



MA Oncology

Vrije Universiteit Amsterdam - VUmc - M Oncology - 2013-2014

This study guide contains information on the Master's Programme in Oncology provided by the VU University medical center (VUmc) for the academic year 2014/2015. Please note, that all forms and recent announcements are also available on the faculty website from the 1[Missing ITEM: sup] of September of the academic year 2014/2015.

Aim of the study programme

Cancer is one of the main causes of death in the Western world. In our ageing society the number of cancer patients continues to rise, since the incidence of the disease is highest among the elderly. Research in order to prevent, diagnose and treat this disease is therefore of vital importance. The same applies to research into the causes of cancer and the long-term effects of treatment. Cancer research is multidisciplinary and takes place within a global network. A researcher in such a demanding environment needs to be well equipped.

The Master's Programme in Oncology aims to transfer the unique combination of fundamental and translational oncology research at the VUmc to the next generation of students. The programme is research-oriented and has a multidisciplinary character. Students are trained in state-of-the-art techniques in cancer research and therapy. The programme also aims for education of skills for being able to develop, organize and perform oncological research.

Structure of organisation

Within the VUmc, all educational activities are coordinated by the VUmc School of Medical Sciences. The programme director and master coordinator of the Master's Programme in Oncology take care of the organisation and gearing of the curriculum. The master in Oncology has its own examination board and a programme committee. The programme committee advises the executive board of the VUmc, the director of the VUmc School of Medical Sciences and the programme director about the content of the Master's Programme and the quality of execution. The examination board decrees norms concerning admission of students, it makes sure that bachelors comply with the requirements for admission, it decrees the terms concerning examination of different disciplines and it overlooks the results of examinations, internships and theses. Furthermore, the examination board evaluates the combinations of optional courses and internships of each individual student. All compulsory and optional courses are coordinated by different course coordinators. The Master's Programme in Oncology has an Admission Board, which is responsible for the execution of the oncology entry assessment and the selection of the applicants during the admission procedure.

General information about organisation, education, research and patient's care within VUmc can be found on the VUmc website: www.vumc.nl.

For more information please contact:

Dr. Marjan M. van Duist, PhD

Coordinator Master's Programme in Oncology

Telephone: 020-4446345

Email: masteroncology@vumc.nl

Student service desk:

Students can turn to the Student Service Desk with general questions about the graduation, registration for courses and examinations, registration of grades and schedules.

Van der Boechorststraat 7, Room: MF A-114

Summary of requirements and guidelines for participation in items to be examined

Compulsory courses

All students of the Master's Programme in Oncology have to attend the compulsory courses of the programme.

Optional courses

For registration of optional courses students can use VUnet. If registration is not possible by using VUnet (e.g. external courses), the mode of inscription and corresponding e-mail addresses are indicated in each course description.

Students have to have a written consent of the board of examiners, if they want to attend an optional course other than those announced by the Master's Programme in Oncology. A form, to ask for approval for an optional course can be found on the faculty website. Courses attended without the written consent of the board of examiners will not be registered. Possible financial consequences will be recovered from the student.

Practical training periods and study of literature

The board of examiners has to give its approval of all practical training periods and the literature study. Forms and guidelines for practical training periods can be downloaded from the faculty website. Unapproved practical training /literature study periods will not be registered by the educational secretarial office. Possible financial consequences will be recovered from the student.

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Master Oncology - Optional Courses

The optional courses in oncology are intended to deepen the knowledge acquired in the compulsory courses. These options cover both theoretical and practical aspects of oncology. Your choice of courses will depend on your own interests and the focus of your practical training. In principle you will be given the greatest possible freedom to choose, however the board of examiners has to approve your choice.

Vakken:

Naam	Periode	Credits	Code
Advanced Molecular Immunology and Cell Biology	Periode 1	6.0	AM_470656
Biobusiness Course	Periode 3+4	3.0	M_OBIOBUS10
Biophotonics I: Microspectroscopy	Periode 3	3.0	AM_470629
Biophotonics III: Practical Training	Periode 3	3.0	AM_470630
Caput Epigenetics	Ac. Jaar (september)	6.0	AM_470606
Clinical Immunology	Periode 2	6.0	AM_470655
Clinical Oncology	Semester 2	6.0	M_OCLINON04
Extension Practical Training	Ac. Jaar (september)	3.0	M_OEXTENS03
Genomes and Gene Expression	Periode 1	6.0	AM_470614
In the Footsteps of Antoni van Leeuwenhoek	Ac. Jaar (september)	3.0	M_OANTONI03
Infectieziekten en vaccinontwikkeling		6.0	AB_487023
Life Cell Imaging	Periode 3+4+5	3.0	M_CLIFECE09
Macroscopic, Microscopic and Pathological Anatomy of the Mouse	Ac. Jaar (september)	3.0	M_OMACROS03
Protein Science	Periode 1	6.0	AM_470145
Proteomics in Biomedical Research	Periode 3+4+5	3.0	M_CPROTBI09
Radiation Protection Course, Level 5B	Ac. Jaar (september)	3.0	M_ORADPRO04
Research Ethics	Periode 3+4+5, Periode 4	3.0	M_CETHICA09
Science and Communication	Periode 1	6.0	AM_470587
Science Journalism	Periode 2	6.0	AM_471014
The Symbolic and Cultural Meanings of Cancer	Ac. Jaar (september)	3.0	M_OSYMBOL04
Viral Oncogenesis	Periode 4	3.0	M_OVIRONC03

Master Oncology - Compulsory Courses

The first semester of the programme is filled with compulsory courses which will give you the basic knowledge about the main themes in cancer development, research and treatment. The last two courses will help you improve your academic skills. Master Oncology students need to at least positively conclude three of the first four oncology compulsory courses to start their internship or literature study.

Vakken:

Naam	Periode	Credits	Code
Biostatistics	Periode 3	3.0	M_CBIOSTA09
Innovative Tumor Therapies	Periode 2	6.0	M_OITT03
Oncogenesis	Periode 1	6.0	M_OONC03
Tumor Biology and Clinical Behaviour	Periode 2	6.0	M_OTBCB03
Tumor Immunology	Periode 1	6.0	M_OTUMIM10
Writing Scientific English	Semester 2	3.0	M_FWSE09

Master Oncology - Internships

In total, you have to spend 66 EC credit points for two internships: a minor (27-33 EC) and a major (33-39 EC). Both internships have to be performed at a research laboratory, acknowledged by the examination board of the Master in Oncology: The minor internship has to be performed at one of the of the OOA Oncology Graduate School laboratories (including VU/ Vumc, NKI, AMC, Sanquin) the major internship can also be done outside this area. We strongly stimulate students to do an internship abroad, but in all cases the internship needs to be approved by the examination board. All regulations regarding internship and needed forms can be found on www.med.vu.nl. These regulations counts for all students which started their Master's Programme in Oncology in 2012 or later

Vakken:

Naam	Periode	Credits	Code
Major Internship	Ac. Jaar (september)	33.0	M_OMAJORI12
Minor Internship	Ac. Jaar (september)	27.0	M_OMINORI12

Master Oncology - Practical Training

For all students which started their master's Programme in Oncology in 2011-2012 or earlier the following counts:

Your practical training in research skills will count for a total of 69 credits, either in the form of two placements of equal length, or one longer period (up to a maximum of 40 credits) and one shorter period (with a minimum of 29 credits). The first placement should be within the VU or the VU University Medical Center. The other will give you the

opportunity to acquire national or international experience. One must deal with a subject within oncology, while the other can explore an area related to oncological research.

Thesis: The Master's thesis includes the results of your second oncological research project of the internship, integrated with and from the perspective of the knowledge acquired in the compulsory education.

All regulations and forms related to this part of your master can be found on www.med.vu.nl. Except of the differences in total credits for internships all other regulations for internship will count from the 1st of September 2012.

Vakken:

Naam	Periode	Credits	Code
Practical Training 1		29.0	M_OPRACT103
Practical Training 2		40.0	M_OPRACT203

Master Oncology - Study of Literature

Your literature study needs to be approved by the examination board. For approval you need to fill out the approval form for a literature study.

Finish the form as completely as possible to allow the examination board to make a proper assessment of your request. For more information about the Literature study check out the Regulations for Literature Study document and needed forms on the faculty website.

When your literature study is finished and assessed by your examiner you need an assessment form. You also need to give an oral presentation at the department of your supervisor/assessor. The total mark consists of 10% for the research outline, 70% report and 20 % oral presentation. You can find all needed forms and regulations for Literature Study at www.med.vu.nl. After handing in your literature study at the administration office, the report will be reviewed and graded by an independent examiner. The final mark of the written report will be the average of the individual marks for the report given by the examiners.

