

# Master of Science in Exercise Physiology

*This programme description is valid for students admitted in the academic year 2017/2018. It was approved by the Faculty of Medicine and Health Sciences on 2 March 2017.*

## **Facts about the Programme of Study**

Programme code: MSPORT

Webpage: [www.ntnu.edu/studies/msport](http://www.ntnu.edu/studies/msport)

Title of the degree: Master of Science in Exercise Physiology

ECTS credits: 120

Duration: Two years (four semesters)

Host Faculty: Medicine and Health Sciences

Host Department: Circulation and Medical Imaging

## **Introduction**

The Master of Science in Exercise Physiology is a research and thesis-based integrated programme of study at the Faculty of Medicine. It is exclusively concerned with basic research training and comprises compulsory courses together with specialization courses dependent upon the research interest of students.

The MSc programme is associated with the Exercise research group at the Department of Circulation and Medical Imaging. One of the main research interests of this group is to examine basic mechanisms behind central and peripheral limitations to the supply and demand of oxygen transport, and to identify training responses. The group is also involved in examining the mechanisms behind muscular and neural limitations to strength and coordination, the prescription of effective endurance and strength training, and the effects on top sports performance.

Another aspect is based upon the fact that the fastest developing diseases within the population, such as obesity, atherosclerosis, diabetes II, osteoporosis and chronic obstructive pulmonary disease, are related to inactivity. Furthermore, physical activity is a key determinant of energy expenditure, and is thus fundamental to energy balance and weight control. The MSc programme aims to identify effective exercise programs for large populations as well as specific patients and risk groups in order to develop effective tools for prevention, treatment, and rehabilitation, and to provide detailed exercise training recommendations that will improve overall health. Effective new training interventions based on basic biological adaptations have positive effects and are effective treatments with high socioeconomic as well as quality of life outcomes.

Physiology has not just delivered huge advances in understanding, diagnosing, and treating human disease, but it is also the cornerstone of what is currently the major biomedical research push – translation research. Physiological research remains the essential links between genes and clinical care. Enormous amounts of new knowledge are barrelling down the information highway, but they are not arriving at the doorstep of our patients. The MSc programme is meant to play a role in ensuring the future of the discipline and, as a result, in translating basic discoveries into clinical care. Translational research just cannot be accomplished without physiology.

Scientific research on physical activity, sports and health has touches on biological (dose-response relations between physical activity and health) and psycho-social questions (how to change physical

activity behaviour). The role of physical activity in health promotion during the next decades is evidently crucial.

## **Learning Outcome**

The graduated student should be able to:

- demonstrate a solid knowledge about Exercise Physiology, good experimental and theoretical skills, and competence to obtain and critically appraise own and already published experimental and theoretical data and to pursue a career in Exercise Physiology;
- show advanced knowledge in Exercise Physiology reaching from the molecular to whole body level, and have practical skills relevant for the field;
- have knowledge of relevant methodologies and techniques including both historical as well as more recent techniques;
- describe how physical activity and exercise influence the heart, arteries and skeletal muscles in our bodies, both for health and performance;
- identify and describe the limitations for the energy delivery and utilization, as well as the muscular and neural limitations for strength and coordination;
- understand and describe the beneficial effects of physical activity for successful aging and disease prevention, and prescribe effective training programs for treatment and rehabilitation;
- understand basic concepts and principles of statistical analysis, and to perform and interpret results from simple statistical analyses;
- have practical skills in how to apply their academic learning in a project work, and develop teamwork skills by learning from their own experience in collaborating on a joint project in an interdisciplinary team;
- recognize and validate problems; formulate and test hypotheses;
- evaluate and formulate a theoretical concept. Evaluation includes originality, independence and applicability;
- apply and adopt experimental methods to gain new knowledge within Exercise Physiology, and have practical skills relevant to perform the tests;
- carry out and present an experiment that can be developed to quality of an international peer-reviewed paper;
- present, evaluate and discuss scientific results in English (orally and in writing);
- reflect on the existence of ethical aspects, sound experimental approaches and scientific thinking;
- collect relevant background information about topics within Exercise Physiology;
- have knowledge about mainstream concepts of Exercise Physiology, advantages/limitations of its applications, history, traditions and the position in the society;
- apply his/her knowledge and capabilities to analyze and carry out complex experiments in not-familiar domains;
- prove capability to apply his/her knowledge to new domains within Exercise Physiology; has skills and knowledge to search for relevant data on his/her own scientific question, and can critically assess published data within the theoretical framework chosen for a particular project;
- summarize, document, report, and reflect on own findings;
- know how to participate in discussions, put forward his/her results both in a constellation of peers as well as for lay-people;
- prove capabilities to contribute to the generation of new idea/concepts/technical approaches to experimental research questions.

