



university of
groningen



umcg

Master's degree programme

Human Movement Sciences

2024-2025



Content



Human Movement Sciences

PAGINA 3 >



The degree programme in Groningen

PAGINA 5 >



The content of the programme

PAGINA 8 >



Testimonials

PAGINA 12 >



Groningen student life

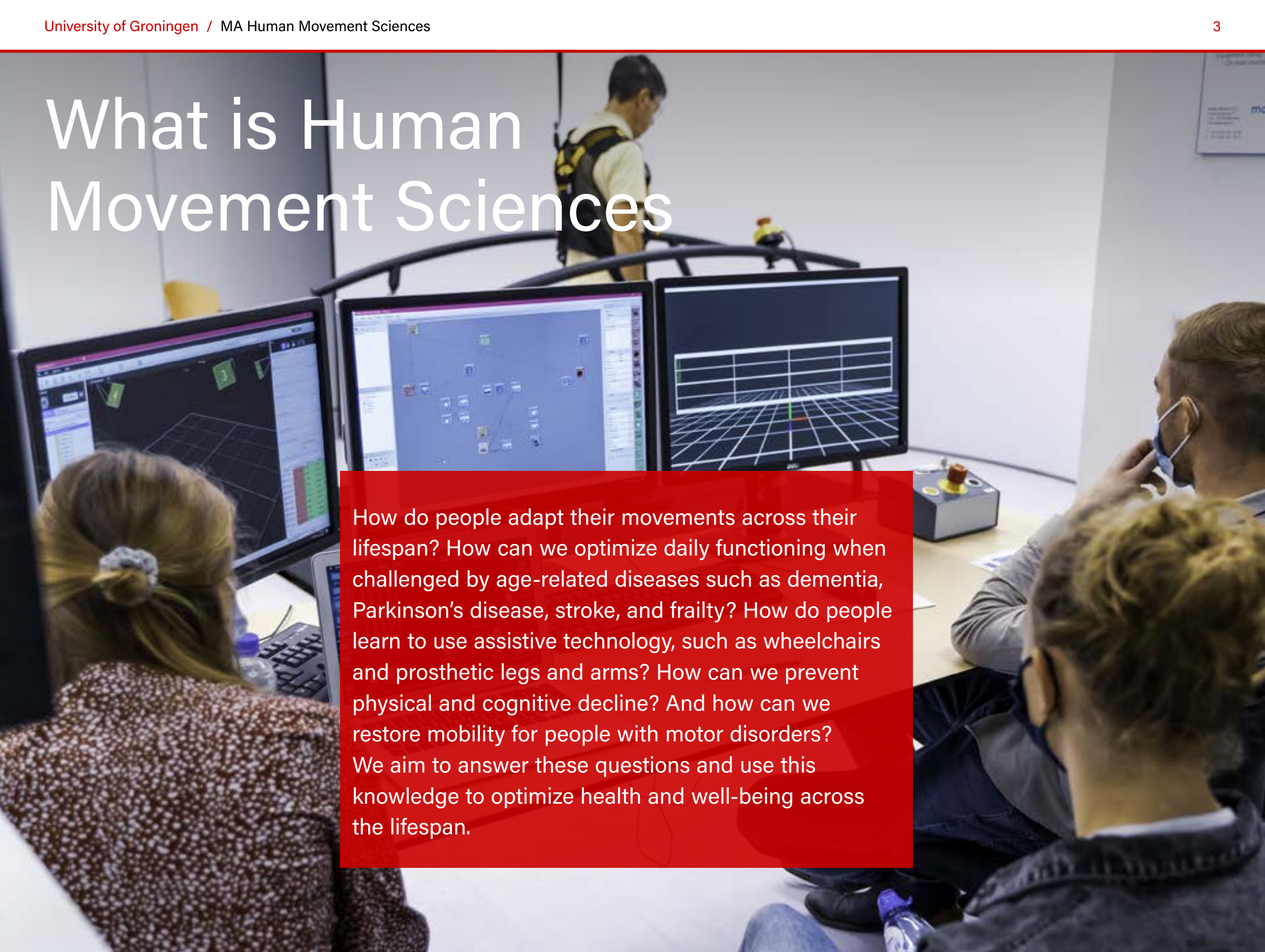
PAGINA 14 >



Admission/application

PAGINA 15 >

What is Human Movement Sciences



How do people adapt their movements across their lifespan? How can we optimize daily functioning when challenged by age-related diseases such as dementia, Parkinson's disease, stroke, and frailty? How do people learn to use assistive technology, such as wheelchairs and prosthetic legs and arms? How can we prevent physical and cognitive decline? And how can we restore mobility for people with motor disorders? We aim to answer these questions and use this knowledge to optimize health and well-being across the lifespan.