Vakken:

Naam	Periode	Credits	Code
Study of Literature	Ac. Jaar (september)	9.0	M_OLITSTU03

Advanced Molecular Immunology and Cell Biology

Vakcode	AM_470656 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	prof. dr. M. van Egmond
Docent(en)	Dr. M. van Egmond, prof. dr. R.E. Mebius, dr. T. van der Pouw Kraan, prof. dr. H.E. de Vries, dr. ing. S.J. van Vliet, dr. W.W.J. Unger
Lesmethode(n)	Hoorcollege, Werkgroep

Doel vak

To acquire insight into:

- cellular interactions within the immune system and how molecular diversity is generated to regulate immune responses.
- the various strategies of host immune responses against pathogens, and how pathogens escape proper immune responses.
- the various strategies of the host to positively or negatively affect immune responses during cancer.
- mechanisms by which the immune system regulates either immune activation or tolerance induction.
- the mechanism of cell migration within the immune system.

End terms:

Knowledge: Knowledge: At the end of the course the student is familiar with current knowledge on the (molecular) pathways involved in the induction and regulation of immune responses in health and disease.

Skills:

- The student is capable of applying the acquired knowledge and can interpret scientific literature and scientific hypotheses of each of the topics described above.
- The student is able to formulate a scientific hypothesis and can design a research proposal addressing the hypothesis.
- The student is able to present and discuss the research proposal with peers.

Inhoud vak

Immunology is a rapidly growing field of research in medicine and attracts a lot of attention for its contribution in various diseases such as infection diseases, cancer and auto-immunity. The course will give the student the opportunity to enhance the knowledge on the scientific aspects within the field of immunology. Special focus lies on the immunological processes underlying homeostasis control i.e., tolerance induction, immunity, antigen presentation and processes that lead to the development of inflammatory diseases (infection diseases through pathogens), auto-immunity (neuro-immunology) and cancer. Because this is an advanced course in the field of immunology, and will go into depth, particularly on molecular details, students should be familiar with basic immunology preferably via a previous basic training course in immunology.

Onderwijsvorm

The course covers immunological processes at the molecular level, and consists of lectures and study groups. In the latter part students will read review articles as well as primary scientific articles on the subjects and discuss in groups opposing views on the molecular immunological processes that occur in the different stages of homeostasis and disease control. State of the art will be discussed of all topics, which will facilitate the study of scientific articles. Additionally, there is time for self study as well as time to design a research proposal, which will be presented. The first three weeks include lectures, study groups, self study and preparation and presentation of the research proposal, whereas the last week mainly covers self study and the exam. In the last week, subjects and possibilities of an internship in the field of immunology will be presented.

Contact hours with teachers and/ or coordinators: 45

Toetsvorm

A written exam at the end of week 4 includes assay ('open') and multiple choice questions (85% of grade). The research proposal has to be presented and accounts for 15% of the grade.

Literatuur

Lectures, reviews and scientific papers are part of the material that covers the exam.

Titles reviews and scientific papers (some changes may occur, final list will be posted on BB)

Reviews

1. Rossi M, Young JW. Human dendritic cells: potent antigen-presenting cells at the crossroads of innate and adaptive immunity. *J Immunol*. 2005 Aug 1;175(3):1373-81.
2. Sallusto F, Mackay CR. Chemoattractants and their receptors in homeostasis and inflammation. *Curr Opin Immunol*. 2004 Dec;16(6):724-31.
3. Kumar H, Kawai T, Akira S. Pathogen recognition by the innate immune system. *Int Rev Immunol*. 2011 Feb;30(1):16-34.
4. van de Pavert SA, Mebius RE. New insights into the development of lymphoid tissues. *Nat Rev Immunol*. 2010 Sep;10(9):664-74.
5. De Libero G et al., How the immune system detects lipid antigens. *Prog Lipid Res*. 2010 Apr;49(2):120-7. doi: 10.1016/j.plipres.2009.10.002. Epub 2009 Oct 24.
6. Surana NK, Kasper DL., The yin yang of bacterial polysaccharides: lessons learned from *B. fragilis* PSA. *Immunol Rev*. 2012 Jan;245(1):13-26.
7. Abbott NJ, Rönnbäck L, Hansson E. Astrocyte-endothelial interactions at the blood-brain barrier. *Nat Rev Neurosci*. 2006 Jan;7(1):41-53.
8. Bevan MJ. Helping the CD8(+) T-cell response. *Nat Rev Immunol*. 2004 Aug;4(8):595-602.
9. Drew M, Pardoll. The blockade of immune checkpoints in cancer immunotherapy. *Nature Reviews Cancer* 12, 252-264 (2012)
10. Hansson GK, Libby P. The immune response in atherosclerosis: a double-edged sword. *Nat Rev Immunol*. 2006 Jul;6(7):508-19.
11. Schirmer SH, van Nooijen FC, Piek JJ, van Royen N. Stimulation of collateral artery growth: travelling further down the road to clinical application. *Heart*. 2009 Mar;95(3):191-7.

Research articles

1. Marsland BJ, Bättig P, Bauer M, Ruedl C, Lässig U, Beerli RR, Dietmeier K, Ivanova L, Pfister T, Vogt L, Nakano H, Nembrini C, Saudan P, Kopf M, Bachmann MF. CCL19 and CCL21 induce a potent proinflammatory differentiation program in licensed dendritic cells.
2. Joffre OP, Sancho D, Zelenay S, Keller AM, Reis e Sousa C. Efficient and versatile manipulation of the peripheral CD4+ T-cell compartment by antigen targeting to DNGR-1/CLEC9A. *Eur J Immunol*. 2010 May;40(5):1255-65.
3. Rangel-Moreno J, Carragher DM, de la Luz Garcia-Hernandez M, Hwang JY, Kusser K, Hartson L, Kolls JK, Khader SA, Randall TD. The development of inducible bronchus-associated lymphoid tissue depends on IL-17. *Nat Immunol*. 2011 Jun 12;12(7):639-46.
4. Reboldi A. et al., C-C chemokine receptor 6-regulated entry of TH-17 cells into the CNS through the choroid plexus is required for the initiation of EAE. *Nat Immunol*. 2009 May;10(5):514-23. doi: 10.1038/ni.1716. Epub 2009 Mar 22.
5. Feau S, Arens R, Togher S, Schoenberger SP. Autocrine IL-2 is

required for secondary population expansion of CD8(+) memory T cells. Nat Immunol. 2011 Jul 31;12(9):908-13.

6. Sierra JR, Corso S, Caione L, Cepero V, Conrotto P, Cignetti A, Piacibello W, Kumanogoh A, Kikutani H, Comoglio PM, Tamagnone L, Giordano S. Tumor angiogenesis and progression are enhanced by Sema4D produced by tumor-associated macrophages. J Exp Med. 2008 Jul 7;205(7):1673-85.

7. Medina RJ, O'Neill CL, Sweeney M, Guduric-Fuchs J, Gardiner TA, Simpson DA, Stitt AW.

Molecular analysis of endothelial progenitor cell (EPC) subtypes reveals two distinct cell populations with different identities. BMC Med Genomics. 2010 May 13;3:18.

8. Coffelt SB, Lewis CE, Naldini L, Brown JM, Ferrara N, De Palma M. Elusive identities and overlapping phenotypes of proangiogenic myeloid cells in tumors. Am J Pathol. 2010 Apr;176(4):1564-76.

Vereiste voorkennis

Bachelor's course immunology: solid knowledge on basic immunology is compulsory before the start of the course.

Aanbevolen voorkennis

It is expected that all students are familiar with Parham, The immune system, 3e ed. Garland Science: Chapter 1-9, and 10.12 t/m 10.20 en 10.24 t/m 10.27; 11.1 t/m 11.6 en 11.8 t/m 11.25.

Doelgroep

Students with a keen interest to study immunological processes that form a basis for a variety of occurrences of diseases. In particular those that cover the interaction between host-pathogen, host-tumor and homeostatic control.

Overige informatie

Study groups and active participation are compulsory. A substitution assignment is required when one or more workshops have not been attended, or when participation is judged as unsatisfactory.

