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 and Content of the programme
The Master Oncology trains you to become a MSc in Oncology with in depth knowledge, attitudes and skills in the field of cancer research. This includes the development, execution, organization and evaluation of scientific research. The duration of your programme is two years (120 EC) and completely taught in English. The two years consist of the following components: compulsory courses, optional courses, a study of literature and two practical training periods. The practical training period consists of a minor and major internships together counting for 66 EC in total. The major internship automatically will be your Master Thesis. The final Master Examination consists of all assessed items, which in practice means that all examinations will be added up to a total of 120 EC. The board of examiners eventually decides whether your Master Examination is finished successfully.

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 the coordinator Master's Programme in Oncology
Dr. Marjan M. van Duist, PhD
Telephone: 020-4446345
Email: masteroncology@vumc.nl

Student Service Centre (SSC):
Students can turn to the Student Service Centre with general questions about the graduation, registration for courses and examinations, registration of grades and schedules.
School of Medical Sciences
1st floor (follow signs to corridor D)
Van der Boechorststraat 7 - 1081 BT Amsterdam
Email: studentenbalie@vumc.nl

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
Students have to have a consent from the examination board, if they want to attend an optional course. A approval can be asked via a digital approval: Approval of Optional Course, this form can be found on the faculty website VUMc School of Medical Sciences . Courses attended without the consent of the board of examiners will not be registered. For registration of optional courses students use the VUnet portal. If registration is not possible by using the VUnet portal, contact your master coordinator.

