



## Musculoskeletal Physiotherapy Sciences

Vrije Universiteit Amsterdam - Fac. der Gedrags- en Bewegingswetensch. - Master Musc. Physioth. Sciences - 2016-2017

The one year master programme (60 EC) Musculoskeletal Physiotherapy Sciences aims at educating graduates, with or without a degree in physiotherapy, on an academic level, enabling them to bring academic theory, research methodology and physiotherapy practice closer together and thus contribute to the optimization of the physiotherapy care in The Netherlands. Graduates should have the ability not only to carry out the full empirical scientific research cycle, but also to translate research results into professional practice.

Students will be introduced to state-of-the-art theories, concepts and measurement methods related to musculoskeletal disorders and their diagnosis and management. Students apply knowledge and insight of research in physiotherapy in practicals and working groups. During the Master Research Project students are involved in all facets of scientific research: they collect and analyze data, and report their findings in a research report.

Master MPS Electives

Students choose two of the courses below, so 6 EC.

### **Doelstelling en eindtermen**

De doelstelling en eindtermen van de opleiding staan beschreven in de [Onderwijs- en Examenregeling \(OER\) 2016-2017](#) van de bacheloropleiding.

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## Master MPS Electives

Vakken:

Naam	Periode	Credits	Code
<a href="#">3D-Kinematics</a>	Periode 4	3.0	B_3DKIN
<a href="#">Electromyography</a>	Periode 5	3.0	B_ELECTROMYO
<a href="#">Histology</a>	Periode 5	3.0	B_HISTOLOGY
<a href="#">Imaging</a>	Periode 4	3.0	B_IMAGING

## Master MPS Obligatory

Vakken:

Naam	Periode	Credits	Code
<a href="#">Biomechanical analysis of human mov.</a>	Periode 2	6.0	B_BIOMANAHM
<a href="#">Master Research Project MPS</a>	Ac. Jaar (september)	24.0	B_MRP
<a href="#">Measuring movement</a>	Periode 1	6.0	B_MEASMOV
<a href="#">Physiotherapy organisation and practice</a>	Periode 1	6.0	B_PHYSORPR
<a href="#">Research meth. in musc. physio 1</a>	Periode 1	6.0	B_REMMP1
<a href="#">Research meth. in musc. physio 2</a>	Periode 2	6.0	B_REMMP2
<a href="#">Translational research</a>	Periode 3	3.0	B_TRANSRES

## 3D-Kinematics

<b>Vakcode</b>	B_3DKIN (900632)
<b>Periode</b>	Periode 4
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	prof. dr. H.E.J. Veeger
<b>Examinator</b>	prof. dr. J. Harlaar
<b>Docent(en)</b>	prof. dr. H.E.J. Veeger
<b>Lesmethode(n)</b>	Hoorcollege, Computerpracticum
<b>Niveau</b>	500

### Doel vak

The student is capable to:

- Define and calculate local joint coordinate systems;

- use and understand different calibration methods and their limitations;
- translate technical motion descriptions into clinically relevant units;
- apply the above to experimental data;
- interpret and comment on methods as described in the literature.

### Inhoud vak

In this course students are introduced to the fundamentals of three-dimensional kinematics, as well as the (more or less) standard application methods.

The course will comprise three separate blocks focusing on

1. the definition and use of local coordinate systems in the calculation of osteokinematics;
2. the use of technical marker sets as well as the practical implications of data processing, especially correcting for missing markers and;
3. the calculation procedures for obtaining helical axes, needed for the definition of functional axes-based coordinate systems

### Onderwijsvorm

Lectures, computer practicals and tutorials

The three computer practicals are linked to in-term assessments. Each practical will contribute for 15% to the final score.

### Toetsvorm

- completion of all 3 assignments is mandatory to qualify for the exam
- two in-term tests on calculation skills, partially exempting for exam
- final test on calculation skills + literature
- score: 3 x 20% for calculation questions (one for each block)
- 40% for essay question
- above 100% = 9/10

### Literatuur

Relevant papers will be listed in Blackboard.

A useful source is the book by Zatsiorsky (Zatsiorsky, Valdimir M., Kinematics of Human Motion. Champaign, Illinois: Human Kinetics, 1st edition, 1998. ISBN 0-880110767-5), which will be used as reference material.

### Vereiste voorkennis

This course requires proficiency in Matlab and matrix calculation. If there is a deficiency related to Matlab skills, students are strongly advised to take the TUE web-based matlab course that can be found at <http://www.imc.tue.nl/>

The BSc course “Mechanische Analyse ...” is advised.

### Aanbevolen voorkennis

Matlab and matrix calculation

### Overige informatie

The maximum number of participants in this course is limited to 40.

