2-YEAR RESEARCH MASTER
2013-2015

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The curriculum

The research master's curriculum includes theoretical courses, colloquia, skills training, workshops and electives throughout year 1 and the beginning of year 2. These ensure that students acquire a broad foundation before choosing a research (internship) topic for the remainder of the programme. Core courses form the backbone of each specialisation and acquaint students with the most important current theories, models and methods within each different domain of specialisation. In addition, to increase awareness of the value of interdisciplinary research approaches, interdisciplinary colloquia and grant writing courses address broad but relevant topics from the perspectives of each of the five specialisations (Cognitive Neuroscience, Neuroeconomics, Fundamental Neuroscience, Neuropsychology and Psychopathology). These intend to stimulate students from all specialisations to put their own research interests into an interdisciplinary perspective and to benefit from cross-fertilisation among the different scientific disciplines. During the grant proposal workshop and writing course, students learn about the importance of obtaining research grants and about how to write good interdisciplinary research proposals (workshop). Students must collaborate in small groups to formulate original research hypotheses and then write and present their own interdisciplinary research proposal under guidance of staff-members who are experts in the field (course). Finally, skills training, electives and workshops endow students with the necessary practical and theoretical knowledge and experience for undertaking research in experimental and applied settings. They also provide a sound basis for accomplishing their own master's thesis research and hence a successful scientific or related career in the near future.

The research master's (MSc) programme is equivalent to 120 European credits.

Core courses
In the core courses, students become acquainted with the most important theories, models, techniques and analytic methods in the domains of Cognitive Neuroscience, Neuroeconomics, Fundamental Neuroscience, Neuropsychology and Psychopathology. The courses are given in a Problem-Based Learning (PBL) or seminar format. Under the guidance of an experienced faculty member, students meet in groups for in-depth discussion of current research issues pertinent to the central theme of the course and based on assigned readings of cutting-edge articles. Course credits (2 to 6.5 credits per course, depending on course length and content) and grades are assigned on the basis of assessments which may include written papers, presentations or exams.

Two Advanced Statistics courses (with a total of 6 credits) are core courses, shared by all specialisations. These courses consist of a mixture of lectures, hands-on training and student-centred meetings and are designed to acquaint students with the most important advanced methods and widespread research applications. The final grade is based on a multiple-choice format exam.

Research Grant Writing Workshop and Course
In the first year Research Grant Writing Workshop students will learn why and how to apply for research grants. They will learn fundamentals of good grant writing, general preparation of grant application and how to deal with reviewer comments. During the second-year Research Grant Writing Course, students will apply what they have learned during the workshop and will work together (in groups of max. 5) to write an interdisciplinary research proposal on their selected topic, including original research hypotheses, experimental design and methods. The resulting proposals will be presented during a symposium.

Colloquia
The first-year colloquium series comprises of nine lectures (one or two organised by each of the five specialisations) presented by senior researchers from the UM faculties or visiting guest lecturers. The colloquia cover a range of topics that go beyond the issues covered in the core curriculum; each will consist of a lecture followed by active discussion, prepared and chaired by the lecturer. Course credits (1 credit in total) are assigned at the end of the first year on the basis of attendance.

Skills Training
Skills training provides the necessary hands-on experience for research in experimental and applied settings. For the Neuropsychology and Psychopathology specialisations, training in basic clinical skills also forms part of the programme. The training extends over four to eight weeks, depending on the topic. Some

of the training courses are given to students of multiple specialisations. Course credits (1 to 2 credits per course) are assigned on the basis of attendance and practical exercises.

Workshops
Methodological and technical workshops provide both the necessary basis for conducting the master's thesis research and the advanced skills for a future scientific career. The teaching format varies depending on the topic of the workshop. Many emphasise hands-on experience and practical aspects. Some workshops are mandatory for all specialisations, some are shared by two or more specialisations and some are specialisation-specific. Course credits (1 to 2 credits per workshop) are assigned on the basis of attendance and either exams, presentations or practical exercises.

Electives
Participating in electives will allow students to acquire theoretical knowledge or practical research experience outside of the required curriculum of their specialisations. There are three types of electives: attending regular courses (RM Elective: Course), writing a review paper (RM Elective: Review) or participating in (parts of) an empirical study (RM Elective: Research). Students from the specialisations of Cognitive Neuroscience, Neuropsychology and Fundamental Neuroscience are required to obtain 3 credits by selecting one of the three types of electives described in the web catalogue and electives manual. Students of the specialisation in Psychopathology are required to obtain 5 credits by selecting a combination of one or more of the three types of electives.

Research Internship and Master's Thesis
In year 2, from week nine onwards, students spend most of their time on the preparation and execution of their research project and their master's thesis. Students from all five specialisations conduct their own research project and master's thesis. Course credits will be assigned on the basis of both the research process and the thesis. The final grade is based on the thesis. For students who do not complete a clinical internship and minor's thesis (see below), the master's research and thesis will be assigned a total of 50 credits.

Clinical Internship and Minor's Thesis
Students specialising in *Psychopathology* are required to conduct a 13-week clinical internship in an approved setting. The clinical internship can be conducted in conjunction with the research internship or separately. Students are required to submit an additional research proposal and scientific report (the minor's thesis), based on client/patient-based investigations performed during the clinical internship. Students following the specialisation in *Neuropsychology* may also choose to undertake a clinical internship and minor's thesis (instead of a full research internship and thesis). For all students who are required to or who choose to do a clinical internship, the minor's internship and thesis will be assigned 20 credits and the master's internship and thesis will be assigned 30 credits.

