



MA Oncology

Vrije Universiteit Amsterdam - VUmc - M Oncology - 2016-2017

This study guide contains information on the Master Oncology programme organised by the VUmc School of Medical Sciences for the academic year 2017-2018. All information about admission, programme components, planning and student facilities are available on the [faculty website](#).

Aim

Cancer is one of the main causes of death in the Western world. Since the incidence of the disease is highest among the elderly, the number of cancer patients continues to rise in our ageing society. 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 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, organise and perform oncological research.

Structure

The VUmc School of Medical Sciences coordinates all educational activities. The Programme Director and Master Coordinator of the Master Oncology take care of the organisation and gearing of the curriculum. The Master Oncology has a Programme Committee, an Examination Board and an Admission Board. 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 programme and the quality of execution. The Examination Board (EC ECRO) decrees norms concerning admission of students, and makes sure that Bachelors comply with the requirements for admission. EC ECRO further decrees the terms concerning examination of different disciplines and overlooks the results of examinations, internships and theses. Furthermore, the Examination Board evaluates the combinations of optional courses and internships of each individual student. The Admission Board is responsible for the execution of the Oncology entry assessment and the selection of the applicants during the admission procedure. All compulsory and optional courses are coordinated by different Course Coordinators.

Compulsory courses

All students of the Master Oncology must attend the compulsory courses of the programme.

Optional courses

Students require consent of the Examination Board EC ECRO, if they want to attend an optional course. Courses attended without the consent of the Examination Board will not be registered. Possible financial consequences will be recovered from the student. Approval can be requested via a digital approval form, which can be found on the [faculty website](#). 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 are motivated to look for optional courses outside VUmc or VU University.

Research projects

The Examination Board EC ECRO has to approve both the Minor Internship and Major Internship, as well as the Literature Study. Approval can be requested via a digital approval form, which can be found on the faculty website. Unapproved Internship or Literature Study periods will not be registered by the educational secretarial office. Possible financial consequences will be recovered from the student.

External students

If a particular compulsory course can have more participants, students of other Master programmes from the VU can attend the course, providing that they meet the entry requirements. A written request for participation needs to be done in advance with the Oncology Admission Board including a CV, a motivation letter, a reference letter and a recent transcript. Without permission of the Oncology Admission Board and the Examination Board of the main study programme non-Oncology students are not accepted in class.

Contact

General information about organisation, education, research and patient care within VUmc can be found on the VUmc website.

Programme Coordinator

Telephone: 020-4446345

Email:masteroncology@vumc.nl

Student Service Centre (SSC)

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

Address

VUmc School of Medical Sciences

Ground floor (behind the cafeteria)

Van der Boechorststraat 7

1081 BT Amsterdam

studentenbalie@vumc.nl

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Master Oncology - Optional Courses

The optional courses are intended to deepen the knowledge acquired in the compulsory courses. These options cover both theoretical and practical aspects of Oncological and Biomedical Research. Your choice of courses will depend on your own interests and the focus of your research projects. In principle you will be given the greatest possible freedom to choose, provided that the Examination Board approves your choice. We encourage students to find optional courses outside our own faculty or institution.

Below you find the the optional courses organised by the VUmc School of Medical Sciences. Via website www.med.vu.nl you find a list of all optional courses followed by students in previous years, including courses at other faculties and institutions.

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
Caput Epigenetics	Ac. Jaar (september)	6.0	AM_470606
Caput Structural Biology	Ac. Jaar (september)	6.0	AM_470607
Clinical Immunology	Periode 2	6.0	AM_470655
Genomes and Gene Expression	Periode 1	6.0	AM_470614
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	Ac. Jaar (september), Periode 3+4+5	3.0	M_CPROTBI09
Radiation Protection Course, Level 5B	Ac. Jaar (september)	3.0	M_ORADPRO04
Science and Communication	Periode 1	6.0	AM_470587
Science Journalism	Periode 2	6.0	AM_471014

Master Oncology - Compulsory Courses

The first semester of the programme consists of compulsory courses that provide you the basic knowledge about the main themes in cancer development, treatment and research. The last two courses will support you to improve your academic skills. Master Oncology students need to positively conclude at least three out of the first four compulsory courses to start their Minor Internship or Literature Study.

Opleidingsdelen:

- [Academic Core Oncology](#)

Vakken:

Naam	Periode	Credits	Code
Biostatistics	Periode 3	3.0	M_FBIOSTA16
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	Periode 3	3.0	M_FWSE09

Academic Core Oncology

Vakken:

Naam	Periode	Credits	Code
Academic Core Oncology 1st year	Ac. Jaar (september)	0.0	M_OACCOREA14
Academic Core Oncology 2nd year	Ac. Jaar (september)	3.0	M_OACCOREB14

Master Oncology - Internships

In total, you have to spend 66 EC credit points for two internships: a minor (30 EC) and a major (36EC). 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 online forms can be found on the faculty website www.med.vu.nl. These regulations apply to all students which started their Master's Programme in Oncology in 2016 or later.

The Master's thesis includes the results of the Major internship, integrated with and from the perspective of the knowledge acquired in the compulsory education. The Master's thesis will get a uniform cover provided and designed by the Master.