## Biomechanical analysis of human mov.

<b>Vakcode</b>	B_BIOMANAHM ()
<b>Periode</b>	Periode 2

<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. J.H.P. Houdijk
<b>Examinator</b>	dr. J.H.P. Houdijk
<b>Docent(en)</b>	dr. J.H.P. Houdijk
<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<b>Niveau</b>	400

### **Doel vak**

In this course the student will learn to select and apply predefined data analysis routines to analyze available data on human movement and interpret the results. Moreover, the student will learn to understand and critically evaluate methods, results and interpretations of biomechanical analyses presented in scientific literature regarding musculoskeletal physiotherapy.

### **Inhoud vak**

Physiotherapists on a daily basis observe human movement to assess issues such as joint range of motion, movement pattern anomalies, muscles and joint strain. Although the practiced eye can derive such information in a reliable way in given circumstances, often these issues remain obscure for the human eye. The human musculoskeletal system is a complex system of multiple bones, muscles and connecting tissues. It is a versatile system that can accomplish an overwhelming number of tasks, given its large number of degrees of freedom. However, this seemingly redundant number of joints and muscles challenges the analysis of these motor tasks. Fortunately, sophisticated measurement techniques and analysis methods are currently available that can be employed to face this challenge. These help us to describe movement patterns and joint movements (i.e. kinematics) and understand underlying forces (kinetics). This course focuses on the mechanical analysis of human movement. It teaches you how mathematical and mechanical laws and conventions can be used to describe and understand human movement and the accompanying load. The (bio)mechanical models and techniques used in these analyses will be discussed and their potential pitfalls and limitations will be highlighted. You will perform the analyses on several available data sets, interpret the results of these analysis in the light of clinical problems and contrast them with results from scientific literature. At the end of the course you are able to apply predefined data analysis routines to available data and interpret the results. Moreover you are able to understand critically evaluate methods, results and interpretations of biomechanical analyses presented in scientific literature.

### **Onderwijsvorm**

Contact hours; 64 (7 lectures; 14 hours, 5 practicals; 40 hours, 5 response lectures; 10 hours) Self study; 104 hours.

### **Toetsvorm**

Examination and grading of this course will be based on the practical reports and a written assignment. Practical reports need to be handed after each practical. The reports of practical 1-4 will be graded and account for 10% of the final grade. The report of practical 5 is not graded as this has a more explorative character. The written assignment involves a methodological research proposal, which will account for 60%

of the final grade.

### Literatuur

Research Methods in Biomechanics-2nd Edition, Robertson et al. 2014,  
Lecture handouts  
Practical assignments  
Selected research papers

### Vereiste voorkennis

No strict admission criteria apply, but basic knowledge of biomechanics, matlab and measuring movement is required.

### Intekenprocedure

For more info on workgroups, laboratories, (computer) practicals etc. please see Blackboard.

### Overige informatie

Course manual will be available on BlackBoard

## Electromyography

<b>Vakcode</b>	B_ELECTROMYO (900815)
<b>Periode</b>	Periode 5
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	prof. dr. J.H. van Dieen
<b>Examinator</b>	prof. dr. J.H. van Dieen
<b>Docent(en)</b>	prof. dr. J.H. van Dieen
<b>Lesmethode(n)</b>	Hoorcollege, Practicum, Computerpracticum
<b>Niveau</b>	400

### Doel vak

- The student has a basic knowledge of electrophysiology and the background of electromyographical signals;
- the student has a basic knowledge of the different ways; of collecting electromyographical data in various fields of application;
- the student can choose the appropriate method for collecting and analyzing EMG data in a kinesiological study;
- the student knows the possibilities and limitations of EMG data;
- the student can interpret EMG data in relation to motor control, force and fatigue;
- the student can identify contamination in EMG data and can apply methods to reduce its effects;

### Inhoud vak

In this course, the students are introduced to the electrophysical background of electromyography (EMG). Subsequently, the course focuses on methodological aspects of EMG acquisition and analysis, addressing the potential of this method as well as its pitfalls.

### Onderwijsvorm

lectures 6 x 2 hours  
practical 2 x 3 hours

The lectures introduce the following topics:

- electrophysiology;
  - motor control (motor unit recruitment and firing);
  - instrumentation and electrodes;
  - HD- EMG and spatio- temporal information;
  - onset determination;
  - amplitude estimation;
  - force estimation;
  - cocontraction and cross- talk;
  - motor unit firing and decomposition;
  - frequency content, conduction velocity and fatigue.
- Practicals concern analyzing EMG data.

### Toetsvorm

2 hours; written test with equally weighted open- ended questions

### Literatuur

Research articles and lecture handouts

### Vereiste voorkennis

- knowledge of and skills in programming in MATLAB at the level described for example in 'Verwerken van digitale signalen'.
- basic knowledge and understanding of the physiology of muscles and their control.