Mentor
During the first year, students in the research master's are assigned a mentor, who will guide the learning process and may support the student in career planning as well as in finding solutions to possible study (or personal) problems. Close monitoring of student performance and progression will help ensure that students complete the master's programme on schedule. During the introduction week of the first year, each student is assigned a faculty mentor who is also a senior researcher in the student's specialisation. Students are responsible for scheduling meetings with their mentors. Meetings take place roughly once a month and are generally short (about 30 minutes or less). The student should inform the mentor in advance about issues to be discussed during the meeting.

In addition to the mentor, faculty student advisors are available for support and guidance. Students who are new to Maastricht University are also assigned a second-year student, who will share practical information about life as a research master's student.

Specialisation in Cognitive Neuroscience (CN)

The specialisation in Cognitive Neuroscience provides students with an extensive and in-depth knowledge of CN theories, cutting-edge neuroimaging and brain research. Students build a thorough understanding of how the brain perceives, feels, moves, learns and creates a conscious mind. Specific course topics range from basic principles of auditory and visual perception and sensory-motor functions, to higher cognitive functions such as attention, language, consciousness, learning and memory. In parallel, students learn to translate this knowledge in fundamental and applied (clinical) research. The Faculty of Psychology and Neuroscience has its own 3-Tesla MRI research scanner and hosts fully equipped EEG as well as TMS laboratories. Furthermore, the 'brains unlimited' project provides a unique research infrastructure with the newest ultra-high field imaging facilities. Students spend substantial amounts of time in these laboratories and receive extensive hands-on training in all aspects of the experimental cycle, including experimental design, recording and manipulating brain activation as well as advanced data analysis.

Cognitive Neuroscience Coordinator:
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Overview of RM in Cognitive Neuroscience (CN)

Period	Research Master's in Cognitive Neuroscience (CN) Year 1 (2013-2014): Milene Bonte
Period 0, 02-09-2013 - 06-09-2013	Introduction week PSY4950 PBL training for non-UM students*
Period 1, 09-09-2013 - 25-10-2013	**Core Courses: **** **PSY4251** Auditory and Higher Order Language Processing (4 credits): Bernadette Jansma **PSY4252** Perception and Attention (4 credits): Peter De Weerd **PSY4106** Advanced Statistics I (total of 3 credits): Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers
	Skills training: **PSY4221** EEG and ERP (2 credits): Fren Smulders
Period 2, 28-10-2013 - 20-12-2013	**Core courses:** **PSY4253** Neuroimaging: Functional MRI (4 credits): Elia Formisano **PSY4254** The Cognitive Neuroscience of Sensory and Motor Systems (4 credits): Joel Reithler, Amanda Kaas **PSY4106** Advanced Statistics I: Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers
	Skills training: **PSY4227** fMRI (2 credits): Elia Formisano
Christmas break	
Period 3, 06-01-2014 - 31-01-2014	**Core course:** **PSY4216** Magnetic Brain Stimulation (TMS) (4 credits): Alexander Sack **PSY4106** Advanced Statistics I (total of 3 credits): Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers **PSY4107** Advanced Statistics II (total of 3 credits): Gerard van Breukelen *Practical training:* PSY4117 SPSS: Gerard van Breukelen
	Skills training: **PSY4108** Neuroanatomy (1 credit): Jos Prickaerts
	Workshop: **PSY4233** Methods of Deactivation (1 credit): Teresa Schuhmann, Peter De Weerd
	PSY4100 Colloquia (total of 1 credit): Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Period 4, 03-02-2014 t/m 04-04-2014	**Core course:** **PSY4215** Advanced fMRI (4 credits): Rainer Goebel **PSY4255** Neuroanatomy and Neuroradiology (4 credits): Alard Roebroeck, Kamil Uludag **PSY4107** Advanced Statistics II: Gerard van Breukelen *Practical training:* PSY4117 SPSS: Gerard van Breukelen
	Workshop: **PSY4231** Real-Time fMRI and Neurofeedback (1 credit): Rainer Goebel
	Skills training: **PSY4228** Diffusion Weighted Imaging and Fibre Tracking (1 credit): Alard Roebroeck
	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson

Period 5, 07-04-2014 t/m 06-06-2014	**Core course:** **PSY4219** Neuronal Correlates of Consciousness (total of 4 credits): Rob de Vries **PSY4256** Timing Neural Processing with EEG and MEG (4 credits): Fren Smulders **PSY4107** Advanced Statistics II: Gerard van Breukelen *Practical training:* PSY4117 SPSS: Gerard van Breukelen
	Workshop: **PSY4110** Scientific Writing (1 credit): Alice Wellum **PSY4237** Basic Mathematical Methods (2 credits): Giancarlo Valente
	Skills training: **PSY4224** Programming in Matlab Basic Course (2 credits): Giancarlo Valente
	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Period 6, 10-06-2014 t/m 04-07-2014	**Core course:** **PSY4219** Neuronal Correlates of Consciousness: Rob de Vries
	Workshop: **PSY4112** Research Grant Writing Workshop (1 credit): Eef Theunissen
	PSY4100 Colloquia