All regulations regarding Internships and required forms can be found on the faculty website . These regulations apply to all students, which started the Master Oncology in 2016 or later.

Vakken:

Naam	Periode	Credits	Code
Major Internship	Ac. Jaar (september)	36.0	M_OMAJORI16
Minor Internship	Ac. Jaar (september)	30.0	M_OMINORI16

Master Oncology - Literature Study

The Literature Study will be carried out under supervision, but in this stage of the education it is expected that the student acts highly independent. It is also possible that the student proposes his/her own subject and presents an own question. The study may be focused on a scientific (bio)medical question, but a more applied or social question is also allowed. The literature objective may be related to the Major Internship. The aim of the Literature Study is that the student will be able to select, evaluate and critically discuss relevant literature.

Based on the literature analysis, the student has to clearly explain not only the state-of-the-art, but also the limitations and problems in the literature. Depending on the context of the study, the student has to formulate recommendations and strategies for further research to solve remaining problems. The Literature Study is written in the format of a review paper. It might be advised to use the concept of a systematic review.

All regulations regarding the Literature Study and required forms can be found on the faculty website . These regulations apply to all students, which started the Master Oncology in 2016 or later.

Vakken:

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

Academic Core Oncology 1st year

Vakcode	M_OACCOREA14 ()
Periode	Ac. Jaar (september)
Credits	0.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	M.M. van Duist
Examinator	M.M. van Duist
Lesmethode(n)	Werkcollege
Niveau	400

Doel vak

The course Academic Core is created to prepare you for the transition from student to scientific researcher. The course will focus on the skills and knowledge which you are not able to learn from a textbook but need to be practiced, experiences, discussed etc. Some of the Academic Core themes will be integrated within the compulsory courses others will be emphasized during interactive workshops, network meetings, seminars etc. Topics that will be addressed are: planning your study programme, presenting in English, self-reflection, sharing experiences and future

career choices with a mentor and preparing for a future job as a researcher.

Inhoud vak

The Course spreads out over the two years of the master programme and consists of the following modules

- Presenting in English
- Debating
- Scientific Writing in English
- Writing and presenting a research proposal
- Data management
- Valorisation and biobusiness
- Ethics and legislation
- Networking
- Research orientation
- Career tracking
- Mentor contact

Onderwijsvorm

There will be classes and interactive workshops organized during the whole master programme with Academic Core themes. Part of these will be organized within other compulsory courses such as e.g. writing a research proposal or doing a debating club. Other themes will be scheduled as Academic Core classes and supported by assignments. A large part of the Academic Core will be independent learning of competences obtained during assignments and workshops

Toetsvorm

The course will be concluded with a portfolio containing all the assignments and documents collected during the year. The master coordinator will assess if the portfolio meets the criteria at the end of each year. Only when the first and second year module of the course has been successfully assessed by the master coordinator, the student will obtain the credits for this course

Doelgroep

This course is one of the compulsory courses for the master programme in Oncology and an essential part of the programme.

Intekenprocedure

Students will be automatically registered for the first year module of the course (A). Students can register for the second year module (B) through vunet.vu.nl (under My study, register for courses and exams). The first year needs to be successfully completed to register and take part in second year activities.

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.

Academic Core Oncology 2nd year

Vakcode	M_OACCOREB14 ()
Periode	Ac. Jaar (september)
Credits	3.0
Voertaal	Engels
Faculteit	VUmc

Coördinator	M.M. van Duist
Examinator	M.M. van Duist
Lesmethode(n)	Werkcollege
Niveau	500

Doel vak

The course Academic Core is created to prepare you for the transition from student to scientific researcher. The course will focus on the skills and knowledge which you are not able to learn from a textbook but need to be practiced, experiences, discussed etc. Some of the Academic Core themes will be integrated within the compulsory courses others will be emphasized during interactive workshops, network meetings, seminars etc. Topics that will be addressed are: planning your study programme, presenting in English, self-reflection, sharing experiences and future career choices with a mentor and preparing for a future job as a researche

Inhoud vak

The Course spreads out over the two years of the master programme and consists of the following modules

- Presenting in English
- Debating
- Scientific Writing in English
- Writing and presenting a research proposal
- Data management
- Valorisation and biobusiness
- Ethics and legislation
- Networking
- Research orientation
- Career tracking
- Mentor contact

Onderwijsvorm

There will be classes and interactive workshops organized during the whole master programme with Academic Core themes. Part of these will be organized within other compulsory courses such as e.g. writing a research proposal or doing a debating club. Other themes will be scheduled as Academic Core classes and supported by assignments. A large part of the Academic Core will be independent learning of competences obtained during assignments and workshops

Toetsvorm

The course will be concluded with a portfolio containing all the assignments and documents collected during the year. The master coordinator will assess if the portfolio meets the criteria at the end of each year. Only when the first and second year module of the course has been successfully assessed by the master coordinator, the student will obtain the credits for this course.

Doelgroep

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Intekenprocedure

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through vUNET.vu.nl (under My study, register for courses and exams).
The first year needs to be successfully completed to register and take part in second year activities.

