Minor Guide
2019/2020
Dear Student,

It is time to choose courses for in the beginning of the third year of your bachelor (Q9 and Q10). To help you with this choice, the faculty will organise a market with all minors to present themselves. To help you even further with this choice and to present the students opinion about the minors to you, SOOS (students organisation of education and study) made a Minor Guide with all sorts of information.

In this guide, all minors are presented with a general description, but also with students’ opinions including pros and cons. The choice you have to make is quite an important one, considering the minors have a span of 20 weeks and will take a big proportion of your third year (12EC for medicine, 27EC for BMS). Therefore, it is important to make a deliberate choice.

The minors are intended to give you more insight in the subjects that are appealing to you or to give more insight in what you want with your future. Do not be afraid of a minor that is called high-demanding. Every course is designed for third year students, therefore it should be do-able for everyone. So, choose something of your interest!

For more information about the examination, learning goals and schedules of the minors, consult the Radboudumc website (go to education → students → bachelor Biomedical Sciences or Medicine → application minors / 3EC courses.)

To make this guide, students’ feedback is essential. Therefore, we would like to thank all students, who filled in the questionnaires last year. We hope you will help us too next year, by filling in the questionnaire during the minors, all to make a new edition again.

Good luck and enjoy making your choice!

Kind regards,

On behalf of the 30th SOOS board,

Aaya Darai, Emmy Kok, Isa Witteveen, Milou Groenen, Jon van Broekhoven en Eline van de Meer
INDEX

1 INFORMATION .......................................................... 6
   GENERAL INFORMATION ............................................. 6
   EXTERNAL MINORS ..................................................... 6
   THANKS TO ............................................................ 6
   STRUCTURE .................................................................. 7
   FUTURE EDITIONS ....................................................... 7

2 MONDAY/TUESDAY MINORS ........................................... 8
   MIN01 (A) EFFICACY AND SAFETY OF DRUGS .................. 8
   MIN02 (A) VISUALIZING HEALTH AND DISEASE: FROM MOLECULE TO MAN .9
   MIN04 (A) CANCER MECHANISMS AND IMMUNE DEFENSE ................. 10
   MIN05 (A) MOVING QUESTIONS: AN INTRODUCTION TO CLINICAL HUMAN MOVEMENT SCIENCE ......................................................... 11
   MIN06 (B) GLOBAL HEALTH AND INFECTIOUS DISEASE ................. 12
   MIN09 (A) PAIN, INFLAMMATION AND CANCER: NEW DRUGS TO COMBAT DISEASE ......................................................................... 113
   MIN11 (A) CLINICAL RESEARCH PRINCIPLES AND PRACTICE ............ 14
   MIN14 (A) NEUROSCIENCE OF STRESS-RELATED PSYCHOPATHOLOGY ...... 15
   MIN18 (A) HEMATO-ONCOLOGY ......................................... 15
   MIN22 (A) HEMOSTASIS, A DELICATE BALANCE! ....................... 17
   MIN23 (B) PEDIATRIC INFECTIOUS DISEASE AND IMMUNITY ........... 18
   MIN24 (A) METABOLIC SYNDROME vs RENAL HORSEPOWER ............ 19
   MIN26 (A) CHALLENGES OF INTEGRATED COMMUNITY-BASED HEALTHCARE ............................................................................ 20
   MIN27 (A) GENOMICS RESEARCH – FROM MOLECULE TO POPULATION..... 21
   MIN29 (A) CONTROL OF INFECTIOUS DISEASE ............................. 22
## 3 WEDNESDAY MINORS

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3KOB</td>
<td>AVANCED DATA ANALYSIS AND PROGRAMMIING</td>
</tr>
<tr>
<td>B3KOE</td>
<td>SCIENCE IN ACTION: PHILOSOPHY AND DYNAMICS OF SCIENCE</td>
</tr>
<tr>
<td>B3KOF</td>
<td>TRANSLATING ANIMAL RESEARCH INTO CLINICAL BENEFIT</td>
</tr>
<tr>
<td>B3KOH</td>
<td>CONSULTANCY</td>
</tr>
<tr>
<td>B3KOG</td>
<td>POPULAR SCIENCE WRITING</td>
</tr>
</tbody>
</table>

## 4 THURSDAY/FRIDAY MINORS

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN03</td>
<td>TRANSITIONAL CARDIOVASCULAR RESEARCH</td>
</tr>
<tr>
<td>MIN08</td>
<td>STATE-OF-THE-ART RESEARCH TECHNOLOGIES IN CANCER, IMMUNOLOGY AND DIAGNOSTICS</td>
</tr>
<tr>
<td>MIN10</td>
<td>DIAGNOSTICS AND RESEARCH IN KIDNEY DISEASE</td>
</tr>
<tr>
<td>MIN12</td>
<td>ASSESSMENT OF SURGICAL INNOVATIONS</td>
</tr>
<tr>
<td>MIN13</td>
<td>MEDICAL BIOTECHNOLOGY TOWARDS CLINICAL PRACTICE</td>
</tr>
<tr>
<td>MIN16</td>
<td>TRANSLATIONAL NEUROSCIENCE</td>
</tr>
<tr>
<td>MIN19</td>
<td>CLINICAL EXERCISE PHYSIOLOGY</td>
</tr>
<tr>
<td>MIN21</td>
<td>BREAST CANCER: BIOLOGY, TREATMENT, PATIENT</td>
</tr>
<tr>
<td>MIN25</td>
<td>BETTER DOCTORS, BETTER PATIENTS, BETTER DECISIONS</td>
</tr>
<tr>
<td>MIN28</td>
<td>HUMAN EMBRYOLOGY IN PERSPECTIVE</td>
</tr>
</tbody>
</table>
1. INFORMATION

GENERAL INFORMATION
It is important to know that the choice of the minor is different for medicine or biomedical science students. Notice the following:

Medicine students only need to choose one minor. Depending on in which cluster you are, you can choose a Monday/Tuesday (coachgroup 1-21) minor or a Thursday/Friday (coachgroup 22-41) minor. Remaining days in your schedule are filled with the continuation of the lines KVS, KVH and PPG.

Biomedical sciences students need to choose one of each type of minors, one Monday/Tuesday, one Wednesday and one Thursday/Friday minor.

The allocation will be announced at the beginning of may.

EXTERNAL MINORS
It is also possible to do an external minor, this means a minor that is not in your curriculum (usually outside the medical faculty in Nijmegen). You could do a minor at the Radboudumc, Radboud University or another institution with academic education at the level of a university. If you would like to do this, a few rules are applicable:
- Only academic education is a possibility (only 2nd and 3rd years courses);
- The minor needs to be approved by the board of examiners beforehand;
- The content of the external minor needs to contribute to your personal journey in a more in-depth or broadening manner in the field of biomedical sciences;
- You can choose an existing minor (12 EC) or make a package of courses. If you choose the latter one, a mentor must guarantee your study plan via a signature. Your mentor also needs to make sure that there is cohesion and no overlap between courses and between the curriculum (a special form is available on the website).
THANKS TO

This guide is only accomplished, because students, like you, filled in the questionnaires about the minors and gave their feedback. We would like to thank all students for their efforts.

We hope that you will do the same for the students after you, in order to help them get the best education as possible and to help them choose a minor that fits their personal preferences.

STRUCTURE

All information will have the same structure. Starting with the Monday/Tuesday minors, followed by the Wednesday and Thursday/Friday minors in ascending order.