## Histology

<b>Vakcode</b>	B_HISTOLOGY ()
<b>Periode</b>	Periode 5
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. W.M.H. Hoogaars
<b>Examinator</b>	dr. W.M.H. Hoogaars
<b>Docent(en)</b>	dr. W.M.H. Hoogaars
<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<b>Niveau</b>	500

### Doel vak

Patients with debilitating musculoskeletal disorders, such as arthritis, osteoporosis and muscle atrophy, form a large and expanding diagnosis group in health care. Physical therapy is generally part of the treatment of these disorders and crucial to attenuate the progression of the disorder and to maintain or improve mobility of these patients. In order to optimize care and to provide the best physical therapy possible for these patients, it is crucial to understand the molecular and cellular processes involved in musculoskeletal adaptation and disease and unravel the mechanisms underlying the physical therapy interventions to recover from tissue injury. This course is an introduction to histology with an emphasis on the microscopic anatomy of the musculoskeletal system, the function of different cells in muscles, bones and joints and the molecular mechanisms underlying the etiology of musculoskeletal disorders. Histochemical and immunohistochemical techniques will be introduced to study structure and function of cells. In addition, practical exercises with microscopes and tissue sections will be used to familiarize students with microscopy and the



cellular structure and organization of different tissues of the musculoskeletal system.

This course provides an introduction into the histology of the musculoskeletal system and the molecular and cellular processes that underlie the development of musculoskeletal disorders.

Intended learning outcomes

- To be able to describe and explain the basic principles of histology and use of histological techniques.
- To be able to assess the value and limits of specific (immuno) histological methods used to study the microanatomy of the musculoskeletal system and musculoskeletal disorders.
- To gain knowledge about the basic principles of cell biology and the function of different cells and structures associated with the musculoskeletal system.
- To gain knowledge about the cellular and molecular processes underlying musculoskeletal disorders.
- To be able to identify and describe the microscopic organization and adaptation of different cells and tissues in muscles, bones, joints and their attachments using histology.
- To be able to identify and interpret molecular and cellular processes associated with tissue injury and musculoskeletal disorders using histology.
- To gain insight in the scientific and clinical relevance of histology and cell biology in the field of musculoskeletal disorders and physical therapy research.
- To be able to contribute to scientific discussions about research on the underlying (molecular) mechanisms of musculoskeletal disorders and the effects of physical therapy

### **Inhoud vak**

The course will include:

- Lectures on basic histological and immunohistochemical techniques used to identify cells and tissues in the musculoskeletal system.
- Lectures on the microscopic anatomy and cellular/molecular biology of the musculoskeletal system.
- Lectures on cellular and molecular adaptations of the musculoskeletal system and pathophysiological processes involved in musculoskeletal disorders, such as arthritis, osteoporosis and muscle wasting disorders.
- Lectures/class discussions discussing recent histological and molecular biology research relevant to the physical therapy field.
- Practicals on microscopy and histochemistry to analyse structure and functional properties of musculoskeletal system.

Lectures and class discussions:

The lectures will provide students with basic knowledge about histology and cellular biology of the musculoskeletal system and current knowledge about the molecular mechanisms of musculoskeletal disorders and tissue regeneration. Reading material mainly consists of Junqueira's basic histology book chapters and current research papers and reviews. Details on the latter resource will be provided on BlackBoard before the course starts. Lecture slides will be posted on BlackBoard after the lecture under Course Documents. The student is encouraged to read through the study material pertaining to the lecture (see course schedule) beforehand as this will facilitate the understanding of the lecture. There will be two class discussions where students can ask questions and participate in class discussions on examples of current research papers

relevant to physical therapy research. Before the last class discussion example exam questions will be posted on BlackBoard, which will be discussed in the last week.

### Practical assignments

There will be 2 practical assessments in this course regarding skeletal muscle structure and adaptation. The practical sessions will consist of an introduction to the laboratory of myology at the department of human movement sciences (1 hour) and two assignment with open questions on skeletal muscle structure and skeletal muscle adaptation (3 hours). Students will use a microscope and histological sections of skeletal muscles to answer the questions described in the Practical Guide. The practical guide will be posted on BlackBoard under course documents.

### Onderwijsvorm

The course consist of 3 ECTS, which equals a load of 84 study hours. These hours could be divided over the course program as follows:

Preperation lectures 26hrs  
Lectures and class discussions  $9 \times 2 = 18$ hrs  
Preparing practical assignments 16hrs  
Practical assignments  $2 \times 4 = 8$ hrs  
Exam preparation 14hrs  
Exam 2hrs  
Total 84hrs

### Toetsvorm

Examination and grading of this course will be based on a knowledge assessment (weight 70%) and the practical assessments (weight 30%).

#### Knowledge assessment:

The knowledge assessment will cover lecture sheets, extra literature provided on blackboard (in the form of reviews and research papers) and chapters from Junqueira's Basic Histology Text and Atlas and Skeletal Muscle from Molecules to Movement (ISBN 9780443074271). The exam will last 2 hours and will consist of multiple open questions.