The general VU registration rules apply. Information on registration deadlines can be found in VUNET. Please note that the general VU rules are strict, both for booking of the classes and (resit-)exams

Advanced 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. R.E. Mebius
Examinator	prof. dr. R.E. Mebius
Docent(en)	drs. K. Brouwer, prof. dr. R.E. Mebius, prof. dr. Y. van Kooyk, dr. T. van der Pouw Kraan, prof. dr. H.E. de Vries, dr. ing. S.J. van Vliet, dr. R.M. Reijmers
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

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, particular 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 (H; 22 hours) and study groups (W; 14 hours). 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 (pro; 4 hours), 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. Contact hours with teachers and/ or coordinators: 40

Toetsvorm

A written exam (T) at the end of the course includes essay ('open') (90% of grade). A minimum score of 5.5 for the written exam is required in order to pass. The research proposal (Pres) has to be presented and accounts for 10% 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

Solid knowledge on basic immunology is compulsory before the start of the course.

Aanbevolen voorkennis

A bachelor's course immunology is recommended.

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.

A bachelor's course immunology is recommended.

Lecturer(s):

prof. dr. R.E. Mebius, prof. dr. M. van Egmond, prof. dr. H.E. de Vries,
prof. dr. Y. van Kooyk, dr. ing. S.J. van Vliet, dr. T. van der Pouw
Kraan, dr. R. Reijmers

Biobusiness Course

Vakcode	M_OBIOBUS10 (311180)
Periode	Periode 3+4
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	prof. dr. A.W. Griffioen
Examinator	prof. dr. A.W. Griffioen
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?

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 commercialisation;
- The keys to success in translating innovative technologies and therapeutic principles to new drugs 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 course 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.

Literatuur

There is no mandatory literature for this course. The assignments involve reading of dedicated papers and viewing of web-based lectures.

Doelgroep

This course is optional for students of the Masters Oncology and Cardiovascular Research, who have completed at least three out of the four compulsory courses of their programme. If enough places are available, students from other MSc in Life Sciences may apply.

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

If you have any questions or need extra information, please contact Maartje Klaassen (maartje.klaassen@vumc.nl).

Biostatistics

Vakcode	M_FBIOSTA16 ()
Periode	Periode 3
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	dr. B.I. Witte
Examinator	dr. B.I. Witte

Lesmethode(n)	Hoorcollege, Practicum
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, binary 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 binary outcome variables: chi-square test and logistic regression;
- multiple regression analysis: association and prediction models;
- repeated measures analysis: repeated measures ANOVA, linear mixed models.

Literatuur

Lecture notes (i.e. PowerPoint sheets) are provided on blackboard.

Advised (not compulsory!) books:

BR Kirkwood & JAC Sterne (2003). Essential Medical Statistics - 2nd edition. Blackwell Science Ltd, Oxford. [Statistical methodology]

SB Gerber & K Voelkl Finn (2005). Using SPSS for Windows – data analysis and graphics. Springer, New York. [SPSS; Electronic access at university via <http://link.springer.com/book/10.1007/0-387-27604-1/page/1>]

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.

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
Examinator	dr. J.M. Kooter
Niveau	500

Doel vak

Course objectives:

At the end of the course, the student:

- is able to describe in detail the structure and composition of Chromatin, the post-translational modifications of chromatin proteins, where these modified proteins can be found in chromosomes, and how they are somatically inherited

- is able to indicate the enzymes responsible for the modifications and how they are regulated and targeted to specific genomic regions
- can recognize the dynamic nature of chromatin and epigenetic protein modifications, and is able to identify the 'readers' of the modifications and their consequences
- can describe the biochemical mechanisms of transcriptional regulation, including the process of transcription initiation, elongation and termination
- can describe the various DNA modifications, their biochemistry, and impact on genome maintenance and gene expression in somatic tissues, including brain
- can describe the epigenetic reprogramming events during mammalian embryonic development, parental imprinting, and biological consequences
- recognize cases of genetic - and epigenetic inheritance, and transgenerational inheritance
- can indicate and explain the molecular causes of human diseases, including cancer, that are due to aberrant epigenetic features and defective epigenetic mechanisms
- is able to identify phenomena that are due to environmentally-induced changes in epigenetic genome properties
- can explain the link between nutrition and epigenetic modifications
- can apply currently used experimental approaches and techniques to study epigenetics and is able to interpret the results

Inhoud vak

The following topics are discussed:

- Non-Mendelian inheritance of traits
- Biochemistry of DNA methylation and de-methylation
- Composition of chromatin and chromatin remodeling
- Biochemistry of histone modifications and chromatin structure
- Somatic and gametic cell inheritance of epigenetic information
- Cellular memory and chromatin modifications by the polycomb-group proteins
- Role of DM&CM in gene expression and genome maintenance
- Role of epigenetics in cancer and other diseases
- Role of DM&CM in sex-chromosome inactivation and activation
- Parental imprinting and gene dosage compensation
- Epigenetic reprogramming events during mammalian development
- Stem cells and reprogramming
- Functions of non-coding RNAs / RNA interference in DM&CS
- Neurobiology and epigenetics
- Epigenetic effects of diet, nutrition, drugs and environmental 'factors', including toxicants and behavior
- Transgenerational effects: inheritance of epigenetic-based traits
- Does epigenetics play a role in evolution?
- Methods that are currently used to analyze DM&CM

Onderwijsvorm

- No regular lectures, mostly self-study
- Studying recent review and research articles (ca 120 hr)
- Weblectures by experts (ca 10 hr)
- Discussion meetings (1-2 per week) in which the topics of the research and review articles are discussed (ca 10 hr)

Toetsvorm

Written exam of open-ended questions

Literatuur

- Basics: Molecular Biology of the Cell by Alberts et al., sixth edition: Chapters on DM&CM and transcriptional control of gene expression

- Recent Review and Research articles, which will be provided via Blackboard.