**Students from Erasmus Rotterdam receive an exemption for PBL training*
*** Electives: 3 credits,* throughout year 1: Vincent van de Ven

Period	**Research Master's in Cognitive Neuroscience (CN) Year 2 (2014-2015)**
Period 1, To be announced in 2014	**Core course:** **PSY5112** Research Grant Writing Course (3 credits): Eef Theunissen **PSY5213** The Brain's Engram: Memorising Experiences and Experiencing Memory (4 credits): Vincent van de Ven, Peter de Weerd
	Workshop: **PSY5231** Signal Analysis (2 credits): Giancarlo Valente
	Skills training: **PSY5223** Programming in Matlab Advanced Course (1 credit): Giancarlo Valente
32 weeks	**PSY5107 Research proposal, PSY5102 Research internship & PSY5103 master's thesis** (50 credits): Sandra Mulkens

Colloquia

PSY4100 Colloquia will be offered in all RM specialisations.

Title	**Colloquia**
Period	3-6
Code	PSY4100
ECTS credits	1
Organisational unit	Cognitive Neuroscience (FPN), Department of Economics (SBE), Psychiatry and Neuropsychology (FHML), Neuropsychology and Psychopharmacology (FPN)
Coordinator	Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Descriptions	Colloquia are presented per specialisation (CN, NE, FN, NP and PP) by senior researchers from the UM faculties or visiting guest lecturers. Each colloquium focuses in depth on one of a wide range of topics, with issues transcending the courses and specialisations. Each colloquium lecture will be followed by active discussion, prepared and chaired by the lecturer (the UM host may fill this role for guest lecturers). A total of nine colloquia will be offered during the first year.
Goals	Knowledge of: Key research domains from different specialisations, interdisciplinary research, interacting with students from different specialisations.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Lecture(s)
Assessment methods	Attendance
Key words	interdisciplinary knowledge

Core courses

Is equal to the Master's module PSY4051

Title	**Auditory and Higher Order Language Processing**
Period	1
Code	PSY4251
ECTS credits	4
Organisational unit	Cognitive Neuroscience
Coordinator	Bernadette Jansma
Descriptions	Although the human visual system has been studied extensively in cognitive neuroscience, so far only little is known about the auditory and speech system: How do we segregate the sound of a Ferrari from the background sounds of other running car engines, or the voice of a friend from that of many others in a crowd? How is auditory information integrated with other senses such as vision or touch? In the last few years cognitive neuroscience research has set a number of milestones in our understanding about how our brain manages these tasks. This knowledge is crucial because hearing and communicating with the environment and with others is one of the most essential human cognitive skills. This course aims to develop students' knowledge about the human auditory and speech system. The course starts with basic neural anatomy and considers how this might constrain but also assist auditory processing. Students learn about the basics of speech segregation and perception. Bottom-up and top-down processes are addressed. Finally, the course discusses how the human mind selects relevant auditory, visual and linguistic information in order to communicate.
Goals	Knowledge of: The basic cognitive and neural principles of auditory and speech processing; critical thinking with regard to research in the domain of auditory/speech processing; and employment of event-related potential (ERP) and fMRI studies.
Instruction language	EN
Prerequisites	
Recommended literature	E-reader.
Teaching methods	Lecture(s) PBL
Assessment methods	Attendance Written exam
Key words	auditory processing, language comprehension, language production, cross modal integration

Is equal to the Master's module PSY4052

Title	**Perception and Attention**
Period	1
Code	PSY4252
ECTS credits	4
Organisational unit	Cognitive Neuroscience
Coordinator	Peter De Weerd
Descriptions	The objective of the course is to present the current neuro-cognitive theories and experimental methods in the field of visual perception and attention. This will be achieved via discussion of a set of core papers in this field. Vision is a complex cognitive process which provides us with a richer stream of information than any other sense. The primate visual cortex is composed of at least 30 highly interconnected functionally specialised regions. The regions where visual information first enters the cortex are called early visual areas. Neurons in these areas have relatively simple properties, and their small receptive fields are arranged to form retinotopic maps of the environment on the cortex. Higher level visual processing occurs in a ventral and dorsal stream, each of which is composed of regions specialised for representation of more complex visual content (including motion, faces and places). This network of functionally specialised perceptual regions can adapt to the task that the organism is faced with. This is the case, for example, when looking for someone in a crowd and attending to one face at a time. There are many kinds of attention, but attention can be generally described as involving some type of information selection. In this course, neural mechanisms underlying prototypical examples of low and high level perception will be studied, as well as neural mechanisms underlying selective attention. The course will discuss both historically important papers, as well as more recent research in visual perception and attention, involving different empirical methods including psychophysics, neurophysiology, functional brain imaging and evoked potentials, with an emphasis on neurophysiology.
Goals	Knowledge of: Visual system (structure and function), low-level and high-level visual perception, visual attention, animal models perception and attention, neurophysiology and related methods, neurophysiology/psychophysics data analysis methods.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Lecture(s) PBL
Assessment methods	Attendance Written exam
Key words	visual system, illusions, perception, attention, neurophysiology, monkey.