Biobusiness Course

Vakcode	M_OBIOBUS10 (311180)
Periode	Periode 3+4
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

Whether scientific discoveries get translated into novel therapeutics or diagnostics, is dependent on many issues. These include such down-to-earth factors as whether a drug can indeed be manufactured at large scale, and careful indication selection and clinical study planning. The goal of the course is to provide insight in the factors that dictate success in present-day development of therapeutics and diagnostics.

Questions that will be addressed are:

- What are the many factors involved in getting from a laboratory discovery to a novel approved medicine, from clinical and regulatory to economic issues;
- How does the pharma and biotech industry access innovation through strategic partnerships with universities and small companies;
- How do entrepreneurial universities contribute to innovation, and turn science into novel medicines and diagnostics.

Inhoud vak

The subjects of the course will include the following:

- General aspects of how several miracle drugs have been developed (Gleevec, Herceptin, Rituxan, Avastin, anti-TNF), from early laboratory research stage to development and clinical proof-of-principle, and the economic and regulatory issues involved;
- General aspects of how certain novel diagnostic tools for staging cancers and for determining drug sensitivity have been developed (for instance for breast cancer, the mamma chip developed by Agendia);
- Impact of careful indication selection and clinical study planning in drug development;
- Regulatory issues regarding drug development, including impact of the European Clinical Trial Directive for Advanced medicinal Therapy Products;
- Examples of a number of VUmc spin-off companies and their activities in drug development and diagnostics;
- Legal and patent issues in technology transfer and partnerships between universities and pharma, biotech and devices companies.

Onderwijsvorm

There will be 24 contact hours, in the form of lectures by the study coordinator and a number of invited lecturers. These will include external experts on molecular diagnostics and regulatory affairs, VUmc colleagues with presentation on their own spin-off companies, and TTO colleagues on legal and patent issues. In addition the course consists of independent learning on the basis of exploring literature and business reports on selected topics, with the intent of preparing a final presentation and report at the end of the course by small groups.

Toetsvorm

The course will be concluded by group presentations on studies of scientific literature and business reports on development of certain drugs and diagnostics. These will be assigned by the course coordinator, and the literature and business studies will also be summarized in short written reports, to be delivered at the end of the course.

Doelgroep

This course is optional for students of the Master Course in Oncology and Cardiovascular research who have completed at least three of the four compulsory courses of their master programme. If enough places are available students from other MSc in life sciences may apply by sending an email to masteroncology@vumc.nl.

Intekenprocedure

Students can register for this course and examinations via vunet.vu.nl (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

Overige informatie

- After the course the students will have thorough knowledge and in depth insight in:
- the scientific, clinical, regulatory and economic issues involved in present-day drug development;
- which party plays which role at all stages from research to development to commercialization;
- the keys to success in translating innovative technologies and therapeutic principles to new drugs and diagnostics.

Use VUUnet to register for this course. If you have any questions or need extra information please contact masteroncology@vumc.nl

Biophotonics I: Microspectroscopy

Vakcode	AM_470629 ()
Periode	Periode 3
Credits	3.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. ir. Y.J.M. Bollen
Docent(en)	prof. dr. ir. E.J.G. Peterman, dr. ir. Y.J.M. Bollen
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

To introduce students into various spectroscopic and microscopic techniques.

Students should know the theoretical principles and the applicability in life sciences of:

- absorption spectroscopy
- fluorescence spectroscopy
- light microscopy
- fluorescence microscopy

Inhoud vak

Optical spectroscopy and microscopy are widely used in cell biology and biophysics. In this course the principles of many of these techniques, including absorption spectroscopy, various types of fluorescence spectroscopy (e. g. polarization, FRET) and fluorescence microscopy (e. g. confocal, TIRF, lifetime imaging) are explained. Their application in modern biophysics and cell biology research is illustrated by a number of (guest) lecturers.

Onderwijsvorm

Lectures (28 hours), group assignment (8 hours), self-study

Toetsvorm

Written exam (75%), oral presentation by group (25%)

Literatuur

Notes, handouts and papers

Doelgroep

MSc students Biology, Biomolecular Sciences, Biomedical Sciences, Medical Natural Sciences, Physical Sciences, Chemistry or related

Overige informatie

Due to largely overlapping contents this course is NOT intended for students who have taken the FEW BSc course "Microscopische beeldvorming (X_420529)".

Practical training in the techniques discussed here is offered in Biophotonics 3, for which Biophotonics 1 is required.

Biophotonics III: Practical Training

Vakcode	AM_470630 ()
Periode	Periode 3
Credits	3.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. ir. Y.J.M. Bollen
Niveau	400

Doel vak

To introduce students into the application of various optical techniques, mainly fluorescence spectroscopy and microscopy.

Students should be able to:

- plan and conduct experiments using optical techniques
- evaluate results on the basis of theoretical knowledge and recent literature
- present their results in short reports and one journal-style paper

Inhoud vak

Optical spectroscopy and microscopy are widely used in cell biology and biophysics. In this course students will obtain hands-on experience with absorption spectroscopy, fluorescence spectroscopy (e. g. FRET and anisotropy) and fluorescence microscopy. The theory behind these techniques is already given in Biophotonics 1, which is required to enter this course. Small groups of students will prepare the experiments, discuss them with the lecturer and carry them out. The group will write a short report on each experiment and one journal-style paper.

Onderwijsvorm

Experiments (± 24 hours) are performed in small groups. Experiments need to be prepared and reports need to be written.

Toetsvorm

Participation during labwork and discussion (individual; 30%); written report (per group; 70%).

Literatuur

Reader (5 euro)

Papers and protocols that will be made available through Blackboard

Vereiste voorkennis

Biophotonics: Microspectroscopy (AM_470629) or Microscopische beeldvorming (X_420529) are required to enter this course.

Doelgroep

MSc students Biology, Biomolecular Sciences, Biomedical Sciences, Medical Natural Sciences, Physical Sciences, Chemistry or related.

Overige informatie

The theoretical background of the techniques used here is discussed in Biophotonics: Microspectroscopy (AM_470629).

Biostatistics

Vakcode	M_CBIOSTA09 (3120003)
Periode	Periode 3
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	dr. B.I. Witte
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

The aim of the course is to introduce several standard statistical methods and the use of the statistical software SPSS to the students.

Inhoud vak

This course focuses on the practical application and interpretation of statistical analyses. A lot of attention is given to regression analysis in case of continuous, dichotomous or survival outcome variables. But also the t-test, the chi-square test and analysis of variance are discussed.

- analysis of continuous outcome variables: t-test, ANOVA and linear regression analysis;
- analysis of dichotomous outcome variables: chi-square test and logistic regression;
- analysis of survival data: Kaplan Meier curves and Cox regression analysis;
- multiple regression analysis: prediction and associations models.

Onderwijsvorm

The course consists of six lectures and exercise classes. In the exercise classes, the students will actively apply the discussed methods to data using the statistical software SPSS.

Intekenprocedure

Students can register for this course and examinations via vunet.vu.nl (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUNet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

Overige informatie

Contact: e.kanters@vumc.nl

Caput Epigenetics

Vakcode	AM_470606 ()
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. J.M. Kooter
Niveau	500

Doel vak

Acquiring knowledge and insight of

- Chromatin structure and its dynamic nature
- Epigenetic mechanisms of transcriptional regulation and genome maintenance
- Somatic and transgenerational inheritance of epigenetic marks and consequences
- Processes in human, animals, plants, fungi, and/or bacteria involving epigenetic mechanisms (depends on student's MSc)
- Human diseases, including cancer, due to defective epigenetics
- Importance of epigenetics in the 'Nature - Nurture' debate
- Experimental approaches and techniques to study epigenetics

Inhoud vak

- Non-Mendelian inheritance of traits
- Biochemistry of DNA methylation and de-methylation
- Biochemistry of histone modifications and chromatin structure
- Composition of chromatin and chromatin remodeling
- Somatic and gametic cell inheritance of epigenetic information
- Cellular memory by means of polycomb-group proteins
- Role of DM&CM in gene expression
- Transposon silencing
- Role of epigenetics in cancer and other diseases
- Role of DM&CM in sex-chromosome inactivation and activation
- Role of DM&CM in gene-dosage compensation
- Role of DM&CM in genomic / parental imprinting
- Epigenetic reprogramming events during mammalian development
- Stem cells, reprogramming and epigenetics
- Role of non-coding RNAs / RNA interference in DM&CS
- Epigenetic effects of diet, nutrition, drugs and environmental factors, including behaviour
- Neurobiology and epigenetics
- Transgenerational effects: inheritance of epigenetic-based traits
- Role of epigenetics in evolution
- Methods to analyze DM&CM

Onderwijsvorm

- Self-study of research and review articles (ca 140 hr)
- Group meetings (1-2 per week) discussing the research and review articles (ca 15 hr)
- Weblectures by experts (ca 10 hr)

Toetsvorm

Written exam

Literatuur

- Review and Research articles accesible via Blackboard.
- Molecular Biology of the Cell by Alberts et al., fifth edition:

Vereiste voorkennis

Bachelor level Genetics and Molecular Biology

Doelgroep

Master students: Biomolecular Sciences, Biology, Biomedical Sciences, Medical Natural Sciences, Pharmaceutical Sciences and Oncology

Clinical Immunology

Vakcode	AM_470655 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. T. van der Pouw Kraan
Docent(en)	dr. C.J.J. Mulder, dr. T. van der Pouw Kraan, dr. B.W. van Oosten, dr. J. Killestein, prof. dr. P. van der Valk, dr. ing. S.J. van Vliet, dr. E.J.G. Peters, H.E. Hulst
Lesmethode(n)	Hoorcollege
Niveau	500

Doel vak

To understand immunopathogenic processes that play a role in the onset and chronicity of three immunological diseases, that cover allergy, auto-immunity and infection diseases, such as celiac disease, multiple sclerosis (MS) and AIDS.