The structure is:
MIN## Name
Coordinator – department with email addresses
Description of the course
Student opinion (with strengths and limitations)

FUTURE EDITIONS

Every year a new edition of the Minor Guide will be published. Mistakes or additions in this version will be implemented in the version on the SOOS website.

http://soos-nijmegen.nl/minorgids/
2. MONDAY/TUESDAY MINORS

MIN01 EFFICACY AND SAFETY OF DRUGS

Dr. S. Heemskerk – Pharmacology & Toxicology
Suzanne.Heemskerk@radboudumc.nl
Prof. Dr. C. Kramers – Pharmacology – Toxicology & Internal Medicine
Kees.Kramers@radboudumc.nl

Description
In this minor you will deepen and broaden your understanding of how drugs act, by familiarizing yourself with the principles that underlie the rational and safe application of drugs in patients. You will address the challenges associated with drug treatment of special patient populations (pregnancy, pediatrics, geriatrics), while also examining various scientific approaches to study effects of drugs on a molecular, organ and patient and population level. You will examine the nature of side-effects of medical drugs, and familiarize yourself with various aspects of market approval, pharmacovigilance and possible withdrawal of drugs from the market due to adverse effects. Finally, we will study and evaluate the medical effects and societal impact of drugs of abuse.

Student opinion
This minor has a great balance between self-study assignments and lectures. It is focused on research and the clinic, this makes it interesting for both medicine and biomedical science students.
The examination is first formative and then summative, the grading will consist of seven parts. But the material does not always match with the examination. The minor is well organized, however you have to enrol for some projects. There are a lot of group projects in this minor.

Strengths:
- Many interesting excursions
- Enthusiastic and very helpful teachers
- Views from different perspectives

Limitations:
- Every group project is in another group
- There are a lot of deadlines
- The organization can seem a bit chaotic
MIN02 (A) VISUALIZING HEALTH AND DISEASE: FROM MOLECULE TO MAN

Dr. A. Cambi – Celbiology
Alessandra.Cambi@radboudumc.nl

Dr. M. Srinivas – Tumor Immunology
Mangala.Srinivas@radboudumc.nl

Description
Imaging in biomedical sciences is vital for research, diagnosis and visualization of health and disease. How can we visualize the growth and metastasis of tumors? How can we follow the migration of even a single immune cell through the body? How can we observe the interactions between antigen presenting cells and T-cells? Rapid technological developments in the imaging field are increasing our capabilities to address these important processes. This minor will provide an in-depth and hands-on introduction to the various imaging modalities used both in clinical and preclinical settings. Going from molecules to man, this Minor will allow the students to understand and operate several key imaging techniques at a basic level, including those at the molecular/cellular level (e.g.: optical and electron microscopy), at the tissue/animal level (immunohistochemistry and intravital imaging) and at whole-body imaging techniques such as ultrasound, MRI and PET. During these practical courses, the students will also gain hands-on experience with a wide range of basic techniques required for preparation of samples for the different imaging modalities, such as cell culture, transfection and immunolabeling with antibodies. The module offers personalized education through multiple possibilities to select your own preferences (i.e. focus on more molecular/cellular, pre-clinical, and/or whole-body imaging). At the end of the minor, students will be able to design experiments involving imaging, with an understanding of the pros and cons of each modality. Thereby, this course will provide a solid foundation for the Bachelor laboratory internships in Toxicology and Pathobiology.

Student opinion
Very fun, interesting and useful minor to gain insight in several imaging techniques on the microscopic and whole-body level. A good ratio of lectures and practical work in which you are introduced to different kinds of microscopes and, as far as possible, whole body imaging. The practical lab work and assignments also make it a good preparation for research internships. Workload is challenging, but reasonable.

Strengths:
- Nice balance between a lot of different educational formats
- Enthusiastic supervisors who are good communicators
- A lot of opportunities to improve your scientific skills

Limitations:
- Schedule changed a lot
- No opportunity to work in advance
- Not a lot of in depth information
MIN04 (A) CANCER MECHANISMS AND IMMUNE DEFENSE

Dr. A.B van Spriel – Tumor Immunology
Ing. J. Pots – Tumor Immunology
Annemiek.vanspriiel@radboudumc.nl
Jeanette.Pots@radboudumc.nl

Description
Cancer is still an increasing problem as the number of cancer patients is predicted to increase by 70% over the next two decades according to the World Health Organization. Insight in cancer development, therapies, and prevention is rapidly increasing making cancer research a leading field in biomedical life sciences. This minor deals with all aspects of cancer from a molecular/cellular, clinical and population point of view with focus on the translation from bench to bedside. Themes that are included in this minor are: molecular basis of cancer, anti-tumor immune responses, cancer diagnostics and screening, epidemiology, and treatment modalities. An essential part of the educational format of the Minor will be in the form of small workgroups (consisting of 3-5 students) that will design, perform and present scientific cancer research. The module offers personalized education through multiple possibilities to select your own preferences (i.e. focus on more molecular, immunological, clinical, and/or epidemiological cancer topics). The students will be challenged to come up with ideas that may improve research. This minor will provide basic insight in scientific knowledge and tools in cancer research, thus preparing a solid basis for the Bachelor internship in Pathobiology, Toxicology and Epidemiology.

Student opinion
This is a very interesting and divers minor, where many different aspects of cancer pathophysiology are discussed. Especially in the first weeks, there is a large focus on lab work, which can be challenging for medicine students. Later in the minor the focus is more on reading scientific papers and presenting these to the group. You can often choose the subject that interests you most.
Many students state that this minor inspires them to work within this field. This minor has relatively long days, often with many free hours in between. It is fairly heavy on contact hours, but there is not that much self-study to be done afterwards. This balances out the study load. Most students experience the total study load as normal.

Strengths:
- Diverse subjects and forms of education
- Very knowledgeable and enthusiastic teachers
- Good balance between theory and practical work

Limitations:
- Long days with many free hours in between classes
- Some parts, for example the lab work, are less relevant for medicine students
MIN05 (A) MOVING QUESTIONS: AN INTRODUCTION TO CLINICAL HUMAN MOVEMENT SCIENCE

Dr. J. Kooloos – Anatomy
Jan.Kooloos@radboudumc.nl

Dr. E. Tanck – Orthopedy
Esther.Tanck@radboudumc.nl

Description
Research in the field of Clinical Human Movement covers a broad range of patient problems. Physically moving seems to be the best possible way to stay healthy and the best medicine for most patients. How to assess and ameliorate impaired movement is our motivation and we like to know: Which of the following questions moves you? How much physical activity is needed to stay healthy? What happens in the human body while exercising? How can human movement be quantified? What are the differences with healthy controls? How to predict the clinical performance of an implant? How to assess pathological gait? Are you fascinated by human movement and do you want to contribute to our understanding of its secrets? Then this minor perfectly suits you.

This minor is an introduction to clinical human movement sciences. You will study and learn fundamental theory to understand how the skeletal, muscular, nervous, cardiovascular, and respiratory systems play an important role in human movement. If one of the systems fails it immediately influences the other systems. Hence, the systems are connected and integrated and form the human movement system. You will learn basic skills to calculate, analyse, interpret and report the relationship between a clinical diagnosis and a movement problem, making use of the different approaches within Clinical Human Movement Sciences. During this minor, you will perform a small-scale research project to optimally prepare you for the Bachelor internship in the field of Clinical Human Movement Sciences. This minor is strongly advised for students who like to do a specialization in Human Movement Sciences.

Student opinion
It’s a busy course with a lot of contact hours. You have to get a minimum of 5.5 on every test. Not all of the classes are as relevant and will not always be tested on the exams. There is time scheduled for self-study during the contact hours. You have to do a lot of small presentations. The course is very interesting in general.