Vereiste voorkennis

Bachelor level Biochemistry, Molecular Genetics and Molecular Biology

Doelgroep

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

Intekenprocedure

Email to Coordinator: j.m.kooter@vu.nl

Overige informatie

In exceptional cases, it is possible to develop a more 'personalized' program, depending on previous courses and the knowledge of epigenetics.

Lecturer:

dr. Jan M. Kooter

Caput Structural Biology

Vakcode	AM_470607 ()
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. ir. Y.J.M. Bollen
Examinator	dr. ir. Y.J.M. Bollen
Niveau	500

Doel vak

To obtain knowledge about a topic in the field of protein structure and protein dynamics that currently attracts a lot of attention. To learn how to present and discuss scientific research.

Inhoud vak

One of the following topics:

- Adaptation of microorganisms to extreme environments
- Prion proteins
- Fluorescent proteins

Onderwijsvorm

Self study, contact with lecturer is possible following an appointment

Toetsvorm

Oral discussion with the lecturer

Literatuur

A number of recent scientific papers will be provided

Vereiste voorkennis

See entry requirements for the specified MSc programs.

Doelgroep

MSc students "Biology", "Biomolecular Sciences" and "Biomedical Sciences"

Overige informatie

The oral discussion with the lecturer can be done in English or in Dutch.

Clinical Immunology

Vakcode	AM_470655 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	J.J. Garcia Vallejo BSc
Examinator	prof. dr. Y. van Kooyk
Docent(en)	drs. K. Brouwer, dr. C.J.J. Mulder, dr. B.W. van Oosten, prof. dr. P. van der Valk, dr. E.J.G. Peters
Lesmethode(n)	Hoorcollege
Niveau	500

Doel vak

To understand immunopathogenic processes that play a role in the onset and chronicity of three immunological diseases, which cover auto-immunity and infectious disease, 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 one week. Each 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.

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 an oral presentation for their fellow students, which is scheduled at each 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, and workshops. Lectures 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 on BB which contains recent reviews specialized on the immunological diseases discussed.

Vereiste voorkennis

Bachelor's course Immunology

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

Lecturers:

Prof. dr. C.J.J. Mulder, dr. E.J.G. Peters, dr. B.W. van Oosten, dr. B. de Jong, prof. dr. H.E. de Vries, prof. dr. J. van Horssen, prof. dr. P. van der Valk, dr. M. Bögels, dr. H. Bontkes, prof. dr. T.D. de Gruijl, prof. dr. Y. van Kooyk

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)
 Prof. dr. B 't Hart (UMCG)

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
Examinator	dr. J.M. Kooter
Docent(en)	dr. J.M. Kooter
Lesmethode(n)	Hoorcollege, Werkgroep, Deeltoets extra zaalcapaciteit
Niveau	400

Doel vak

Course objectives:

The student should be able, at the molecular level, to

- describe the composition of eukaryotic and prokaryotic genomes and identify and indicate the function of the different sequences
- explain and dissect the process of transcription initiation, - elongation and - termination, and how these processes are regulated, mainly in eukaryotes
- describe in detail the structure and composition of chromatin, the post-translational modifications of histone proteins, the enzymatic machinery involved and their control
- distinguish between general and the various types of specific transcription factors, and explain their collaboration to induce or repress gene expression
- describe the various forms of DNA modification, their biochemistry, and impact on genome maintenance and gene expression in various somatic tissues
- describe the epigenetic reprogramming during mammalian embryonic development, parental imprinting, and differentiation
- explain how non-protein encoding RNAs can affect gene expression
- explain the various types of RNA processing and post-transcriptional regulation of gene expressing and design experiments to study these processes
- apply currently-used experimental approaches and techniques to perform gene specific and genome-wide expression studies

Inhoud vak

To achieve the course objectives, the following topics will be discussed:

- Genome structure, Transcriptional regulation and Epigenetic mechanisms:
- Genome organization: coding versus non-coding sequences
- Composition and biochemistry of basic transcription machinery
- General and specific transcriptional regulators and their regulation
- Transcription initiation, elongation and termination
- Identification and function of regulatory sequences: promoters, enhancers, suppressors, boundaries

- Epigenetics: Chromatin structure and histone modifications: writers-readers-erasers
- Epigenetics: DNA modifications (e.g. methylation) and their biochemical properties
- Epigenetic reprogramming during mammalian development
- Monoallelic gene expression and its importance for embryonic development and other biological processes
- 3D Nuclear structure and long range DNA interactions
- Transcriptional regulation and chromatin changes in stem cells, during differentiation, and development
- Cellular memory: establishing and maintenance of differentiation status
- Regulatory networks: the various ways by which regulators themselves are regulated
- Short and long non-coding RNAs and the mechanism by which they affect gene expression
- Experimental approaches and Techniques to study gene expression, differentiation and homeostasis