Is equal to the Master's module PSY4054

Title	**Neuroimaging: Functional MRI**
Period	2
Code	PSY4253
ECTS credits	4
Organisational unit	Cognitive Neuroscience
Coordinator	Elia Formisano
Descriptions	The investigation of human brain functions using a range of imaging methods (such as electro- and magneto-encephalography, Positron Emission Tomography and Magnetic Resonance Imaging) represents the most influential development in Cognitive Neuroscience in the last years. In this course, students will learn about the essential facts of functional Magnetic Resonance Imaging (fMRI). FMRI presents clear advantages over the other methods, particularly in terms of increased spatial resolution. Since its invention in 1992, fMRI has led to major advances in understanding the neural mechanisms that underlie higher levels of human mental activity and has established a strong link between cognitive psychology and neuroscientific research. The other Cognitive Neuroimaging programmes confront student with several applications of fMRI in specific cognitive domains (visual perception and attention, sensorimotor integration, auditory perception). In this course, however, students will gain a deeper knowledge of fundamental and methodological aspects of fMRI. The tasks will address questions such as: How can the fMRI signal be related to neural activity? How are functional images obtained with an MRI scanner? What do I need for performing a good fMRI measurement? How are "activation maps" created? Some of the tasks are directly linked to a practical part of the course and are intended to provide the necessary theoretical framework for the design, analysis, measurement and interpretation of results in fMRI investigations. Practical sessions on acquisition and analysis of fMRI data of cognitive functions such as auditory and visual processing will be integrated in to the group meetings.
Goals	Knowledge of: Nuclear Magnetic Resonance, Magnetic Resonance Imaging, functional MRI, physical basis (f)MRI, neurophysiologic basis fMRI, neuronal firing, local field potentials, blood oxygenation level dependent contrast, fMRI design, blocked designs, event related designs, fMRI analysis, motion correction, spatial and temporal filtering, univariate statistics, general linear models, single-subject statistics, multi-subject statistics, correction for multiple comparisons, false discovery rate, brain comparison and normalisation, Talairach transformation.
Instruction language	EN
Prerequisites	
Recommended literature	Huettel, S.A., Song, A.W., & McCarthy, G. (2009). *Functional Magnetic Resonance Imaging. (2nd ed.). Sunderland,* MA: Sinauer, Associates, Inc. Publishers; Jezzard, P., Matthews, P.M., & Smith, S.S. (2001*). Functional MRI: An introduction to methods*. Oxford, UK: Oxford

	University Press; Journal articles, book chapters.
Teaching methods	Lecture(s) PBL
Assessment methods	Attendance Written exam
Key words	functional neuroimaging, Magnetic Resonance Imaging, experimental design, analysis methods.

Is equal to the Master's module PSY4055

Title	**The Cognitive Neuroscience of Sensory and Motor Systems**
Period	2
Code	PSY4254
ECTS credits	4
Organisational unit	Cognitive Neuroscience
Coordinator	Joel Reithler, Amanda Kaas
Descriptions	Every day activities such a riding a bicycle, typing a summary and drinking a cup of coffee require the continuous interaction of brain systems that serve sensory perception and systems that control the body's muscles. In other words, most of the things people do require sensorimotor integration. In this course, several important aspects of sensorimotor integration in the brain will be studied, particularly in the context of visual perception. Since sensory perception (visual as well as auditory) is covered extensively in other courses, the main focus here will be on the motor system and in the transformation and processing of sensory information for motor control. Initially, basic processes are covered, such as types of motor control (since visual perception takes time, how should individuals use past information to control future actions?), the representations used by primary and secondary motor areas (which parameter is under ultimate control: muscle contractions, joint angles or whole movements?) and coordinate transformations (how to get from incoming visual information, coded with respect to our current eye position, to motor commands, coded with respect to our current body posture). Later in the course, the focus will shift to higher level issues such as motor learning, action selection and decision making, and predicting the actions of others. All topics will be discussed in the context of cognitive neuroscience research so that students learn how these topics can be investigated both with classical behavioural experiments and with modern techniques such as functional Magnetic Resonance Imaging.
Goals	Knowledge of: Processing involved in sensorimotor coordination, neural mechanisms behind sensorimotor integration, brain anatomy of action representations, neuro-behavioural correlates of motor learning, relevant research methods.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Lecture(s) PBL
Assessment methods	Attendance Written exam
Key words	sensorimotor coordination, reference frames, coordinate transformations, mirror neuron system

Title	**Neuroanatomy and Neuroradiology**
Period	4
Code	PSY4255
ECTS credits	4
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Alard Roebroeck, Kamil Uludag
Descriptions	This course introduces the anatomy of the human brain and the methods to characterize its structure and biochemical properties *in vivo* and *ex vivo*. The human brain is compartmentalised into different functional units and the brain areas are connected via white matter paths. In addition, there are remarkable differences in the biochemical composition within the cortex (e.g. receptors, neurotransmitters and modulators). The most important non-invasive tool to characterise the neuroanatomy currently is magnetic resonance imaging (MRI). MRI can image different biological processes due to the fact that the transverse and longitudinal magnetizations of the protons (and other nuclei) are sensitive to the local biological environment. MRI is a versatile tool to assess tissue composition and function because it can probe different tissue features by manipulating magnetization and its evolution. For example, susceptibility-weighted MRI measures the magnetic susceptibility of brain tissue determined by iron and myelin concentration. Whereas diffusion MRI is sensitive to diffusion of water in the white matter thus allowing assessment of white mater paths and their integrity. In addition to MRI, invasive methods to study the micro-architecture of cortical areas will be introduced, namely; microscopy, tracers and staining methods. Brain areas can be additionally characterised by their different functional properties. Thus, recent data analysis and experimental design approaches, to delineate functional units of the brain and align them between different subjects, will be a topic of the course. Finally, it will be shown that the above-mentioned neuroanatomy methods are indispensable to diagnose and monitor neurological diseases.
Goals	Knowledge of: Lobes, gyri, sulci, layers in the neocortex, cell types, brodmann atlas, neurotransmitter, neuromodulators, receptors, MRI physics, magnetic spin system, relaxation rates, MRI contrasts, MRI sequences, neuroanatomy, cytoarchitecture, myeloarchitecture, diffusion properties in the brain, functional neuroanatomy, perfusion, diffusion MRI sequences, tractography, white matter atlas.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Assignment(s) Lecture(s) Paper(s) Presentation(s)

