



# MINOR GUIDE 2020/2021

WHAT SHOULD **YOU** CHOOSE?!?

MADE POSSIBLE BY THE  
STUDENT ORGANISATION FOR  
EDUCATION AND STUDY

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!

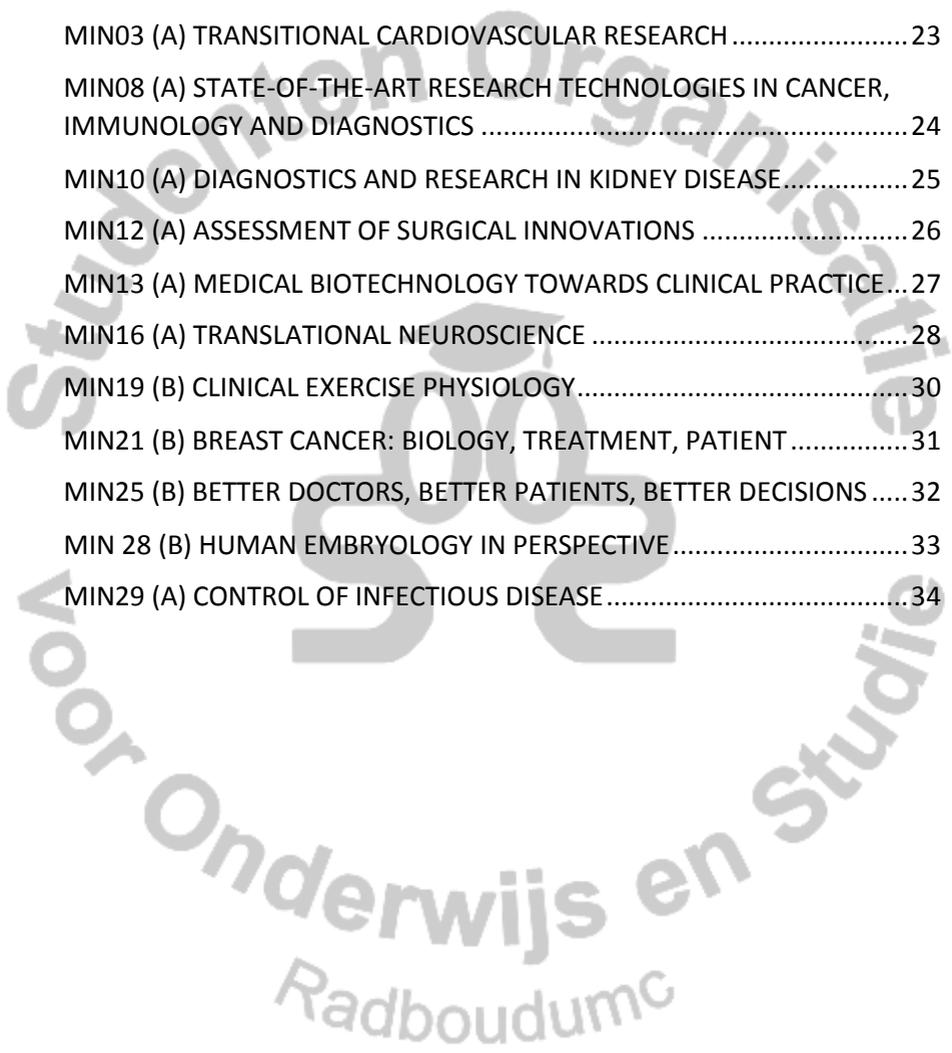
On behalf of the 31<sup>st</sup> SOOS board,

Lisa Houtman, Damiano Piga, Quentin Marsman, Lotte Kleimeier, Floor Schmeits and Robert Hauptmeijer