Post-transcriptional regulation

- integration of transcriptional and post-transcriptional control
- 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 and its biological importance
- Experimental approaches and Techniques to study post-transcriptional regulation of gene expression

Onderwijsvorm

- Lectures and interactive meetings, including lectures by guest speakers who are working in a particular field of research that is discussed in the course (ca 45 hr).
- Weblectures by experts (ca 5 hr)
- Self study (ca 100 hr)

Toetsvorm

There are 2 sub-exams:

- First exam is half way the course and consists of Multiple Choice question and accounts for 40% of the final mark
- Second exam is at the end of the course and consists of open questions and accounts for 60% of the final mark. For the second exam, knowledge of the first part is needed. Resit of a sub-exam is not allowed.

Literatuur

- Book: 'Gene Control' 2nd edition, by David Latchman, Garland Science
- Research and Review articles on specific topics, illustrating the latest developments in the field (from Blackboard site)
- PPT - lecture notes

Vereiste voorkennis

Basic concepts in Molecular Biology, Genetics, and Biochemistry

Doelgroep

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

Intekenprocedure

Enrollment through studentportal: Vunet.vu.nl

Overige informatie

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

Innovative Tumor Therapies

Vakcode	M_OITT03 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	prof. dr. G.J. Peters
Examinator	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.

Overige informatie

The student will have acquired knowledge of the latest developments in the field of cancer treatment and will have acquired insight in the development of theories.

The student will be able to integrate his/hers acquired knowledge of and insight in the formation of opinions concerning research questions in this field.

Coordinators: Prof. Dr. A.W. Griffioen en Dr. E. Giovannetti

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
Examinator	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

Literature Study

Vakcode	M_OLITSTU03 ()
Periode	Ac. Jaar (september)
Credits	9.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	dr. ir. V.L.J.L. Thijssen
Examinator	dr. ir. V.L.J.L. Thijssen
Niveau	500

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

Animal experiments, especially using mice and rats, are an important part of many PhD projects. A better understanding of rodent anatomy, histology, pathology, genetics, wellbeing, and a proper perspective of the difference of rodent models versus human physiology can improve the quality of these experiments substantially.

Course participants are introduced into various aspects of research with rodents. The aim is to increase awareness of the physiology and genetics of experimental animals, thereby enabling better planning and execution of animal research.

After finishing this course, students:

- can describe and demonstrate the anatomy and histology of major organs of the mouse;
- are able to choose mouse strains suitable for their research;
- can interpret histological and imaging data;
- can judge behaviour and deduce wellbeing of experimental animals;
- can design mouse experiments that are better suited for translation to humans.

Inhoud vak

The subjects covered are:

1. Anatomy (dissection) of adult male and female mice

2. Microscopic and pathological anatomy of rodent tissues and organs
3. Dealing with pathologically changed animals
4. Developmental and neuro-anatomy: comparison of rodent and human anatomy
5. Imaging the mouse (MRI and PET/SPECT)
6. Gene targeting, transgenic strategies, and generation of mouse models
7. Mouse breeding and querying the Jax phenotype database
8. Rodent behaviour and experimental outcomes

Doelgroep

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

Intekenprocedure

This course is organised and coordinated by the Tytgat Institute for Liver & Intestinal Research and the Department of Cell Biology & Histology, in collaboration with the Oncology Graduate School of Amsterdam (OOA, Onderzoekschool Oncologie Amsterdam). The course is incorporated in the course programme of the AMC Graduate School for Medical Sciences. Participants follow lectures in the morning and learn hands-on skills in the afternoon.

The course lasts 9 days and takes place once a year. Attending both weeks is recommended, however, it is possible to attend only the first week (mouse anatomy, histology, pathology, and imaging) or the second week (mouse genetics, behaviour and scaling).

Study load: 72 hours, which is comparable to 2.6 ECTS

For further information and registration contact:

Ms Mona Brox Edvardsen
 Tytgat Institute for Liver and Intestinal Research
 email: m.edvardsen@amc.uva.nl

Overige informatie

For further information contact:

Dr. J.E. Seppen
 Course coordinator
 Tytgat Institute for Liver and Intestinal Research
 email: j.seppen@amc.uva.nl

Dr. E.A.J. Reits
 Course coordinator
 Department of Cell Biology & Histology
 email: e.a.reits@amc.uva.nl

Website: www.ooa-graduateschool.org

Major Internship

Vakcode	M_OMAJORI16 ()
Periode	Ac. Jaar (september)
Credits	36.0
Voertaal	Engels
Faculteit	VUmc

Coördinator	dr. ir. V.L.J.L. Thijssen
Examinator	dr. ir. V.L.J.L. Thijssen
Niveau	500

Minor Internship

Vakcode	M_OMINOR16 ()
Periode	Ac. Jaar (september)
Credits	30.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	dr. ir. V.L.J.L. Thijssen
Examinator	dr. ir. V.L.J.L. Thijssen
Niveau	400

Oncogenesis

Vakcode	M_OONC03 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	prof. dr. R.H. Brakenhoff
Examinator	prof. dr. R.H. Brakenhoff
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.