Strengths:
- A diverse educational program
- A course for both biomedical sciences - and medicine students
- Clear schedule
- Very practical

Limitations:
- A lot of contact hours
- Long days
MIN06 (B) GLOBAL HEALTH AND INFECTIOUS DISEASE

Dr. E. Spaan – Health Evidence  
Ernst.Spaan@radboudumc.nl

Dr. A. Tostmann – Primary and Community Care  
Alma.Tostmann@radboudumc.nl

Description

Global health is the health of populations in a global context and it goes beyond the perspectives and concerns of individual countries. It is about the control of infectious diseases, such as HIV/AIDS, Tuberculosis and Malaria, as well as non-communicable disease, such as diabetes and cancer, and about universal health coverage.

The challenges of global health are at the intersect of molecular, clinical, epidemiological, economic and other socio-behavioural sciences. Minor06 reflects this multidisciplinary nature and offers you a broad scope of methods, instruments and techniques stemming from the different disciplines. You will acquire theoretical knowledge, practical insights and hands-on skills, as well as learn how to translate scientific knowledge into policy recommendations through oral presentations and written products. During the minor you will engage with leading researchers at Radboudumc and meet professionals and potential future employers working in Global Health and Infectious Diseases at pharmaceutical companies, knowledge institutions, and development/aid organizations.

This Minor also contains two visits outside of Nijmegen. You will attend a conference of the Dutch Society of Tropical Medicine on Refugee Health in Amsterdam and you will visit the beating heart of global health policy, the WHO, as well as UNAIDS and the International Red Cross in Geneva, Switzerland. Here you will present the results of your project.

Student opinion

The conference in Geneva was a highlight of the minor. It is very inspiring and provides insight in the relevance of the subject. Although this minor is suitable for both medicine as well as biomedical science students, most medicine students express that it is more tailored towards biomedical science students.

Most students describe the study load as normal. The focus is on contact hours, rather than self-study.

During the weeks you will

Strengths:
- Enthusiastic (guest)teachers, that are experts in their field
- Good variety of different topics
- Study trip to Geneva

Limitations:
- More catered towards biomedical science students than medicine students
- Because so many different topics are discussed, none of them are addressed in depth
- Many presentations
MIN09 (A) PAIN, INFLAMMATION AND CANCER: NEW DRUGS TO COMBAT CANCER

Dr. ir. M. Adjobo-Hermans – Biochemistry
Merel.Adjobo-Hermans@radboudumc.nl

Dr. H. Pluk – Biochemistry & Molecular Mechanisms of Disease
Helma.Pluk@radboudumc.nl

Description
This minor focuses on the steps – from mechanism to molecule to patient – involved in the development of novel personalized medicines and therapies to treat diseases that pose a heavy burden on society, i.e. cancer, neuropathic pain and rheumatoid arthritis. Since the development of new therapeutics is increasingly based on profound fundamental knowledge, the molecular mechanisms of these medicines will be thoroughly discussed. Next, current techniques in drug design, drug delivery and clinical development will be discussed. Also, the techniques and applications involved in the development of personalized medicines, such as computer modelling, genome wide sequencing, genetic and metabolic biomarker analysis will be discussed. Future developments and the requirements to develop a personalized healthcare approach: “from molecule to man to population and back to man” will be an important part of this minor. This minor will be given in close collaboration with clinical professionals that have experience with the therapeutics discussed and include a patient’s perspective on novel personalized therapeutics. Students will be introduced into the relevant topics by means of self-study, interactive lectures and small group assignments. Practical components are part of the course to deepen knowledge and give hands-on experience. Students will be stimulated to mine and discuss current literature in order to complete team-based learning assignments and to present and defend a project proposal on personalized healthcare.

Student opinion
This minor is very broad and focuses on a lot of different aspects of therapeutics. Most of the teachers are very enthusiastic. The study pressure is rather high, however, you get a lot in return. Furthermore, the practical work is appreciated.

Strengths:
- Minor has a wide range of subjects
- Opportunity to applicate knowledge by the practical work
- A lot of different teachers

Limitations:
- The study pressure is rather high
- The assessment paper should be better prepared and guided by the teachers
MIN11 (A) CLINICAL RESEARCH PRINCIPLES AND PRACTICE

Dr. F. De Vegt – Health Evidence  
Femmie.deVegt@radboudumc.nl

Dr. W. Kieviet – Health Evidence  
wietske.kieviet@radboudumc.nl

Description
Excellent patient-oriented clinical research is fundamental for modern medical practice. Clinical researchers provide and investigate the evidence that is needed for providing the best care for patients. Research questions relevant for clinical practice are for example:
- ‘Is glycated haemoglobin, HbA1c, a useful biomarker for the diagnosis of diabetes?’
- ‘Is survival in breast cancer patients improved after treatment with hormonal therapy compared to treatment with chemotherapy?’
- Is urinary tract infection a risk factor for bladder cancer?
- Does the increase in quality of life after treatment with TNF blocking agents in patients with rheumatoid arthritis outweigh the extra costs?

If any of these questions are appealing to you as a biomedical researcher or physician in training, this minor might be very interesting for you! An important feature of the minor is learning from and being situated in clinical practice. You will perform a clinical research project which is supervised by a medical specialist and a research methodologist. During the minor, in-depth background of clinical research and the research process, explaining the principles and methods used to obtain quantitative evidence are taught. After this minor you will be well equipped to organize and perform your own clinical research in practice!

Student opinion
In this minor you learn how to design a clinical research trial (and how hard that is). This knowledge is integrated in lectures, a small trial you will design by yourself, and a major project that runs parallel with the lectures. Because of the integrated knowledge this minor is really diverse, and immediately turns knowledge into practice.

Strengths:
- A lot of practical work with real data from the hospital
- Clear structure with blocks of subjects and a longitudinal project
- Committed teachers with a lot of personal guidance (because of small group)

Limitations:
- Few challenging course
- Some lectures were in Dutch
- Vague exercises during the course
MIN14 (A) NEUROSCIENCE OF STRESS-RELATED PSYCHOPATHOLOGY

Dr. E. Hermans – Donders Institute
erno.hermans@donders.ru.nl

Description
Stress is a pervasive phenomenon in our lives that can have severe consequences at levels of organization ranging from molecule to population. This course explains the cognitive and neural (dys)functions underlying the development of stress-related psychopathology. It will provide an overview of relevant disorders such as major depression, anxiety disorders, and addiction. The course will explain how symptomatology observed across these disorders can be mapped onto neural systems supporting cognitive functions such as emotion and mood regulation, attention, motivation, and social cognition. Disease development will be discussed within a theoretical framework of gene-environment interaction, which assumes that psychopathology results from a complex interplay of genetic risk factors and environmental stressors. The course has a broad interdisciplinary and translational character: it will explain how animal models for stress-related disorders are developed in molecular and behavioural neuroscience, how (dys)functions of relevant neural systems are investigated using neuroimaging methods in humans, and how knowledge gained from this research is applied to advance treatment.

Student opinion
This minors is about stress-related disorders and it is very good choice if you are interested in the brain. It is given by people who are experts in their field of research and they know how to keep your attention the whole course. The contact hours usually are on Monday. The minors is not very clinical, but also has no lab work.