# INDEX

General Information .....	4
External minors.....	4
MONDAY/TUESDAY MINORS.....	5
MIN01: EFFICACY AND SAFETY OF DRUGS .....	5
MIN02: VISUALIZING HEALTH AND DISEASE: FROM MOLECULE TO MAN .	6
MIN04: CANCER MECHANISMS AND IMMUNE DEFENSE.....	7
MIN05: MOVING QUESTIONS: AN INTRODUCTION TO CLINICAL HUMAN MOVEMENT SCIENCE.....	8
MIN06 (B) GLOBAL HEALTH AND INFECTIOUS DISEASE .....	9
MIN09 (A) PAIN, INFLAMMATION AND CANCER: NEW DRUGS TO COMBAT DISEASE .....	11
MIN11 (A) CLINICAL RESEARCH PRINCIPLES AND PRACTICE .....	12
MIN14 (A) NEUROSCIENCE OF STRESS-RELATED PSYCHOPATHOLOGY....	13
MIN18 (A) HEMATO-ONCOLOGY .....	14
MIN22 (A) HEMOSTASIS, A DELICATE BALANCE!.....	15
MIN23 (B) PEDIATRIC INFECTIOUS DISEASE AND IMMUNITY .....	16
MIN27 Genomics research- from molecule to population.....	17
WEDNESDAY MINORS.....	18
B3KOB - AVANCED DATA ANALYSIS AND PROGRAMMING: HOW TO MAKE MORE OF YOUR RESULTS?.....	18
B3KOE - SCIENCE IN ACTION: PHILOSOPHY AND DYNAMICS OF SCIENCE	19
B3KOF - TRANSLATING ANIMAL RESEARCH INTO CLINICAL BENEFIT.....	20
B3KOH CONSULTANCY.....	21

B3KOG POPULAR SCIENCE WRITING .....	22
THURSDAY/FRIDAY MINORS.....	23
MIN03 (A) TRANSITIONAL CARDIOVASCULAR RESEARCH .....	23
MIN08 (A) STATE-OF-THE-ART RESEARCH TECHNOLOGIES IN CANCER, IMMUNOLOGY AND DIAGNOSTICS .....	24
MIN10 (A) DIAGNOSTICS AND RESEARCH IN KIDNEY DISEASE.....	25
MIN12 (A) ASSESSMENT OF SURGICAL INNOVATIONS .....	26
MIN13 (A) MEDICAL BIOTECHNOLOGY TOWARDS CLINICAL PRACTICE...	27
MIN16 (A) TRANSLATIONAL NEUROSCIENCE .....	28
MIN19 (B) CLINICAL EXERCISE PHYSIOLOGY.....	30
MIN21 (B) BREAST CANCER: BIOLOGY, TREATMENT, PATIENT .....	31
MIN25 (B) BETTER DOCTORS, BETTER PATIENTS, BETTER DECISIONS .....	32
MIN 28 (B) HUMAN EMBRYOLOGY IN PERSPECTIVE.....	33
MIN29 (A) CONTROL OF INFECTIOUS DISEASE.....	34



## 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 (coach group 1-21) minor or a Thursday/Friday (coach group 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.)

## MONDAY/TUESDAY MINORS

### MIN01: EFFICACY AND SAFETY OF DRUGS

Dr. S. Heemsker – Pharmacology & Toxicology

[Suzanne.Heemsker@radboudumc.nl](mailto:Suzanne.Heemsker@radboudumc.nl)

Prof. Dr. C. Kramers – Pharmacology – Toxicology & Internal Medicine

[Kees.Kramers@radboudumc.nl](mailto: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. The teachers are all very enthusiastic and they always want to help you.

#### Strengths:

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

#### Limitations:

- Every group project is in another group
- There are a lot of deadlines and different feedback moments
- The organization can seem a bit chaotic

**Overall grade from students: 7.6**

## MIN02: VISUALIZING HEALTH AND DISEASE: FROM MOLECULE TO MAN

Dr. A. Cambi – Cellbiology

Dr. M. Rijpkema – radiology and nuclear medicine

[Alessandra.Cambi@radboudumc.nl](mailto:Alessandra.Cambi@radboudumc.nl)

[Mark.Rijpkema@radboudumc.nl](mailto:Mark.Rijpkema@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