To acquire insight in both clinical parameters as well as basic scientific principles that play a role in these diseases.

To acquire insights in the currently used treatments to reduce disease activity.

To understand the mechanism by which the immune system regulates these diseases, and how one could modify immune response to the benefit of the patient.

To apply the acquired knowledge of scientific literature and scientific hypotheses of each of the topics described above by presenting it to their fellow students.

Inhoud vak

During the course three immunological diseases will be discussed: celiac disease, multiple sclerosis (MS) and AIDS, each for the duration of a week. The week will start with a clinical introduction into the features of the disease by a practicing clinician at the VUmc, who illustrates the symptoms in patients that have these diseases. Based on this introduction questions will be formulated and within small groups students will formulate answers through literature search. During the week more lectures will be given on the immunological mechanisms that play a role during these complex diseases. These lectures highlight molecular immunological tools used, as well as novel strategies such as genomics-proteomics profiling of the disease, the use of animal models that mimic disease, as well as vaccine development and treatment methodology of the diseases. Through self study and searching literature students will try to answer the questions via a written essay of 2-3 pages and an oral presentation for their fellow students,

which is scheduled at Friday.

Onderwijsvorm

The course covers immunological processes as well as clinical parameters both at the molecular as well as the cellular level and will discuss both innate and adaptive immune responses. The course consists of lectures, selfstudy, practica and workshops. Practical works and workshops both are compulsory. In the latter part students will present their answers on questions based on literature searching and reading of reviews as well as the lectures. For the duration of one week one disease will be discussed, whereas the last week covers mainly selfstudy and the exam.

Contact hours

19 hours lectures

15 hours workgroups and presentations

Toetsvorm

Lectures and workshops are compulsory and form part of the material that covers the exam. Active participation in discussion is part of the appraisal (presentations of answers to assay questions account for 10% of the exam). Written exam at the end of week 4 include 15 essay questions (90%).

Literatuur

The immune system by P. Parham 3th edition, Immunobiology by Janeway 7th edition, Case Studies in Immunology: A Clinical Companion (by Geha 6th edition), including a handout which contains recent reviews specialized on the immunological diseases discussed.

Vereiste voorkennis

Bachelors course Immunologie

Doelgroep

MSc students with a keen interest to study immunological processes within the complexity of diseases such as allergy, multiple sclerosis and AIDS.

Overige informatie

External lecturers:

Dr. J. Borghans (UMCU)

Prof. dr. F. Koning (LUMC)

Dr. J. Samsom (ErasmusMC)

Dr. W.A. Paxton (AMC)

Prof. dr. T.B.H. Geijtenbeek (AMC)

Clinical Oncology

Vakcode	M_OCLINON04 (311160)
Periode	Semester 2
Credits	6.0
Voertaal	Engels
Faculteit	VUmc
Lesmethode(n)	Werkgroep
Niveau	500

Inhoud vak

This 4-week course, organized for bachelors medical science students, is aimed at offering in depth education in the field oncology, ranging from basic molecular biology to clinical bedside research, therapy and quality of life. Translation and application of new scientific results into the clinics is a major theme during this course.

By discussion of several tumor types (hematological malignancies, colorectal cancer, lung cancer, breast cancer and head and neck cancer) recent developments in oncology research will be reviewed.

The course will consist of lectures, patient interviews, excursions to the lab and departments VUmc.

Intekenprocedure

For course information please send a e-mail to to Esther Ruhé (e.ruhe@vumc.nl)

Overige informatie

For course information and application: check the website

<http://www.oaa-graduateschool.org/site/courses.html>

or send e-mail to Esther Ruhé (e.ruhe@vumc.nl)

Extension Practical Training

Vakcode	M_OEXTENS03 (311166)
Periode	Ac. Jaar (september)
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	M.M. van Duist
Niveau	500

Overige informatie

This course has 3 or 6 credits

Genomes and Gene Expression

Vakcode	AM_470614 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. J.M. Kooter
Docent(en)	dr. J.M. Kooter
Lesmethode(n)	Hoorcollege, Werkgroep, Overig, Deeltoets extra zaalcapaciteit
Niveau	400

Doel vak

To provide students with the basic features and latest insights and concepts of the various ways gene expression in eukaryotes is regulated. At the end of the course, students have acquired the knowledge and

understanding of the topics listed under Course content.

Inhoud vak

The following topics will be covered:

Genome structure, Transcriptional regulation and Epigenetic mechanisms:

- Genome organization: coding versus non-coding sequences
- Composition and biochemistry of basic transcription machinery
- Transcription initiation, elongation and termination
- Regulatory sequences: promoters, enhancers, suppressors, boundaries
- Application of comparative genomics to identify cis-acting elements
- Epigenetics: Chromatin structure and histone modifications
- Epigenetics: DNA methylation
- Monoallelic gene expression
- Nuclear structure and long range DNA interactions
- Transcription regulation throughout the cell cycle
- Transcription regulation and development
- Regulatory networks: the regulation of regulators
- Cellular memory: establishing and maintaining differentiation status
- Gene expression control in stem cells and differentiation
- Non-coding RNAs and control of gene expression
- Intergenic and antisense transcription
- Techniques and applications

Post-transcriptional regulation

- RNA processing, including alternative splicing and its regulation
- Nucleo-cytoplasmic RNA transport
- RNA stability and degradation pathways
- RNA interference (siRNAs)
- Translation regulation and RNA degradation by micro(mi)RNAs
- RNA-editing
- Riboswitches
- Techniques and applications

Analysis of gene expression

- Human transcriptome
- Single-gene analyses and techniques
- Deep sequencing and micro-arrays

Onderwijsvorm

- Lectures, including lectures by guest speakers who are working in a particular field of research discussed in the course (ca 45 hr).
- Weblectures by experts (ca 6 hr)
- Self study (ca 110 hr)

We aim for a highly interactive atmosphere.

Toetsvorm

Two 'written' exams with open and closed questions (multiple choice (MC)): one at the end of week 2 (only MC), which contributes 40% of end grade, and the second at the end of week 4 (MC and open questions), which contributes 60%.

Literatuur

- Book: Molecular Biology of the Cell by Alberts et al., 5th edition: Chapters on chromatin structure, transcriptional and post-transcriptional regulation of gene expression (Chapters 4, 6, 7, 8)
- Book: Molecular Biology by Robert Weaver, 5th edition: Part I, II, IV, V, VIII)
- Research and Review articles on specific topics, illustrating the latest developments in the field (from Blackboard site)

- PPT - lecture notes

Doelgroep

Master students: Biomolecular Sciences, Biology, Biomedical Sciences, Pharmaceutical Sciences, Oncology, and Medical Natural Sciences.

Overige informatie

Compulsory portal course for MSc students Biomolecular Sciences, all differentiations.

In the Footsteps of Antoni van Leeuwenhoek

Vakcode	M_OANTONI03 (311169)
Periode	Ac. Jaar (september)
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

A five day course covering the many possibilities of microscopy for research.

Inhoud vak

This course teaches you the application of a range of imaging possibilities within the Centre for Microscopy at the AMC, the VUmc and the NKI-AvL. They are presented in lectures, discussions and hands-on demonstrations. The individual research projects of the attending participants will be discussed in relation to the demonstrated techniques, allowing exchange of ideas with fellow participants and microscopy experts and operators. The course is a guide to implement cellular imaging in your own research project. A part of the participants could bring their sample for analysis after consulting with the organization first.