Strengths:
- Interesting subjects
- Enough time for self-study
- Insights into different perspectives
- Clear build-up and what is expected
- Excellent guidance of teachers

Limitations:
- Discussion sessions have no extra value
- Background information is not always tested
- Build-up of exams
- The quality of teachers is sometimes poor
- Very theoretical lectures and no workgroups
MIN18 (A) HEMATO-ONCOLOGY
Dr. C. Hess – Hematology Dr. A. van der Waart – Laboratory Medicine
corine.hess@radboudumc.nl anniej.vanderwaart@radboudumc.nl

Description
The therapeutic field of hemato-oncology is a combination of clinical, molecular and immunological aspects. On one hand, new insights on the molecular-biological causes of the malignant cells can be used to develop new therapeutical targets. On the other hand, hematological malignancies are excellent targets for cellular immune therapy. In this minor, the deregulated pathways, clinical aspects, diagnostic and (up-coming) therapeutic strategies are discussed according to the four main groups of hemato-oncological disorders: leukemia’s, myeloproliferative disorders, plasma cell disorders, and lymphoma’s. Here, both the molecular and immunological aspects are discussed from pathobiology and diagnosis to (molecular & immune) therapy. The knowledge gained in this first part of the minor will be tested by a written exam. Development of new therapies against hematological malignancies requires (bench-based) research as well as (bedside-based) clinical trials. In the 2nd part of this minor, the gained knowledge will be used to develop a research proposal or clinical protocol for the development and testing of a new therapy. This will be performed in small work groups (3-4 students) and will be via examined via a report and oral presentation.

Student opinion
This minor is great for medicine students with an interest in hematological malignancies. You gain very in-depth clinical knowledge on the subject. You will also learn a lot about reading scientific papers and presenting them in an academic setting. Because this module focuses largely on clinical cases, biomedical science students experience it as less relevant to their education. The study load is normal, but the difficulty is fairly high. There is a good balance between self-study and contact hours, with a little more focus on self-study compared to other minors.

Strengths:
- In-depth knowledge
- Prompts students to do their own research and study by themselves
- Opportunity to focus on individual interests, within this field

Limitations:
- Very high level
- More catered towards medicine students than biomedical science students
MIN22 (A) HEMOSTASIS, A DELICATE BALANCE!
Dr. B. Laros-van Gorkom – Hematology      Dr. W. van Heerde – Laboratory Medicine
Britta.Laros-vanGorkom@radboudumc.nl       Waander.vanHeerde@radboudumc.nl

Description
Regulation of homeostasis is an essential part of daily clinical practice. Nowadays, more than 50% of the hospitalized patients are treated to prevent thrombotic complications. Most life-threatening complications derive from thrombotic or bleeding events, and searching for the right balance can be a major challenge both for in-hospital and outpatient practice. Thrombosis and homeostasis is an area of continuing innovation and development.
In our minor we provide a translational approach for you to get involved in the magic world of homeostasis. You will get possibilities to integrate your newly acquired knowledge in practice by patient interviewing together with hand-on laboratory diagnostics. Training and coaching in personal presentation skills will be an integral part of the course.
You will be introduced to other stakeholders, like pharmaceutical industries and patient organizations broadening your view. Finally, the course will challenge you to think out of the box with respect to the current therapeutic options; what to do with the giant possibilities with respect to genetics and personalized medicine?

Student opinion
It is a very interesting course. There is enough time to work on your self-studies during the contact hours, which means you have less work to do at home. There is no midterm exam so it’s a bit difficult to know how to prepare for the final exam.

Strengths:
- Clinical course with patient contact moments
- Very diverse
- Very detailed and clear subjects that are not taught in regular classes

Limitations:
- Routine form of classes, where assignments are discussed in groups
- Monotonous
MIN23 (B) PEDIATRIC INFECTIOUS DISEASE AND IMMUNITY

Dr. S. Van Selm – Pediatrics
saskia.vanselm@radboudumc.nl
Dr. K. van Aerde – Pediatrics
Koen.vanAerde@radboudumc.nl

Description
The discipline of pediatric infectious diseases covers a broad range of infections. Incidence and manifestations of infections by the development of the child and the associated maturation and shaping of the immune system, especially in new-borns and infants. Pediatric infectious diseases have been a very fruitful area of science, leading to major new insights and improvements in medical care worldwide. The development of preventive interventions of childhood diseases like diphtheria, measles, polio and pertussis has made a major contribution to the improvement of health worldwide. In this elective course the student will learn more about the scientific process and principles, while increasing knowledge on pediatric infectious diseases, the developing immune system, immunodeficiency’s and vaccines. Understanding of the interplay between the causative agents, pathogenesis and the immune system is an essential step in achieving control and elimination of disease. The course aims to further educate on the scientific process in the medical sciences. You will be able to be inspired by participation in a clinical round, and interactive lab tour and research meetings, and to be in close contact to experts in the field for reflection on the assignments.

Student opinion
This minor is well organized. It has more self-study assignments than lectures. There is a lot of casuistry and practical work in this minor, this makes it sometimes too clinical for the biomedical science students. The study load is well distributed. The assessment of the minor consists of 3 parts.

Strengths:
- Interesting lectures
- As a student you learn good, scientifical English
- Enthusiastic and helpful teachers

Limitations:
- The organization is not always on time
- Less research-based than the other minors
- It is not always clear how much you have to learn for the exams
MIN24 (A) METABOLIC SYNDROME vs RENAL HORSEPOWER

Prof. Dr. J. Hoenderop – Kidney Physiology
Joost.hoenderop@radboudumc.nl

Dr. J. Kooij – Physiology
joanneke.kooij@radboudumc.nl

Description
This minor focuses on complex chronic diseases, like renal disorders in metabolic syndrome, which both show a rapid, worldwide increase in incidence. Metabolic syndrome increases the risk of diabetes and cardiovascular disease and a close association has been found with the development of renal damage. Introduction lectures will give an overview of principles and theories related to the central theme; renal manifestations of metabolic syndrome. Pathophysiological mechanisms, the effect of renal disorders and metabolic syndrome on tissues and organs as well as the interaction between nutrition and the complex chronic disease will be discussed. A journal club will be organized to practice critical reading and evaluation of recent research papers. There will be a patient demonstration and case reports, and you will learn about the possible consequences of chronic kidney disorder as dialysis and transplantation will be discussed. Special emphasizes will be on the practical education assignments that are directly related to ongoing research projects. By combining the practical assignments with critical evaluating of the obtained experimental results, listening to lecturers by experts, group discussions and self-study, you will learn the basis of experimental research within the domain of renal physiology and cardiovascular disease.

Student opinion
Unfortunately, no student feedback was available for this course.
MIN26 (A) CHALLENGES OF INTEGRATED COMMUNITY-BASED HEALTHCARE

Dr. M. Dees – IQ healthcare
Prof. Dr. K. van der Velden – Primary and Community Care
Marianne.Dees@radboudumc.nl
Koos.vanderVelden@radboudumc.nl

Description
The main challenge our health care system currently faces is how to improve patients’ perceived health and satisfaction with care at reduced healthcare expenditure per capita (the so-called ‘Triple Aim’). Integrated community-based care is believed to be the solution to reach this triple aim. Core aspects of integrated community-based care are the focus on (positive) health instead of on disease; demand-driven versus supply-driven care; patient centeredness; down-sizing from specialized care to primary or community care, and intersectorial collaboration. Since 2015, when the legal responsibility for vulnerable people was transferred from the central government to local municipalities, policymakers, health care and welfare professionals in the Netherlands have been searching for answers on how to organize and implement integrated community-based care. Research can support this by providing insight into the type and magnitude of local health problems and the existing preventive infrastructure, by identifying best practices and developing or recommending evidence-based interventions. However, the study of integrated community-based care often requires alternative research designs to the traditional ones like randomized controlled trials. For example, the use of ‘big data’ from general practitioners and community health services (‘GGD’), from which a defined area (‘wijk’) can be studied with regard to the prevalence of health parameters, in combination with welfare data. As a student Biomedical or Medical Sciences, the study of integrated community-based care prepares you for your future professional practice in a changing healthcare system. General practitioners (GPs) need to, more than before, collaborate with other professionals in ensuring the best possible health of citizens. This course reflects this, as its multidisciplinary nature offers you different perspectives (e.g., general practice, public health, policy, welfare and prevention, patient perspectives) on health. The course allows you to use real data and perform interviews with policymakers, GGD and GPs.