#### Practical assessment:

The practical assessment will contain questions about microscopic analysis of histological muscle sections. For the practical assessment you are allowed to take your plan and notes. The assessment has to be submitted through BlackBoard before the deadline. The average grade for the 2 practical assessments will make up 30% of the final grade for this course. All practical assessments have to be submitted through BlackBoard before the deadline. Assessments handed in after the deadline will not be taken into account.

#### Final grade:

The final grade for this course will be determined from the practical assessments (30%) and the knowledge assessment (70%). The final graded will be determined based on non rounded-off grades for the practical and knowledge assessment. The final grade (on a scale of 1-10) will be rounded down to the nearest half point.

### Literatuur

Junqueira's Basic Histology Text & Atlas 13th Edition (ISBN 0071780335)  
Skeletal Muscle from Molecules to Movement (ISBN 9780443074271)

Other sources:

Recent research papers and reviews (will be available on blackboard)

## Imaging

<b>Vakcode</b>	B_IMAGING ()
<b>Periode</b>	Periode 4
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	prof. dr. H.E.J. Veeger
<b>Examinator</b>	prof. dr. H.E.J. Veeger
<b>Docent(en)</b>	prof. dr. H.E.J. Veeger, dr. R.T. Jaspers
<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<b>Niveau</b>	500

### Doel vak

To be able to interpret x-ray images, MRI and ultrasound and to recognize relevant structures of the musculoskeletal system (1)

- To be aware of projection and field strength pitfalls (2, 9)
- using x-ray: to be able to recognize signs of arthrosis and osteoporosis (3)
- using MRI: to be able identify ACL injuries and rotator cuff tears (3)
- using ultrasound: to be able to identify tendon and muscle damage (3)
- to be able to perform an ultrasound assessment evaluation of the shoulder or knee, based on a specific research question (3, 5, 6, 18)
- able to report on an ultrasound assessment evaluation of the shoulder or knee, based on a specific research question (14)

### Inhoud vak

In this course students will be trained in interpreting images from the most common imaging tools used in orthopaedics: x-ray, MRI and ultrasound. As ultrasound is one of the tools that is most easily available in physiotherapy practice, students will learn to record and interpret ultrasound images based on existing cases.

The course will comprise:

- classes on the basic theory behind x-ray, MRI, and ultrasound.
- classes on the recognition of a selection of musculoskeletal disorders using images.
- Visit to the imaging department VUmc
- Demo of ultrasound use within a physiotherapy practice.

### Onderwijsvorm

Practical + report on a specific case based on ultrasound recordings.

### Toetsvorm

Interim exam

Conditional requirements

Students need to be in time and to bring their VU\_ID to the exam in order to be admitted. Students who are more than half an hour late are not allowed to take the interim exam. Their exam will be graded with a 1.0.

### Examination and grading

The interim exam exists of multiple choice questions and open-end questions. The multiple choice questions count for 60% to the grade for the interim exam, the open-end questions for 40%.

The grade for the interim exam will be determined using the standard procedure for setting of a cutting score. This procedure can be found on Blackboard The grade will be round off at half points.

### Report

Students will be working on the presentation of a case in groups of three. The results of their work should be presented in a short report, containing a brief introduction and explanation of the research question, a description of the method, the measurement results and interpretation thereof, and a brief discussion of their findings. The report will be graded as a group effort. The criteria for grading can be found on BlackBoard (see: "report\_instructions").

### Conditional requirements

The report should be constructed conform the instructions as can be found on BlackBoard (see: "report\_instructions").

Reports shall be handed in through Blackboard as a group assignment.

Reports will undergo a plagiarism check.

### Determining final grade

The final grade will be determined as follows:

$40\% \times \text{grade interim exam (rounded off at half point)} + 60\% \times \text{grade report (rounded of at half point)}$ . A minimum score of 5.5 for the report is required.

### Resit

In case of a final score below 5.5 (and a minimum score of 5.5 for the report), the interim exam can be retaken. The resit will be an oral exam.

### Literatuur

Cornwall, Nyre & Harris: Imaging Handbook for Physical Therapists.  
ISBN: 978-1-4511-3031-7

Daniels & Dexter (eds.): Selected chapters from; Basics of Musculoskeletal Ultrasound (2013) (url:

<http://www.springer.com/us/book/9781461432142>)

## Master Research Project MPS

<b>Vakcode</b>	B_MRP ()
<b>Periode</b>	Ac. Jaar (september)
<b>Credits</b>	24.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	prof. dr. M.W.J. Coppieters
<b>Docent(en)</b>	dr. J.H.P. Houdijk, prof. dr. M.W.J. Coppieters
<b>Lesmethode(n)</b>	Werkgroep
<b>Niveau</b>	600

## Measuring movement

<b>Vakcode</b>	B_MEASMOV ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. T. IJmker
<b>Examinator</b>	dr. T. IJmker
<b>Docent(en)</b>	dr. R. Verheij, dr. T. IJmker
<b>Lesmethode(n)</b>	Hoorcollege, Practicum, Computerpracticum
<b>Niveau</b>	400

### Doel vak

In this course the student will become familiar with measurement techniques and methods frequently used to measure physical quantities in musculoskeletal physiotherapy sciences. The student will also learn how to use Matlab to process the obtained data, report on the methods and results, and interpret their observations.