Topics covered include:

- basic principles of microscopy
- basic principles of confocal laser scanning microscopy
- specimen preparation and staining methods
- quantitative analysis of microscopic images (e.g. Image J)
- electron microscopy techniques
- live cell imaging (e.g. inverted automated fluorescence and Total Internal Reflection Fluorescence)

Doelgroep

This is a PhD-students' course organized by the "Onderzoeksschool Oncologie Amsterdam" (OOA). OOA courses are open for Master Oncology students as optional courses under certain conditions.

Overige informatie

For course information and application: check the website

www.ooa-graduateschool.org/cms/course-program/ or

send e-mail to Esther Ruhé (e.ruhe@vumc.nl)

Infectieziekten en vaccinontwikkeling

Vakcode	AB_487023 ()
Credits	6.0
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	A. van Luijn MSc
Docent(en)	dr. D.R. Essink, prof. dr. P.R. Klatser
Lesmethode(n)	Hoorcollege

Doel vak

Verwerven van kennis en inzicht in:

- Algemene kennis van (door vaccinatie te bestrijden) infectieziekten en hun gevolg;
 - Inzicht in het Rijksvaccinatie programma (RVP)
 - Kennis over werkzaamheid en effectiviteit van vaccins;
 - Inzicht in publieke opinie, communicatie en scare stories
 - Inzicht in productie en kwaliteitsbewaking vaccins
 - Kennis van passieve en actieve immunisatie
 - Inzicht in WHO- EPI voor vaccinatie in ontwikkelingslanden
 - Kennis over reizigersvaccinatie
 - Kennis over diagnostische toetsen
 - Inzicht in beheersingsstrategieën
 - Kennis en inzicht van de verschillende typen actoren die een rol spelen bij infectieziekten; en vaccinatie/ vaccinontwikkeling;
 - Kennis over vaccinontwikkeling en regelgeving en richtlijnen die in acht worden genomen tijdens de ontwikkeling van vaccins;
 - Kennis over de Internationale regels die van toepassing zijn voor de productie van vaccins;
 - Kennis over good manufacturing practices (GMP) en good laboratory practices (GLP);
- Niveau 3: specialisatie

Inhoud vak

Deze cursus is bedoeld een inzicht te geven in de preventieve gezondheidszorg op het gebied van bestrijding van infectieziekten door middel van vaccinatie. Aan de orde komen bijna alle infectieziekten die bestreden kunnen worden door middel van vaccinatie. Dit geldt niet alleen voor Nederland maar ook internationaal. In de colleges wordt duidelijk gemaakt dat overal in de wereld de bestrijding van infectieziekten anders is georganiseerd. Het verschilt niet alleen in vaccinatie schema's, maar de verschillen worden ook bepaald of gebieden endemisch zijn voor bepaalde infecties. In eerste instantie wordt het vaccinatie beleid in Nederland onder de loep genomen, waarbij de rol van de overheid, de Gezondheidsraad, het RIVM en het Nederlands Vaccin Instituut uitvoerig naar voren komen. Ook wordt uitgebreid stilgestaan bij de toekomst van het RVP. Het vaccinatie programma in Nederland is niet meer alleen gericht op zuigelingen maar wordt steeds meer een programma voor alle leeftijden. Daarnaast wordt ook de belangrijke rol van communicatie en publieke opinie belicht. Los van dit alles staat de reizigersvaccinatie, maar het spreekt bijna van zelf hoe belangrijk deze is. Vaccineren moet worden gezien als het moduleren van het afweersysteem. Met het oog daarop wordt een opfris college immunologie gegeven om goed inzicht te krijgen in de immunologische aspecten van vaccins en vaccinatie. Een vaccin is geen geneesmiddel als een pil met 10 in een doosje, daarom zal intensief worden ingegaan op de bereiding,

productie, kwaliteitsbewaking (GMP) en opslag van vaccins als mede nieuwe ontwikkelingen hierbij. Aandacht wordt uiteraard besteed aan de farmaceutische industrie die een grote invloed heeft bij het ontwikkelen en vervaardigen van vaccins. Bij het vaststellen van de werkzaamheid van vaccins maar ook bij het vaststellen van infecties speelt diagnostiek een grote rol, ook hierop zal uitvoerig worden ingegaan. Tot slot zal de rol van activiteiten en campagnes van organisaties als de WHO en Unicef bij de bestrijding van infectieziekten op mondiaal niveau worden belicht en bekijken, als voorbeelden van de situatie in landen in ontwikkeling de situatie in Vietnam en Ghana.

Onderwijsvorm

Het onderwijs wordt gegeven d. m. v. hoorcolleges (39 uur) en opdrachten (6 uur). Studenten worden in groepen ingedeeld en iedere groep krijgt één van de 12 vaccins die via een vast stramien mondeling aan de groep moet worden gepresenteerd. Communicatie op gebied van vaccinatie campagnes zal geoefend worden in de vorm van een Lagerhuis debat.

Indien mogelijk: bezoek aan het Nederlands Vaccin Instituut, Bilthoven en Sanquin, Amsterdam. (10 uur)

Toetsvorm

Een schriftelijk tentamen moet met een voldoende worden afgesloten

Literatuur

Syllabus

Doelgroep

Keuzevak voor derdejaars studenten BSc Gezondheid en Leven en Biomedische Wetenschappen.

Overige informatie

Coördinator: P. Steerenberg (contact via Anna van Luijn).

Vak wordt niet meer gegeven per 2011 - 2012, alleen een laatste (bezem) toets.

Innovative Tumor Therapies

Vakcode	M_OITT03 (311104)
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	prof. dr. G.J. Peters
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	400

Doel vak

After completion of the course the student will have acquired knowledge of and insight in the background of the treatment of cancer. The student has been given a broad overview of the development of theories in this field.

Inhoud vak

The contents of this course are largely determined by the latest developments in the field of research concerning cancer therapies. Depending on these developments, the course program can be adjusted at any time.

Topics:

- Targeted therapy
- Personalized
- Metabolism
- Pharmacodynamics/pharmacogenomics
- gene therapy and RNAi
- radiotherapy
- antibody therapy
- angiogenesis
- clinical trials
- social and psychosocial aspects

Onderwijsvorm

38 hours (12 working group, 20 active participation, 6 demonstration).

The course will be given in English. Students are required to have a large self-motivation. The course will be highly interactive and will consist of contact hours with a teacher and project groups in which recent publications are being discussed. Excursions will be incorporated, in which one type of therapy is topic of study.

Workgroup and lectures: recent publications are being discussed.

Active participation: project writing and presentation. Students are required to have a large self-motivation. The course will be highly interactive.

Patient demonstrations: excursions will be incorporated, in which one type of anti cancer therapy is topic of study.

Toetsvorm

The exam will consist of the material presented during the lectures, selected course reading and selected chapters from Weinberg's book.

The project will get a separate assessment.

Literatuur

The course material will consist of recent reviews in the field of innovative therapies, which will be handed out at the start of the course.

Doelgroep

This course is compulsory for students of the Master in Oncology. When positions are available, students of the General Master in Biomedical Sciences can also attend the course, providing that they have completed the optional course "Oncologie" during the bachelor phase.

Life Cell Imaging

Vakcode	M_CLIFECE09 (3120008)
Periode	Periode 3+4+5
Credits	3.0
Voertaal	Engels
Faculteit	VUmc

Coördinator	dr. R.J.P. Musters
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Inhoud vak

Advances in light microscopy, digital image processing, and the development of a variety of powerful fluorescent probes present expanding opportunities for investigating the cardiovascular system. This laboratory and lecture course will provide participants with the theoretical and practical knowledge to utilize novel cell imaging technologies. Students will learn the principles of light microscopy and flow cytometry as well as use of different types of electronic cameras, laser-scanning systems, functional fluorophores, delivery techniques, and digital image- processing software.

Literatuur

Syllabus including relevant articles.

Intekenprocedure

Students can register for this course and examinations via vunet.vu.nl (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

Overige informatie

Contact: r.musters@vumc.nl

Macroscopic, Microscopic and Pathological Anatomy of the Mouse

Vakcode	M_OMACROS03 (311163)
Periode	Ac. Jaar (september)
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

This course aims to provide a practical understanding of the anatomy and histology of what is currently the most frequently used experimental animal, the house mouse. In addition, it focuses on recognition of pathological changes in the mouse.