Student opinion
Unfortunately, no student feedback was available for this course.
MIN27 (A) GENOMICS RESEARCH – FROM MOLECULE TO POPULATION

Dr. D.R.H. de Bruijn – Genetics  Prof. Dr. M. Huijnen – Molecular Informatics
Diederick.deBruijn@radboudumc.nl  Martijn.Huijnen@radboudumc.nl

Description
It is safe to say that genome variation contributes to every human disease, except perhaps trauma related injuries. The relation between genome structure, function, variation and disease-related phenotypes can be studied using genetic, epidemiological, and bioinformatic tools. These tools encompass the whole field from molecular (in vitro, in vivo), in silico, to population-based studies. It is likely that any (bio)medical researcher will encounter or use these tools in his/her own research activities. This minor focuses on the application of such tools to (bio)medicine. In other words: To use the information contained within the genome of patients to understand and diagnose diseases, and (when possible) define strategies for prevention, treatment and/or curing these diseases.

Student opinion
Strengths
- personal education
- broad new subjects
- usefully in other minors
- enthusiastic lecturers
- tests are planned at different times
- test forms differ
- topics alternate

Limitations
- basic knowledge is needed
- topics alternate
- not always a clear overview
MIN29 (A) CONTROL OF INFECTIOUS DISEASES
Dr. JLA. Hautvast – Primary and Community Care
Jeannine.Hautvast@radboudumc.nl
Dr. F. Stelma – Microbiology
Foekje.Stelma@radboudumc.nl

Description
This minor focuses on the acquisition of essential scientific knowledge and skills to contribute to the prevention, containment, rational treatment and control of infectious diseases in hospital and community settings, and will thereby prepare students for a research internship in this area.

Main objectives
After completion of the minor, students are able:

1. To gain profound understanding of how genetic diversity and antigenic variation in infectious diseases is related to infectious disease pathogenesis, transmission and evolution.
2. To participate in a multidisciplinary antibiotic stewardship team by having active knowledge of the working mechanisms of antimicrobials, knowledge on when to use which antibiotic, and how micro-organisms can counter antimicrobials (antibiotic resistance).
3. To develop hospital infection control programs by understanding the concept of hospital infection prevention and control on a patient level, including the understanding of different indications for patient isolation, different types of isolation and the criteria for ending isolation.
4. To apply the theoretical basis of infectious disease surveillance, outbreak investigation, vaccine epidemiology and infectious diseases prevention & control into practice and science settings.
5. To acquire modelling skills and to be able to use them for the prediction of the effect of interventions on an outbreak.
6. To integrate the knowledge gained during the course into a small field-study, involving literature search, data collection, analyses and reporting & presentation.

Student opinion
Unfortunately, no student feedback was available for this course.
3. WEDNESDAY MINORS

B3KOB - ADVANCED DATA ANALYSIS AND PROGRAMMING: HOW TO MAKE MORE OF YOUR RESULTS?

Dr. A. Pistorius – Biochemistry
Arthur.pistorus@radboudumc.nl

Description
In many areas of the biomedical sciences you, as a researcher have the task to discover relevant parameters in sometimes large data sets or to match experimental data with a theoretical model. It appears not easy to make a choice from a wealth of specialised, user-friendly, commercial software and to remain critical with respect to the method and the outcome, when using these packages. In order to prevent scientific errors and to improve reusability of data and software, data-analysis is often carried out using e.g. MATLAB, R and Image-J. Although the latter two are more specialized for statistics and image analysis respectively, these all-purpose programs are available for several computer platforms and might be considered as standard programs for tackling all kinds of data-acquisition, analysis, and visualisation of scientific data in many fields of science. By virtue of their open character, you are free to adapt its functionality and to design new functionality to tailor the program to your own needs.

In this practical course, you will develop experience in the use of a selection of the most important scientific software suites. Training in the use of these programs may prove advantageous in later stages of your study or career when research data have to be analysed or when literature data have to be critically assessed. Moreover, armed with this experience, you are able to understand and to adapt programs or scripts in other programming languages when needed. Emphasis is placed on MATLAB as an all-round, full-fledged programming environment. Elements of the syntax and the use of function M-files are treated and applied to research questions from the biomedical sciences (data analysis, statistics and graphical presentation) which you will elaborate with a fellow student. Case studies are selected from biochemistry, bioinformatics, cell biology, pharmacology, neurosciences, physiology, hematology and cardio-vascular studies. You are invited to work on research projects of your own choice.

Student opinion
Strengths:
- Programming skills are trending
- A lot of skills are obtained with many exercises
- Practical
- You can choose a topic you like, since there is 1 topic ‘free’

Limitations:
- Busy course with long days
B3KOE - SCIENCE IN ACTION: PHILOSOPHY AND DYNAMICS OF SCIENCE
Dr. A.J.M Oerlemans – IQ healthcare
Anke.Oerlemans@radboudumc.nl

Description
Science was long regarded as an isolated practice of small groups of experts, completely separate from “the real world”, whose products eventually trickled down into society. In the 20th century, this sharp divide vanished. Many now consider science a social phenomenon, which takes shape in a context with many different influences. Scientists, policymakers, interest groups, patients, political forces and societal developments all shape scientific thinking and the products of science.

In this course we will look at this social phenomenon through the eyes of different philosophical and sociological theories. We will use different case studies – HIV/AIDS, sickle cell anemia, Tay Sachs disease, among others – to consider the different actors and contextual factors that influence biomedical science. Throughout the course we will look at the influence of societal developments, technology, political activism, external sponsors, the institutional context and the role of the scientists themselves. You will work on a group portfolio, in which you apply the different theories and perspectives to one specific case study (disease).

After completing this course, you will be able to take a broader perspective towards scientific practice and reflect on the context that influences biomedical science and its products.

Student opinion
In this course, you will learn about different science-related issues which will broaden your perspective on science. The course is well organized and divided in some interesting themes that are logically scheduled. On the basis of working groups and SSAs the themes will be sufficiently discussed. There are enough opportunities to ask questions or additional explanation. Besides, a report has to be written where pairs can delve into their own topic of interest.

Strengths
- Very well-organized (incl. realistic time plan)
- Interesting topics (valuable for future biomedical professionals)
- Helpful and inspiring teacher
- Different study materials (e.g. books, documentaries, newspaper articles)

Limitations
- Some self-study assignments were difficult to fully understand
- A bit vague what is expected from the report
B3KOF - TRANSLATING ANIMAL RESEARCH INTO CLINICAL BENEFIT

Dr. M. Leenaars – SYRCLE  
marlies.leenaars@radboudumc.nl

Dr. K. Wever – SYRCLE  
kim.wever@radboudumc.nl

Description
The central topic of this minor is the impact of preclinical animal research on human health care. Although controversial, animal experiments are still an essential step in the development of many new drugs and therapies for humans. They are perceived as necessary to predict the safety and efficacy of new medical treatments, before testing such treatments in clinical trials. However, promising results obtained in animal studies do not necessarily translate to patients. Despite extensive preclinical testing in animals, up to 85% of early clinical trials for novel drugs fail. Such translational failure may be caused by a variety of limitation, biases and systematic failures in the use of animals as models of humans. Translating animal data to humans is therefore not an easy task. How can this process be optimized? In view of the ethical debate around animal experimenting, how can the value of necessary animal studies be maximized? The challenges and opportunities in this translational process from mouse to man are studied in this minor, as well as the impact currently performed animal research has on improvement of health care.

