doelgroep**

2CS

## **Sportpsychologie**

<b>Vakcode</b>	B_SPORTPSY (900554)
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. R.R.D. Oudejans
<b>Examinator</b>	dr. R.R.D. Oudejans
<b>Docent(en)</b>	dr. R.R.D. Oudejans
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	200

## Doel vak

Studenten beschikken over kennis van en inzicht in de belangrijkste onderwerpen, stromingen en theorieën van de sportpsychologie.

## Inhoud vak

De cursus beoogt de studenten te introduceren in het domein van de sportpsychologie en hen kennis te laten maken met het gebied van de exercise psychology. Aan de hand van het boek 'Sportpsychologie' vindt kennismaking plaats met de belangrijkste onderwerpen van de sportpsychologie. Aan de orde komen:

- sportpsychologie en de relatie van sportpsychologie met 'de' psychologie; de ontwikkeling van de sportpsychologie;
- motivatie, attributie en emotie en sport;
- persoonlijkheid en sport;
- mentale vaardigheden en mentale training;
- coaching;
- sportteams;
- agressie, blessures, burn-out, verstoord eetgedrag en 10.000 uur oefenen;

Daarnaast wordt kort stilgestaan bij mentale voorstellingen.

Kennismaking met de exercise psychology vindt plaats aan de hand van hoofdstuk 18 uit het boek 'Foundations of sport and exercise psychology' van Weinberg & Gould, waarbij onder andere aandacht wordt gegeven aan verschillende modellen van gedragsverandering.

## Onderwijsvorm

De cursus omvat 12 hoorcolleges van elk twee uur en wordt afgesloten met een tentamen. De resterende circa 144 uren zijn voor zelfstudie. Twee van de 12 colleges zijn gastcolleges verzorgd door sportpsychologen die in de praktijk van de sport werkzaam zijn.

## Toetsvorm

Tentamen (waar-onwaarvragen). Het tentamen duurt 2,75 uur inclusief dyslexietijd.

## Literatuur

- Bakker, F.C., & Oudejans, R.R.D. (2012). Sportpsychologie. Nieuwegein: Arko Sports Media (circa EURO 52, 50);
- Weinberg, R.S. & Gould, D. (2007 of 2011). Foundations of sport and exercise psychology (4de of 5de druk), hieruit Hoofdstuk 18, Exercise behavior and adherence, pp. 415-446. Champaign, IL: Human Kinetics.
- Aanvullende literatuur wordt aan het begin van de cursus opgegeven en is opgenomen in de cursushandleiding.

## State, Power and Conflict

<b>Vakcode</b>	S_SPC ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Sociale Wetenschappen
<b>Coördinator</b>	dr. E.B. van Apeldoorn
<b>Examinator</b>	dr. E.B. van Apeldoorn

<b>Docent(en)</b>	dr. E.B. van Apeldoorn
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	100

### Doel vak

This course aims to familiarize students with fundamental political science concepts, especially the concept of power, and apply those concepts in order to gain a better understanding of the recent history of, and contemporary issues in, world politics. After completing the course, students will have:

- Knowledge of different approaches to the concept of power and be able to apply these to the analysis of (contemporary) political issues;
  - An understanding of what 'states' are and how the modern state and the modern states system came into being;
  - Knowledge of some key approaches in political science and an overview of the discipline and major sub-disciplines;
  - Knowledge of and insight into the main developments in the history of world politics from the Peace of Westphalia to the Iraq War and the current era of globalization and the power shift to Asia;
- Be familiar with main patterns of cooperation and conflict between states as well as between non-state actors and be able to understand some of these patterns by the application of key political science concepts and some key approaches within the sub-discipline of International Relations.

### Inhoud vak

The course, which offers a broad introduction to the major concepts of and main approaches in political science, consists of two main parts. After a critical overview of different concepts of power, the concept of the state and contending perspectives on the conflict and cooperation within modern political systems, the course introduces students to contemporary world politics through an overview of international political history from the 17th century to the present. Here we seek to understand history by identifying recurrent patterns of cooperation and conflict not just between states but also involving non-state actors, and by applying some of the concepts and approaches dealt with in the first part of the course. The course will end with a discussion of contemporary issues within the context of a globalized world politics, such as the ongoing War on Terror, the communications revolutions and its impact upon power.

### Toetsvorm

Written examination

### Literatuur

- Nye, J., en D. Welch Understanding Global Conflict and Cooperation: An Introduction. Latest International Edition. Pearson.

- To be announced

### Doelgroep

Bachelor students political science; Pre-Master course students; exchange students

## Statistical Methods

<b>Vakcode</b>	X_401020 (401020)
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<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. D. Dobler
<b>Examinator</b>	dr. D. Dobler
<b>Docent(en)</b>	dr. D. Dobler
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege, Practicum, Deeltoets extra zaalcapaciteit
<b>Niveau</b>	200

### Doel vak

After this course, the student should be:

- familiar with basic principles and techniques of statistics;
- able to apply these principles and techniques to data using the statistical package R;
- able to present results from statistical analyses in a clear, concise way;
- able to interpret and critically evaluate these results.

### Inhoud vak

- Summarising data;
- Basics of probability theory;
- Estimating means and fractions;
- Hypothesis testing for one- and two-sample problems;
- Correlation and linear regression;
- Contingency tables.

### Onderwijsvorm

Lectures (2x2hours), exercise classes (2 hours) and computer classes (2 hours).

### Toetsvorm

Mandatory (group) assignments and exams (midterm and final, both mandatory).

You will work on assignments during weekly computer classes.

### Literatuur

Mario F. Triola "Elementary Statistics" Twelfth Edition (Pearson New International Edition) ISBN 978-1-292-03941-1

### Doelgroep

2CS, 2LI, 2IMM

## Strategic Management of Technology and Innovation

<b>Vakcode</b>	E_BK3_SMTI ()
<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>	prof. dr. ir. J.J. Berends
<b>Examinator</b>	prof. dr. ir. J.J. Berends



<b>Docent(en)</b>	J.T. Hummel MSc
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	200

### Doel vak

Academic skills: In this course students learn to critically evaluate innovation management concepts from academic literature and popular management press.