Internships and study of literature
The examination board has to give its approval for all internships and the literature study. A approval can be asked via a digital approval: Approval of internships, this form can be found on the faculty website VUMc School of Medical Sciences Unapproved internships will not be registered by Student Service Centre.
<table>
<thead>
<tr>
<th>Course Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Master Oncology - Optional Courses</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Master Oncology - Compulsory Courses</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Academic Core Oncology</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Master Oncology - Internships</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Master Oncology - Study of Literature</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Vak: Academic Core Oncology 1st year (Ac. Jaar (september))</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Vak: Academic Core Oncology 2nd year (Ac. Jaar (september))</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>Vak: Advanced Molecular Immunology and Cell Biology (Periode 1)</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Vak: Biophotonics I: Microspectroscopy (Periode 3)</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>Vak: Biophotonics III: Practical Training (Periode 3)</strong></td>
<td>9</td>
</tr>
<tr>
<td><strong>Vak: Biostatistics (Periode 3)</strong></td>
<td>10</td>
</tr>
<tr>
<td><strong>Vak: Caput Epigenetics (Ac. Jaar (september))</strong></td>
<td>12</td>
</tr>
<tr>
<td><strong>Vak: Caput Structural Biology (Ac. Jaar (september))</strong></td>
<td>13</td>
</tr>
<tr>
<td><strong>Vak: Clinical Immunology (Periode 2)</strong></td>
<td>14</td>
</tr>
<tr>
<td><strong>Vak: Extension Practical Training (Ac. Jaar (september))</strong></td>
<td>16</td>
</tr>
<tr>
<td><strong>Vak: Genomes and Gene Expression (Periode 1)</strong></td>
<td>16</td>
</tr>
<tr>
<td><strong>Vak: In the Footsteps of Antoni van Leeuwenhoek (Ac. Jaar (september))</strong></td>
<td>18</td>
</tr>
<tr>
<td><strong>Vak: Innovative Tumor Therapies (Periode 2)</strong></td>
<td>19</td>
</tr>
<tr>
<td><strong>Vak: Life Cell Imaging (Periode 3+4+5)</strong></td>
<td>20</td>
</tr>
<tr>
<td><strong>Vak: Macroscopic, Microscopic and Pathological Anatomy of the Mouse (Ac. Jaar (september))</strong></td>
<td>21</td>
</tr>
<tr>
<td><strong>Vak: Major Internship (Ac. Jaar (september))</strong></td>
<td>22</td>
</tr>
<tr>
<td><strong>Vak: Medical Imaging (Periode 4)</strong></td>
<td>24</td>
</tr>
<tr>
<td><strong>Vak: Minor Internship (Ac. Jaar (september))</strong></td>
<td>24</td>
</tr>
<tr>
<td><strong>Vak: Oncogenesis (Periode 1)</strong></td>
<td>25</td>
</tr>
<tr>
<td><strong>Vak: Protein Science (Periode 1)</strong></td>
<td>27</td>
</tr>
<tr>
<td><strong>Vak: Proteomics in Biomedical Research (Periode 3+4+5)</strong></td>
<td>28</td>
</tr>
<tr>
<td><strong>Vak: Radiation Protection Course, Level 5B (Ac. Jaar (september))</strong></td>
<td>29</td>
</tr>
<tr>
<td><strong>Vak: Research Ethics (Periode 3+4+5)</strong></td>
<td>30</td>
</tr>
<tr>
<td><strong>Vak: Science and Communication (Periode 1)</strong></td>
<td>30</td>
</tr>
<tr>
<td><strong>Vak: Science Journalism (Periode 2)</strong></td>
<td>31</td>
</tr>
<tr>
<td><strong>Vak: Study of Literature (Ac. Jaar (september))</strong></td>
<td>33</td>
</tr>
<tr>
<td><strong>Vak: The Symbolic and Cultural Meanings of Cancer (Ac. Jaar (september))</strong></td>
<td>33</td>
</tr>
<tr>
<td><strong>Vak: Tumor Biology and Clinical Behaviour (Periode 2)</strong></td>
<td>34</td>
</tr>
<tr>
<td><strong>Vak: Tumor Immunology (Periode 1)</strong></td>
<td>35</td>
</tr>
<tr>
<td><strong>Vak: Viral Oncogenesis (Periode 4)</strong></td>
<td>37</td>
</tr>
<tr>
<td><strong>Vak: Writing Scientific English (Semester 2)</strong></td>
<td>38</td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Naam</th>
<th>Periode</th>
<th>Credits</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Molecular Immunology and Cell Biology</td>
<td>Periode 1</td>
<td>6.0</td>
<td>AM_470656</td>
</tr>
<tr>
<td>Biophotonics I: Microspectroscopy</td>
<td>Periode 3</td>
<td>3.0</td>
<td>AM_470629</td>
</tr>
<tr>
<td>Biophotonics III: Practical Training</td>
<td>Periode 3</td>
<td>3.0</td>
<td>AM_470630</td>
</tr>
<tr>
<td>Caput Epigenetics</td>
<td>Ac. Jaar (september)</td>
<td>6.0</td>
<td>AM_470606</td>
</tr>
<tr>
<td>Caput Structural Biology</td>
<td>Ac. Jaar (september)</td>
<td>6.0</td>
<td>AM_470607</td>
</tr>
<tr>
<td>Clinical Immunology</td>
<td>Periode 2</td>
<td>6.0</td>
<td>AM_470655</td>
</tr>
<tr>
<td>Extension Practical Training</td>
<td>Ac. Jaar (september)</td>
<td>3.0</td>
<td>M_OEXTENS03</td>
</tr>
<tr>
<td>Genomes and Gene Expression</td>
<td>Periode 1</td>
<td>6.0</td>
<td>AM_470614</td>
</tr>
<tr>
<td>In the Footsteps of Antoni van Leeuwenhoek</td>
<td>Ac. Jaar (september)</td>
<td>3.0</td>
<td>M_OANTONI03</td>
</tr>
<tr>
<td>Life Cell Imaging</td>
<td>Periode 3+4+5</td>
<td>3.0</td>
<td>M_CLIFECE09</td>
</tr>
<tr>
<td>Macroscopic, Microscopic and Pathological Anatomy of the Mouse</td>
<td>Ac. Jaar (september)</td>
<td>3.0</td>
<td>M_OMACROS03</td>
</tr>
<tr>
<td>Medical Imaging</td>
<td>Periode 4</td>
<td>6.0</td>
<td>X_428526</td>
</tr>
<tr>
<td>Protein Science</td>
<td>Periode 1</td>
<td>6.0</td>
<td>AM_470145</td>
</tr>
<tr>
<td>Proteomics in Biomedical Research</td>
<td>Periode 3+4+5</td>
<td>3.0</td>
<td>M_CPROTBI09</td>
</tr>
<tr>
<td>Radiation Protection Course, Level 5B</td>
<td>Ac. Jaar (september)</td>
<td>3.0</td>
<td>M_ORADPRO04</td>
</tr>
<tr>
<td>Research Ethics</td>
<td>Periode 3+4+5</td>
<td>3.0</td>
<td>M_FETHICA14</td>
</tr>
<tr>
<td>Science and Communication</td>
<td>Periode 1</td>
<td>6.0</td>
<td>AM_470587</td>
</tr>
<tr>
<td>Science Journalism</td>
<td>Periode 2</td>
<td>6.0</td>
<td>AM_471014</td>
</tr>
<tr>
<td>The Symbolic and Cultural Meanings of Cancer</td>
<td>Ac. Jaar (september)</td>
<td>3.0</td>
<td>M_OS YMBOL04</td>
</tr>
<tr>
<td>Viral Oncogenesis</td>
<td>Periode 4</td>
<td>3.0</td>
<td>M_OVIRONC03</td>
</tr>
</tbody>
</table>

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.