Student opinion
This minor gives you an introduction into animal research. Different topics regarding the translational problems involved in animal research are covered. Due to the fact that this topic is not part of the regular program of Biomedical Sciences it is very useful for students interested in performing animal studies. During the minor you will work on a topic of your choice, and describe the translational issues in the study of that specific disease. This assignment gives you the opportunity to directly incorporate the knowledge you have learned during the lectures.

Strengths:
- Speed dates with people of the Animal Welfare Body and animal scientists
- In depth assignment on a specific topic of choice
- Gives you a clear overview of the pro’s and con’s of animal studies

Limitations:
- Organisation could be chaotic sometimes
- Most lectures where presented in Dutch
Description
‘Consultancy’ is one of three career profiles students of Biomedical Sciences can choose in their master’s program. It has been developed for those who aspire to assume a role as an advisor, i.e. someone who on the basis of his or her scientific background can determine what are effective solutions to biomedical problems, but also has the communicative skills to manage the possibly different views and stakes of persons involved. The latter requires that, apart from a solid scientific background, analytical skills, and creativity, you have developed competencies such as listening, maintaining a client focus, negotiating, and managing resistance. And this, in turn, requires that you have a clear view on who you are, understand what are your signature strengths, and can use these to manage yourself in interaction with others. This course offers an introduction to consultancy and the required communicative skills. It has been developed for those who already know that their future is in consultancy, as well as for those who wish to discover whether consultancy suits them. This is a matter of learning by doing. You and your peers will constitute your own learning lab and engage in a series of workshops that will have your personality and signature strengths surface. On the basis of feedback, you will reflect on your behavior and its effectiveness, and experiment with alternatives. Very importantly, you should understand that essentially this is about you. You should participate only if you feel comfortable being approached personally and sharing your thoughts and feelings with your peers.

Student opinion
Strengths:
- Informative
- Practical
- Self-reflection
- Close relationship with the group
- Positive personal growth
- Involved teachers
- Conversation skills
- Experiencing what the master could be like
- Personally involved

Limitations:
- Intense and sometimes exhausting days
- Concrete application is missing
- Sometimes a little vague
- Long and intensive days
B3KOG POPULAR SCIENCE WRITING
Dr. C. Struijke – Faculty of Arts
c.struijke@let.ru.nl

Description
Researchers are increasingly expected to share their findings with the general public in order to convince them that their research is beneficial for society. In this course, you will learn to write a magazine or newspaper article that is geared toward a wide, general audience. You will learn to focus your writing on the essence of your research project, highlight its importance, and approach it from new angles. This course will teach you to use a creative writing style that is engaging, informative, convincing and accessible at the same time.

Student opinion
Strengths
- Learn to write about medicine in a fun way
- enthusiastic teachers

Limitations
- few contact hours
4. THURSDAY/FRIDAY MINORS

MIN03 (A) TRANSITIONAL CARDIOVASCULAR RESEARCH
Prof. dr. G. Rongen – Pharmacology and Toxicology
Gerard.Rongen@radboudumc.nl

Description
This minor focuses on atherosclerosis and heart failure, main causes of death and reduced quality of life globally. It will bring you in contact with investigators from field and will prepare you for a bachelor research fellowship within the research facilities of these investigators. In addition, this minor gives you the opportunity to follow an introduction course in regulations and organization of human (clinical) research, knowledge that is essential to perform studies in humans or with material sampled from humans. Both atherosclerosis, heart failure and its important risk factors will be introduced by lectures and (self) study assignments focusing on the pathobiology, pathophysiology and epidemiology of these disorders. Some monogenetic diseases associated with heart failure will also be discussed to facilitate an in-depth knowledge of metabolic modulation of cardiac function and (mal)adaptive processes that can prevent or enhance cardiac dysfunction. Subsequently, you will collaborate in research teams of 3-4 students to investigate these topics further in self-study assignments and interactive lectures. Areas of uncertainty will be identified and these will be selected by teams for further literature searches that will be reviewed by these teams in plenary ‘meet-the-expert’ sessions. Coached by investigators/faculty members, each team will use one of these reviews to design a research protocol that should solve some of the identified uncertainty. This research should have a translational character, that means: it translates between levels of complexity from molecule to population or reverse. The final goal of the proposed research should be to improve personalized prevention and treatment of atherosclerosis or heart failure.

Student opinion
This minor is suitable for both medicine as well as biomedical science students, although more focused on research than clinic. You will receive lectures from many different inspiring (guest)teachers for the different subjects and visit a cardiologist who is an expert in the field. Other work forms consist mostly of groupwork and group presentations. Most students describe the study load as normal, although with many contact hours.

Strengths:
- Much in-depth knowledge
- Lots of practical work

Limitations:
- Long days with many contact hours
- Sometimes unclear what is expected for the exam
MIN08 (A) STATE-OF-THE-ART RESEARCH TECHNOLOGIES IN CANCER, IMMUNOLOGY AND DIAGNOSTICS

Dr. A. Kuppevelt – Biochemistry
toin.vankuppevelt@radboudumc.nl

Description
This minor focusses on molecular and biomedical Technologies and strategies used in modern Laboratories all over the World. Focus is on contemporary challenges in cancer, immunology and diagnostics. The minor has a strong emphasis on practical skills, and prepares student for their traineehips an in pathobiological, toxicological and biomedical research. The technologies practiced are all firmly embedded in current medical challenges such as cancer. Inflammation, biomarkers and toxicological issues. Technologies that will be addressed include molecular-biological techniques for DNA/RNA/protein analyses, mass spectrometry, (immune)histological/cell-based techniques, and bioinformatics. Hands-on (lab) activities with the aforementioned techniques constitute a major part of the minor. In addition, ample training will be given to rationally apply technologies to design research strategies, and to be able to communicate data/designs in a comprehensive way. The minor will be capped by a mini-symposium in which the student will be given the opportunity to present a self-designed research strategy focused on a biomedical issue of her/his own choice.

Student opinion
This minor is recommended for all biomedical science students, mostly if you want to execute your bachelor internship in the lab. A lot of different subjects are discussed in a short time, you learn a lot and it is well organized. It is a very interactive minor. And in this minor, you meet a lot of different scientist and you get the opportunity to see their workplace.