Cautious gate

Walking on two legs is a dangerous activity since it involves continuously falling and recovering. It is therefore not so strange that people start to walk more cautiously when the change of falling increases. We often see this with people walking in challenging settings (e.g. walking on ice), or when they believe they can no longer walk very well. Despite the inherent challenges of walking, we are quite capable of adjusting to walk safely in different environments. But people can also walk too cautiously, which can actually be more dangerous. To better understand this paradox, we expose younger and older adults to simulated slips on a treadmill. This causes them to walk cautiously, allowing us to examine what cautious gait is and whether we can influence it. In response to the simulated slips, young adults make smart adjustments (i.e. specific to the simulated slip characteristics) in their walking pattern that reduce the risk of losing balance. We are now investigating whether this ability is still the same in older adults (see video).

Sander Swart



Humans are made to move

From the grey matter between your ears down to the pores on your little toe, everything in and on your body plays a role in the realization of movement. Since our ability to move determines our well-being and health, and since we have to make do with the same body from cradle to grave, it is of vital importance that we study movement. The Master's degree programme in HMS therefore trains students to become academic professionals who understand how movement arises, why movement can sometimes be tricky, and what can be done to get people moving better and more. In our ageing society, where people are getting less exercise and increasingly suffer from movement problems, a growing number of organizations, entrepreneurs and policymakers are becoming aware of the importance of movement specialists. That is why I firmly believe that a Master's graduate in HMS is a scholar with a future!

Rob den Otter, Assistant Professor in Neurosciences, Psychology, and Experimental Rehabilitation

The degree programme in Groningen

Two-year programme in English (120 ECTS).

Best scores in National Student Survey (NSE) and Elsevier Best Studies rankings.

Develop scientific and professional skills in an ambitious environment.

Building bridges between fundamental lab research and applied societal practice.

Room for personal tracks with academic assignments and hands-on experience to match your interests, under expert supervision.

Collaborate with staff and (PhD) students on your own research project.

Direct link to the clinical environment of the University Medical Center Groningen (UMCG).



'We contribute to a healthy and balanced society'

Moving better has added benefits for the quality of life of young and old. Movement is necessary to prevent and positively influence the course of illnesses, and it keeps us fit and able. For most people, the ability to move around is self-evident, but we still have a lot to learn about our everyday movements. Research into human movement focuses on motor learning and performance in human beings of all ages. We draw on fundamental knowledge from several academic fields such as Biomechanics, Neuroscience, Behavioural Sciences, Biomedical Engineering, and Data Science. It is all about thinking across boundaries. In our labs, we contribute to developing new technologies for monitoring and influencing movement performance and behaviour. We implement these technologies to monitor functions and develop interventions in clinical and everyday settings. Movement scientists are driven to observe, measure, understand, and improve movement. Do you share this curiosity and do you dare to experiment?

We support you

During our two-year programme, we support you as you acquire new knowledge and skills, and help you to meet scientists and experts in the field. This allows you to build a network around a research topic that interests you, and explore the applications of this research in society. In addition to our close cooperation with the University Medical Center Groningen (UMCG), we also partner with research, health, and education institutions in the Netherlands and abroad.

This Master's programme offers two specializations:

- 1 Functional recovery and rehabilitation
- 2 Motor function and cognition in healthy ageing



1 Functional recovery and rehabilitation

You will learn to understand impaired movement and its functional implications. You will also explore how to restore and improve function through training and assistive technology in rehabilitation practice. For instance, we study how people learn to use wheelchairs and prosthetic limbs, and how we can tune these devices to a patient's specific needs. We also try to understand how prevention and training can improve functioning for complex care patients, such as children with Developmental Coordination Disorder (DCD), stroke patients, and patients with burn injuries. Based on this understanding, we develop and evaluate innovative interventions. Thanks to our knowledge, we are also ideal partners for Paralympic sports programmes, helping athletes in adapted sports to become the world's best!

2 Motor function and cognition in healthy ageing

Movement is the basis for all our activities in daily life, from playing outside to grocery shopping. Regular physical activity improves the likelihood of healthy ageing. In addition, adaptation to changes in body functions and the environment is an ongoing lifelong process. We study movement in diverse populations, from age 18 to 90, from athletic adults to geriatric patients, using a variety of methods, from computational modelling techniques to observations of activities in everyday environments. By participating in our course units, you will better understand how movement adaptability and flexibility changes across the life span and the impact of age-related diseases on mobility and task performance. You will learn about recent technologies and innovative treatments to stay healthy, support healthy lifestyle(s), and remain independent from healthcare for as long as possible. In addition, you will gain insight into the need for physical activity for disease prevention, cognition, and well-being across the entire lifespan. Thanks to our knowledge, we can contribute to preventing physical inactivity and optimizing the quality of our everyday movements for more healthy years.