Opleidingsdelen:

- Academic Core Oncology

Vakken:

<table>
<thead>
<tr>
<th>Naam</th>
<th>Periode</th>
<th>Credits</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biostatistics</td>
<td>Periode 3</td>
<td>3.0</td>
<td>M_OBIOSTA14</td>
</tr>
<tr>
<td>Innovative Tumor Therapies</td>
<td>Periode 2</td>
<td>6.0</td>
<td>M_OITT03</td>
</tr>
<tr>
<td>Oncogenesis</td>
<td>Periode 1</td>
<td>6.0</td>
<td>M_OONC03</td>
</tr>
<tr>
<td>Tumor Biology and Clinical Behaviour</td>
<td>Periode 2</td>
<td>6.0</td>
<td>M_OTBCB03</td>
</tr>
<tr>
<td>Tumor Immunology</td>
<td>Periode 1</td>
<td>6.0</td>
<td>M_OTUMIM10</td>
</tr>
<tr>
<td>Writing Scientific English</td>
<td>Semester 2</td>
<td>3.0</td>
<td>M_FWSE09</td>
</tr>
</tbody>
</table>

Academic Core Oncology

Vakken:

<table>
<thead>
<tr>
<th>Naam</th>
<th>Periode</th>
<th>Credits</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Core Oncology 1st year</td>
<td>Ac. Jaar (september)</td>
<td>0.0</td>
<td>M_OACCOREA14</td>
</tr>
<tr>
<td>Academic Core Oncology 2nd year</td>
<td>Ac. Jaar (september)</td>
<td>3.0</td>
<td>M_OACCOREB14</td>
</tr>
</tbody>
</table>

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:
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:

<table>
<thead>
<tr>
<th>Naam</th>
<th>Periode</th>
<th>Credits</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Internship</td>
<td>Ac. Jaar (september)</td>
<td>33.0</td>
<td>M_OMAJORI12</td>
</tr>
<tr>
<td>Minor Internship</td>
<td>Ac. Jaar (september)</td>
<td>27.0</td>
<td>M_OMINORI12</td>
</tr>
</tbody>
</table>

Academic Core Oncology 1st year

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_OACCOREA14 ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Ac. Jaar (september)</td>
</tr>
<tr>
<td>Credits</td>
<td>0.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>M.M. van Duist</td>
</tr>
<tr>
<td>Examinator</td>
<td>M.M. van Duist</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Werkcollege</td>
</tr>
<tr>
<td>Niveau</td>
<td>400</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_OACCOREB14 ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Ac. Jaar (September)</td>
</tr>
<tr>
<td>Credits</td>
<td>3.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>M.M. van Duist</td>
</tr>
<tr>
<td>Examinator</td>
<td>M.M. van Duist</td>
</tr>
</tbody>
</table>
**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.

Advanced Molecular Immunology and Cell Biology

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>AM 470656 ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 1</td>
</tr>
<tr>
<td>Credits</td>
<td>6.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>Fac. der Aard- en Levenswetenschappen</td>
</tr>
<tr>
<td>Coördinator</td>
<td>prof. dr. M. van Egmond</td>
</tr>
<tr>
<td>Examinator</td>
<td>prof. dr. M. van Egmond</td>
</tr>
<tr>
<td>Docent(en)</td>
<td>drs. K. Brouwer, prof. dr. R.E. Mebius, dr. T. van der Pouw Kraan, prof. dr. H.E. de Vries, prof. dr. M. van Egmond, dr. ing. S.J. van Vliet, Dr. M. van Egmond</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege, Werkgroep</td>
</tr>
<tr>
<td>Niveau</td>
<td>500</td>
</tr>
</tbody>
</table>

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 rapid 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 week 4 includes assay ('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
11. Schirmer SH, van Nooijen FC, Piek JJ, van Royen N. Stimulation of

Research articles

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.