### Inhoud vak

Within human movement sciences in general and physiotherapy research in particular a large set of measurement techniques and methods is available, ranging from a more psychosocial towards a biomechanical approach. This course will only cover some of the most frequently used techniques from the more biomechanical approach to answer scientific questions related to human movement. The following techniques will be addressed specifically: measurement of kinematic quantities with Optotrak and a smartphone camera, measuring forces with a force platform, measuring linear and angular accelerations with an accelerometer, and measuring muscle activity with electromyography (EMG).

A large part of this course consists of general methods and techniques that apply to the measurement of almost all physical signals, or the processing of these signals into meaningful quantities. Students will learn how to perform measurements with the aforementioned equipment, and how to process the acquired signals using Matlab. Lastly, students will learn to analyze the reliability and precision of the given methods and to make a sound judgment as to the adequacy and limitations of a given measurement method to solve a problem.

### Onderwijsvorm

Contact hours: 52, consisting of:

- Lectures (10; 2 hours each)
- Practicals (4; for each practical 3 hours of data collection and 5 hours of data analysis)

Self-study: 116 hours (preparation of lectures and practicals, exercises, exam preparation)

### Toetsvorm

Final exam (70%)

Written assessment consisting of open end and multiple choice questions

Practical report (30%)

In the practical report, students will (individually) write a methods and results section in the form of a scientific paper on the measurement and data analysis they performed in Practical 4.

### Literatuur

- Selected chapters of the book: Research methods in biomechanics (second edition), by Robertson et al.
- Syllabus (BlackBoard)
- Selected research articles
- Additional texts on selected topics (Blackboard)

### Vereiste voorkennis

Knowledge and understanding of basic mathematics and biomechanics and basic Matlab programming skills are a prerequisite for this course.

### Intekenprocedure

For additional info on workgroups, laboratories, (computer) practicals etc. please see the Course Manual on Blackboard.

Apart from students from the Master MPS, is this course also available for students from the master programmes Human Movement Sciences, and not available for other students

### Overige informatie

Intended learning outcomes

(Relation to Master program's end qualifications between brackets)

1. To gain knowledge of common principles in signal processing. (2)
2. To gain knowledge of the common function, applicability and limitations of measurement tools often used for measuring movement in physiotherapy research. Specifically: Optotrak, force sensors, accelerometers and electromyography. (2)
3. To be able to select the appropriate measurement set-up and parameters to answer a given research question. (3,4)
4. To be able to operate common measurement tools in movement analysis. (3,4)
5. To be able to process data collected with the designated measurement tools using Matlab. (3,4)
6. To be able to report the used method, and interpret and report the results of the measurement outcomes. (9,14)
7. To be able to critically evaluate the accuracy and validity of the measurement outcomes. (9)

## Physiotherapy organisation and practice

<b>Vakcode</b>	B_PHYSORPR ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. G.G.M. Scholten-Peeters
<b>Examinator</b>	dr. A.L. Pool-Goudzwaard
<b>Docent(en)</b>	dr. G.G.M. Scholten-Peeters, dr. A.L. Pool-Goudzwaard
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege

**Doel vak**

In this course the student will get insight into the physiotherapy profession and process to create relevant research questions and to communicate and collaborate with physiotherapists in the field.

**Inhoud vak**

In order to perform relevant scientific research within the physiotherapy field, students should be familiar with the primary principles of the physiotherapy profession. In this module, students will get insight into the Dutch physiotherapy practice. Aspects like the different roles of the physiotherapists, legal, positioning of the physiotherapists in the different care settings will be discussed. The primary principles of the physiotherapy practice are considered like the different models of care, evidence based practice (EBP), clinical reasoning within the screenings- diagnostic and treatment process, the use of clinical guidelines and the International Classification of Functioning, Disability, and Health (ICF).

The physiotherapy profession has undergone a paradigmatic shift, where a 'biopsychosocial' model of care has acquired popularity alongside the traditional 'biomedical model' of care. Physiotherapists offer treatment aimed at recovery, optimization or maintenance of movements. Their clinical reasoning process is necessary to provide a specific physiotherapy diagnosis including the relevant dimensions of the ICF. The physiotherapy profession uses the most recent scientific insights, to provide (cost)effective and safe patient care. Evidence- based practice within the physiotherapy field includes: the best available external evidence, the physiotherapist's preferences/expertise and patient' preferences/personal values. The physiotherapist discusses and provides the patient with the evidence on the important harms and benefits of the physiotherapy intervention taking into consideration the personal preferences, wishes, needs and qualities of patient as a whole person in his biopsychosocial, family and working surrounding. The physiotherapy optimizes its collaboration with other health care professionals by using the "International Classification of Functioning, Disability, and Health" (ICF) system developed by the World Health Organization (WHO). The importance of clinical guidelines and measuring of recovery will be discussed.