Assessment methods	Attendance Presentation Written exam
Key words	neuroanatomy, neuroanatomy methods, functional neuroanatomy, anatomical MRI, diffusion MRI, perfusion MRI, clinical neuroradiology

Title	**Advanced fMRI**
Period	4
Code	PSY4215
ECTS credits	4
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Rainer Goebel
Descriptions	Building on the course Neuroimaging, this course will examine advanced topics of fMRI methodology and applications. In the first week, students learn how knowledge about vascular effects may help to detect BOLD artefacts. In the second week, the principles of real-time fMRI will be presented, this is followed by an overview of fMRI neurofeedback studies and a discussion of whether it can be used as a new therapeutic tool. In addition, machine learning techniques for the real-time decoding of mental states and the application of these techniques in brain-computer interfaces will be discussed. In the third week, students examine advanced methods to establish correspondence between different brains. The course also discusses the importance of brain normalisation for random-effects statistical analysis, creation of probabilistic atlases and meta-analyses. In the fourth week, the possibilities and challenges of ultra high field fMRI will be discussed focusing on studies aimed at columnar-level spatial resolution.
Goals	Knowledge of: Effects of vascular system on the interpretability of the BOLD fMRI signal; real time fMRI data analysis during ongoing experiments; possibilities and limitations of fMRI-based brain-computer interfaces (BCIs); fMRI neurofeedback training as a new therapeutic tool; real-time decoding of mental states; advanced methods of brain normalisation; opportunities and challenges of high-resolution fMRI at ultra-high magnetic field strengths.
Instruction language	EN
Prerequisites	Research master course 'Neuroimaging'
Recommended literature	Journal articles, book chapters.
Teaching methods	Paper(s) PBL Presentation(s)
Assessment methods	Attendance Presentation Written exam
Key words	neurovascular coupling, real-time fMRI, neurofeedback, BCI, brain normalisation, columnar-level imaging

*PSY4216 is the same for **CN** and NE.*

Title	**Magnetic Brain Stimulation (TMS)**
Period	3
Code	PSY4216
ECTS credits	4
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Alexander Sack
Descriptions	This course will provide students with an in-depth knowledge of; non-invasive magnetic brain stimulation techniques, including the mechanisms of action; the physico-physiological principles; various application protocols; functional magnetic brain stimulation paradigms and approaches for combining brain stimulation with brain imaging techniques simultaneously within the same experimental session. Since the very beginning of experimental brain research, neuroscientists have dreamed about not only observing the brain at work, but actually changing and modulating the neuronal activity in the brain without causing harm to patients or subjects. With the development of Transcranial Magnetic Stimulation (TMS) it is now possible to non-invasively reach into the skull of a patient or healthy subject and to temporarily alter brain activity at a specific location. This possibilities of TMS opens the door to a wide range of experimental and clinical applications. In combination with methods of functional imaging, it is not only possible to passively measure the brain activity during the execution of a particular function, but TMS can alse be used to increase or decrease the neuronal activity in the task-related brain area and reveal behavioural changes in the actual task performance. This enables identification of those brain areas that are functionally relevant to a particular function. In a clinical context, TMS has also been used to treat neurological and psychiatric diseases that are accompanied by a pathologically increased or decreased activity in a specific brain region. Since TMS offers the possibility to increase or decrease neuronal activity beyond the stimulation itself, it might, in the future, become a powerful therapeutic tool to help treat diseases like depression or schizophrenia.
Goals	Knowledge of: Physics and mechanisms of action of TMS, physiological effects of TMS, TMS protocols and application paradigms, animal studies using TMS, TMS in human cognitive neuroscience, combining TMS with functional imaging, clinical applications of TMS.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles.
Teaching methods	Assignment(s) Lecture(s) Presentation(s) Work in subgroups
Assessment methods	Attendance Presentation Written exam

Key words	non-invasive brain stimulation, functional magnetic brain interference, multi-modal imaging.