Biophotonics I: Microspectroscopy

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>AM_470629 ()</th>
</tr>
</thead>
</table>

Vrije Universiteit Amsterdam - VUMc - M Oncology - 2015-2016

30-5-2016 - Pagina 8 van 40
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

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.

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

Written exam (75%), oral presentation by group (25%). Both parts need to be passed (with a grade of 5.5 or higher) in order to pass the course.

Notes, handouts and papers

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

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.
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
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
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;
• analysis of survival data: Kaplan Meier curves and Cox regression analysis;
• multiple regression analysis: association and prediction models;
• repeated measures analysis: repeated measures ANOVA.

Onderwijsvorm
The course consists of seven lectures, seven exercise classes and self-study. In the exercise classes students will actively apply the discussed methods to several datasets using the statistical software SPSS.

Literatuur

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 (vunet.vu.nl).

Overige informatie
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&CM
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 15 hr)

Toetsvorm
Written exam

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.

Caput Structural Biology

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>AM 470607 ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Ac. Jaar (september)</td>
</tr>
<tr>
<td>Credits</td>
<td>6.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>Fac. der Aard- en Levenswetenschappen</td>
</tr>
<tr>
<td>Coördinator</td>
<td>dr. ir. Y.J.M. Bollen</td>
</tr>
<tr>
<td>Examinator</td>
<td>dr. ir. Y.J.M. Bollen</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>AM_470655 ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 2</td>
</tr>
<tr>
<td>Credits</td>
<td>6.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>Fac. der Aard- en Levenswetenschappen</td>
</tr>
<tr>
<td>Coördinator</td>
<td>dr. T. van der Pouw Kraan</td>
</tr>
<tr>
<td>Examinator</td>
<td>prof. dr. Y. van Kooyk</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege</td>
</tr>
<tr>
<td>Niveau</td>
<td>500</td>
</tr>
</tbody>
</table>

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

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**
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 het Hart (UMCG)

**Extension Practical Training**

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_OEXTENS03 (311166)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Ac. Jaar (september)</td>
</tr>
<tr>
<td>Credits</td>
<td>3.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>M.M. van Duist</td>
</tr>
<tr>
<td>Examinator</td>
<td>M.M. van Duist</td>
</tr>
<tr>
<td>Niveau</td>
<td>500</td>
</tr>
</tbody>
</table>

**Overige informatie**
This course has 3 or 6 credits

**Genomes and Gene Expression**

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>AM_470614 ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 1</td>
</tr>
<tr>
<td>Credits</td>
<td>6.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>Fac. der Aard- en Levenswetenschappen</td>
</tr>
<tr>
<td>Coördinator</td>
<td>dr. J.M. Kooter</td>
</tr>
<tr>
<td>Examinator</td>
<td>dr. J.M. Kooter</td>
</tr>
<tr>
<td>Docent(en)</td>
<td>dr. J.M. Kooter</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege, Werkgroep, Deeltoets extra zaalcapaciteit</td>
</tr>
<tr>
<td>Niveau</td>
<td>400</td>
</tr>
</tbody>
</table>

**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.

In the Footsteps of Antoni van Leeuwenhoek

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_OANTONI03 (311169)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Ac. Jaar (september)</td>
</tr>
<tr>
<td>Credits</td>
<td>3.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege, Werkgroep</td>
</tr>
<tr>
<td>Niveau</td>
<td>500</td>
</tr>
</tbody>
</table>

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.

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 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)

Innovative Tumor Therapies

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_OITT03 (311104)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 2</td>
</tr>
<tr>
<td>Credits</td>
<td>6.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>prof. dr. G.J. Peters</td>
</tr>
<tr>
<td>Examinator</td>
<td>prof. dr. G.J. Peters</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege, Werkcollege</td>
</tr>
<tr>
<td>Niveau</td>
<td>400</td>
</tr>
</tbody>
</table>

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 consists 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

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_CLIFECE09 (3120008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 3+4+5</td>
</tr>
<tr>
<td>Credits</td>
<td>3.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_OMACROS03 (311163)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Ac. Jaar (september)</td>
</tr>
<tr>
<td>Credits</td>
<td>3.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege, Werkgroep</td>
</tr>
<tr>
<td>Niveau</td>
<td>500</td>
</tr>
</tbody>
</table>

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](http://www.ooa-graduateschool.org). For registration: use application form on website (links available under Course programme on OOA website. Mail application to vumcca@vumc.nl.