Lab facilities

The department of Human Movement Sciences (HMS) has a wide range of facilities consisting of laboratories, equipment, and software. All our labs are equipped with state-of-the-art and technologically high-quality equipment, allowing us to measure or influence almost all physiological signals related to the musculoskeletal system.

In 2020, we launched the construction of a completely new Virtual Reality Lab. In the coming years, this will be further developed into three different Virtual Reality Laboratories, each with their own specific character.

1 Rehabilitation and functional recovery

Patients with movement disorders

Rehabilitation practice

Restore functioning

Compensate impaired movement

2 Motor function and cognition in healthy ageing

People throughout the lifespan

Everyday environments

Support active lifestyle

Prevent or slow age-related declines

The content of the programme

In this Master's degree, we apply serious gaming within research. For example, to train dexterity in users with an arm prosthesis, so they can use their prosthesis better in daily life. We also carry out research with serious gaming for training with a shoulder prosthesis. Training with serious games can lead to higher quality EMG patterns and better functional outcomes. This highlights the need for more research in user training for machine learning with controlled prosthetics.

Two-year programme

In this two-year programme, we will get you up to date on the latest insights into Human Movement Sciences in our in-depth courses. In the first year, you will get a head start with our specialization courses, where you will meet our experts and scientists working in the field of Rehabilitation and Healthy Ageing. These courses will give you a broad understanding of current research themes, and you will be able to personalize your academic track. In the second semester, you will choose a topic you are interested in and learn how to write a literature review under the personal supervision of one of our researchers.

In the second year of the Master's programme, you will spend most of your time on your graduation project on an actual and current research topic. You will work together with a team of researchers and students and PhD students, taking measurements and collecting data. As part of this process, you will have to gain the approval of a medical ethical committee and find participants for your research. Measurements can take place in our state-of-the-art research labs with their outstanding facilities, or in a field setting at a research, health, or education institute in the Netherlands or abroad.



Examples of recent review or Master Graduation topics

Rehabilitation:

- Changes in coordination patterns in the arm during rehabilitation training after a stroke.
- Problems of adolescents with Developmental Coordination Disorder.
- Physical fitness, physical activity, fatigue, and health-related quality of life after a burn injury.
- Measurements of power output of wheelchair athletes during training and competition.
- Pathways to sport and physical recreation for young people with physical disabilities.
- The relation between preoperative physical functioning and functional recovery in patients undergoing a liver or pancreatic resection.



Examples of recent review or Master Graduation topics

Healthy Ageing:

- Flexibility and adaptability of walking patterns across the life span.
- Virtual, augmented, and mixed reality to optimize motor behaviour.
- Neural mechanisms of balance (learning) in ageing.
- Height, size, and gap width variation in jumping stone configurations: Which factors attract children and adults the most?
- Monitoring of physical activity patterns and quality of motor behaviour in real-life environments using wearable sensors.
- The effect of physical exercise on mood in patients with dementia and mediating effect of cognition.

If you enrol in this Master's programme, we guarantee that you will receive a lot of individual attention and personal feedback. We will help you to strengthen your presentation skills, both orally and in writing.



Personal profiling

We think personal profiling is important, which is why we also offer personal learning trajectories through academic assignments in the field, and encourage you to carry out graduation projects with your own input. Personal profiling will give you the opportunity to become acquainted with the work field of human movement scientists and prepare you for your future career.



Anouk Oosterwijk

PhD research

Performing simple daily activities requires sufficient flexibility in all joints with associated movement directions. Unfortunately, loss of flexibility in one or more movement directions of a joint is a well-known complication after various diseases, including burns. In burns, scar contractures limit flexibility. To gain insight into the extent of this problem, an important question to answer is therefore: when is a certain degree of range of motion (ROM) loss actually a problem for the patient? In her PhD research, Anouk Oosterwijk focuses on the relation between loss of ROM due to scar contractures after burn injuries and the performance of daily tasks.



Potential jobs

A Master's degree in Human Movement Sciences is the ticket to an exciting and challenging career. As a graduate, you will have developed a professional and academic attitude that will enable you to work independently and further develop in an area of human movement science. There are many opportunities in the field of movement, health, healthy ageing and lifestyle(s), rehabilitation, and sports. Potential careers include doing research at a university, in a hospital or in a company, teaching at a research university or university of applied sciences, or working as a movement analyst in industry, a policy-maker in healthcare or government, or a data scientist. Some students even start their own company in the healthcare or fitness sector.