*PSY4256 is the same for **CN** and NE.*

Title	**Timing Neural Processing with EEG and MEG**
Period	5
Code	PSY4256
ECTS credits	4
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Fren Smulders
Descriptions	Cognitive neuroscientists can currently choose from a range of different imaging methods to investigate human brain function. Each of these methods has its own strengths and limitations, which determine its suitability for studying a particular research question. Both electroencephalography (EEG) and magnetoencephalography (MEG) are important in characterising the time course of activation of neural systems involved in perceptual and cognitive processes. These processes include auditory and visual perception, attention, language, memory and development. EEG and MEG signals reflect complementary aspects of brain activity, with MEG having some advantages over EEG in the localisation of underlying neural sources. This course provides detailed knowledge on EEG and MEG, both of which have a clear advantage over other neuroimaging methods in terms of temporal precision. The study of EEG and MEG experimental design, data acquisition and data analysis will be combined with detailed literature discussions on theoretical and methodological issues. Based on different types of empirical questions, there will be discussion of the potential of a range of methods for advanced EEG and MEG analysis, including analysis in the time and frequency domain, source localisation, the combination with functional magnetic resonance imaging (fMRI) and transcranial magnetic stimulation (TMS) methods, independent component analysis and analyses of functional connectivity.
Goals	Knowledge of: Electro-encephalography, event-related potentials, magneto-encephalography, dipole source analysis, distributed source analysis, Fourier analysis, wavelet analysis, independent component analysis, connectivity analysis, application: mental chronometry, application: attention, lateralised event-related potentials, combination electro-encephalography and functional magnetic resonance imaging, combination electro-encephalography and trans-cranial magnetic stimulation.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Lectures Paper Presentation Working visit
Assessment methods	Attendance Final paper Presentation
Key words	electroencephalography, magnetoencephalography,

	biological signal analysis, source localisation

Title	Neural Correlates of Consciousness
Period	5, 6
Code	PSY4219
ECTS credits	4
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Rob de Vries
Descriptions	Many scientists nowadays are optimistic about solving the mysteries of consciousness. Philosophers are less euphoric. David J. Chalmers distinguishes two types of problems in this field: 'easy' and difficult problems. The distinction itself is trivial and yet illuminating. 'Easy' problems are those questions that *appear* to deal with consciousness but are reformulated in such terms as: How does the brain process external stimuli? How does the brain integrate incoming information into a whole? How does introspective and retrospective reporting of our inner experiences occur, and how reliable is it? What factors influence the content of our dream reporting? 'Difficult' questions are, for example, Why do the above information processing and production involve conscious experiences? Do conscious experiences play a causal role in our actions and our mental life, and if so, what part do they play? How can a physical system create such a 'thing' as conscious experience?' Even though difficult problems are currently unsolvable, there are still a lot of 'easy' problems that can be researched. A basic problem for every science of consciousness is: What are the neuronal correlates of consciousness? What does the finding of these neuronal correlates tell us about the solution of the difficult problem? The first question is a scientific one. The second is still philosophical. This course assesses neurocognitive ins and outs of the binding problem. The neuronal correlates of Bernard Baars' global workspace theory of consciousness, Ned Block's distinction between access and phenomenal consciousness and Victor Lamme's theory of recurrent processes as neuronal correlate of consciousness will all be objects of study. Part of the course is reading based, wherby students make summaries and prepare questions to discuss during the meetings.
Goals	Knowledge of: Philosophical theories about consciousness, the concept of neuronal correlates of consciousnes, the binding problem, distinction between acces and phenomenal consciousnes, consciousness as a different function from attention, global workspace theory of consciousness, recurrent process theory of consciousness, vegetative state and minimal consciousness, philosophical and neuroscientific theories about free will, new developments into the research into the neural correlates of consciousness.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Assignment(s) Presentation(s)
Assessment methods	Attendance Final paper Take home exam

Key words	philosophical problems of consciousness, neuronal correlates of consciousness, phenomenal and access consciousness, minimal consciousness patients, brain and free will.

PSY4106 Advanced Statistics I will be offered in all RM specialisations.

Title	**Advanced Statistics I**
Period	1 - 3
Code	PSY4106
ECTS credits	3
Organisational unit	Faculty Office (FPN)
Coordinator	Nick Broers
Descriptions	The course consists of six units. In the first four units, participants will be given an in-depth training in the following standard statistical methods: factorial ANOVA for between-subject designs, analysis of covariance (ANCOVA), multivariate ANOVA (MANOVA), discriminant analysis and multiple linear regression. Students are assumed to have background knowledge of balanced two-way factorial ANOVA and multiple regression. These methods will be briefly reviewed. The following advanced topics will then be covered: unbalanced factorial designs, contrast analysis, interaction, simple slope analysis, dummy coding, centring covariates, different coding schemes, collinearity and residuals checks and data transformation. The distinction between confounders and mediators in regression and ANCOVA is also discussed, forming a bridge from regression to structural equations modelling (SEM). The latter is an advanced multivariate method that is gaining importance in psychology but still requires special software (such as Lisrel, EQS, AMOS or Mplus). SEM is introduced in two units, starting with causal modelling and mediation analysis in cross-sectional research and then extending to longitudinal research and latent variables (factors). Special attention is given to identifying models, model equivalence, global and local goodness of fit indices, parsimony, model modification and cross-validation. Some concepts from matrix algebra are needed for SEM, and these will be briefly discussed without going into technical detail.
Goals	Knowledge of: Oneway analysis of variance, contrast analysis, unbalanced designs, multivariate analysis of variance, discriminant analysis, linear regression with interaction terms, linear regression with dummy variables, data transformations, simple slope analysis, analysis of covariance, path analysis, structural equation modeling, confirmatory factor analysis, structural models with latent variables.
Instruction language	EN
Prerequisites	
Recommended literature	Diamantopoulos, A. (1994). Modelling with LISREL: A guide for the uninitiated. Journal of Marketing Management, 10, 105-136; Field, A. (2009). Discovering statistics using SPSS (3rd ed.). London: Sage; Howell, D.C. (2007). Statistical methods for psychology (6th ed.). Belmont (CA): Thomson/ Wadsworth; Kleinbaum, D.G., Kupper, L.L., Muller, K.E., & Nizam, A. (1998). Applied regression analysis and other multivariable methods