Knowledge: In this course, students gain theoretical understanding concerning:

- innovation types and the external innovation environment including innovation trajectories, standards, platforms, and ecosystems
- the development of innovation strategies and their operationalization in project selection, collaboration, and protection
- the product development process and organizational conditions for innovation

Bridging theory and practice: The course offers insight in the strategic importance of technological innovation for firms and society, recent developments in technology and innovation, and helps to develop skills to analyze real life cases.

### Inhoud vak

This course focuses on the strategic management of technology and innovation. Innovation refers to the development and implementation of new products, services, processes and business models and many of those innovations are enabled by technological developments. Innovation is crucial for business organizations to stay competitive in ever changing markets. In this course, students learn to understand and apply basic theories behind the processes of technology-based innovation within organizations and their environments, the development of innovation strategies, and the organizational implementation of innovation strategies. Theoretical understanding is applied in a simulation game and real life cases focusing on managerial dilemmas in the management of innovation.

### Onderwijsvorm

Lectures  
Tutorials

### Toetsvorm

Individual assignment  
Group assignments  
Written exam

### Literatuur

- Schilling, M. (2016). Strategic management of technological innovation (5th ed). Boston: McGraw-Hill.
- Selection of academic articles (listed in course manual)
- Lectures, tutorials, and lecture slides

## Structural Policy

<b>Vakcode</b>	E_ME_SP ()
<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. S. Hochguertel
<b>Examinator</b>	dr. S. Hochguertel
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	300

### Doel vak

The objective of this course is to identify, justify, analyze and evaluate policy options to various current economic problems, including issues in the fields of labor markets, social insurance, pensions, development, trade, environment and product market competition. Using problem sets and exercises, along with work on economic data will increase and deepen understanding and help broaching a large number of microeconomic policy fields.

Specific learning outcomes upon completion of this curricular item are:

- ability to formulate the economic rationale for policy intervention in various current economic problems;
- ability to develop policy options from economic theories;
- ability to evaluate existing and potential policy options, both in theory and in practice;
- critical attitude to existing theoretical and empirical policy analysis of current economic problems;
- ability to apply tools of economic modeling;
- ability to interpret economic data.

### Inhoud vak

Structural policy is on top of the agenda when it comes to keeping individual countries on the path to stability and growth. Microeconomic structural reforms (say, in labor and product markets, social security and welfare systems) are often seen as long-run policy measures complementary to short-term macroeconomic stabilization policies.

This course discusses the role of economic policy in the context of both market failures and government objectives to adjust market outcomes. Each problem is analyzed along four different dimensions: (1) statement of the problem, (2) discussion of the rationale for government intervention, (3) policy options, and (4) evaluation of the economic outcomes of the policy in theory and practice.

Current structural economic problems arising in the following fields are prime candidates to be discussed:

- environment: externalities, property rights, tragedy of the commons, taxation, climate policy;
- competition policy and regulation: imperfect competition, market power, cartels, price-discrimination, regulation and de-regulation;
- labor market: unemployment incidence, active labor market policy, taxes and labor supply;
- social insurance and social security: disability insurance, moral hazard, welfare payments, pensions (social security), adverse selection;
- development and trade: analysis of living standards, provision of

legal and political frameworks, trade protection, WTO.

During the course, both theoretical and empirical economic work in policy context is discussed.

### Onderwijsvorm

Lectures; tutorials

### Toetsvorm

Grade is average of problem sets (30 %) and written examination (70%), with written exam grade of at least 5.0.

### Literatuur

Background reference is: Daron Acemoglu, David Laibson and John A. List, 2016, Economics. Harlow, Essex: Pearson Education Ltd. ISBN13: 978-1-292-07920-2.

We further use J. Anthony Cookson, 2010, Intermediate Economics. (20 US\$, ca. 18 EUR), downloadable from [www.lulu.com/cookson](http://www.lulu.com/cookson) as well as various academic papers and ancillary textbook chapters, and/or to be announced on Canvas.

### Vereiste voorkennis

Basic knowledge of math and statistics, as provided in the academic core of any academic program at Vrije Universiteit Amsterdam or equivalent.

### Aanbevolen voorkennis

The course builds on a previous courses in the Minor Economics program, in particular, Foundations of Microeconomics. Familiarity with contents of that course is assumed. Familiarity includes a working knowledge of how to apply economic models in context and how to select and use appropriate graphical tools of analysis.

### Doelgroep

Third-year bachelor students of any major.

### Overige informatie

This course is an integral part of the University Minor Economics; participants gain strongly from attending the entire minor program. This course prepares for Applications in Economic Policy, and has intersections with the course Business Cycles and Stabilization Policy.

## Study and career

<b>Vakcode</b>	X_400633 ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	0.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	O.W. Schrofer
<b>Examinator</b>	O.W. Schrofer
<b>Docent(en)</b>	L. Molenaar
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	200

# Sustainability and Environmental Change

<b>Vakcode</b>	AB_1230 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	dr. A.J.A. van Teeffelen
<b>Examinator</b>	dr. A.J.A. van Teeffelen
<b>Docent(en)</b>	prof. dr. J.C.J.H. Aerts, prof. dr. G.R. van der Werf, prof. dr. ir. P.H. Verburg, dr. A.J.A. van Teeffelen, T.I.E. Veldkamp MSc
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege

## Doel vak

In this course students learn about the environment's pivotal role in achieving sustainable solutions for human development, mainly focused on global environmental problems. After this course, students:

1. can explain key concepts from the natural sciences relevant for the study of sustainability;
2. can characterize key components of the environment, namely water, land and atmosphere, and can explain key processes affecting their characteristics;
3. can explain the role of the environment in socio-environmental systems;
4. can identify methods to quantify the state of the environment, and analyze environmental change;
5. can perform SWOT derived from the environmental conditions for specific sustainability challenges.