During the first 4 weeks, these main theoretical principles are considered and theoretically applied on some cases. The internships in week 5-7 are aimed to gain experience with the physiotherapy practice, get insight into the barriers and facilitators to provide evidence based treatment, perform research and reveal gaps of knowledge within the physiotherapy profession. Student will not be trained to become physiotherapists themselves. No 'hands-on' practica will be performed.

**Onderwijsvorm**

Lectures (4x), 2 hours each

Tutorial groups (8x), 2 hours each

The lectures will provide the theoretical background of common principles in physiotherapy practice. To prepare the lectures, students have to read at least the peer-reviewed articles, guidelines, websites and chapters from recommended books as suggested on the course schedule. Lecture slides will be posted afterwards on BlackBoard under 'Course

Documents'.

There will be 8 tutorial groups in this course. The educational form will vary from discussions and critical reflections on the diagnostic and therapeutic process of patients from physiotherapy practice, presentations about the clinical guidelines and (dis)advantage of questionnaires within the physiotherapy, and a debate about the applicability of scientific evidence within the physiotherapy practice. To prepare the tutorial groups, students have to read at least the recommended literature as suggested on the course schedule.

The internships will take place in different physiotherapy practices, preferably in different care settings (primary care, hospital care or rehabilitation care settings). The schedule will be made by the secretariat.

Arrangements of dates need to be made by the students during the first 2 weeks of the course

to prevent delay. The internships should not be started before week 4 because the lack of theoretical background and theoretical principles of the physiotherapy.

### **Toetsvorm**

Examination and grading of this course will be based on a critically appraised patient report (70%, minimum 5.5), a summary of the best available evidence combined with patient and therapeutic perspectives and a report of gaps of knowledge in the physiotherapy field with corresponding relevant research questions (30%, minimum 5.5).

### **Literatuur**

literature to be studied: will be provided through blackboard

### **Intekenprocedure**

For more info on workgroups, laboratories, (computer) practicals etc. please see Blackboard.

## **Research meth. in musc. physio 1**

<b>Vakcode</b>	B_REMMP1 ()
<b>Periode</b>	Periode 1
<b>Credits</b>	6.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. M.J.M. Hoozemans
<b>Examinator</b>	dr. M.J.M. Hoozemans
<b>Docent(en)</b>	dr. M.J.M. Hoozemans, prof. dr. M.W.J. Coppieters
<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<b>Niveau</b>	400

### **Doel vak**

In this course the student will become familiar with the research methodology that is frequently used in musculoskeletal physiotherapy sciences. The student will also learn how to use SPSS for statistical analyses, and how to interpret and document the output in relation to research questions.

Intended learning outcomes:

- To gain knowledge and understanding of research methods commonly used in musculoskeletal physiotherapy (epidemiology, regression analysis,



research designs, qualitative research, prognostic research and diagnostic research)

- To be able to apply knowledge to formulate new research questions, to select appropriate research designs, to correctly select and perform statistical procedures using SPSS software, to interpret the output properly and to communicate the methods and findings correctly.
- To be able to use appropriate knowledge and tools to critically appraise the quality of scientific research in musculoskeletal physiotherapy and related fields.
- To reach a level of understanding of clinical epidemiology, experimental research and statistics that enables participation in the debate about strengths and limitations of specific research designs and statistical procedures.

### **Inhoud vak**

Research Methodology in Musculoskeletal Physiotherapy Part 1 provides an overview of research methods and evidence-based musculoskeletal physiotherapy. Topics that are discussed are: revision of basic statistics, descriptive and analytic epidemiology, regression analysis (including multiple and logistic regression), research designs, qualitative research, prognostic research (including survival analysis and clinical prediction rules) and diagnostic research (including clinimetrics (reliability and validity)). The critical appraisal of the quality of studies in these domains is also covered. Practical sessions (computer labs) are organised for students to learn how to apply the statistical methods using statistical software packages (SPSS).

### **Onderwijsvorm**

Preparation time lectures: 44 hours  
Lectures: 22 hours  
Practical assignments: 20 hours  
Exam preparation: 76.5 hours  
Exams: 5.5 hours

### **Toetsvorm**

Learning outcomes are assessed via a theoretical and practical examination. Both examinations are conducted at the end of the teaching period. The theory examination (65% of total score) consists of short answer questions. In the practical examination (35% of total score), students are requested to analyse datasets using SPSS software. Both examinations are must-pass components (5.5/10).

### **Literatuur**

Field (2013) Discovering statistics using IBM SPSS statistics (3th or 4th edition)  
Fletcher (2014) Clinical epidemiology (5th edition)  
Selected scientific papers and book chapters

### **Intekenprocedure**

For more info on workgroups, laboratories, (computer) practicals etc. please see Blackboard.