Inhoud vak

The course on Oncogenesis consists of three parts. The first part involves morning sessions with lectures given by experts on various topics of oncogenesis. The second part involves a literature (self-) study on a specific familial cancer syndrome followed by a group-presentation in the last week of the course. The third part involves a

repetition of some basic lectures for which students will summarize lectures with the aid of the handouts that will become available on Blackboard. The latter two parts will be executed by groups of 4 students in a way that all students will be involved in a presentation.

Topics include:

1. Last updates on the roles of cancer genes and cancer pathways
2. Modern cancer genomics and (epi)genetics including Next Gen sequencing
3. Mechanisms, models and molecular methods, including CRISPR-Cas9 genome editing
4. Viruses causing cancer
5. Clinical aspects of cancer and precancer biology
6. Cancer predisposition syndromes

Onderwijsvorm

- ± 45 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 56 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. Handouts of the presentations, including those of the literature studies, will be available on Blackboard. There will be a rehearsal examination during the course. Also the lecture repetitions and presentations of the literature studies will be judged.

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.

(Review) articles posted on Blackboard and 'the Biology of Cancer' (Robert A. Weinberg, second edition) is recommended as a reference work for deeper background knowledge and to facilitate studying the different subjects.

Literatuur

The course reader (available on Blackboard) contains (review) articles on the various topics.

Doelgroep

This course is compulsory for students of the Master in Oncology.

Overige informatie

The students will have acquired insight in the latest developments in the field of oncogenesis, cancer genetics and technologies to investigate the molecular aspects of cancer. Furthermore, the students will be able to integrate knowledge and insight in the formation of opinions concerning research questions about the development of cancer, and learn how to review and present scientific work.

Coordinators:

Protein Science

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

Doel vak

The student:

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

Inhoud vak

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

Lecture topics include:

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

Case studies:

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

Onderwijsvorm

Lectures (30 h) accompanied by work (paper) discussions (6 h) and self study

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

Toetsvorm

Written exam (100%)

Literatuur

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

Doelgroep

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

Overige informatie

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

Proteomics in Biomedical Research

Vakcode	M_CPROTBI09 (3120006)
Periode	Ac. Jaar (september), 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. The large-scale analysis of proteins and their quantitative changes in health and disease, a research field called proteomics, may provide candidate biomarkers and targets for therapeutic interventions.

This proteomics course consists of one week of theory (lectures and literature study) and one week of practice in the lab. Together this will provide a solid basis for the understanding of what proteomics is about, how its central technique, mass spectrometry, can be used for global protein identification and quantification, and what biomedical/clinical questions can be answered using an appropriate experimental design. In the second week, students will get hands-on experience with a real proteomics experiment and the generated data will be used to illustrate what bioinformatics analyses can be done to enable biological insight of large scale data.

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.

Overige informatie

Minimum number of participants: 5, maximum: 12
For optimal participation, basic knowledge of molecular and cellular biology is needed.

Contact:

Prof. dr. Connie R. Jimenez
Head OncoProteomics Laboratory
Department of Medical Oncology, VUmc Cancer Center Amsterdam
e-mail: c.jimenez@vumc.nl
Website: www.oncoproteomics.nl

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 in 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 VU University/VUmc.

Toetsvorm

Written exam, twice a year. Only students who pass the exam and thus obtain the governmental diploma "Stralingshygiëne, deskundigheidsniveau 5B" get 3 ECTS. 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. The course will be given in week 37 (September 11 – September 15) and in week 46 (November 13 – November 17) of 2017.

Contact:

A.Y. Rijnders, BSc

Administrator course Werken met Radioactiviteit / Radiation Protection – niveau 5B

Radiologie & Nucleaire Geneeskunde

email: ay.rijnders@vumc.nl

G.W.M. Visser, BSc

Coordinator course Werken met Radioactiviteit / Radiation Protection – niveau 5B

email: gwm.visser@vumc.nl

Website: <http://www.mnc.vu.nl>

N.B. International students who want to participate in the course are requested to contact the coordinator of the course before application.

Science and Communication

Vakcode	AM_470587 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	P. Klaassen MA
Examinator	P. Klaassen MA
Docent(en)	dr. J.F.H. Kupper, drs. ir. M.G. van der Meij, P. Klaassen MA
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

- Gain theoretical insight in the nature of science,
- Gain theoretical insight in the nature of communication,
- Gain theoretical insight in the relationship between science and society,

- d) Gain insight in the role of science communication in this relationship,
- e) Acquire knowledge of different theories and models of science communication,
- f) Acquire knowledge of different strategies, media and activities for science communication,
- g) Learn how to practically apply theoretical concepts from the field of science communication in communicating science,
- h) Develop practical skills for science communication (especially writing and giving oral presentations).

Inhoud vak

Science is all around us and shapes our lives in many different ways. From the vaccines you need to get when traveling abroad to the smartphone you use on a daily basis, and from the public transportation you use to get to the university to the ingredients of your toothpaste: scientific knowledge is elemental to all of these. Simultaneously, society shapes the ways in which science and technology develop too. Science, technology and society influence each other continuously—or, to put it differently, they 'communicate'.