## Inhoud vak

The environment plays a crucial role in supporting societies, for example by providing materials, energy, food, clean air, and clean water. Environmental conditions change over space and time, influenced by both natural and human factors. In this course students learn about the environment's pivotal role in achieving sustainable solutions for human development. Starting from the key environmental components water, land and atmosphere, we characterize environmental change and how that leads to other environmental and societal changes. Methods to assess environmental change are addressed and students identify for their specific case studies what strengths, opportunities, weaknesses, and threats are associated to the 'planet dimension'. The course comprises interactive lectures and exercises and is evaluated through an assignment and a written exam.

## Onderwijsvorm

The course is organized in thematic weeks, which provide students with an understanding of the specifics of the dimensions water, land and atmosphere, how these can be studied and how they interact. Each week has 1 to 2 lectures, in parallel to which students develop their assignment. Lectures (H) and assignment are supported by in-class discussions (W), reading material, and exercises.

Lectures (H) 15-20h

Workshops (W) 15-20h

Assignment ~45h

Self study ~80h

### Toetsvorm

The course will be evaluated through

1) Group Assignment (A): SWOT analysis in Planet domain for personal case in the form presentation & working paper (30% of final grade)

2) A closed-book written exam (E) (70% of final grade).

A minimum grade of 5.5 is required to pass the course. There is one resit opportunity for the exam. Assignments with a grade lower than 5.5 can be improved once, after which the maximum grade that can be obtained for the assignment is 6.0.

### Literatuur

- A textbook that introduces the planetary dimensions of sustainability (TBA)

- Selected articles as announce in the course guide (TBA), including:

o De Fries, R. S., Ellis, E. C., Chapin III, F. S., Matson, P. A., Turner II, B. L., Agrawal, A., ... Syvitski, J. (2012). Planetary Opportunities: A Social Contract for Global Change Science to Contribute to a Sustainable Future. *BioScience*, 62(6), 603–606.

<http://doi.org/10.1525/bio.2012.62.6.11>

o Wu, J. (2013). Landscape sustainability science: Ecosystem services and human well-being in changing landscapes. *Landscape Ecology*, 28(6), 999–1023. <http://doi.org/10.1007/s10980-013-9894-9>

- Open data sources, educational software packages, websites, videos etc

### Aanbevolen voorkennis

Grand Challenges (minor Sustainability: Global Challenges, Interdisciplinary Solutions. Period 1)

### Doelgroep

Students following the minor Sustainability: Global Challenges, Interdisciplinary Solutions.

### Overige informatie

The course is coordinated by Dr. Astrid van Teeffelen, and Ted Veldkamp, MSc. Lecturers include Dr. Philip Ward, Prof. Guido van der Werf, Prof. Peter Verburg.

## Sustainable Supply Chain Management

<b>Vakcode</b>	E_IBA3_SSCM ()
<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. ir. D.A.M. Inghels
<b>Examinator</b>	dr. ir. D.A.M. Inghels
<b>Docent(en)</b>	dr. ir. D.A.M. Inghels
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	300

## **Doel vak**

After successfully completing the course Sustainable Supply Chain Management you are able to

### Academic Skills:

- Analyze supply chain problems taking into account interests of different stakeholders (economic, ecological, societal and others) and evaluate (future) performance effects of supply chain policy options.

This type of analysis will support sustainable decision-making.

### Quantitative Skills:

- Quantify the economic, ecological and societal objectives for supply chain management cases by applying and master commonly used techniques to tackle real life sustainable supply chain management problems.

### Knowledge:

- Understand the transition from a linear to a closed loop (circular) economy and its implications for Supply Chain Management

### Bridging Theory and Practice:

- Use a sustainable supply chain analysis framework to assess contemporary topics in sustainable supply chain management and to analyze supply chain management cases.

- Formulate recommendations for improvement of supply chains from a sustainable perspective

## **Inhoud vak**

This course aims to introduce students in operationalizing sustainability in supply chains. We define sustainability as the combined economic, environmental, and social optimum of supply chain alternatives that take into account constraints, such as technological limits or legislation, also known as the triple bottom line (TBL) approach of People-Planet-Profit optimization. Life Cycle Assessment (LCA) is presented as a methodology to quantify the environmental impact of products and processes and Analytic Hierarchy Process (AHP) to quantify social impact. Multi Criteria Decision Analysis is introduced as a concept to operationalize the TBL approach for practical sustainable supply chain problems. Next we discuss systems thinking using Systems Dynamics for understanding and evaluating the complex and interactive behaviour of systems, such as sustainable supply chains. Finally the sustainability evaluation of chains and the management of reverse supply chains will be addressed.

## **Onderwijsvorm**

Lectures and computer tutorials

## **Toetsvorm**

Written exam – Individual assessment

(Interim) Assignment(s) – Group assessment

## **Literatuur**

Readings will be announced via Canvas.

## **Aanbevolen voorkennis**

It is recommended that students are familiar with key concepts and techniques from business or operations management and (business) mathematics.

## **Systems Architecture**

<b>Vakcode</b>	XB_40009 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Exacte Wetenschappen
<b>Coördinator</b>	dr. A. Uta MSc
<b>Examinator</b>	prof. dr. ir. A. Iosup
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	100

### Doel vak

1. Explain the basic concepts, historical objectives, and modern functions of digital computers.
2. Describe the basic architecture and operation of digital computers.
3. Use proficiently binary data representation, number representation, and arithmetic and data conversion.
4. Explain at a proficient level the architecture and operation of each of the main components of a digital computer: the basic processing unit, the hierarchical memory system, the I/O system, and the interconnection system.
5. Explain at a basic level various system mechanisms for building faster single-node systems, such as pipelining and caching, and large-scale systems, such as interconnects and program synchronization.
6. Demonstrate proficiency with basic assembly programming by implementing basic operations of digital computing in realistic scenarios.
7. Analyze at a basic level the tradeoffs inherent in the design of digital computers, concerning among others performance (simple modeling), scalability (Amdahl's Law), availability, energy consumption, and cost.