**Overall grade from students: 6.8**

## MIN04: CANCER MECHANISMS AND IMMUNE DEFENSE

Dr. A.B van Spriel – Tumor Immunology  
[Annemiek.vanspriel@radboudumc.nl](mailto:Annemiek.vanspriel@radboudumc.nl)

Ing. J. Pots – Tumor Immunology  
[Jeanette.Pots@radboudumc.nl](mailto: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 diverse 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
- many presentations in a short amount of time

**Overall grade from students: 7.9**

## MIN05: MOVING QUESTIONS: AN INTRODUCTION TO CLINICAL HUMAN MOVEMENT SCIENCE

Dr. J. Kooloos – Anatomy  
[Jan.Kooloos@radboudumc.nl](mailto:Jan.Kooloos@radboudumc.nl)

Dr. E. Tanck – Orthopedy  
[Esther.Tanck@radboudumc.nl](mailto: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. There is time scheduled for self-study during the contact hours. You have to do some small presentations and attend some journal clubs. The course is very interesting in general because the content is very broad. The distribution of the tests is good.

### 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

**Overall grade from students: 7.8**

## MIN06 (B) GLOBAL HEALTH AND INFECTIOUS DISEASE

Dr. E. Spaan – Health Evidence  
[Ernst.Spaan@radboudumc.nl](mailto:Ernst.Spaan@radboudumc.nl)

Dr. A. Tostmann – Dept. of medical Microbiology  
[Alma.Tostmann@radboudumc.nl](mailto:Alma.Tostmann@radboudumc.nl)

### Description

Globalization affects every corner of the world, forcing us to approach important health issues more and more from a global perspective. The interest in global health and infectious diseases is therefore increasing. It provokes a great deal of media, student, and faculty interest, has driven the establishment of several academic programs, is supported by governments as a crucial component of foreign policy, and has become a major philanthropic target. Global health is the health of populations in a global context and it goes beyond the perspectives and concerns of individual countries. Global health is about the prevention and control of infectious diseases, such as HIV/AIDS, tuberculosis, malaria and dengue, as well as non-communicable disease such as diabetes and cancer; as well as about health system research and universal health coverage.

As a Biomedical Sciences or Medical student, studying global health and infectious diseases is relevant. Challenges of global health are at the intersect of molecular, clinical, epidemiological, economic and other socio-behavioural sciences. The present Minor reflects this multidisciplinary nature and offers you a broad scope of methods, instruments and techniques stemming from the different disciplines. The course is designed for you to acquire theoretical knowledge, practical insights and hands-on skills, e.g. through lab practical and statistical modelling exercises. You will also learn how to translate scientific knowledge into policy recommendations and to deliver these in writing and through oral presentations in English.

In week 1 you will be introduced to global health and infectious diseases. Throughout the course you will gradually expand your view and breadth of analysis, from a molecular perspective (week 2-5), and patient and clinical perspective (weeks 6-12), to a health systems and policy perspective (week 13-19). Throughout the weeks you will work on your Global Health in Action project, a parallel group project for which you will study in-depth a highly relevant issue in global health. During the minor you will engage with leading researchers at Radboudumc and meet professionals working in Global Health and Infectious Diseases at public health institutions, knowledge institutions, and non-governmental organizations.

This Minor includes two visits outside of Nijmegen. In week 12 of the minor (19 Nov 2019), you will attend the Radboud Centre for Infectious Diseases (RCI) Science Day in Berg & Dal, near Nijmegen where leading infectious diseases and global health researchers will present their work. In week 20 of the minor [27-28 Jan 2019], a study tour will take place during which organisations working in the field of Global Health will be visited and you will present the results of your Global Health Action project and receive feedback from experts.

### Student opinion

The study tour 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.