Students of the Science Communication specialization are expected to become experts in understanding and designing interactions between science and society. In order to make this interaction fruitful and valuable for both science and society, it is first of all important to gain theoretical knowledge about science, about communication and about science communication. Science and Communication provides students with the theoretical and conceptual foundations of the discipline of science communication. Thus, you will develop an in-depth understanding of communication processes at the core of several interfaces, including those between scientists from different disciplines, between different sciences and their stakeholders, and between science and the public.

Onderwijsvorm

Lectures (18 h)
 Workgroups (15 h)
 Home-study for group assignments (12h)
 Home-study for individual assignments/exam (100h)

Toetsvorm

- Your participation, two (small) individual assignments (1A & 1B) a pitch presentation and a "job application". All these are assessed as pass or fail.
 If you pass all of them, you have earned the first 10% of your final mark. For each one you fail, you have to do an alternative assignment that has to be handed in on Friday October 22nd. Nota bene: if you fail your participation, this cannot be compensated with an alternative assignment!
- A group assignment in which you develop a label to an exhibit at a science museum and write an accompanying essay. 10%
- A review of a science communication effort of your own choosing (an exhibit at a science center or museum, a public lecture, a (popular) science book, et cetera...). 10%
- "TED-talk" in which you present the research you did (e.g. for your Bsc thesis or (first) Msc internship). 20%

- Exam. 50%

Literatuur

Academic articles. Direct links to articles will be provided on BlackBoard.

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.

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
Examinator	dr. J.F.H. Kupper
Docent(en)	dr. J.F.H. Kupper
Lesmethode(n)	Hoorcollege, Werkgroep, Computerpracticum
Niveau	500

Doel vak

To acquire knowledge of and insight into:

- the concepts, models and issues of science journalism according to contemporary scientific literature
- the criteria for effective science journalism with respect to diverse media
- the representation of science in the media
- the role of science journalism in the use of scientific knowledge in society

To acquire skills in:

- writing popular scientific texts for different genres such as news, background and interview
- science reporting using videos
- designing science communication for different media such as newspaper, radio and internet

Orientation to the professional practice of science journalism

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, popular science videos, 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 (remaining hours).

Toetsvorm

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

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-specialisation within FALW or FEW will have precedence over other students. Students from other faculties and or universities need to get formal consent from the course coördinator (Frank Kupper) before enrolment.

Overige informatie

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

Tumor Biology and Clinical Behaviour

Vakcode	M_OTBCB03 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	dr. E. Hooijberg
Examinator	dr. E. Hooijberg
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

The course "Tumor Biology and Clinical Behavior" aims to provide in depth knowledge of and insight in the relationship of gene expression, biology and clinical behavior of tumors. Students will obtain a broad overview of development of theories in this field of oncological research. Moreover, students will be trained to develop an increasingly critical view on published literature and to function as critical mass towards research project plans of colleagues (peer review).

This course consists of three components:

- 1) Lectures given by experts on various topics of tumor biology and clinical behavior, comprising 'Biology of metastasis', 'Tumor profiling', 'Screening and prevention', and 'Molecular imaging'
- 2) Journal clubs that stimulate students to develop a critical view on published literature, using papers that span 'bench to bedside' research
- 3) Research proposals, in which students learn to design and present a 4-year PhD student translational research project proposal.

Lectures will be given throughout the course by the organizers and guest speakers. On the basis of their contents the lectures can be subdivided into the topics 'Histopathology/epidemiology', 'Tumor profiling and biomarkers', 'Bioinformatics/Biostatistics', 'Tumor-microenvironment interactions', 'Tumor cell spread / Metastasis', 'Molecular Imaging' and 'Screening and prevention'. Journal clubs will be held during the first three weeks of the course, during which one paper will be discussed in detail.

Research proposals; students will present their progress on preparation of a research proposal twice by Power Point presentations. Other students will help to improve these proposals in workgroup discussions, guided by tutors. The complete research proposal will be presented at the end of the course. The remaining time during the course can be used for preparation for Journal clubs, Research proposals, and study for examination. Details of the preparation for the Journal clubs and Research proposals are provided elsewhere in this reader.

Onderwijsvorm

50 hours, consisting of 32 lectures (1 hr each), 2 journal club discussion groups (2 hrs each), and 3 research proposal work groups (4 hrs 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. The complete proposal will be presented at the end of the course.

Marks will be given by both tutors and will determine 40% of the final mark. The other 60% of the assessment will be done by an exam, consisting of essay questions, 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 behavior of tumors.

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.

Coordinators:

Dr. S.A.G.M. Cillessen

Dr. E. Hooijberg

Tumor Immunology

Vakcode	M_OTUMIM10 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	prof. dr. T.D. de Gruijl
Examinator	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.

Onderwijsvorm

A written exam at the end of week 4 will consist of essay (open) questions. Active participation in presentations, discussions and Debating Clubs is part of the appraisal. A substitute assignment is required when one or more workshops have not been attended. Final grade: combination of Open Questions(85%)and participation Debating Clubs(15%)

To succeed: a minimum of 5.5 for the written exam is required.