### Inhoud vak

Computers are everywhere, in industry, academia, governance, and many other activities that impact our society. But what are they? How do they work? How to analyze them and to improve their performance?

Matching the requirements of the IEEE/ACM CS Curriculum 2013, topics for this course include: the architecture, the structure, the operation and the interconnection of computer components into computer systems, including modern architectures, data representation, assembler programming, virtual machines, the structure of translators, compiling and loading, basic operating systems concepts (I/O, interrupt handling, process).

### Onderwijsvorm

Lectures 4h/week  
 Tutorial (Instructie) 2h/week  
 Practical work (Lab) 4h/week, from week 4.  
 Self-study in teams of 4-6 students.  
 This course uses gamification.

### Toetsvorm

(Mandatory) basic lab assignments. Does not award any points. (Turn in to SAs)  
 (Mandatory) final exam, written, multiple choice.  
 (Optional) in-class exercises, oral and written.

(Optional) mid-term exam, written, multiple choice. The results of the mid-term exam count only if the final exam is also taken by the student, and only if it increases the final grade of the student.

(Optional) self-study booklet, hand-written. (Turn in to TA)

(Optional) advanced lab assignments. (Turn in to SAs)

(Optional) bonus lab assignments. (Turn in to SAs)

All partial results (including the lab, and the mid-term and final exams) are only valid during one academic year.

The end grade is the total number of points accumulated across all assessment possibilities scored divided by 1000.

It is possible to score a perfect 10 as final grade.

## Literatuur

### Books

(students can pick any)

Carl Hamacher and Zvonko Vranesic, Computer Organization, 6th edition, McGraw-Hill Education, 2011. ISBN-13: 978-0073380650

Andrew S. Tanenbaum and Todd Austin, Structured Computer Organization, 6th edition, Pearson, 2012. ISBN-13: 978-0132916523

David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, 5th edition, Morgan Kaufmann, 2013. ISBN-13: 978-0124077263

### Additional Study Materials

Course and Lab guides are also provided via Canvas.

## Systems Programming

<b>Vakcode</b>	X_400377 (400377)
<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. A. Bakker
<b>Examinator</b>	dr. A. Bakker
<b>Docent(en)</b>	dr. A. Bakker
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	300

### Doel vak

The goal of this course is to prepare students for lab assignments and scientific research in computer systems (operating systems, compiler construction, network programming, computer networks, parallel programming, etc.) After attending this course, students should be able to develop, test, and debug "systems" programs written in C under Linux or BSD.

### Inhoud vak

The course is a combination of lectures and lab assignments.

During the course, the student is taught how to program in C, use POSIX APIs for process control and networking, understand memory management, use low-level debugging and verification tools, and use performance



profiling tools.

### Onderwijsvorm

7 lectures of 2h, in combination with several lab assignments to be returned during the study period. Extensive help will also be provided by ways of questions and answers sessions (1h), and a discussion mailing list.

### Toetsvorm

The student will be graded based on the lab assignments he or she handed in (i.e., a Practicum). Exact grading scheme announced at the start of the course. There is a resit opportunity later in the year.

### Vereiste voorkennis

- must have studied algorithms (incl. sorting, basic graph processing) and data structures (incl. lists, trees, priority queues);
- must have basic understanding of Unix concepts (directory tree, file permissions, terminal).

### Aanbevolen voorkennis

Prior experience with another language from the C family (eg. Java, Arduino-C, C++, Objective-C, C# or D) is strongly recommended.

### Doelgroep

3CS

### Overige informatie

Registration for this course is also compulsory via Canvas one week before the start. The course will be given in English.

The coordinator and teacher of this course is Arno Bakker ([arno@cs.vu.nl](mailto:arno@cs.vu.nl))

## Talent and Talent Identification

<b>Vakcode</b>	B_TALIDENT ()
<b>Periode</b>	Periode 3
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. D.L. Mann
<b>Examinator</b>	dr. D.L. Mann
<b>Docent(en)</b>	dr. D.L. Mann
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	300

### Doel vak

On the successful completion of this course, students will be able to:

1. Critically evaluate whether skilled athletes are 'born' or 'made' (i.e., evaluate the nature vs. nurture debate in the development of athletic skill);
2. Critically appraise current means of identifying talent and consider newer, more evidence-based methods;
3. Apply knowledge about the typical developmental pathways used to describe how talent develops;
4. Identify environmental factors associated with the development

- of athletic skill;
- Evaluate the ethical considerations inherent in identifying talent from a young age;
  - Critically evaluate existing or new systems established by applied sporting organisations to identify and nurture talent.

### Inhoud vak

The ability to identify and develop talent in potentially skilled athletes is a central role for many coaches, scientists, and sporting administrators. National and professional sporting organisations invest substantial amounts of time and money in establishing systems designed to identify and nurture future talent, yet there is still considerable doubt about how effective these systems may be. This course on Talent and Talent Development will assess what it takes to become a talented athlete, and will uncover what we know about the ideal conditions for developing athletic skill. The course will address the emerging body of research that seeks to evaluate existing talent identification systems and to develop newer, more evidence-based procedures for identifying and developing talent. Further, a number of applied case studies will be examined to discover how these issues have been addressed by professional sporting organisations.