	(3rd ed.). Pacific Grove (CA): Brooks/Cole.
Teaching methods	Assignment(s) Lecture(s) Skills Training(s)
Assessment methods	Attendance Written exam
Key words	univariate analysis of variance, multivariatie analysis of variance, regression analysis, structural equation modeling

The practical training associated with PSY4106 Advanced Statistics I is PSY4119. Practical training: SPSS and Lisrel will be offered in all RM specialisations.

Title	**Practical training: SPSS and Lisrel**
Period	1-3
Code	PSY4119
ECTS credits	-
Organisational unit	Faculty Office (FPN)
Coordinator	Nick Broers
Descriptions	In order to make practical use of the statistical models that form the topic of the Advanced Statistics course, researchers must make use of statistical software. This course will utilise the traditional SPSS program, but also the specialised LISREL software. LISREL is a statistical program that allows structural equations models to be tested.
Goals	Defining contrasts, building regression models, doing multivariate analyses, transforming data, testing simple slopes, creating and testing SEM models
Instruction language	EN
Prerequisites	
Recommended literature	Handouts given during practicals.
Teaching methods	Assignment(s) Training(s)
Assessment methods	Attendance
Key words	SPSS, LISREL, statistical software

PSY4107 Advanced Statistics II will be offered in all RM specialisations.

Title	**Advanced Statistics II**
Period	3-5
Code	PSY4107
ECTS credits	3
Organisational unit	Faculty Office (FPN)
Coordinator	Gerard van Breukelen
Descriptions	The course consists of seven units. The first three units cover classical repeated measures ANOVA for the one- and two-way within-subject design and the split-plot (between x within) design. Special attention is given to: a) the choice between multivariate and univariate data formats and method of analysis, and the sphericity assumption; b) the distinction between the within-subjects and between-subjects part of a split-plot ANOVA, and how to obtain both using regression analysis; c) the surprising consequences of including covariates into repeated measures ANOVA; and d) the choice between different methods of analysis for randomised versus non-randomised group comparisons. Subsequently, a further three units are devoted to mixed (multilevel) regression for nested designs and longitudinal studies. This mixed regression starts with a unit on marginal models for repeated measures as an alternative to repeated measures ANOVA in cases of missing data or within-subject covariates. Students are shown the pros and cons of various models for the correlational structure of repeated measures, such as compound symmetry and AR1. The second unit covers the random intercept model for repeated measures as a method to include individual effects in marginal models for longitudinal data (growth curves) or single trial analyses of lab data (response times, ERP, fMRI). Students learn how this can be combined with e.g. ARMA modelling to distinguish between interpersonal and intrapersonal outcome variation. The random intercept model will also be applied to a cluster randomised trial, i.e. an RCT where organisations like schools or companies instead of individuals are randomised. The third and last unit on mixed regression covers random slope models for longitudinal data (individual differences in change over time), single trial analysis (individual differences in stimulus effects) and multicentre trials (RCT within each of a number of organisations). Finally, the topic of optimal design, sample size and power calculations is introduced in a seventh unit.
Goals	Knowledge of: Repeated measures ANOVA for within-subject and split-plot (between x within) designs, including factorial designs and covariates in repeated measures ANOVA; Mixed (multilevel) linear regression with random effects and autocorrelation; Optimal design and sample size calculations for experimental and observational studies.
Instruction language	EN
Prerequisites	Good understanding of descriptive and inferential statistics at the elementary and intermediate level, including t-tests, factorial ANOVA and multiple linear regression. Skilled in the

	use of SPSS for statistical data analyses.
Recommended literature	Lecture handouts and a suitable book chapter or article.
Teaching methods	Assignment(s Lecture(s Training(s)
Assessment methods	Attendance Written exam
Key words	within-subject designs, repeated measures ANOVA, mixed (multilevel) regression, marginal versus random effects models, optimal design, sample size, power

The practical training associated with PSY4107 Advanced Statistics II is PSY4117. Practical training SPSS will be offered in all RM specialisations.

Title	**Practical training: SPSS**
Period	3-5
Code	PSY4117
ECTS credits	-
Organisational unit	Faculty Office (FPN)
Coordinator	Gerard van Breukelen
Descriptions	This practical training forms part of the PSY4107 Advanced Statistics II course. The practical consists of six sessions in the computer rooms in which SPSS procedures for repeated measures and multilevel data are practised. The goal is to understand how proper analyses of such data can be done using SPSS.
Goals	Knowledge of: How to run with SPSS: repeated measures ANOVA for within-subject and split-plot (between x within) designs, including factorial designs and covariates; How to run SPSS for: mixed (multilevel) linear regression with random effects and autocorrelation.
Instruction language	EN
Prerequisites	Good understanding of descriptive and inferential statistics at the elementary and intermediate level, including t-tests, factorial ANOVA and multiple linear regression. Skilled in the use of SPSS for statistical data analyses.
Recommended literature	Field A (2009). Discovering statistics with SPSS (3rd ed.). London: Sage, plus the mandatory assignments on EleUM. For the theoretical part of course PSY4107 lecture handouts and suitable book chapters and articles are used.
Teaching methods	Training(s)
Assessment methods	Attendance
Key words	within-subject designs, repeated measures ANOVA, mixed (multilevel) regression, marginal versus random effects models

PSY5112 Research Grant Writing Course will be offered in all RM specialisations.