**Overige informatie**
For further information: [www.ooa-graduateschool.org/cms/course-program/](http://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**
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 an oncology research-related topic. The results of the major internship integrated with the knowledge obtained 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 practice, 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.

Medical Imaging

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>X_428526 (428526)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 4</td>
</tr>
<tr>
<td>Credits</td>
<td>6.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>Faculteit der Exacte Wetenschappen</td>
</tr>
<tr>
<td>Niveau</td>
<td>400</td>
</tr>
</tbody>
</table>

Inhoud vak

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

Minor Internship

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_OMINORI12 ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Ac. Jaar (september)</td>
</tr>
<tr>
<td>Credits</td>
<td>27.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>dr. ir. V.L.J.L. Thijsen</td>
</tr>
<tr>
<td>Examinator</td>
<td>dr. ir. V.L.J.L. Thijsen</td>
</tr>
<tr>
<td>Niveau</td>
<td>400</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_OONC03 (311101)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 1</td>
</tr>
<tr>
<td>Credits</td>
<td>6.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>prof. dr. P.J.F. Snijders</td>
</tr>
<tr>
<td>Examinator</td>
<td>prof. dr. P.J.F. Snijders</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege, Werkcollege</td>
</tr>
<tr>
<td>Niveau</td>
<td>400</td>
</tr>
</tbody>
</table>

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. Cell cycle, signaling and cancer genes
2. Cancer genetics and epigenetics
3. Mechanisms and models
4. Viruses causing cancer
5. Clinical aspects
6. DNA repair, clinical genetics and predisposition syndromes

**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.

**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.

Coordinators:
Prof.dr. R.H. Brakenhoff
Dr. S. Cillessen
Dr. R. Wolthuis

Protein Science

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>AM_470145 ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 1</td>
</tr>
<tr>
<td>Credits</td>
<td>6.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>Fac. der Aard- en Levenswetenschappen</td>
</tr>
<tr>
<td>Coördinator</td>
<td>dr. D. Bald</td>
</tr>
<tr>
<td>Examinator</td>
<td>dr. D. Bald</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege, Werkgroep</td>
</tr>
<tr>
<td>Niveau</td>
<td>400</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_CPROTBI09 (3120006)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 3+4+5</td>
</tr>
<tr>
<td>Credits</td>
<td>3.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>prof. dr. J. de Groot-van der Velden</td>
</tr>
<tr>
<td>Examinator</td>
<td>prof. dr. J. de Groot-van der Velden</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege, Werkgroep</td>
</tr>
<tr>
<td>Niveau</td>
<td>500</td>
</tr>
</tbody>
</table>

**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.

Overige informatie
Contact:
Dr. Connie R. Jimenez
Associate Professor, Head OncoProteomics Laboratory
Dept. Medical Oncology
e-mail: c.jimenez@vumc.nl

Radiation Protection Course, Level 5B

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M.ORADPRO04 (311164)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Ac. Jaar (september)</td>
</tr>
<tr>
<td>Credits</td>
<td>3.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>G.W.M. Visser BSc</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege</td>
</tr>
<tr>
<td>Niveau</td>
<td>500</td>
</tr>
</tbody>
</table>

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.NB. 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**

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_FETHICA14 ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 3+4+5</td>
</tr>
<tr>
<td>Credits</td>
<td>3.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>prof. dr. G.A.M. Widdershoven</td>
</tr>
<tr>
<td>Examinator</td>
<td>prof. dr. G.A.M. Widdershoven</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege, Werkgroep</td>
</tr>
<tr>
<td>Niveau</td>
<td>500</td>
</tr>
</tbody>
</table>

**Science and Communication**

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>AM_470587 ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 1</td>
</tr>
<tr>
<td>Credits</td>
<td>6.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>Fac. der Aard- en Levenswetenschappen</td>
</tr>
<tr>
<td>Coördinator</td>
<td>P. Klaassen MA</td>
</tr>
<tr>
<td>Examinator</td>
<td>P. Klaassen MA</td>
</tr>
<tr>
<td>Docent(en)</td>
<td>dr. B.J. Regeer, dr. J.F.H. Kupper, P. Klaassen MA</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege, Werkgroep</td>
</tr>
<tr>
<td>Niveau</td>
<td>500</td>
</tr>
</tbody>
</table>

**Doel vak**
- Gain theoretical insight in the relationship between science and society,
- Gain insight in the role of science communication in this
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.