### Onderwijsvorm

The course consists of 12 lectures (18 hours in total), in addition to the expectations of self-study (approximately 114 hours), an assignment (approximately 10 hours total) and a final exam (3 hour duration)

### Toetsvorm

Textbook: Baker J., Cobley S., Schorer, J. (2012) Talent identification and development in sport. International perspectives. Routledge: Abingdon, Oxon

### Overige informatie

As of 2017-18 this course replaces the course 'Talent en Talentontwikkeling'

## Text Mining for Digital Humanities

<b>Vakcode</b>	L_PABAALG004 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. A.S. Fokkens
<b>Examinator</b>	dr. A.S. Fokkens
<b>Docent(en)</b>	drs. E. Maks, dr. A.S. Fokkens
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	200

### Doel vak

In this course, students are trained in systematic text analysis. In particular, we explore the process of identifying and annotating information in historic and contemporaneous texts such as novels, lyrics, letters, newspaper articles, movie scripts, blogs and other other social media texts using manual and automatic methods. They

will learn the implications for the theoretical models and concepts they are familiar with in their own discipline. Students will work on a research project of their choice and annotate them in a interdisciplinary context using different tools and methods. They will apply expert and crowd annotations, develop code-books and compare the results. Finally, they will use a machine-learning program for analyzing text and reflect on the performance of the automatic annotation. We will focus on high-level semantic annotations of, for example, (historic) events, entities and emotions that are of interest to a broader range of humanities and social and computer science students. Students present their findings in a research paper.

### **Inhoud vak**

This module addresses the process of systematic text analysis through human and automatic annotation. Annotations make information that is implicit in data explicit allowing researchers to search their data systematically. This kind of research forces Humanities scholars and social scientists to represent their Interpretation of texts in a data structure. Computer science students will learn about how text mining technologies can be applied in Humanities and Social Sciences. Annotation requires the use of some type of interpretation model and it results in an analysis that can be compared across annotators. As such, annotation can be seen as an important step towards the formalization of humanities and social science as a discipline. The degree to which annotators agree or disagree (the so-called Inter Annotator Agreement) tells us something about the reproducibility of the interpretation process, the matureness of theoretical notions and the criteria used to apply them to real data. Different backgrounds of annotators will lead to different types of annotations. Linguists, (cultural-)historians, social-scientists, and literature-scientists will consider sources and data differently and consequently come to different annotations of the same source/data. The same holds for experts and non-experts. The former are traditionally involved in assigning metadata to sources, the latter do the same in crowd-sourcing initiatives. Finally, annotated data can be used to train machines to do the same. How does this work? Can a machine do better than humans? How do you evaluate this?

### **Onderwijsvorm**

Lecture, Seminar (2 hrs a week each)

### **Toetsvorm**

Paper

### **Literatuur**

To be announced

### **Vereiste voorkennis**

None

### **Aanbevolen voorkennis**

Course: From Object to Data

### **Doelgroep**

3rd year bachelor students, in particular Humanities, Social Science and Computer Science

## Overige informatie

This module is taught at the VU. Module registration at the VU is required.

## The Developing Brain

<b>Vakcode</b>	AB_1059 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Aard- en Levenswetenschappen
<b>Coördinator</b>	dr. M.C. van den Oever
<b>Examinator</b>	dr. M.C. van den Oever
<b>Docent(en)</b>	prof. dr. S. Spijker, dr. R.E. van Kesteren, dr. R.M. Meredith, dr. H.K.E. Vervaeke, dr. M.C. van den Oever
<b>Lesmethode(n)</b>	Practicum, Computerpracticum, Werkgroep, Hoorcollege
<b>Niveau</b>	300

### Doel vak

Students acquire a basic understanding of the various stages of brain development that shape the life of individuals over time.

### Inhoud vak

The brain performs differently at various ages; the young brain being very plastic, whereas the aging brain is gradually losing its adaptive capacity. Importantly, early and late brain development is affected by specific genetic factors and vulnerable to changes induced by environmental factors. These alterations can result in neurodevelopmental and neurodegenerative disorders.

In this course, we will discuss pre- and postnatal brain development. We will first focus on early development and its relation to brain disorders such as autism and mental retardation. Then, we will focus on brain development during childhood and adolescence and discuss issues related to this stage of development, such as sexual orientation, gender identity, schizophrenia and the effects of drugs of abuse (alcohol, nicotine). Lastly, concerning the aging brain, we will discuss healthy brain aging as well as specific diseases of aging, such as Alzheimer's and Parkinson's disease.

### Onderwijsvorm

Lectures (34 hours)

Workgroups (7 hours)

### Toetsvorm

Exam (E; multiple choice questions and open questions): 80%

Academic skills assignment (A): 20%

Compensation: the average grade of both tests combined has to be >5.5.

Students have the option to resit the exam (E).

### Literatuur

"Foundations Of Behavioral Neuroscience" by N.R. Carlson (Pearson Education (US)), 8th edition.

Literature on Canvas.

### Aanbevolen voorkennis

The course 'Cognitive Neuroscience' of the minor 'Brain & Mind'.  
Alternatively, a basic understanding of neurons, neurophysiology and neuroanatomy is required.

### Doelgroep

Students of the minor Brain & Mind.

### Overige informatie

This minor course requires a minimum of 25 participants.

## The Personal is Political: Biography, Gender and Diversity

<b>Vakcode</b>	L_AABAALG068 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. D.G. Hondius
<b>Examinator</b>	dr. D.G. Hondius
<b>Docent(en)</b>	dr. D.G. Hondius, dr. B. Boter, dr. J.C.A.P. Ribberink
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	200

### Doel vak

1. Acquiring knowledge of and insight in the field of historical gender and diversity studies;
2. Acquiring knowledge of and insight in historical research perspectives;
3. Develop academic research skills;
4. Develop writing skills;
5. Develop presentation skills.