## **Research meth. in musc. physio 2**

<b>Vakcode</b>	B_REMMP2 ()
<b>Periode</b>	Periode 2
<b>Credits</b>	6.0

<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	prof. dr. M.W.J. Coppieters
<b>Examinator</b>	prof. dr. M.W.J. Coppieters
<b>Docent(en)</b>	dr. M.J.M. Hoozemans
<b>Lesmethode(n)</b>	Hoorcollege, Practicum
<b>Niveau</b>	400

### Doel vak

In this course the student will become familiar with the research methodology that is frequently used in musculoskeletal physiotherapy sciences. The student will also learn how to use SPSS for statistical analyses and how to interpret and document the output in relation to research questions.

Intended learning outcomes:

- To gain knowledge and understanding of research methods commonly used in musculoskeletal physiotherapy (clinical effectiveness research designs, statistics in experimental research, systematic reviews, and academic integrity and ethical conduct)
- To be able to apply knowledge to formulate new research questions, to select appropriate research designs, to correctly select and perform statistical procedures using SPSS software, to interpret the output properly and to communicate the methods and findings correctly
- To be able to use appropriate knowledge and tools to critically appraise the quality of scientific research in musculoskeletal physiotherapy and related fields
- To reach a level of understanding of clinical epidemiology, experimental research and statistics that enables participation in the debate about strengths and limitations of specific research designs and statistical procedures, and that enables effective communication and collaboration with other clinicians, researchers, epidemiologists and statisticians
- To understand academic integrity and ethical conduct, and to act accordingly

### Inhoud vak

Research Methodology in Musculoskeletal Physiotherapy Part 2 continues the overview of research methods and evidence-based musculoskeletal physiotherapy. Topics that are discussed are: clinical effectiveness research designs (including randomised clinical trial methodology), statistics in experimental research (including one-way and two-way, repeated-measures, between groups and mixed design ANOVA), systematic reviews, and academic integrity and ethical conduct. The critical appraisal of the quality of studies in these domains is also covered. Practical sessions (computer labs) are organised for students to learn how to apply the statistical methods using statistical software packages (SPSS).

### Onderwijsvorm

Preparation time lectures: 40 hours

Lectures: 20 hours

Practical assignments: 24 hours

Preparation debate: 16 hours

Workgroup debate: 2 hours

Writing report of the debate: 20 hours

Exam preparation: 40.5 hours

Exams: 5.5 hours

### Toetsvorm

Learning outcomes are assessed via a theoretical and practical examination, and a group presentation accompanied by a written report. Both examinations are conducted at the end of the teaching period. The theory examination (50% of total score) consists of an actual exam with short answer questions and the written report of the academic debate. The practical examination (50% of total score) consists of an actual exam, in which students are requested to analyse a dataset using SPSS software and report the methods and results in line with the requirements of a scientific journal, and the group presentation. All assessment components are must-pass components (5.5/10).

### Literatuur

Field (2013) Discovering statistics using IBM SPSS statistics (3th or 4th edition)  
Fletcher (2014) Clinical epidemiology (5th edition)  
Selected scientific papers and book chapters

### Intekenprocedure

For more info on workgroups, laboratories, (computer) practicals etc. please see Blackboard.

## Translational research

<b>Vakcode</b>	B_TRANSRES ()
<b>Periode</b>	Periode 3
<b>Credits</b>	3.0
<b>Voertaal</b>	Engels
<b>Faculteit</b>	Fac. der Gedrags- en Bewegingswetensch.
<b>Coördinator</b>	dr. A.L. Pool-Goudzwaard
<b>Examinator</b>	dr. A.L. Pool-Goudzwaard
<b>Docent(en)</b>	dr. G.G.M. Scholten-Peeters, dr. A.L. Pool-Goudzwaard
<b>Lesmethode(n)</b>	Hoorcollege, Werkcollege
<b>Niveau</b>	400

### Doel vak

In this course the student will become familiar with translational research models within the physical therapy domain. This knowledge will enable the student to describe possible following steps in translational research. In this way the student will prepare him/herself for the writing of an essay on valorisation related to their own research project as part of their end thesis (required final exam of their research project)

### Aim

The following learning goals will be tested by means of writing an essay:

- a: to gain and apply knowledge of the translational model in the physiotherapy domain, specifically on cost effectiveness, utilization, guidelines and implementation research
- b: to be able to use hypothetical results from research projects to design and report on the next step within translational research model for application within the physical therapy domain.

Essence of writing this essay is that by means of the translational model of Rubio et al., 2010 (See literature in course documents) you will describe how research can become of value to either physiotherapists/ patients/ population or government. Examples of additional value can be implementation of knowledge as useful tests, skills, strategies, knowledge on cost effectiveness of interventions, implementation of guidelines, etc.