Most biomedical PhD students perform animal experiments at some stage of their research career, but most students have never had practical instructions with respect to anatomy, histology and pathological anatomy of experimental animals.

For this reason, experimental animals are usually not subjected to a thorough and systematic inspection to assess whether, besides the local (expected) effects in the organ(s) under study, other organs are affected as well. The present course aims to provide practical insight (s) in the anatomy and histology of the mouse, presently the most frequently used experimental animal. In addition, the course focuses on

recognition of pathological changes in the mouse.

Inhoud vak

The subjects covered are:

1. Anatomy of the adult male and female mouse
2. Microscopic and pathological anatomy of tissues and organs
3. Dealing with pathologically changed animals
4. Developmental and neuro-anatomy
5. Selection of mouse models
6. Quantification of pathological changes.

Most biomedical PhD students perform animal experiments at some stage in their research career, but few have ever received any practical instruction concerning the anatomy, histology, and pathological anatomy of experimental animals. For this reason, the animals are not usually subjected to a thorough and systematic inspection to assess whether other organs, not just those being studied in the experiment, are affected as well.

Each student dissects a mouse to learn this species' topographic anatomy. The microscopic component focuses on studying and understanding the architecture of normal and pathologically changed mouse tissues. The practical component involves the recognition of cell and tissue types, as well as of changes in the architecture of tissues as a result of pathological processes, under the microscope. Standard staining techniques are demonstrated, as are functional ones.

Topics

Independent study (approx. 120 hrs), complemented with training sessions.

First, during the initial lecture knowledge on the first 9 chapters will be refreshed and rehearsed. Subsequently, the chapters 10 -16 of Parham (2nd ed.) and research models in immunity and disease will be lectured and discussed. Moreover, small-scale working group sessions are scheduled to provide highly interactive discussions on recent literature selected in order to highlight cutting edge research questions (2 x 3 hours).

Doelgroep

This is a PhD-students' course organized by the "Onderzoeksschool Oncologie Amsterdam" (OOA). OOA courses are open for Master Oncology students as optional courses under certain conditions.

Intekenprocedure

For further information: <http://www.ooa-graduateschool.org>. For registration: use application form on website (links available under Course programme on OOA website. Mail application to vumc-cca@vumc.nl.

Overige informatie

For further information: www.ooa-graduateschool.org/cms/course-program/
For registration: use application form (Course Link: Course Documents / Important Forms > concerning Placement and Study of Literature / Forms for Approval) to Esther Ruhé-Hoogervorst (e.ruhe@vumc.nl)

Major Internship

Vakcode	M_OMAJORI12 ()
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Periode	Ac. Jaar (september)
Credits	33.0
Voertaal	Engels
Faculteit	VUmc
Niveau	500

Doel vak

The major internship is the final practical training within the master programme and consists of at least 33 EC with a maximum of 39 EC. The aim of the major internship is to obtain in depth knowledge and practice of a certain oncology research.

Inhoud vak

The major internship can be carried out within or outside the VU/VUmc. The internship must be performed in a oncology research related topic. The results of the major internship integrated with the knowledge obtained acquired during the compulsory education forms the master thesis.

The master thesis will be defended in public. When performing the practical components students must adhere to the faculty's safety regulations.

Onderwijsvorm

Practical work, presentation, report, work discussion etc.

Toetsvorm

- For the major placement a student always has to ask for approval of the examination board of the Master's Programme in Oncology via the form, which can be found on www.med.vu.nl. This form should be filled in together with the supervisor and assessor, and contains detailed information on the internship. The submission of the form to the examination board is the responsibility of the master student.
- After 6 weeks an interim assessment has to be made by the assessor and the supervisor. This 6 week period concludes the trial period. An assessment has to be made regarding the possibility to successfully finish the placement within the given timeframe.
- At the end of a placement: for each part a partial mark will be given. The final mark is calculated, using the norm 50-25-25% for respectively laboratory practise, final report and oral presentation. The final judgement will be executed in the presence of the supervisor, assessor and the student.

Literatuur

A student is expected to learn and carry out scientific research under supervision and in a later stadium more independently. During the internship also included in the learning objectives are theoretical preparation, literature search, planning of experiments, writing of the final report, work discussions and participating in scientific activities at the department.

Overige informatie

A student is expected to read and process Scientific articles relevant to the internship. For more information check out the regulations on the faculty website.

Minor Internship

Vakcode	M_OMINOR112 ()
Periode	Ac. Jaar (september)
Credits	27.0
Voertaal	Engels
Faculteit	VUmc
Niveau	400

Doel vak

The minor internship is the first practical training within the master programme and consists of at least 27 EC with a maximum of 33 EC. The aim of the practical training is to obtain hands on experience in performing scientific research.

Inhoud vak

The minor placement needs to be carried out within one of the laboratories of the oncology graduate school OOA (VU/VUmc, NKI, Sanquin, AMC). The placement can be performed in a field related to oncology research. When performing the practical components, students must adhere to the faculty's safety regulations.

Onderwijsvorm

Practical work, presentation, report, work discussion etc.

Toetsvorm

- For the minor placement a student always has to ask for approval of the examination board of the Master's Programme in oncology via the form which can be found on the faculty website. This form should be filled in together with the supervisor and assessor and contains detailed information on the internship. The submission of the form to the examination board is the responsibility of the master student.

- After 6 weeks an interim assessment has to be made with the assessor and the supervisor. This 6 week period concludes the trial period. An assessment has to be made regarding the possibility to successfully finish the placement within the given timeframe.

- At the end of a placement for each part a partial mark will be given. The final mark is calculated, using the norm 50-25-25% for laboratory practise, final report and oral presentation respectively. The final judgement will be executed in the presence of the supervisor, the assessor and the student.

Literatuur

A student is expected to learn and carry out scientific research under supervision and in a later stadium more independently. During the internship also included in the learning objectives are theoretical preparation, literature search, planning of experiments, writing of the final report, work discussions and participating in scientific activities at the department.

Overige informatie

A student is expected to read and process scientific articles relevant to the internship. For more information check out the regulations for internship on the faculty website.

Oncogenesis

Vakcode	M_OONC03 (311101)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	prof. dr. P.J.F. Snijders
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	400

Doel vak

The aim of this course is to acquire knowledge of and insight in the general concepts of oncogenesis and basic tumor biology, which includes the different genetic alterations and classes of genes involved, their role in cellular signalling, DNA repair and cell cycle control, the (molecular) tools to study carcinogenesis including NextGen sequencing, transgenic mouse models and high-throughput functional genomics and model systems used in the field of oncogenesis. In addition, cancer predisposition syndromes, exogenous factors involved in oncogenesis with emphasis on viruses, and markers of progression, genetic counselling, screening, as well as intervention options will be studied.

The students will be given an up-to-date overview of the current knowledge and opinions in this exciting field. Furthermore, the students will acquire insight into how to interpret literature on specific topics in oncogenesis and present their findings in a clear and concise manner.

Onderwijsvorm

± 50 interactive lectures given by experts during morning sessions
± 6-7 interactive lecture repetitions given by student groups
± 6-7 interactive literature presentations given by student groups
The course has approximately 47.5 contact hours with teachers and course coordinators.

Toetsvorm

The course will be concluded with a 3 hours examination (24 open questions) on the contents of the lectures. Also the lecture repetitions and presentations of the literature studies will be judged and the final mark of this course will be determined by the average of the scores for the examination (counting for 70%), The lecture repetition (counting for 10%), and the literature presentation (counting for 20%). Students need to be present and actively participate during the course. Absence is only allowed with reason and need to be reported on beforehand.

Handouts of the presentations, including those of the literature studies. (Review) articles posted on Blackboard can be consulted as reference work to facilitate studying the different subjects.

Literatuur

The course reader (available on Blackboard) contains (review) articles on the various topics as well as handouts of the presentations of the lectures, chapters 3 to 12 of "The biology of Cancer" by Robert Weinberg.

Doelgroep

This course is compulsory for students of the Master in Oncology. When positions are available, students of the general master in Biomedical Sciences can also attend the course, provided that they have completed the optional course "Oncologie" during the bachelor phase.

Overige informatie

The students will have acquired insight in the latest developments in the field of oncogenesis and cancer genetics. Furthermore, the students will be able to integrate knowledge and insight in the formation of opinions concerning research questions about the development of cancer.