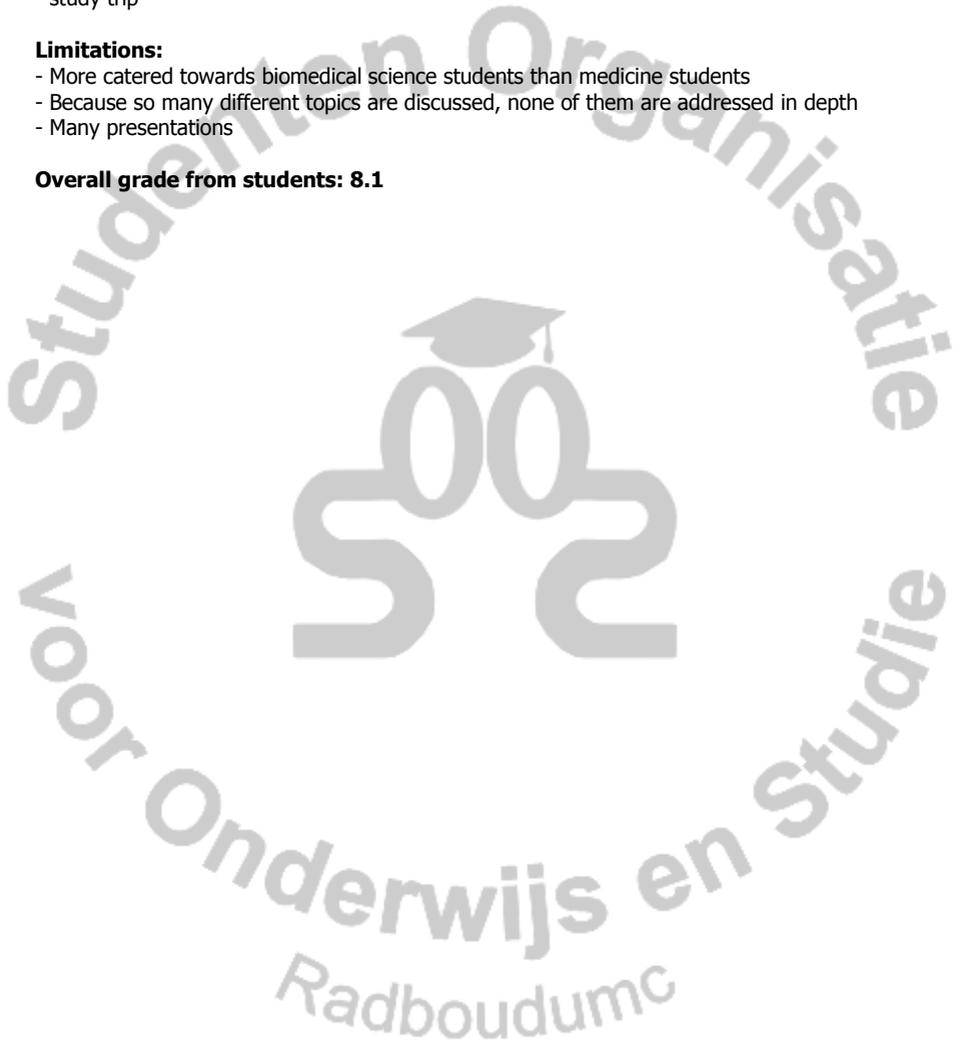
**Strengths:**

- Enthusiastic (guest)teachers, that are experts in their field
- Good variety of different topics
- study trip

**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

**Overall grade from students: 8.1**



## MIN09 (A) PAIN, INFLAMMATION AND CANCER: NEW DRUGS TO COMBAT DISEASE

Dr. ir. M. Adjobo-Hermans – Biochemistry

[Merel.Adjobo-Hermans@radboudumc.nl](mailto:Merel.Adjobo-Hermans@radboudumc.nl)

Dr. H. Pluk – Biochemistry & Molecular  
Mechanisms of Disease

[Helma.Pluk@radboudumc.nl](mailto: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 apply knowledge by the practical work
- A lot of different teachers
- great distribution

### Limitations:

- The study pressure is rather high
- The assessment paper should be better prepared and guided by the teachers

**Overall grade from students: 7.5**

## MIN11 (A) CLINICAL RESEARCH PRINCIPLES AND PRACTICE

Dr. W. Kieviet – Health Evidence  
[wietske.kieviet@radboudumc.nl](mailto:wietske.kieviet@radboudumc.nl)