Toetsvorm

A written exam at the end of week 4 will consist of essay (open) questions. Active participation in presentations, discussions and Debating Clubs is part of the appraisal. A substitute assignment is required when one or more workshops have not been attended. Final grade: combination of Open Questions(85%)and participation Debating Clubs(15%)

To succeed: a minimum of 5.5 for the written exam is required.

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.

Overige informatie

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

Other students interested in the course can apply by sending an e-mail to the coordinator of the Master's Programme in Oncology

Coördinatoren:

Prof.dr. Marjolein van Egmond

Prof.dr. Tanja de Gruijl

Writing Scientific English

Vakcode	M_FWSE09 (3120015)
Periode	Periode 3
Credits	3.0
Voertaal	Engels
Faculteit	VUmc
Coördinator	drs. J.K.A. Meijer
Examinator	drs. J.K.A. Meijer
Lesmethode(n)	Werkcollege
Niveau	500

Doel vak

The aim of this course is to provide Master's students with the essential linguistic know-how for composing a successful research proposal in English that is well organized, idiomatically and stylistically appropriate and grammatically correct.

At the end of the course students

- know how to structure a research proposal;
- know what the information elements are in parts of their research proposal;
- know how to produce clear and well-structured texts on complex subjects;
- know how to write well-structured and coherent paragraphs;
- know how to construct effective sentences;
- know what collocations are and how to use them appropriately;
- know how to adopt the right style (formal style, cohesive style, conciseness, hedging)
- know how to avoid the pitfalls of English grammar;
- know how to use punctuation marks correctly;
- know how to cite sources effectively;
- know what their own strengths and weaknesses are in writing;
- know how to give effective peer feedback.

Inhoud vak

The course will start with a general introduction to writing a research proposal in English. Taking a top-down approach, we will then analyse the structure of a research proposal in more detail. As we examine several sections of a research proposal, we will peel back the layers and discover how paragraphs are structured, what tools are available to ensure coherence within and among paragraphs, how to write effective and grammatically correct sentences and how to choose words carefully and use them effectively.

Topics addressed during the course include the following:

- What makes a good proposal?
 - o 5 crucial questions you must always answer
 - Considering your readers: who are they? What do they expect? How do they read your text? How does that affect your writing?
 - o The importance of considering reading strategies
 - What is the basic structure of a research proposal and what are they key elements of each section?
 - How do you "sell" your project / research? Why language matters!
- Strategies for writing successful research proposals: using the English language effectively and enhancing readability
- o Keeping it brief: don't waste words
 - o Writing well-structured and coherent paragraphs
 - o Writing effective sentences (sophisticated word order, information distribution)
 - o Using modality and boosters to your advantage
 - o Using appropriate and effective vocabulary
 - o Arguing convincingly
 - o Using active constructions (but also using the passive effectively)
 - Understanding grammar (tenses, basic word order, agreement, prepositions, etc.)
 - Understanding punctuation
 - Referring to sources: summarising, paraphrasing, quoting (how and

when?)

- Avoiding plagiarism

Onderwijsvorm

Research proposal writing in English is an four-week course that consists of 4 contact hours a week. Students are required to spend at least 6 to 8 hours of homework per week. They will work through a phased series of exercises that conclude with the requirement to write several text parts (e.g. Introduction/Background, Relevance section, Summary). Feedback on the writing assignments is given by the course teacher and by peers.

Toetsvorm

Students will receive 3 course credits when they meet the following requirements:

- Students hand in three writing assignments (e.g. Introduction, Relevance section, Summary) and get a pass mark for all writing assignments;
- Students provide elaborate peer feedback;
- Students attend at least 7 out of 8 sessions (or, in case of 6 sessions, they attend at least 5);
- Students are well prepared for each session (i.e. do all homework assignments);
- Students actively participate in class;
- Students do not plagiarise or self-plagiarise.

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.

Doelgroep

This course is only open to students of the two-year Master's programme Oncology. These students are only eligible to the course if they have already conducted scientific research (e.g. for their Bachelor's thesis) or if they will be working on a research project when taking Scientific Writing in English.

Intekenprocedure

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

For all you courses you must register through VUnet.vu.nl This way, you find out immediately if a place is available. All activities for which you are registered will be displayed in your personal timetable, which also includes any timetable changes. If you have not registered for a course then you will not be admitted to that course, you will not be assigned to a group, you will not be able to use Blackboard, you will have no timetable, your grades will not be recorded, etc. In short, you will not be able to take part.

From the moment that you are conditionally registered for a programme, you can sign up for specific courses via VUnet.vu.nl

This course is only meant for Master Oncology students.

Overige informatie

- To do well, students are expected to attend all lessons. Group schedules are to be found on Blackboard.
- A VUnet registration for this course automatically gives access to the corresponding Blackboard site. Group registration only takes place via Blackboard (general groups: registration by students following FALW programmes containing this course, groups assigned to specific studies: registration through programme and course coordinator).
- Make sure Scientific Writing in English does not overlap with another course.
- If you have registered for a group in Blackboard, you are expected to attend all sessions (eight). If you decide to withdraw from the course, do so in time, both on Blackboard and in VUnet. This all will avoid a 'fail' on your grade list for not taking part in this course and allows other students to fill in a possible very wanted group spot.
- For specific Blackboard matters concerning this course, please contact by sending email to masteroncology@vumc.nl