Practical Training 1

Vakcode	M_OPRACT103 ()
Credits	29.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	M.M. van Duist
Niveau	400

Overige informatie

In total a master oncology student has to spend 69 ECTS credit points for two practical training periods: two periods with the same length or one longer (corresponding to maximal 40 ECTS credit points ~ ca. 27 weeks) and a shorter one (corresponding to minimal 29 ECTS credit points ~ ca.19 weeks). Course is only available for students started in 2011 or earlier

Practical Training 2

Vakcode	M_OPRACT203 ()
Credits	40.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	M.M. van Duist
Niveau	500

Overige informatie

In total a master oncology student has to spend 69 ECTS credit points for two practical training periods: two periods with the same length or one longer (corresponding to maximal 40 ECTS credit points ~ ca. 27 weeks) and a shorter one (corresponding to minimal 29 ECTS credit points ~ ca.19 weeks). Course is only available for students started in 2011 or earlier.

Protein Science

Vakcode	AM_470145 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. D. Bald
Docent(en)	dr. M.H. Siderius, prof. dr. ir. E.J.G. Peterman, dr. J.N.M. Commandeur, dr. D. Bald, prof. dr. M.J. Smit
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	400

Doel vak

Repeat and deepen knowledge and understanding of protein structure, function, dynamics and regulation. Getting an overview of current methods for protein to expression, purification and investigation of protein/protein interaction.

The focus will be on general methods that you can apply to answer a wide range of biochemical, biomedical and biotechnical questions.

The student should know:

Principles of protein structure, function, dynamics, inhibition and engineering

Background of current protein science techniques

Inhoud vak

We will start with a repetition of protein structure and function.

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

Lecture topics include:

Protein Structure, Protein Function, Protein Dynamics, Molecular Machines, Control of Protein Function, Protein inhibition, Antibiotic action, Development of antibiotics in pharmaceutical industry, Protein expression and purification, Protein Interaction, Molecular Modeling and docking studies

Case studies:

GPCRs as drug target, Cytochrome P450, The molecular machine Kinesin, Chaperones as Protein folding machines

Onderwijsvorm

Lectures (30h) accompanied by work discussions (4 h) and self study (individual or in small groups) to prepare for the lectures and to and discuss the material presented in lectures or the accompanying papers.

Toetsvorm

Written exam

Literatuur

No special book required. Useful may be "Protein Structure and Function" by Petsko/Ringe. You can also use any Biochemistry textbook (e.g. Voet and Voet) for repetition. You will receive material (reviews and original articles on relevant topics). Examples of scientific literature: Lee et al. Nature 2010, Bax et al. Nature 2010, and Kumar Exp. Opin. Drug Metab 2010.

Doelgroep

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

Overige informatie

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

Proteomics in Biomedical Research

Vakcode	M_CPROTBI09 (3120006)
Periode	Periode 3+4+5
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	dr. C.R. Jimenez
Examinator	dr. C.R. Jimenez
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

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

Inhoud vak

Protein identification by tandem mass spectrometry and database searching;
Gel electrophoresis and mass spectroscopy techniques to quantify isoform expression and the nature and extent of post translational modifications;
Data mining: placing large scale protein expression data in a biological context (network analysis).

Literatuur

Syllabus including relevant articles

Intekenprocedure

Students can register for this course and examinations via vunet.vu.nl (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

Radiation Protection Course, Level 5B

Vakcode	M_ORADPRO04 (311164)
Periode	Ac. Jaar (september)
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	G.W.M. Visser BSc
Lesmethode(n)	Hoorcollege
Niveau	500

Doel vak

Aim of the course "Working with Radioactivity" is preparing researchers, assistants and students for safely working with radioactive substances and/or apparatus emitting ionising radiation.

Onderwijsvorm

The course encloses one week, divided in theory (~ 40%) and practical work (~60%). For both parts there will be a guide book in Dutch or English available. The experiments will lead to a practical work report to be used as the guidance for future radiological activities.

Participants shall receive a certificate as proof of their participation at the course, if they are judged to work safely with radioactivity. The with this certificate related allowance to work with radioactivity is limited to the laboratories of the Vrije Universiteit / VUmc.

Toetsvorm

Written exam, twice a year. Only students who pass the Dutch exam and thus obtain the governmental diploma "Stralingshygiëne, deskundigheidsniveau 5B" get 3 ECTS. For English speaking students the possibility exists to do exam in Leiden. The diploma gives allowance to work with radioactivity in the Netherlands, and most often even in Europe and America.

Doelgroep

The course given in the Radionuclide Centre is for students who need the course for working with radioactivity during their study at the Vrije Universiteit / VUmc, and for students who are strongly interested to work with radioactivity in future.

Overige informatie

For each course the maximal number of participants is 12. During the year 4 courses (twice in Dutch, twice in English) are given. During the year the possibility of 3 extra courses exists provided the number of participants is at least 8. See for more information:

<http://www.rnc.vu.nl> or ask J.E. Handgraaf

J.E. Handgraaf is the administrator of the RNC-course, Tel: 020-4449101, JE.Handgraaf@vumc.nl. People who do want to do the course but do not understand Dutch, are before application requested to contact: G.W.M. Visser, coordinator of the course, Tel: 020-4449710, gvisser@rnc.vu.nl or gwm.visser@vumc.nl

Research Ethics

Vakcode	M_CETHICA09 (3120009)
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Periode	Periode 3+4+5, Periode 4
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	dr. M.J.P.A. Janssens
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

Provide basic insight in research ethics and ethical reviewing and provide understanding of ethical conduct, the ethics review process and other mechanisms established to protect research participants.

Inhoud vak

Before a study can actually be carried out, you need permission of a Research Ethics Committee (REC) or another body which is authorized to review protocols on ethical aspects. This REC will judge your study protocol on its merits. The system of ethical reviewing and other control mechanisms, like codes and regulations, were established after a set of cases of research misconduct (e.g. Nuremberg, 1949; Beecher 1966), in order to protect the public (including research participants and patients) from bad or over-enthusiastic scientists. Research ethics can be regarded as the endeavor to determine good and bad conduct in research. On some topics or principles we easily agree, on other topics we try to find a resolution through ponderous processes of discussion and negotiation, face to face or, by publication in journals. As a researcher you have the final responsibility for your research, and your research participants. Therefore it is important that you become sensitive for aspects that might endanger or harm, or are disrespectful to their rights.

Topics

- Introduction in research ethics
- Ethical reviewing
- Medical ethics committee
- Ethical obligations: conduct and regulations
- Decision making capacity
- Informed consent
- Risk benefit

Onderwijsvorm

- 5 interactive sessions, including lectures, discussion of assignments, discussion of literature, audiovisual material etc. (15h)
- 1 poster presentation (or if preferred: ppt presentation) (3h)
- Assignments (20 h)
- Self Study (39 h)

Toetsvorm

- Poster presentation (50%)
- Active participation (50 %)

Literatuur

Research articles will be provided on BB. Students are expected to carry out literature study themselves

Intekenprocedure

Students can register for this course and examinations via vunet.vu.nl (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

Overige informatie

Coordinator:

Prof dr G.A.M. Widdershoven
Dr. M.J.P.A. Janssens

Science and Communication

Vakcode	AM_470587 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. B.J. Regeer
Docent(en)	dr. B.J. Regeer, dr. J.F.H. Kupper, T. de Lange MSc, B.M. Tielemans
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

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

Inhoud vak

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

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

Onderwijsvorm

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

Toetsvorm

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

Literatuur

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

Doelgroep

The course Science and Communication is a compulsory course for students of the Master specialisation Science Communication (Wetenschapscommunicatie) and is a prerequisite for the internship. Science and Communication is an optional course for students from other master programs in the health and life sciences.

Overige informatie

Guest lecturers amongst others:
 A. van der Plas (TNO)
 F. van Dam (CSG, Centre for Society and the Life Sciences)

Science Journalism

Vakcode	AM_471014 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. J.F.H. Kupper
Docent(en)	dr. J.F.H. Kupper, W.J. Breukers MSc, dr. M.J.W. Bos
Lesmethode(n)	Hoorcollege, Werkgroep, Computerpracticum
Niveau	500

Doel vak

To acquire knowledge and insight into:
 - the popularization of natural scientific knowledge and the use of different media
 - the criteria for effective science journalism with respect to diverse media
 - the role of science journalists in the debate about knowledge in society
 To acquire skills in:
 - writing popular scientific texts for different genres such as

news, background and interview
- designing science communication for different media such as newspaper, radio and internet
Orientation to the professional practice of science journalism

Inhoud vak

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

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

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

Onderwijsvorm

Lectures and seminars on theory and practice of science journalism and writing skill training (36h). Considerable time is set aside for performing science journalism in assignments (108h). The assignments are assessed by lecturers and fellow students (peer-review process). Self study (16h).

