

BIOMEDICAL SCIENCES

Clinical Human Movement Sciences

Radboud Universiteit



Radboudumc

Clinical Human Movement Sciences

A specialisation in the Biomedical Sciences Master's

Study different aspects of patient-centered movement sciences, including exercise physiology, neurology, rehabilitation and biomechanics to improve treatment of movement disorders and chronic diseases.

Specialisation Coordinators

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The BMS Master's

Our Master's programme in Biomedical Sciences offers eight specialisations and four career profiles. In the first semester, each specialisation starts with four courses that reflect its central topics and methodology, followed by an elective course. In the second semester of the first year students do a research internship. In the second year students follow elective courses and courses of their career profile, followed by a profile internships. Furthermore, the course 'Personal & Professional Development' runs throughout the entire programme under the guidance of a coach. It covers topics such as personal learning goals, responsible research & innovation, well-being, and career prospects.

The specialisation

The field of clinical human movement sciences has a strong multidisciplinary character with topics like (exercise) physiology, (functional) anatomy, biomechanics, orthopedics, neurosciences and rehabilitation; these form the basics of the specialisation. At Radboud University, the specialisation Clinical Human Movement Sciences is characterized by a strong patient-centered approach. We focus on how to get and how to keep patients as physically active as possible. Within this specialisation we deal with questions like:

- How much exercise is needed to stay healthy?
- What happens in the human body during exercise?
- What techniques are available to measure human movement?
- How do neurological disorders affect movement?
- What interventions help to improve movement?

Internship possibilities

You will choose a research, consultancy or communication profile and you will do two internships of your own choice. One research internship and one profile internship. Internships in the field of clinical human movement sciences can be done at different world renowned research groups from various departments of the Radboudumc, but there are also plenty opportunities at other locations in the Netherlands or abroad.. We have many connections



with research institutes, companies, and universities all over the world. So the possibilities are endless! Examples are: other universities, sport centers, rehabilitation centers, patient associations, health insurers, Knowledge Centre for Sport & Physical Activity, The National Health Care Institute (Zorginstituut Nederland), TNO or other research institutes.

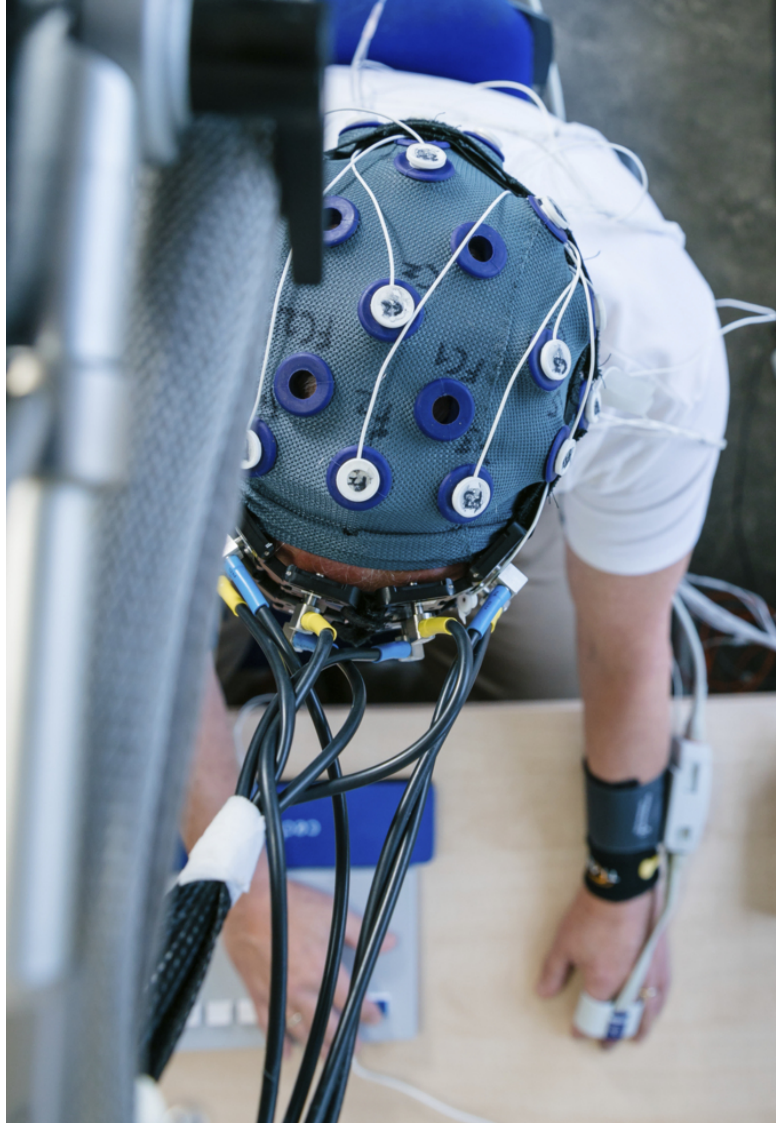
Career perspectives for CHMS-alumni

Many students and alumni are member of our LinkedIn group Clinical Human Movement Sciences. To see where alumni end up, you can take a look at this LinkedIn group page. Alumni work for example as researchers or PhD-candidates at hospitals or university medical centers. Also, human movement scientists work at rehabilitation centers, sport unions, patient associations, health insurers, sport clubs, ministry of defense, police, NOC*NSF, InnoSportLabs, Knowledge Centre for Sport & Physical Activity, The National Health Care Institute (Zorginstituut Nederland), etc.