### Inhoud vak

"The personal is political", was a well-known rallying slogan in the late 1970s women's movement. Modern historical research acknowledges the impact and influence of the many dimensions that shape individual lives, including gender, sexuality and sexual preference, ethnicity, race, age, religion and class. This seminar explores how these intersecting dimensions are present and influence the lives and biographies of politically engaged personalities, famous or unknown, by studying the genre of the political biography, autobiography and life writing. The seminar sets out with a short series of lectures by experts in the field, followed by writing and research assignments. Students will work at an individual paper, based in a biographical research project of their own choice; suggestions will be available. The course ends with student's presentations of their findings.

### Onderwijsvorm

Seminar (twice weekly), with assignments and several guest lectures . Meetings are scheduled on Wednesday morning and Friday morning, 10.00-12.45.

### Toetsvorm

- Active participation in class including following up the assignments (10%)
- Individual presentation of the outline of the individual research paper and how it links to the common reading in class (15%)
- Final discussion in semi-public seminar (15%)
- Final paper (4000 words) (60%)

Each element has to be satisfactory in order to pass the course.

### Literatuur

Literature will be made available for students in the first week of the course.

### Vereiste voorkennis

Academic skills course (ACVA) passed.

### Doelgroep

BA2 students in History, Humanities, Social Sciences, Philosophy, and Medical Studies.

### Overige informatie

This course is part of the Minor Gender and Diversity.

## Toegepaste Inspanningsfysiologie

<b>Vakcode</b>	B_TIF (900322)
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. J.J. de Koning
<b>Examinator</b>	dr. J.J. de Koning
<b>Docent(en)</b>	dr. J.J. de Koning, dr. R.T. Jaspers, prof. dr. H.A.M. Daanen
<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<b>Niveau</b>	300

### Doel vak

Het uitbreiden van inspanningsfysiologische kennis en het toepassen daarvan op vraagstukken binnen de sport en gezondheid.

### Inhoud vak

De verhoogde energiebehoefte van het musculaire systeem als gevolg van fysieke activiteit vraagt van verschillende fysiologische mechanismen een zodanige actie dat homeostase van het interne milieu behouden blijft.

Het cardiovasculaire en respiratoire systeem spelen hierin een cruciale rol. De mogelijkheid van deze systemen om in te spelen op de belasting bepaalt in hoge mate de inspanningstolerantie en/of gezondheid van het individu. Er zijn vele factoren die het functioneren van het cardiovasculaire en respiratoire systeem beïnvloeden. Te denken valt aan trainingstoestand, voeding, klimaat, hypo- en hyperbare omstandigheden en sportspecifieke omstandigheden. Daarnaast hebben chronische aandoeningen aan de verschillende systemen grote invloed op de

inspanningstolerantie. Ten grondslag aan het functioneren van het musculaire-, cardiovasculaire- en respiratoire systeem liggen de moleculair biologische processen die aanmaak en afbraak van eiwitten reguleren. Inzicht in deze processen maakt duidelijk hoe training en adaptatie aan veranderende omstandigheden werkt. Om de skeletspieren en het cardio-respiratoire systeem goed te laten functioneren is naast training een gebalanceerde voeding noodzakelijk. Aangepaste voeding kan zelfs resultaten van training en herstel bevorderen. In deze cursus wordt aandacht besteed aan factoren die de inspanningstolerantie bepalen, de moleculair biologische processen die trainingseffecten reguleren en de rol van voeding in training en herstel. De aandacht zal liggen op hoe deze kennis toegepast kan worden binnen sport en gezondheid. De cursus bevat practica waarin de student vertrouwd wordt gemaakt met de interpretatie van integratieve cardio-pulmonaire inspanningstesten, de thermofysiologie en moleculaire technieken.

### Onderwijsvorm

De stof wordt aangeboden in de vorm van hoorcolleges in combinatie met practica. Totaal 168 uur, waarvan 42 uur hoorcollege, 12 uur practicum, 111 uur zelfstudie en 3 uur tentamen.

### Toetsvorm

tentamen

Schriftelijke tentamen met open vragen en meerkeuze vragen. De practica zijn verplicht.

### Literatuur

McArdle, Katch and Katch. Exercise Physiology: Nutrition, energy and human performance. Williams & Wilkins, ISBN 1-6083-1859-1, 7th or 8th edition, 2010/2014.

Molecular Exercise Physiology: an introduction. Edited by Henning Wakerhage. Routledge, 2014, ISBN 978-0-415-60788-9.

Burke & Deakin. Clinical Sports Nutrition. McGraw-Hill Education, ISBN 100070277206, 5th edition.

Materiaal aangeboden via Canvas.

### Vereiste voorkennis

- 900115: Inleiding inspanningsfysiologie (deze kennis wordt bekend verondersteld.)

- 900225: Training en prestatie (voorheen Trainingsfysiologie, code 900210 deze kennis wordt bekend verondersteld)

### Aanbevolen voorkennis

De student moet beschikken over basiskennis van de inspanningsfysiologie (energiesystemen, cardio-pulmonair systeem, training).

### Intekenprocedure

De indeling van werkgroepen/(computer)practica/tutorgroepen etc. vindt plaats via Canvas.

## Urban Studies

<b>Vakcode</b>	S_UBS ()
<b>Periode</b>	Periode 1+2+3

<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Sociale Wetenschappen
<b>Coördinator</b>	dr. F. Colombijn
<b>Examinator</b>	dr. F. Colombijn
<b>Docent(en)</b>	dr. F. Colombijn
<b>Lesmethode(n)</b>	Hoorcollege, Studiegroep
<b>Niveau</b>	300

### **Doel vak**

Knowledge and Understanding. After having completed this course, the student has acquired knowledge and understanding of:

- (1) key concepts in urban anthropology;
- (2) the ways in which urban development and sustainable development are intertwined.

Application of knowledge and understanding. After having completed this course, the student has acquired the competences to:

- (1) apply key concepts from urban anthropology to an ethnographic research in public spaces in Amsterdam;
- (2) combine and compare key concepts in urban anthropology in a written argument.