## **Target Groups and Admission Requirements**

Candidates should hold a bachelor's degree (or 3-year equivalent), preferably within biochemistry, biology, exercise physiology/sport sciences, movement science, nursing, occupational therapy, physiotherapy, or similar fields. A firm foundation in human biology is required. The minimum average grade required is the Norwegian "C".

International applicants need to submit proof of English proficiency (TOEFL, IELTS, APIEL or University of Cambridge test). More details about the language requirements are available at [www.ntnu.edu/studies/langcourses/languagerequirements](http://www.ntnu.edu/studies/langcourses/languagerequirements)

Applicants who are not citizens of the European Union (EU) or the European Economic Area (EEA) need to provide a financial guarantee to get a residence permit in Norway.

## **Teaching Methods, Learning Activities and Student Social Activities**

In 2010 the new Hearth and Lung Centre opened at Øya campus in Trondheim. In this building students get to work in high-tech laboratory environments side by side with researchers both from NTNU and St. Olav's Hospital.

The teaching includes lectures, colloquiums, problem-based learning (PBL), seminars, demonstrations, practical training, self-tuition, and independent work. During the work with the master's thesis the student will do research in our well-equipped laboratories.

SOMA is the master's students' own social student organization. SOMA has various activities during the semesters, including welcome parties and other activities for new students, excursions, courses and much more. For more information, visit SOMA's blog: <http://somantnu.blogspot.com>

## **Compulsory HSE Training**

All master's students must participate in compulsory Health, Safety and Environment (HSE) training. This includes a HSE lecture and a fire protection course, both held in the first two weeks of the semester. When these activities have been completed, the student must pass an electronic test. This is to be done by 1 September 2016. If the student fails to do so, the access card to the campus/hospital buildings will be withdrawn.

## **Programme Structure**

The master's degree is a two-year, full-time programme starting in the autumn semester. There are two main components:

- Theoretical and methodological courses (totalling 60 credits)
- Master's thesis (60 credits)

The first semester is primarily based on theory and lectures. From the second semester most attention is directed towards preparing for carrying out an experiment representing work at the forefront of the research in exercise physiology in close co-operation with the professors in the research group.

Experts in Teamwork (EiT) is compulsory for all master's degree students at NTNU, and it is taught intensively in the weeks 2, 3 and 4 in the second semester. Read more about EiT here: <http://www.ntnu.edu/eit>

By the end of the first semester, the student must choose a topic for the thesis. A master's thesis agreement (including a project description) is drawn up by the student and submitted to the programme

board within the first academic year. More information is available at [www.ntnu.edu/dmf/studies/master](http://www.ntnu.edu/dmf/studies/master).

The student must have passed all theoretical and methodological courses before he/she can submit the thesis.

Year 1		Year 2	
1 <sup>st</sup> semester (autumn)	2 <sup>nd</sup> semester (spring)	3 <sup>rd</sup> semester (autumn)	4 <sup>th</sup> semester (spring)
<i>KLH3100</i> Introduction to Medical Statistics (7.5 credits)	<i>EiT</i> Experts in Teamwork (7.5 credits)	<i>SPO3900</i> Thesis in Exercise Physiology (60 credits)	
<i>SPO3020</i> Training Circulation and Oxygen Consumption (7.5 credits)	<i>SPO3040</i> Environmental Adaptations (7.5 credits)		
<i>SPO3030</i> Training Muscle and Force Production (7.5 credits)	<i>SPO3060</i> Specialisation in Exercise Physiology (15 credits)		
<i>SPO3055</i> Research Methods in Exercise Physiology (7.5 credits)			

### **Innovation and Entrepreneurship**

The programme of study is bringing research-based knowledge on how exercise can be used as medicine back to society through the various professions of our graduates. With an increasing aging population as well as an increasing prevalence of lifestyle-related diseases, this represent an effective, low-cost way to address one of modern society's main challenges.

### **Course Descriptions**

The course descriptions are available at [www.ntnu.edu/studies/courses](http://www.ntnu.edu/studies/courses)