Specialisation courses

ORTHOPAEDIC BIOMECHANICS IN MOTION

The bones, joints, cartilage, tendons, and the way they co-operate and handle external and internal forces are key elements for the locomotive system to maintain posture and perform movements. It is important to know the deformation that occurs in these tissues during loading and to have insight in factors that contribute to the strength of these tissues. Research methods in orthopaedic



biomechanics include mechanical experiments, computer simulations and computer predictions regarding the musculoskeletal system.

By studying dissections and performing clinical examination you will learn the anatomy of the lower extremity. This anatomical basis will help you to understand the function of the musculoskeletal system from a biomechanical point of view. Next, you will perform computer simulations to determine the strength of a femur with a metastatic lesion. Thereafter, you will carry out functional tests to examine whether an extension exercise is an appropriate exercise after an anterior cruciate ligament reconstruction and, if so, how it should be executed. During the last part of the course, you will analyze kinematics of a knee joint before and after a total knee replacement in an experimental surgery setting.

EXERCISE PHYSIOLOGY

This course explores the impact of exercise on cardiovascular health and performance outcomes. First, you will learn about thermoregulatory responses under thermoneutral and hot ambient conditions and how this may impact health and performance. Practical experiments will be altered with heat balance calculations and exploring heat mitigation measures. Thereafter, the impact of long-term high-volume high-intensity exercise training on cardiovascular remodelling will be explored, including the possibility whether one can exercise too much and how this may impact health outcomes. This includes the athlete's heart, the athlete's artery, and



Internship example: Running speed and all-cause mortality.

"I focused on determining whether or not there is an association between running speed and all-cause mortality in amateur runners. It was a large-scale study that required me to learn new research skills such as R and Python, as well as advanced critical thinking."

2nd year CHMS student

diseases such as coronary atherosclerosis and atrial fibrillation. You will learn how to assess the cardiovascular system of athletes, by using 12-lead ECG measurements and echography of the heart and blood vessels.

SMART MOVES: NEUROSCIENCE MEETS REHABILITATION

The course explores how the nervous system controls movement, how this control fails in neurological and neuromuscular disorders, and how recovery can be supported through rehabilitation. Students will study the neural circuits responsible for balance, gait and voluntary movement, and examine how disorders like Parkinson's, ALS, and muscular dystrophies arise from disruptions at both the systems and molecular levels—such as protein aggregation and genetic mutations.

The course combines neuroscience with clinical application. Through hands-on labs using techniques such as EMG, mobile EEG and 3D motion capture, students will learn to assess motor impairments and evaluate functional recovery. Patient cases will challenge the students to apply clinical reasoning, linking impairments to underlying mechanisms and formulating effective treatment strategies.

By integrating basic neuroscience, diagnostic tools, and real-world rehabilitation, this course prepares the students to critically engage with the science and practice of movement rehabilitation.

MOVEMENT SCIENCES IN CLINICAL PRACTICE

This course offers an integrated approach of the translation of movement sciences into clinical practice. For this purpose, you will use your basic and applied knowledge in 3 distinct clinical cases: i) a patient with a click-on prosthesis, ii) a recreational athlete, and iii) a patient with Parkinson's disease. Together with fellow students, and under guidance of expert researchers and clinicians, you will develop and evaluate innovative strategies to enhance daily life physical activity levels using a patient-centered approach.

Other courses

In your elective space you can take additional courses at other faculties or universities if you want. Many students choose to do courses outside of the Radboudumc, for example at the other Human Movement Sciences programmes in Amsterdam, Groningen or Maastricht, at technical universities, or at food-related studies in Wageningen. Also, some students choose to go abroad to follow courses.



Internship example: Gait analysis of patients with ankle-foot orthoses.

"My internship took place at the St Maartenskliniek at the research & innovation department, focussing on performing gait analysis on patients wearing ankle-foot orthoses. During my internship, I was able to improve my scientific writing and contribute to the measurement of patients. When it came to formulating my own research question and strategies, I had a lot of freedom. I really liked the diversity in the educational backgrounds of fellow students."

1st year CHMS student

Please email us for more information about the programme, the specialisation or the application process.
Admissions@radboudumc.nl

For general information, or a chat with current students, please visit our website.
www.ru.nl/masters/bms