Attitude. After having completed this course, the student demonstrates:

- (1) the ability to work in small research teams to carry out a small ethnographic research project;
- (2) to report about the research projects in verbal and written form.

### **Inhoud vak**

Cities around the world are centres of economic development, attracting domestic and foreign investors, visitors, and high-skilled and low-skilled migrants. Locked in a global competition for investments, cities need to be developed in a way that they are attractive to investors and become socially and ecologically sustainable. Social sustainability requires that different actors get their fair place in the city, in terms of income opportunities, and a space to dwell, meet, express oneself, and work. Ecological sustainability requires that cities reduce their ecological footprint, compensate environmental damage to the planet, and reuse as many resources as possible. Taking urban space as the focus of our attention in this course, we will go into politics, inequality, lifestyles, and liveability.

### **Onderwijsvorm**

lectures and tutorials

### **Toetsvorm**

written exam (50%) and joint research paper (50%).

### **Literatuur**

To be announced on Canvas.

### **Aanbevolen voorkennis**

There are no requirements, but ideally students have completed the courses Political and Economic Anthropology, and Development and Globalization (for BSc CAO and minor Anthropology), or Development and Globalization and Identity, Diversity and Inclusion (Minor DGC).



## Doelgroep

Bachelor 2 Culturele Antropologie en Ontwikkelingssociologie; Minor Anthropology; Minor Development and Global Challenges; open as elective course to other students.

## Overige informatie

This course fits into several programmes. It is part of the Bachelor Culturele Antropologie en Ontwikkelingssociologie; it is the closing of the theme block "Development", but in time follows directly on two courses from the theme block "World Making" (in particular Identity, Diversity and Inclusion, and Nation and Migration). The themes of these courses –politics, inequality, development, globalization, diversity, identity, migration– all return in Urban Studies. In the same vein, Urban Studies is the closing of the minor Development and Global Challenges. For students of the minor Anthropology, the most memorable element will be their first experience with ethnographic fieldwork. While Urban Studies is integrated in all these programmes, the course can also be taken as an elective course of its own. It is the only course on Urban Studies offered in the Faculty of Social Sciences of Vrije Universiteit Amsterdam and it is especially interesting to exchange students who wish to get to know Amsterdam better.

Note that students are expected to attend three meetings of the "studielint" in November-December (all students) and in September-October (only students of the Bachelor Culturele Antropologie en Ontwikkelingssociologie and the minor Anthropology).

## Visualizing Humanities and Social Analytics

<b>Vakcode</b>	L_AABAALG066 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. H.M.E.P. Kuijpers
<b>Examinator</b>	dr. H.M.E.P. Kuijpers
<b>Docent(en)</b>	dr. J.W.H.P. Verhagen, prof. dr. I.B. Leemans, dr. H.M.E.P. Kuijpers
<b>Lesmethode(n)</b>	Werkcollege
<b>Niveau</b>	300

## Doel vak

- Students will become familiar with the concepts of data visualization in Digital Humanities and Social Analytics, and acquire practical skills in data visualization techniques such as graphs and digital maps.
- Practical skills will include: processing of spatial data and creating appealing map visualizations in Google Earth, QGIS, ESRI Story Maps and other map services; and the quantitative analysis of textual data (e.g. (social) media data) through AmCAT and R.
- Students will learn to critically reflect on the implications of the selection, structuring and manipulation of data as well as the choice of visualization techniques to present the outcomes of research projects.
- Students will learn to position their own work in the field of Digital Humanities and Social Analytics.

- Students will learn to apply their knowledge by developing their own research projects around a given dataset.
- Students will learn to collaborate in an interdisciplinary group, manage group processes, and communicate their results to an audience of peers and teachers.

### **Inhoud vak**

This course will offer practical training in digital visualization techniques, placed in the broader scope of Digital Humanities and Social Analytics. Visualization of data plays an important role in exploring and analysing quantitative data deriving from large and complex datasets, such as relational databases and text corpora varying from 17th century literature to newspaper archives to tweets. Visualizations can be used both to present the end results of research projects as well as to support all phases of the hermeneutic cycle of questioning, searching, aggregating and analysing data. They may reveal patterns and provide leads for new research questions. In this course students will become familiar with a number of visualization tools and learn to reflect critically on the way they can be used.

An important part of the classes will entail practical training in the processing of spatial and textual data. This course invites you to choose a personal research topic and will teach you basic practical skills in digital mapping and other visualisations to use in your own research. Digital mapping is a powerful visualization tool for both social science and humanities students who study events in space and time. The visualization of textual data will help you to manage and analyse large corpora of texts. You will define and investigate a research question, learn how to create and structure data and how to uncover patterns in your data through visualization. At the end of the course you will be able to use attractive visualizations to present your research results in both oral and written communications.

### **Onderwijsvorm**

Seminar, 2x2

### **Toetsvorm**

Participation, assignments and presentation (40%), research paper (60%)

### **Literatuur**

T.B.A.

### **Aanbevolen voorkennis**

This course is designed for students who study the minor Digital Humanities and Social Analytics. For other students it would be helpful to familiarize with the basics of digital data in advance. Please contact the instructors for more information and advice.

### **Doelgroep**

Students of the UvA & VU faculty of Humanities and Social Sciences, international exchange students as well as students of Informatics (UvA) and Computer Science (VU).

### **Intekenprocedure**

This course is part of the joined UvA/VU Minor Digital Humanities and Social Analytics. This module is taught at the VU. Module registration at the VU is required for UvA students.

## Overige informatie

This course is part of the minor Digital Humanities and Social Analytics. This module is taught at the VU. Module registration at the VU is required.