Toetsvorm

Individual exam (20%), Individual Assignments (50%, Small Group Assignments (30%)

Literatuur

Announced on Blackboard one month before start of the course

Doelgroep

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

Overige informatie

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

Study of Literature

Vakcode	M_OLITSTU03 (311150)
Periode	Ac. Jaar (september)
Credits	9.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	M.M. van Duist
Niveau	500

The Symbolic and Cultural Meanings of Cancer

Vakcode	M_OSYMBOL04 (311170)
Periode	Ac. Jaar (september)
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	dr. A.K. Oderwald
Lesmethode(n)	Werkcollege
Niveau	500

Doel vak

The aim of this course is to acquire insight in the symbolic and cultural meanings of cancer.

Inhoud vak

Reading and analyzing stories of cancer patients, reading of secondary articles.

Onderwijsvorm

The course will be given in English. The course consists of discussion groups and a symposium. Students are required to have a large self-motivation. The course will be highly interactive. An active participation is required.

Toetsvorm

The course will be terminated with a paper and a presentation. More than 20% absence without agreement will have consequences for crediting the course.

Literatuur

The course material consists of a reader, autobiographies of cancer patients and novels about cancer.

Doelgroep

This course is optional for students of the Masters in Oncology. When positions are available, students of other masters can attend the course after an intake with the teacher.

Intekenprocedure

Students can register for this course and examinations via vunet.vu.nl (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams. Scheduling of this course will be dependant on the amount of students who register for the course.

Overige informatie

Contact: ak.oderwald@vumc.nl

Tumor Biology and Clinical Behaviour

Vakcode	M_OTBCB03 (311102)
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Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	dr. R.J.A. Fijneman
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	400

Doel vak

The aim of the course is to provide in depth knowledge of and insight in the relationship between somatic DNA alterations, gene and protein expression, and subsequent biology and clinical behavior of tumors. Students will obtain a broad overview of (development of) theories in this field of 'bench-to-bedside' translational research. Moreover, students will be trained to develop an increasingly critical view on published literature and to function as a critical peer review group towards research project plans of colleagues.

Inhoud vak

Developing novel immunotherapeutic approaches for the treatment of cancer represents a rapid growing field of research in medicine. In order to design successful strategies it is essential to understand the complex interactions between tumor cells and the immune system. The course will give the student the opportunity to enhance his or her knowledge of tumor immunology. Special focus will lie on immunological processes accompanying tumor development as well as opportunities to use the immune system to fight cancer.

Topics:

- epidemiology of tumours
- natural course and clinical behaviour of tumours
- Screening and Prevention
- Tumor – Stroma interaction
- tumour profiling and clinical outcome
- homing and metastases
- sentinel node concepts
- Molecular imaging

Onderwijsvorm

50 hours, consisting of 32 lectures (1h each), 3 journal club discussion groups (2h each), and 3 research proposal work groups (4h each). This course is characterized by a high level of interactive education. Students have to participate actively in discussion- and work-groups.

Toetsvorm

A major aspect of the course is preparation of a research proposal by power point presentation in groups of 2 students. Tutors will help in preparing these proposals by detailed discussion sessions each Friday of the course. The complete proposal will be presented at the end of the course. Marks will be given by both tutors and will determine 50% of the final mark. The other 50% of the assessment will be done by a multiple-choice exam covering the major topics of the lectures. Students have to attend all sessions during the course. Active participation is absolutely required.

Literatuur

The course material consists of recent reviews in the field of gene expression, biology and clinical behaviour of tumours.

Doelgroep

The course is compulsory for students of the Master in Oncology

Overige informatie

A solid basal knowledge of oncology is compulsory before the start of the course.

Tumor Immunology

Vakcode	M_OTUMIM10 (311179)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	prof. dr. T.D. de Gruijl
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	400

Doel vak

- To acquire a working knowledge of various cellular mechanisms underlying antitumor immunity.
- To understand cellular interactions between the immune system and tumor cells.
- To acquire insight into the various strategies of host immune responses against tumor cells, and how tumor cells escape immune responses.
- To understand novel immunotherapeutic strategies against cancer.
- To acquire insight in monitoring effective immune responses during immunotherapy of cancer.

To apply the acquired knowledge and interpret scientific literature and scientific hypotheses of each of the topics described above.

Inhoud vak

Developing novel immunotherapeutic approaches for the treatment of cancer represents a rapidly growing field of research in medicine. In order to design successful strategies it is essential to understand the complex interactions between tumor cells and the immune system. The course will give the student the opportunity to enhance his or her knowledge of tumor immunology. Special focus will lie on immunological processes accompanying tumor development as well as opportunities to use the immune system to fight cancer. As this is an advanced course in the field of immunology and oncology, it will also cover in-depth discussions on molecular mechanisms underlying immune-tumor cross-talk. Students should be familiar with basic immunology and oncology, preferably via a previous basic training course in immunology and oncology.

Topics include:

- immune surveillance of cancer, tumor escape mechanisms,

immunotherapeutic

- approaches (e.g. DC vaccination, monoclonal antibody therapy, adoptive T cell transfer), state-of-the-art clinical trials and monitoring immune responses in cancer patients.

Toetsvorm

Lectures, Chapter 15 of Weinberg and provided literature make up the source material that will be covered by the exam. A written exam at the end of week 4 will consist of essay (open) questions. Active participation in presentations, discussions and Tumor Immunology Debating Clubs is part of the appraisal. A substitute assignment is required when one or more workshops have not been attended.

Literatuur

Chapter 15 of "The Biology of Cancer, Weinberg, Garland Science". Furthermore, all lectures, reviews and scientific papers for workshops and scientific debates can be found on Black Board.

Doelgroep

This course is compulsory for Master Oncology students. Given the broad relevance of immunology in life sciences this course also provides excellent opportunities for other differentiations and Master programs, e.g. Msc students Biomedical Sciences with a keen interest in immunological processes that form the basis for a variety of diseases.

Viral Oncogenesis

Vakcode	M_OVIRONC03 (311168)
Periode	Periode 4
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	prof. dr. J.M. Middeldorp
Lesmethode(n)	Hoorcollege
Niveau	500

Doel vak

The aim of the course is to give students an up-to-date insight into the mechanism of viral oncogenesis in humans.

Inhoud vak

The subjects of the course may include several of the following issues:

General aspects of DNA and RNA tumour viruses
Human papillomavirus (HPV) and cervical cancer
Hepatitis B/C viruses (HBV/HCV) and hepatocellular carcinoma
Human papillomavirus (HPV) and non-melanoma skin cancer
Epstein Barr virus (EBV) in lymphoma and carcinoma
Human Herpes Virus 8 (HHV8) and Kaposi's sarcoma

Onderwijsvorm

6-12 contact hours. In addition the course consists of independent learning on the basis of a literature study on selected topics. Introduction session with basic lectures will be provided by the teachers. Question time with the teachers to decide in consultation.

Toetsvorm

The course will be concluded by group presentations on literature studies (3 hours). Moreover, findings on literature studies should be summarized in a short written summary to be delivered at the end of the course.

Literatuur

Literature consists of recent (review) papers in the field of viral oncogenesis.

Doelgroep

This course is optional for students of the Master Course in Oncology who have completed three compulsory courses of the Master Course in Oncology.

Intekenprocedure

Students can register for this course and examinations via vunet.vu.nl (under My study, register for courses and exams). The general VU registration rules apply. Information on registration deadlines can be found in VUnet. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams.

Overige informatie

After the course the students will have thorough knowledge and in depth insight into:

the fundamental processes which play a role in viral oncogenesis
the mechanisms of the various oncogenic viruses
the translation of fundamental research into clinical applications
Apply per email to the coordinator of the Master's Programme in Oncology.

Writing Scientific English

Vakcode	M_FWSE09 (3120015)
Periode	Semester 2
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	M.M. van Duist
Lesmethode(n)	Werkcollege
Niveau	400

Onderwijsvorm

24 contact hours (24 active participation). The course is focussed on self-tuition in 8 sessions of 3 hours each. The plenary sessions concentrate on the process of writing and the product is part of writing. Homework is part of the course.

Literatuur

Effective Scientific Writing: An Advanced Learner's guide to Better English (A. Bolt & W. Bruins, ISBN 978 90 8659 6171). VU bookstore: €27.95.