Regarding the translational model as a loop, you can also describe how hypothetical results from e.g. population based implementation research (T3) can result in basic fundamental research (T1)

### **Inhoud vak**

In this course students will gain knowledge and be trained in translational research within the domain of physiotherapy. The student will learn about all steps within translational research by lectures and tutorials of experts in the field. Furthermore the students will be challenged to apply this knowledge by development of relevant research questions, setting up correct design, either quantitative and/ or qualitative research, responding to pitfalls of implementation and reaching for efficacy and (cost) effectiveness and utilization, by means of group and/ or individual assignments. Students will learn to interpret and practice this knowledge in writing an essay on steps in translational research as a final exam and will learn to elaborate on the decisions made by a presentation and discussion.

### **Onderwijsvorm**

The course comprises of lectures, practical assignments and self-study.

Lectures:

The lectures will provide global theoretical background on models within translational research and focus on epidemiological research questions related to the added value within the musculoskeletal domain for physiotherapy.

The lectures follow the course of the translational research model, and will explain the covered material with examples. Sometimes additional material is presented in preparation for the practicals. Lecture slides will be posted on BlackBoard after the lectures under Course Documents.

The student is encouraged to read through the study material pertaining to the lecture (see course schedule) beforehand, as this will facilitate the understanding of the lecture.

All lectures will take place in the first 3EC of the course.

The course will comprise lectures on:

- Translational research models
- Core sets
- Implementation research (guidelines)
- Qualitative research
- Economic evaluations in PT

Practicals:

During the 3 EC practicals will consist of study assignments linked to the lectures. If requested study products related to the assignments should be posted in time for the following lecture.

### **Toetsvorm**

The exam exists of a written essay and a presentation of this essay.

Conditional requirements

Students need to deliver their essay prior to the deadline. Students need to follow guidelines on how to write the essay and minimal

requirements of the presentation, see criteria list below and as posted on Blackboard.

Feedback, examination, grading and re-examination  
Assessment Deadline Weight Compensable Retake  
Essay 26 June 2017 65% Yes Yes  
Oral presentation 26 June 2017 35% Yes Yes

Prior to examination a student is entitled to two feedback moments on the essay by one reviewer. The grades for the interim exam will be determined by two separate reviewers using a criteria list. The criteria list can be found on Blackboard. You pass for the exam if you score a 5.5 or higher for the essay and presentation together. The grade will be round off at half points. Failing the exam entitles the student to one re-examination implementing the feedback given by two reviewers on the business case used for the first attempt.

#### Criteria list

1. A written essay (last chapter of thesis of research master project)  
Consisting of min. 2000 max. 3000 words

Recommended content:

- Description of a (given) topic of research related to physical therapy regarding the position within translational research (T1, T2 or T3 phase)
- Description of adjacent two steps within translational research model
- Description of these research steps regarding their position within the translational research model
- How these steps will be of value for physiotherapists/ patients/ population and/ or government,

All above based on logical thinking, hypothetical results and on the basis of literature, information from media etc. etc.

2. A presentation on the essay of maximal 15 minutes

#### Literatuur

literature to be studied: will be provided through blackboard

- Rubio DM, Schoenbaum EE, Lee LS, Scheingart DE, Marantz PR, Anderson KE, Platt LD, Baez A, Esposito K. Defining translational research: implications for training. *Acad Med.* 2010 Mar;85(3):470-5.
- Rajan A, Sullivan R, Bakker S, van Harten WH. Critical appraisal of translational research models for suitability in performance assessment of cancer centers. *Oncologist.* 2012;17(12):e48-57
- Korthals-de Bos I, van Tulder M, van Dielen H, Bouter L. Economic evaluations and randomized trials in spinal disorders: principles and methods. *Spine (PhilPa)* 1976). 2004 Feb 15;29(4):442-8
- Whitehead SJ, Ali S. Health outcomes in economic evaluation: the QALY and utilities. *Br Med Bull.* 2010;96:5-21.
- Raaijmakers LGM, Hamers FJM, Martens MK, Bagchus C, de Vries, Kremers SPJ Perceived facilitators and barriers in diabetes care: a qualitative study among health care professionals in the Netherlands. *BMC Family Practice BMC* 2013; 14:114
- Grunseit AC, O'Hara BJ, Chau JY, Briggs M, Bauman AE Getting the Message Across: Outcomes and Risk Profiles by Awareness Levels of the "Measure-Up" Obesity Prevention Campaign in Australia *Plos one* Published: April 6, 2015
- Petty N, Thomson O, Stew G. Ready for a paradigm shift? Part 2: Introducing qualitative research methodologies and methods *Manual Therapy* 2012; 17(5);378-384
- Petty N, Thomson P, Stew G Ready for a paradigm shift? Part 1: Introducing the philosophy of qualitative research *Manual Therapy*

2012;17(4):267-274

• Peters DH(1), Adam T, Alonge O, Agyepong IA, Tran N.

Implementation research: what it is and how to do it. *BMJ*. 2013 Nov 20;347:f6753.

### **Intekenprocedure**

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