Strengths:
- You get to work in small groups (around 5 students) with intensive guidance
- Applying knowledge into practice
- Good preparation for biomedical bachelor-internship

Limitations:
- There is not enough time planned for writing the scientific article
- More catered towards biomedical science students than medicine students
MIN10 (A) DIAGNOSTICS AND RESEARCH IN KIDNEY DISEASE

Prof. Dr. D.W. Swinkels – Laboratory Medicine
Prof. Dr. J. Hoenderop – Fysiology
Dorine.Swinkels@radboudumc.nl
Joost.Hoenderop@radboudumc.nl

Description
Each day, 180 litres of plasma is filtered by your kidneys to remove waste products from the circulation and maintain volume homeostasis. Around 99% of this filtrate/pro-urine is reabsorbed within the kidney via various transport processes, making the kidney a true hub of activity. A vast number of factors governs transport in the kidney, many of which are still largely unknown to us. This is where you come in! In this minor, you will adopt the role of a renal researcher, attempting to answer questions like: Can we come up with alternatives to kidney transplants? What is the link between hypertension and kidney disease? Which cells are involved in scar-formation in focal segmental glomerulosclerosis? How does the kidney regulate excretion of magnesium and calcium, even though dietary intake varies wildly? How accurate and precise are the diagnostic tools that we currently have, and can we improve them? In addition, there will be multiple opportunities to discuss the impact of renal disease with patients suffering from kidney diseases. What is it like to receive a renal transplant? What is the impact of having to travel to the dialysis ward almost every day? This will provide you with the framework you need to set up and conduct your very own experiments at the one of the Radboudumc departments with ongoing ground-breaking renal research programs. Over the course of several weeks, you will function as a PhD student at such a department, and hopefully add exciting new knowledge on renal disease mechanisms and associated leads for novel diagnostic tools or treatment targets kidney. You will present your newly found data to the other researchers at the department and in a scientific article. Taken together, this minor introduces you to current topics in renal disease, using a bench-to-bedside approach. A variety of lab, diagnostics, clinical and social experiences will help you gain a better understanding of the connection between fundamental kidney research and clinical practice. And will let you experience top-notch research first-hand to prepare you for your bachelor internship.

Student opinion
This minor is very practical. You will obtain a lot of hands-on experience, which makes this minor feel like an internship.

Strengths:
- Working in small groups
- Enthusiastic teachers
- Learning a lot of lab skills

Limitations:
- Limited freedom in writing the research report
MIN12 (A) ASSESSMENT OF SURGICAL INNOVATIONS

Dr. M. Tummers – Health Evidence
Marcia.tummers@radboudumc.nl

Dr. Ir. R. Reuzel – Health Evidence
Rob.Reuzel@radboudumc.nl

Description
This minor is for those who seek to improve health(care), not only by trying to understand mechanisms of health and disease, but also by ensuring that innovative interventions match the needs of patients, physicians, and other stakeholders. Existing methodologies for evaluation are mostly applied after the intervention has been developed. A phase in which the options for improvement are limited. As a result, implementation of the intervention often fails. Addressing issues upfront, prevents unwanted interventions from being developed and steers development of interventions toward desired futures. To achieve this, it requires us to look at health problems from the perspective of stakeholders. We need to understand which working mechanisms (biological, social, political) contribute to these problems, and identify new interventions to solve them. It also requires that we are able to complementarily employ mechanism- and evidence-based approaches to evaluating these interventions. This helps to understand the value of interventions, identify barriers and facilitators to implementation, and recognize possibilities for improvement.

In this minor, you will learn basic methods of problem structuring (qualitative research, participatory evaluation), health technology assessment (outcome measurement, early HTA), and implementation science. In addition, you will engage in the philosophy of technology so as to be able to reconstruct value framework of stakeholders and build scenarios for the future development of health interventions. This all main involves practice-based leaning; you and others working with stakeholders on real topical health problems.

Student opinion
Strengths:
- Interactive
- Enough time for self-study
- Practical
- Different options to choose from
- Involved teachers
- Coherence
- Working in groups

Limitations:
- Uncertainty about the subject material of the exam
- Content of minor not clear at first
- More catered towards biomedical science students than medicine students
MIN13 (A) MEDICAL BIOTECHNOLOGY TOWARDS CLINICAL PRACTICE

Dr. R Wansink – Cell Biology
Dr. W. Hendriks – Cell Biology
Rick.Wansink@radboudumc.nl
wiljan.hendriks@radboudumc.nl

Description
Medical biotechnology comprises the application of living cells or cell material in the development or generation of products to prevent, diagnose or treat human disease. Historical examples of biotechnology in support of medicine are the development of vaccines against smallpox and the production of antibiotics or human insulin by bacteria or yeast. Exciting 21st century developments are genetic engineering (e.g. CRISPR/Cas), gene therapy and stem cell-based regenerative medicine. Medical biotechnology is a rapidly evolving field integrating knowledge obtained in molecular, cell biological, genetic and immunological scientific areas. The first part of this Minor runs together with the NWI-MOL104 Medical Biotechnology course and provides an overview of how interdisciplinary efforts help shaping modern. Principles and concepts of medical biotechnology will be discussed in a scientific, medical and societal context, including ethical and legal considerations. Together with fellow students you will write a medical biotechnological research proposal and present this at a mini-symposium. In the second half of the Minor you will carry out typical biotechnological experiments in four different projects in the lab. These include molecular diagnostics (e.g., PCR, sequencing), recombinant DNA techniques and protein production, cell adhesion assays and cell culture, and cell transfection experiments mimicking gene therapy. Medical Biotechnology towards Clinical Practice presents an excellent theoretical and practical foundation for students interested in molecular life sciences, pathobiology, toxicology and health technology.

Student opinion
This minor will prepare you for your internship, the broadest way possible. The first ten weeks are only theory and a research proposal together with FNWI students. The last ten weeks of the minor exist of four different projects in which a lot of lab skills are obtained.

Strengths:
- A lot of interesting and innovative subjects
- Good and accessible teachers
- Much knowledge and many practical skills learned
- Clear structure (lecture – self-study – response course)

Limitations:
- Large amount of theory in 7 weeks
- Difficult theory, because it is together with FNWI
- No recordings of lectures
- Little time for writing research proposal and learning for examination
MIN16 (A) TRANSLATIONAL NEUROSCIENCE
Dr. D. Schubert – Cognitive Neuroscience  
Hans.vanBokhoven@radboudumc.nl
Prof. Dr. H. van Bokhoven - Genetics  
d.schubert@donders.ru.nl

Description
Why are there currently still no cures even for intensively studied neurodevelopmental and movement disorders, such as autism spectrum disorders? Starting from this basic question you are going to set a frame in this interfaculty minor “Translational Neuroscience” and draw upon the following topics: What is nowadays known about the neurobiological mechanisms underlying these disorders? Where is preclinical and clinical research now and are there new treatments and therapies in sight? The problems clinicians and researchers nowadays face with neurodevelopmental and movement disorders range from diagnostics, neurobiology, genetics and choosing suitable research methodologies to therapy.

A core element of the minor is that during its entire length you will work in groups of three students in order to produce together a translational research proposal for studying a particular neurological or movement disorder. During this project you will carry out a systematic review of the scientific literature complementary to the information that has been taught in the course modules. Each group will be supported by a “personal tutor”, who is an expert scientist or clinician in the respective field.

Content wise, we will first introduce the clinical problem settings. Subsequently researchers will provide you with the fundamental knowledge of neurobiological and genetic processes as well as state of the art methodologies (including (lab) practical(s). Finally, we will explain and illustrate the current applications of various methodologies in translational and clinical research as well as in therapy and diagnostics.

Student opinion
This minor is a good fit for students with broad interests: you will study 5 diseases with completely different mechanisms, from the molecular level to the clinical level. Since this minor is about translational science, you will also learn about fundamental research, animal research and clinical research. All in all, many different, but coherent, topics are discussed!

Moreover, this minor is interfacultary. That means you will be joined by students from (medical) biology and molecular life sciences. During the group project, groups are formed with one medicine student, one biomedical sciences student and one student from the other faculty. Each student has its own strengths and this comes to together nicely during the group project.

In this minor, you are graded for many different things. There are three written exams, two deadlines from the group project and two reports from specialisation modules. So, there are many grading moments, but you get graded on a broader spectrum of skills.