Dr. Marleen van Gelder – health evidence  
[marleen.vanGelder@radboudumc.nl](mailto:marleen.vanGelder@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 deciding on 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!. During the minor, in-depth background of clinical research and the research process is provided, explaining the principles and methods used to obtain quantitative evidence. It will build upon the knowledge that you gathered in 2<sup>nd</sup> bachelor in several ways: you will learn how to design a randomized clinical trial, how to develop a useful clinical prediction model, how to deal with common methodological challenges such as misclassification and missing data, and it will give you hands on experience in doing analyses in context of your own project. During the minor we run an well appreciated journal club in which you will train your critical appraisal skills 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. There is a lot of practical work with statistics and SPSS.

### 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)
- Journal club prepares you for the written exam

### Limitations:

- Some lectures were in Dutch
- Vague exercises during the course
- Sometimes parts of this minor are perceived as repetition for biomedical science students

**Overall grade from students: 7.4**

## MIN14 (A) NEUROSCIENCE OF STRESS-RELATED PSYCHOPATHOLOGY

Dr. E. Hermans – Donders Institute  
[erno.hermans@donders.ru.nl](mailto: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. Especially the lectures, writing the research proposal and presenting was very well received by the students. It was considered as a good training for future internships. This module has a good balance between clinical features and research features.

### 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
- Very theoretical lectures and no workgroups

**Overall grade from students: 7.6**

## MIN18 (A) HEMATO-ONCOLOGY

Dr. C. Hess – Hematology  
[corine.hess@radboudumc.nl](mailto:corine.hess@radboudumc.nl)

Dr. A. van der Waart – Laboratory Medicine  
[anniek.vanderwaart@radboudumc.nl](mailto:anniek.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
- The teachers were not aware of the background knowledge of the students
- The teachers spoke insufficient English

**Overall grade from students: 7.3**

## MIN22 (A) HEMOSTASIS, A DELICATE BALANCE!

Dr. B. Laros-van Gorkom – Hematology  
[Britta.Laros-vanGorkom@radboudumc.nl](mailto:Britta.Laros-vanGorkom@radboudumc.nl)

Dr. W. van Heerde – Laboratory Medicine  
[Waander.vanHeerde@radboudumc.nl](mailto:Waander.vanHeerde@radboudumc.nl)

### Description

Regulation of hemostasis 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 out-patient practice. Thrombosis and hemostasis 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 hemostasis. 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

This is a very interesting minor. It contains contact with patients as well as lab practicals. This minor contributes to the study programme in a very nice way. The study load is doable, however it is not very well distributed. It is a very diverse programme, which is a bit clinical, but suitable for biomedical science students as well

### 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

**Overall grade from students: 8.2**

## MIN23 (B) PEDIATRIC INFECTIOUS DISEASE AND IMMUNITY

Dr. S. Van Selm – Pediatrics  
[saskia.vanselm@radboudumc.nl](mailto:saskia.vanselm@radboudumc.nl)

Dr. K. van Aerde – Pediatrics  
[Koen.vanAerde@radboudumc.nl](mailto: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, scientific English
- Enthusiastic and helpful teachers
- A tour in the hospital to see your knowledge in practice

### Limitations:

- Less research-based than the other minors
- It is not always clear how much you have to learn for the exams
- Sometimes you are expected to know more than you already do

**Overall grade from students: 7.6**

## MIN27 Genomics research- from molecule to population

Dr. Ir. DRH de Bruijn

[Diederik.debruijn@radboudumc.nl](mailto:Diederik.debruijn@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

The different ways of testing in this minor is very nice. In the 5th week there is a written exam, halfway the minor a literature assignment and at the end a second written exam and an integrative assignment. The minor is very well organised and has a good build-up of theory. There are only a few teachers in this minor, who are very approachable and have a lot of knowledge.