Jelmer Braaksma

PhD

Jelmer Braaksma is a PhD student at the department for Human Movement Sciences (UMCG/RUG). His research focuses on the effect of a power-assisted wheelchair (such as an e-bike) on physical (shoulder) strain. After completing his Bachelor's degree, he had the opportunity to publish his thesis during his Master's degree programme, which in turn led to him obtaining a Master-PhD position. The Bachelor's and Master's programmes in Human Movement Sciences gave him the skills and knowledge needed to work as an academic.



Laura Mayrhuber

Research assistant at the Swiss Paraplegic Research Center

Laura Mayrhuber works as a research assistant at the Swiss Paraplegic Research Center as a part of the Shoulder Health and Mobility Group. The aim of her project is to validate a monitoring system for shoulder loading activities in day-to-day activities in manual wheelchair users with a spinal cord injury, based on wearable sensor data. Additionally, she is working on the publication of her review on shoulder injuries in wheelchair tennis and her Master's graduation paper on scapula kinematics in wheelchair tennis. The Master's degree in Sport Sciences and her internship at the UMCG wheelchair work lab gave her the necessary assets to work as a researcher, as well as helpful connections in the field of wheelchair and biomechanics research.



Lisette Kikkert

Consultant in health care at Proscop

Lisette Kikkert obtained her PhD in Movement Sciences after completing a Master's degree in Human Movement Sciences. Her PhD dissertation concerned the relationship between quality of walking and cognitive functioning in frail elderly subjects. After this, she worked for almost three years as a consultant in health care at Proscop. Here, she gained more insight into how care is organized. She worked on themes such as: how to keep healthcare future-proof and affordable, more focus on prevention, and how to smartly link data to provide an integrated insight into the health of populations. Soon, Lisette will continue her career at the Centre for Improvement and Innovation of the Isala Hospital.



Jeroen Waanders

Lecturer & researcher in Nursing at Saxion
University of Applied Sciences

Jeroen Waanders has been appointed lecturer and researcher in Nursing at the Saxion University of Applied Sciences in Enschede. During his Master's in Human Movement Sciences (specialization: Healthy Ageing), he started the Master-PhD trajectory to investigate the effects of age on eccentric muscle function in walking in young adults and elderly subjects. Towards the end of his PhD, Jeroen was appointed junior lecturer to help him gain teaching experience. This helped him to become not only an excellent researcher, but also an attractive candidate for future teaching positions.

Groningen student life

Groningen is a young and dynamic student city. It is the largest city in the northern Netherlands, yet small and friendly enough to feel like home. Thanks to its many students, Groningen has an extremely young population: one in six inhabitants is a student! The city has a multicoloured youth culture and all kinds of sports and nightlife. It is a bustling city, both on weekdays and at weekends, and it has everything a university town should have. Groningen, space to create your future!

Studiosi Mobilae

Studiosi Mobilae is the study association for students of Human Movement Sciences in Groningen. The association organizes a variety of interesting activities, such as excursions to companies in the Netherlands and abroad and a symposium. Studiosi has a Master's Committee, which organizes get-togethers and activities especially for Master's students of Human Movement Sciences.



More information

Admission

- Secondary school degree: preferably including mathematics, physics, and biology as part of the final examination (up until the last year of secondary school).
- Bachelor's degree (Bachelor of Science) in Human Movement Sciences or a related field (e.g. Sport and Exercise Sciences, Kinesiology, etc), or education and experience on a comparable level (this will be assessed by the Admissions Board).
- Proof of English proficiency (TOEFL 90 internet, IELTS 6.5 (6.0 on each component), or Cambridge Certificate of proficiency in English), unless your native language is English.

This Master's programme has a selection procedure. More information on admission and application can be found here:

www.rug.nl/masters/human-movement-sciences/#!requirements

For more specific information, please contact studieadviseur-bw@umcg.nl

Once you are accepted, the International Service Desk (ISD) or the Faculty contact person will assist you in applying for a visa, dealing with immigration authorities, arranging insurance, and registering at the University.

Tuition fees

- EU/EEA nationals approx. €2,503 per year
- Non-EU nationals approx. €24,200 per year

Scholarships

To find out whether you are eligible for a scholarship or grant, use our grant finder www.rug.nl/grantfinder. Note that many students apply for these scholarships and only a few are available. Please be aware that many of our programmes require that you apply approximately two months before the official application deadline of the programme.

Cost of living

www.rug.nl/education/bachelor/international-students/financial-matters/

Application


You can apply online, via www.rug.nl/howtoapply


Application deadline:

1 March (Non) EU/EEA)

1 March (Dutch students)

Contact

 rug.nl/masters/human-movement-sciences/

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 [bewegingswetenschappen](https://www.instagram.com/bewegingswetenschappen)

 [BW_Groningen](https://twitter.com/BW_Groningen)

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