Strengths:
- Diverse teachers
- Different views on topics
- Encouragement to have own research ideas
- Well informed teachers
- Very informative
- Structured lectures
- Broad topics
- Brain dissection course
- Clear overall minor structure

Limitations:
- Many workgroups
- Difficult themes
- Overlapping subjects
- Lectures could be less ‘dull and dry’
- Very few practicums (dissection course + two 2-day modules)
- Many grading moments
- Fixed project groups
MIN19 (B) CLINICAL EXERCISE PHYSIOLOGY

Dr. T Eijsvogels – Physiology  Dr. Van Hees
Thijs.Eijsvogels@radboudumc.nl

Description
The aim of this minor is to focus on clinical exercise physiology by offering a twenty-week program developed to gain all knowledge needed to apply the principles of exercise physiology in (medical) practice and in a scientific context. The minor starts with an introduction in the field and a recap of the general physiology of the respiratory, circulatory and muscular systems, which are the primary organ systems in exercise physiology. Next, the effects of acute exercise on each of these organ systems will be discussed via lectures, working groups and practical work meetings. Also, the interaction between diseases of these organ systems and exercise is part of the minor. Furthermore, you will learn to perform and interpret exercise tests and diagnose patients using exercise tests. In the final weeks of the minor you will learn the principles of exercise training and you will apply this knowledge by developing a training program for an athlete or a patient, based on the principles you have learned. The minor is concluded by a written exam, a skills test, testing your ability to perform an exercise test and handing in your training program.

Student opinion
This minor is great for students who are interested in exercise and its effects on the human body. Not only will you learn the theory behind it, you will also experience it yourself while performing exercise test with fellow students. There is a good balance between theory and practical application.
The minor is well structured, starting out with reiteration of the basics, before going into depth on the subject.
The study load varies throughout the semester. Within the first weeks it was very busy with long days, while later in the semester it got easier. Students describe the study load as normal. The focus is on contact hours, rather than self-study.

Strengths:
- Enthusiastic and competent teachers
- Many practical work forms
- Subjects are relevant for both medicine as well as biomedical science students

Limitations:
- Not all teachers speak English sufficiently
- Often long days, especially on Friday
MIN21 (B) BREAST CANCER: BIOLOGY, TREATMENT, PATIENT

Dr. P. Span – Radiation Oncology
Paul.Span@radboudumc.nl

Dr. M. Zegers – Cell Biology
Mirjam.Zegers@radboudumc.nl

Description
About 14,000 women (and 100 men) are diagnosed with invasive breast cancer each year in the Netherlands, which means that 12-13% of women will develop breast cancer at any time in her life. Early detection, particularly via national breast cancer screening, combined with loco regional treatment and systemic adjuvant therapy has improved the prognosis in women with breast cancer (Breast Cancer Guideline, NABON 2012). In this minor, we will use breast cancer as example to understand the many factors that determine successful translational research on a human disease. Breast cancer is a good example for these various underlying molecular defects to which targeted therapies can be designed. Furthermore, breast cancer patient support and advocacy groups are relatively large and well-organized and are an important factor in research fund raising.

Important aspects covered in this minor includes the following:
- Do we understand enough of the molecular mechanisms that cause a disease and to develop targeted therapy?
- How well are we able to study the disease and to predict therapeutic efficacy in the laboratory, using cell culture or animal models.
- What methods are here available for diagnosis, and to design targeted and personalized treatment?
- How can we monitor efficacy of therapy?
- How to prioritize available budgets for screening funding and therapy?
- How are patients involved in decision making?

Student opinion
In this minor, you learn about: the molecular mechanisms that cause a disease, targeted therapy, therapeutic efficacy in the laboratory, methods for diagnosis, monitoring therapy, prioritize available budgets for research funding and therapy and involvement in decision making. The end grade consists of a combination of the grade for a written exam, small assignments and a practical report.

Strengths:
- The learning material for the exam is given in a lot of fun PR’s and HC’s.
- The timetable is very favorable and you have enough time for assignments.
- A favourable planning in terms of lesson
- Writing the practical report is very useful if you want to learn more about research.
- Enthusiastic teachers

Limitations:
- There is little variation in other forms of learning (RC, SSA, etc.), besides the Lectures and other practica.
- In this minor you learn a lot about the molecular part of breast cancer, but not much about breast cancer on other levels.
MIN25 (B) BETTER DOCTORS, BETTER PATIENTS, BETTER DECISIONS
Dr. J. Brasperning – IQ healthcare
Joze.Braspenning@radboudumc.nl
Dr. H. Calsbeek – IQ Healthcare
H.Calsbeek@radboudumc.nl

Description
The aim of this minor is to deepen the understanding and teaching the skills regarding methods of quality of care management and research. Critical reflection on the application of these methods is asked from a doctor who wants to become a "responsible caregiver". The students acquire knowledge of important determinants of quality care, including gender and age specific aspects, and are questioned on how to practice the new knowledge. Especially attention will be given in how quality management take place in practice (excursions). The minor is structured around five themes on quality of care that is (1) public health, (2) the different perspectives of quality of care (e.g. outcomes, value, cost), (3) making quality of care explicit or measurable (e.g. quality indicators), and (4) methods to implement quality of care, and (5) patient safety. Quality of care is described in clinical guidelines, but discussion with e.g. patients and payers reveal that guidelines do not cover all aspects of quality of care. It is also known that the quality of care delivered can be improved. Improvement can be possible in different areas, such as medical knowledge and skills, communication with patients or collaboration with colleagues. Moreover, the insights about what is appropriate medical care, are subject to change, based on the increasing scientific knowledge and changing expectations of patients, other professionals in healthcare, insurance companies or policy makers as well as changes in the organization of the care processes. Individual physicians will have to learn continuously to keep up with these changes. How can this be managed? What happens in practice? What kind of culture is needed?

Student opinion
The study load is relatively small. You have to write a letter, do a presentation and make an implementation plan. You only have two contact hours a day on average. You learn about different healthcare systems and how to improve healthcare. It discusses how to measure quality and addresses different quality marks.

Strengths
- few contact hours
- a lot of group work

Limitations
- no clinical aspects
- assignments can be vague
MIN 28 (B) HUMAN EMBRYOLOGY IN PERSPECTIVE

Dr. Ir. N. Roeleveld – Health Evidence    Dr. A.N. Schepens-Franke – Anatomy
Nel.roeleveld@radboudumc.nl    Annelieke.schepensfranke@radboudumc.nl

Dr. I. van Rooij – Health Evidence
Iris.vanrooij@radboudumc.nl

Description
If you are fascinated by the complex process that leads from just two cells to the development of a complete human being and would like to know more about the causes and clinical aspects of birth defects, you will like this minor. It will enhance your knowledge of embryonic and fetal development of all major organ systems of the human body and will show you the variety of birth defects in these organ systems. In addition, you will get familiar with research and care involved in pregnancies complicated by birth defects and in children with birth defects. Clinical aspects, such as prenatal screening, diagnosis, treatment, prognosis and ethical issues will be addressed and discussed with clinicians working in the field. You will also acquire knowledge on the influence of several non-genetic / environmental risk factors, such as smoking or medication use during pregnancy, on embryonic and fetal development. Finally, you will get the chance to apply your knowledge and skills acquired during the minor by developing a research proposal and writing case report (as a BLOG or VLOG) on a patient with a birth defect. During the minor, you will work individually or in small groups on different projects. Each week has a specific topic and a journal club, in which a paper from the literature related to the topic of the week will be discussed.

Student opinion
This minor is very broad. The minor focuses on embryonic development as well as clinical aspects of birth defects. Also, the patient participation program is useful to get to know more about the influence of certain birth defects on daily life.

Strengths:
- A lot of enthusiastic teachers
- Clear lectures
- Broad programme

Limitations:
- Much self-study compared to contact hours