### Strengths

- Good build-up of theory
- Broad range of subjects with 1 theme in general
- A lot of different techniques
- Assignments were very well related to the lessons
- Approachable and enthusiastic teachers
- Different ways of testing

### Limitations

- Sometimes the theory was not explained properly
- Test at the end of the minor was very long

## WEDNESDAY MINORS

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

Dr. A. Pistorius – Biochemistry  
[Arthur.pistorius@radboudumc.nl](mailto:Arthur.pistorius@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 cardiovascular 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](mailto: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](mailto:marlies.leenaars@radboudumc.nl)

Dr. K. Wever – SYRCLE  
[kim.wever@radboudumc.nl](mailto: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 were presented in Dutch

## B3KOH CONSULTANCY

Dr. R. Reuzel – Health Evidence

[rob.reuzel@radboudumc.nl](mailto:rob.reuzel@radboudumc.nl)

### 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

#### Limitations:

- Intense and sometimes exhausting days
- Concrete application is missing
- Sometimes a little vague

Monday/Tuesday

**Wednesday**

Thursday/Friday

## B3KOG POPULAR SCIENCE WRITING

DR. C. STRUIJKE – FACULTY OF ARTS

[c.struijke@let.ru.nl](mailto: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.



## THURSDAY/FRIDAY MINORS

### MIN03 (A) TRANSITIONAL CARDIOVASCULAR RESEARCH

Prof. dr. G. Rongen – Pharmacology and Toxicology  
[Gerard.Rongen@radboudumc.nl](mailto:Gerard.Rongen@radboudumc.nl)

#### Description

In this minor, a group of dedicated medical investigators will introduce you to the world of 'Translational Cardiovascular Research'. You will learn about the pathophysiology of atherosclerosis, myocardial infarction and heart failure. You will be introduced to methods to study these diseases in preclinical, clinical and epidemiological research. You will explore the opportunities that rare monogenetic diseases may offer us to better understand frequently occurring complex and multifactorial diseases. You will do this exploration with a group of preclinical and clinical investigators who together cover a broad range of types of research from preclinical (at the level of molecule, organelle and cell), animal, clinical and population research. In this minor, we want to emphasize the importance of translation of preclinical and population research findings to humans in vivo in order to improve health care and outcome of patients. Various methods to translate these findings will be presented, including the study of rare monogenetic diseases, studies on the mechanism of drug actions and various (pre)clinical models of cardiovascular disease. Near the end of your bachelor study in Biomedical Health Sciences and Medicine, you are equipped with various skills that are essential to bring this challenge to a good end, such as a general overview in the (patho)physiology of human health and disease and skills in literature search and presentation. In this module you will be trained to further enhance these skills and to achieve a more detailed knowledge in two research areas: atherosclerosis and heart failure. Integration of preclinical knowledge with clinical observations and practice will be a main challenge that you will face in this process. You will apply this knowledge to develop new research ideas and protocols that you will present with your research team to an audience of interested peers.

#### Student opinion

This minor was well received by biomedical science students as by medicine students, even though the minor focusses on research. The teachers are very enthusiastic and know a lot about their field of expertise. The practical's are very informative and were explained properly. The minor goes deep into the subject of matter, which is sometimes experienced as too difficult.

#### Strengths:

- Much in-depth knowledge
- Lots of practical work
- enthusiastic teachers

#### Limitations:

- Long days with many contact hours
- Sometimes unclear what is expected for the exam
- The different parts of the minor seem to be uncoherent of each other

**Overall grade from students: 6.5**

## MIN08 (A) STATE-OF-THE-ART RESEARCH TECHNOLOGIES IN CANCER, IMMUNOLOGY AND DIAGNOSTICS

Dr. A. Kuppevelt – Biochemistry  
[toin.vankuppevelt@radboudumc.nl](mailto: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 traineeships 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

**Overall grade from students: 8.0**

## MIN10 (A) DIAGNOSTICS AND RESEARCH IN KIDNEY DISEASE

Prof. Dr. D.W. Swinkels – Laboratory Medicine  
[Domine.Swinkels@radboudumc.nl](mailto:Domine.Swinkels@radboudumc.nl)

Prof. Dr. J. Hoenderop – Fysiologie  
[Joost.Hoenderop@radboudumc.nl](mailto: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. The subject matter might be a little difficult sometimes so this minor can be a challenge. This minor is focused on the clinic as well as on research which makes it interesting for all students.