Science Journalism

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>AM_471014 ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 2</td>
</tr>
<tr>
<td>Credits</td>
<td>6.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>Fac. der Aard- en Levenswetenschappen</td>
</tr>
<tr>
<td>Coördinator</td>
<td>dr. J.F.H. Kupper</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Examinator</td>
<td>dr. J.F.H. Kupper</td>
</tr>
<tr>
<td>Docent(en)</td>
<td>dr. J.F.H. Kupper</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege, Werkgroep, Computerpracticum</td>
</tr>
<tr>
<td>Niveau</td>
<td>500</td>
</tr>
</tbody>
</table>

**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 defendable 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.

**Study of Literature**

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_OLITSTU03 (311150)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Ac. Jaar (september)</td>
</tr>
<tr>
<td>Credits</td>
<td>9.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>dr. ir. V.L.J.L. Thijsen</td>
</tr>
<tr>
<td>Examinator</td>
<td>dr. ir. V.L.J.L. Thijsen</td>
</tr>
<tr>
<td>Niveau</td>
<td>500</td>
</tr>
</tbody>
</table>

**The Symbolic and Cultural Meanings of Cancer**

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_OSYMBOL04 (311170)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Ac. Jaar (september)</td>
</tr>
<tr>
<td>Credits</td>
<td>3.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>dr. A.K. Oderwald</td>
</tr>
<tr>
<td>Examinator</td>
<td>dr. A.K. Oderwald</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Werkcollege</td>
</tr>
<tr>
<td>Niveau</td>
<td>500</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>vakcode</th>
<th>M_OTBCB03 (311102)</th>
</tr>
</thead>
<tbody>
<tr>
<td>periode</td>
<td>Periode 2</td>
</tr>
<tr>
<td>credits</td>
<td>6.0</td>
</tr>
<tr>
<td>voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>coördinator</td>
<td>dr. E. Hooijberg</td>
</tr>
<tr>
<td>examinator</td>
<td>dr. E. Hooijberg</td>
</tr>
<tr>
<td>lesmethode(n)</td>
<td>Hoorcollege, Werkcollege</td>
</tr>
<tr>
<td>niveau</td>
<td>400</td>
</tr>
</tbody>
</table>

**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. 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 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.

Coordinators:
Dr. S. Cillessen
Dr.E. Hooijberg

Tumor Immunology

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_OTUMIM10 (311179)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 1</td>
</tr>
<tr>
<td>Credits</td>
<td>6.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>prof. dr. T.D. de Gruijl</td>
</tr>
<tr>
<td>Examinator</td>
<td>prof. dr. T.D. de Gruijl</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege, Werkcollege</td>
</tr>
<tr>
<td>Niveau</td>
<td>400</td>
</tr>
</tbody>
</table>
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

Viral Oncogenesis

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_OVIRONC03 (311168)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Periode 4</td>
</tr>
<tr>
<td>Credits</td>
<td>3.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>prof. dr. P.J.F. Snijders</td>
</tr>
<tr>
<td>Examinator</td>
<td>prof. dr. P.J.F. Snijders</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Hoorcollege</td>
</tr>
<tr>
<td>Niveau</td>
<td>500</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Vakcode</th>
<th>M_FWSE09 (3120015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periode</td>
<td>Semester 2</td>
</tr>
<tr>
<td>Credits</td>
<td>3.0</td>
</tr>
<tr>
<td>Voertaal</td>
<td>Engels</td>
</tr>
<tr>
<td>Faculteit</td>
<td>VUmc</td>
</tr>
<tr>
<td>Coördinator</td>
<td>drs. J.K.A. Meijer</td>
</tr>
<tr>
<td>Examinator</td>
<td>drs. J.K.A. Meijer</td>
</tr>
<tr>
<td>Lesmethode(n)</td>
<td>Werkcollege</td>
</tr>
<tr>
<td>Niveau</td>
<td>400</td>
</tr>
</tbody>
</table>

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?
  - 5 crucial questions you must always answer
- Considering you readers: who are they? What do they expect? How do they read your text? How does that affect your writing?
  - 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
- Keeping it brief: don’t waste words
- Writing well-structured and coherent paragraphs
- Writing effective sentences (sophisticated word order, information distribution)
- Using modality and boosters to your advantage
- Using appropriate and effective vocabulary
- Arguing convincingly
- 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

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