

Admission Requirement Research Master HMS

General requirements

- A bachelor's degree from a relevant field of study.
- Good grades - a GPA of 7.0 (out of 10) or higher (or the international equivalent, e.g., a B+ or a GPA of 3.3) for the final two years of the bachelor's program.
- Strong interest in and aptitude for research, as demonstrated in research-oriented courses, internships and/or thesis.
- General academic competencies, such as critical thinking, critically evaluating scientific literature, quantitative literacy, written and oral communication.
- Proficiency in English (see language requirements below).

Requirements - Research Skills:

This category encompasses the necessary analytical and practical skills that are essential for both research and practical applications in the field of Human Movement Sciences. The following knowledge, comprehension, and skills at the bachelor's degree level, acquired from an institution of higher academic education, are required:

1. Knowledge and understanding of mathematics (differential, integral and vector calculus, matrix calculations); *Example of textbook: Maths in Motion, T. de Haan*
2. Basic understanding of, and skills in, statistics (correlation, regression analysis, Student's t-tests, ANOVA) in R or comparable tool/programming language; *Example of textbook: Discovering Statistics using R and RStudio, A. Field*
3. Understanding of, and skills in, processing digital signals in Python or comparable tool/programming language; *Example course: MIT edx course on introduction to programming using python*
<https://www.edx.org/learn/computer-science/massachusetts-institute-of-technology-introduction-to-computer-science-and-programming-using-python>
4. Knowledge and understanding of, and skills in, common measurement and data processing techniques in human movement sciences.

Requirements Knowledge:

This category comprises the fundamental theoretical knowledge pertaining to anatomy, physiology, biomechanics, psychology, and neuroscience, which form the foundational elements of human movement sciences. The entry requirements differ per domain. For each domain, the following knowledge requirements apply.

1. Biomechanics

- 1.1. Knowledge and understanding of biomechanical concepts. Kinematics, kinetics, laws of motion and mechanical energy and power. *Example of textbook: Biomechanics and Motor Control of Human Movement, D.A. Winter.*
- 1.2. Knowledge and understanding of mathematics (differential, integral and vector calculus, matrix

calculations). *Example of textbook: Maths in Motion, T. de Haan*

1.3. Knowledge of the anatomical nomenclature, knowledge and understanding of the conceptual aspects of the structure and function of muscles, knowledge and understanding of form and function of joints. *Example of textbook: Human Anatomy and Physiology, E.N. Marieb.*

In addition, 3.1 and 3.2.

2. Movement Neuroscience for Health and Rehabilitation

2.1 Knowledge and understanding of neuroanatomy, function of different brain structures and the neurophysiology of brain processes.

2.2 Knowledge and understanding of neuromuscular control, spinal cord circuits and motor units, movement control and sensory feedback; *Example of textbook: Neuroscience, Purves et al.*

3. Physiology of Human Performance and Health

3.1. Knowledge and understanding of the cardiovascular and respiratory system and the human energy systems; *Example of textbook: Essentials of Exercise Physiology, W.D. Mc Ardle et al.*

3.2. Knowledge and understanding of muscle physiology and mechanics; *Example of textbook: Skeletal Muscle from Molecules to Movement, D.A. Jones et al.*

In addition, 1.3.

4. Psychology in Sports, Performance, and Health

4.1. Knowledge and understanding of human psychology (principles on learning, perception, memory and emotion); *Example of textbook: Psychology, the Science of Mind and Behavior, M.W. Passer & R.E. Smith*

4.2 Knowledge and understanding of motor control and coordination (feedback and feedforward models, visual control and proprioceptive feedback, and motor learning and development); *Example of textbook: Motor Control and Learning, R.A. Schmidt et al.*