### Strengths:

- Working in small groups
- Enthusiastic teachers
- Learning a lot of lab skills
- Clear structure
- Learning how to write a research proposal

### Limitations:

- Limited freedom in writing the research report
- The planning of the examination is not always advantageous

**Overall grade from students: 6.9**

## MIN12 (A) ASSESSMENT OF SURGICAL INNOVATIONS

Dr. M. Tummers – Health Evidence  
[Marcia.tummers@radboudumc.nl](mailto:Marcia.tummers@radboudumc.nl)

Dr. Ir. R. Reuzel – Health Evidence  
[Rob.Reuzel@radboudumc.nl](mailto: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.

### Student opinion

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 learning; you and others working with stakeholders on real topical health problems.

### Strengths:

- Interactive
- Enough time for self-study
- Practical
- Freedom of choice
- Involved teachers
- Coherence is great
- 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

**Overall grade from students: 7.4**

## MIN13 (A) MEDICAL BIOTECHNOLOGY TOWARDS CLINICAL PRACTICE

Dr. R Wansink – Cell Biology  
[Rick.Wansink@radboudumc.nl](mailto:Rick.Wansink@radboudumc.nl)

Dr. W. Hendriks – Cell Biology  
[wiljan.hendriks@radboudumc.nl](mailto: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

**Overall grade from students: 7.8**

## MIN16 (A) TRANSLATIONAL NEUROSCIENCE

Dr. D. Schubert – Cognitive Neuroscience  
[d.schubert@donders.ru.nl](mailto:d.schubert@donders.ru.nl)

Prof. Dr. H. van Bokhoven - Genetics  
[Hans.vanBokhoven@radboudumc.nl](mailto:Hans.vanBokhoven@radboudumc.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 interfaculty. That means you will be joined by students from (medical) biology and molecular life sciences.

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.