## Web Technology

<b>Vakcode</b>	X_400488 ()
<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.R. van Ossenbruggen
<b>Examinator</b>	dr. J.R. van Ossenbruggen
<b>Docent(en)</b>	dr. J.R. van Ossenbruggen
<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<b>Niveau</b>	100

### Doel vak

Everyone uses the Web, but how was it originally built, how has it evolved to what it is now, and how might it further develop in the future? This course will introduce you to the key ideas, languages and protocols underlying the Web, including URI, HTTP, HTML, CSS and JavaScript. You will develop the skills you need to apply these techniques to create basic Web content yourself, and to systematically validate and assess more advanced Web content made by others.

These techniques constitute the basis building blocks of the Web as it is today, and understanding how they are related will also help you understand future developments. You will learn how to master new topics by finding your own learning materials on the Web and how to assess their relevance and trustworthiness. At the end of the course, you have communicated the results of your assessments in a (oral) presentation to your peers, and have written both a technical report and a short news article for the general public.

While the course is primarily focused on technological aspects, as a professional in academia or industry, you need to be able to relate technological developments to relevant trends in science and society in general. In this course you will assess the impact of Web technology on important issues such as privacy and security concerns; copyright, cybercrime and other legal aspects; accessibility and net neutrality; social media usage and Web ethics.

### Inhoud vak

During the course, you will:

- create your own HTML content and formally validate it on syntactical correctness
- create your own CSS style sheets to render the same HTML content differently on different devices
- apply JavaScript code made by others and use it to enrich the interactive behavior of your own Web content, and learn how to debug such applications
- build a full-text search engine in the R toolkit

- build a Web server with a RESTfull HTTP API
- write a technical report in which you evaluate a third-party website on international accessibility criteria
- present the evaluation results to your peers

### Onderwijsvorm

Lectures (4x2 hours p/week), practical sessions (2x4 hours p/week), assignments, presentation

### Toetsvorm

Written exam, 4 assignments

### Literatuur

Provided online via Canvas

### Aanbevolen voorkennis

A introductory programming course

### Doelgroep

1CS, 1LI, 1IMM

## Wetenschapsfilosofie

<b>Vakcode</b>	W_BA_MWET ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Nederlands
<b>Faculteit</b>	Faculteit der Geesteswetenschappen
<b>Coördinator</b>	dr. ir. G.J. de Ridder
<b>Examinator</b>	dr. ir. G.J. de Ridder
<b>Docent(en)</b>	dr. ir. G.J. de Ridder
<b>Lesmethode(n)</b>	Hoorcollege
<b>Niveau</b>	300

### Doel vak

- Studenten verkrijgen kennis van en inzicht in diverse basisconcepten, problemen, en discussies uit de wetenschapsfilosofie.
- Studenten verwerven vaardigheden om de diverse standpunten in de besproken wetenschapsfilosofische debatten kritisch te evalueren.
- Studenten leren wetenschapsfilosofische aspecten van maatschappelijke discussies over wetenschap, wetenschapsbeleid en de rol van wetenschap in de maatschappij te herkennen en leren hun kennis van wetenschapsfilosofie toe te passen op deze discussies teneinde beredeneerde standpunten in te kunnen nemen.
- Studenten ontwikkelen hun mondelinge en schriftelijke argumentatie- en uitdrukingsvaardigheden verder.

### Inhoud vak

In dit vak komen centrale thema's uit de wetenschapsfilosofie aan bod, zoals wat wetenschap onderscheidt van niet-wetenschap (het demarcatieprobleem), de aard van wetenschappelijke verklaringen, of wetenschappelijke theorieën ons kennis over de objectieve structuur van de wereld opleveren, de rol van waarden in wetenschap, de bredere verantwoordelijkheden van wetenschappers en de eventuele grenzen van wetenschap.

Deze thema's zullen behandeld worden aan de hand van klassieke en recente literatuur uit wetenschapsfilosofische boeken en tijdschriften. Behalve om het verkrijgen van basiskennis over de wetenschapsfilosofie, draait dit vak ook om het kritisch leren reflecteren op wetenschap en de rol van wetenschap in de maatschappij. Daarom zullen we in de colleges ook steeds zoeken naar concrete toepassingen van de behandelde stof in de actualiteit.

### **Onderwijsvorm**

Interactieve hoor- en werkcolleges.

### **Toetsvorm**

- Twee individuele thuisopdrachten naar aanleiding van de te bestuderen stof (50%)
  - Schriftelijk tentamen (50%)
- Voor beide onderdelen moet een voldoende (>5,5) worden behaald.

### **Literatuur**

De literatuur bestaat uit twee delen: (1) kernartikelen die de docent beschikbaar zal maken en (2) een achtergrondtekstboek naar keuze.

(1) De kernartikelen komen uit klassieke en recente wetenschapsfilosofische boeken en tijdschriften en zullen gaan over de bovengenoemde thema's.

(2) Eén van de volgende tekstboeken fungeert als achtergrondtekst. Lezing ervan is niet verplicht, maar wel sterk aanbevolen om een beter overzicht te krijgen over het totale gebied van de wetenschapsfilosofie.

- Lisa Bortolotti, *An Introduction to the Philosophy of Science* (Chichester: Polity, 2008) – een evenwichtige inleiding met aandacht voor de bredere maatschappelijke en morele aspecten van wetenschap;
- Peter Godfrey-Smith, *Theory and Reality: An Introduction to the Philosophy of Science* (Chicago: U of Chicago Press, 2003) – een grondige en goed leesbare inleiding met aandacht voor zowel de klassieke thema's als voor recente ontwikkelingen;
- Samir Okasha, *Philosophy of Science: A Very Short Introduction* (Oxford: Oxford UP, 2002) – een kort maar toch redelijk volledige overzicht van het veld;
- Alex Rosenberg, *Philosophy of Science: A Contemporary Introduction*, 2nd ed. (London: Routledge, 2005) – ook een grondige inleiding waarin alle klassieke thema's goed uiteengezet worden.

### **Vereiste voorkennis**

geen

### **Doelgroep**

Studenten van de minor Filosofie; premasterstudenten