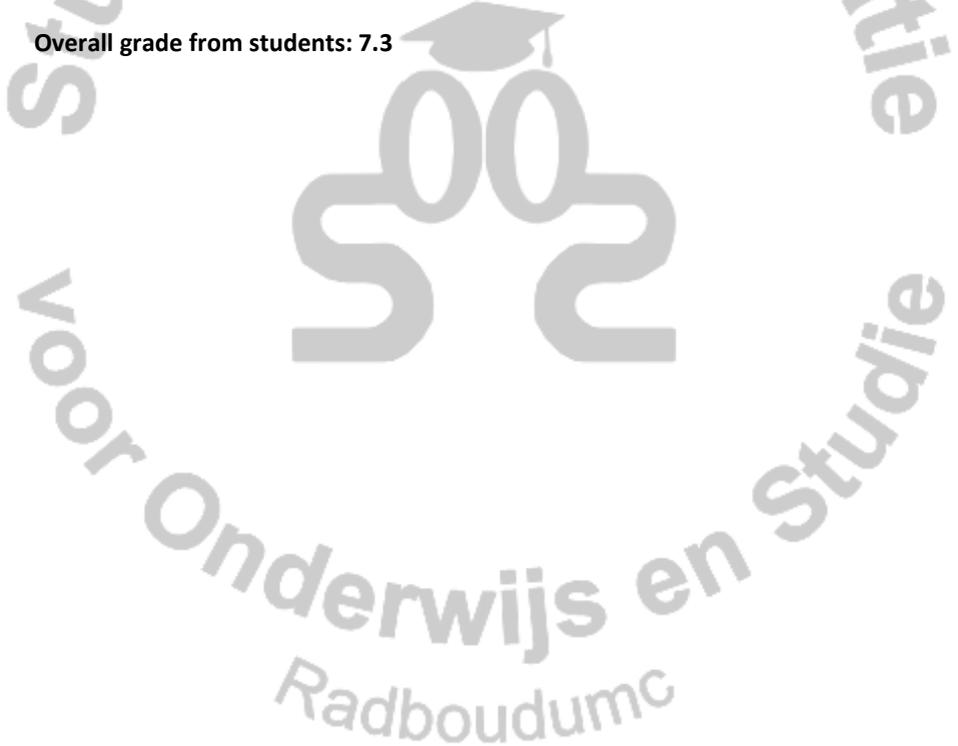
**Strengths:**

- Diverse teachers
- Different views on topics
- Encouragement to have own research ideas
- Very informative
- Structured lectures
- Broad topics
- Brain dissection course

**Limitations:**

- Many workgroups
- Difficult themes
- Overlapping subjects
- Lectures could be less 'dull and dry'
- Very few practicums (dissection course + two 2-day modules)

**Overall grade from students: 7.3**



## MIN19 (B) CLINICAL EXERCISE PHYSIOLOGY

Dr. T Eijsvogels – Physiology

[Thijs.Eijsvogels@radboudumc.nl](mailto:Thijs.Eijsvogels@radboudumc.nl)

Dr. J. Van Hees – Pulmonary diseases

[Jeroen.vanHees@rADBoudumc.NL](mailto:Jeroen.vanHees@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
- A lot of guest speakers and some excursions

### Limitations:

- Not all teachers speak English sufficiently
- Often long days, especially on Friday

**Overall grade from students: 8.2**

## MIN21 (B) BREAST CANCER: BIOLOGY, TREATMENT, PATIENT

Dr. P. Span – Radiation Oncology

Dr. M. Zegers – Cell Biology

[Paul.Span@radboudumc.nl](mailto:Paul.Span@radboudumc.nl)

[Mirjam.Zegers@radboudumc.nl](mailto: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, ZSO, etc.), besides the HC's and PR's.
- In this minor you learn a lot about the molecular part of breast cancer, but not much about breast cancer on other levels.

**Overall grade from students: 7.5**

## MIN25 (B) BETTER DOCTORS, BETTER PATIENTS, BETTER DECISIONS

Dr. J. Braspenning – IQ healthcare  
[Joze.Braspenning@radboudumc.nl](mailto:Joze.Braspenning@radboudumc.nl)

Dr. H. Calsbeek – IQ Healthcare  
[H.Calsbeek@radboudumc.nl](mailto: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

In this module the lectures are given by teachers from different fields within healthcare. You will learn about public health, patient safety, different perspectives of quality care and how to measure them or implement quality care within different workfields.

### Strengths

- A lot of different aspects of medical care were discussed
- Good distribution of the work load

### Limitations

- Chaotic organisation

**Overall grade from students: 6.1**

## MIN 28 (B) HUMAN EMBRYOLOGY IN PERSPECTIVE

Dr. Ir. N. Roeleveld – Health Evidence  
[Nel.roeleveld@radboudumc.nl](mailto:Nel.roeleveld@radboudumc.nl)

Dr. A.N. Schepens-Franke – Anatomy  
[Annelieke.schepensfranke@radboudumc.nl](mailto:Annelieke.schepensfranke@radboudumc.nl)

Dr. I. van Rooij – Health Evidence  
[Iris.vanrooij@radboudumc.nl](mailto: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
- You will learn a lot about different organ systems

### Limitations:

- Much self-study compared to contact hours
- The last weeks the minor might feel a little chaotic
- The study load of this minor is a bit higher than others

**Overall grade from students: 8.1**

## MIN29 (A) CONTROL OF INFECTIOUS DISEASE

Dr. JLA. Hautvast – Primary and  
Community Care

[Jeannine.Hautvast@radboudumc.nl](mailto:Jeannine.Hautvast@radboudumc.nl)

Dr. F. Stelma – Microbiology

[Foekje.Stelma@radboudumc.nl](mailto: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

#### Strength

- Helpful teachers with a lot of expertise
- Interactive lessons
- Very good distribution of the study load

#### Limitations

- Not always a sufficient level of English

**Overall grade from students: 7.1**