Title	**Research Grant Writing Course**
Period	1
Code	PSY5112
ECTS credits	3
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eef Theunissen
Descriptions	In this course, students will apply what they have learned during the Research Grant Writing Workshop (PSY4112). Students will work together (groups of max. 5) to write a research proposal on their selected topic, including an original research hypothesis, experimental design and methods. This proposal should promote interdisciplinarity; therefore students are encouraged to think across boundaries of different scientific fields. A senior researcher will guide students during this writing process. The students will write their proposal in 3 steps, and they will receive feedback from their mentor and peers. The resulting proposals will be presented during a symposium by way of a poster or an oral presentation.
Goals	Knowledge of how to: Review literature, formulate a research hypothesis, design a research study, write a research proposal, present the proposal at a symposium (oral or poster).
Instruction language	EN
Prerequisites	This course is a continuation of the Research Grant Writing Workshop (PSY4112).
Recommended literature	
Teaching methods	Work in subgroups
Assessment methods	Attendance Final paper Presentation
Key words	research proposal, interdisciplinary, hypothesis, design, methods, research symposium, peer review

Title	The Brain's Engram: Memorising Experiences and Experiencing Memory
Period	1
Code	PSY5213
ECTS credits	4
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven, Peter de Weerd
Descriptions	The brain is able to retain a myriad of perceptual experiences in the memory for shorter and longer durations of time. Memory formation requires the selection of relevant items in working memory, and the consolidation of the experience into a lasting neural representation. At the same time, memory retrieval appears to involve the reactivation of the neural processes of memory formation. In this course, students will discuss the neuroscience of working memory and episodic memory, and in how far these types of memory rely on similar neural mechanisms and brain networks. The role of prefrontal cortex as well as the hippocampal complex in memory formation and retrieval will be discussed in detail. The literature comprises cutting-edge empirical research papers from various neuroscience disciplines, including cognitive neuroimaging, neurophysiological recording, pharmacological manipulation and neurobiological fields.
Goals	Knowledge of: neuroscience of memory formation, consolidation and retrieval; Hippocampal anatomy and function; neurophysiology of memory; neuroscience methods; brain activity and connectivity; fleshing out cutting-edge empirical research papers
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Lecture(s) Paper(s) PBL Presentation(s) Work in subgroups
Assessment methods	Attendance Presentation Written exam
Key words	working memory, episodic memory, hippocampus, prefrontal cortex, neurophysiology, LTP, consolidation, reactivation, neuroscience

Skills training

1. PSY4221 EEG and ERP is equal to the Master's module PSY4034 EEG and ERP (DP & CN)
2. PSY4221 EEG and ERP (in **CN,** NE, FN, NP. In NP it will be offered as an Elective).

Title	**EEG and ERP**
Period	1
Code	PSY4221
ECTS credits	2
Organisational unit	Cognitive Neuroscience
Coordinator	Fren Smulders
Descriptions	Electroencephalography (EEG) and Event Related Potentials (ERP) offer a combination of precise measurements for the time course of brain processes. These are low cost, non-invasive measurements and are widely available. For these reasons they make a unique contribution to cognitive neuroscience. Scientific interest in EEG and ERP is growing, and results have been increasingly integrated with other neuro-imaging techniques during the last few decades. Lectures and basic literature provide an introduction for students to the basics of EEG and ERP research, EEG and ERP terminology and the possibilities and limitations within EEG and ERP. One topic that students will learn is how to set up an experimental paradigm that is suitable for EEG and ERP measurements. Students also study practical measurement issues, such as electrode placement and types of artefacts. Finally, students must interpret the resulting data. Successful measurement requires an understanding of the basics of EEG and ERP signal analysis techniques, such as artefact management, spectral analysis, filtering, ERP averaging, time-frequency analysis etc. Students also receive hands-on training in smaller groups in running an ERP experiment, including electrode application, minimising artefacts, and health and safety in the lab. A number of simple experimental paradigms will be utilised; these provide interesting and reliable results. Data processing will include a number of common EEG analyses, e.g. analyses in the time and frequency domain.
Goals	Knowledge of: Basic EEG/ERP paradigms, EEG recording systems, measurement settings, electrode application, data quality verification, analogue-digital conversion, basic EEG / ERP components, interpreting topographical plots, neural origins of EEG, time domain analysis, frequency domain analysis, time-frequency analysis, filtering, ocular artefact control, muscle artefact control, choice of reference, re-referencing.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, handbooks.
Teaching methods	Lecture(s) Paper(s) Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	Electroencephalography (EEG), Event-related potentials (ERP), electrophysiology, measurement, analysis of brain

	potentials.

Is almost equal in credits to the Master's course PSY4056. In the Master's degree it is a practical training; in the RM it is a skills training.

Title	**fMRI**
Period	2
Code	PSY4227
ECTS credits	2
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Elia Formisano
Descriptions	The primary goal is to provide hands-on experience in experimental design, acquisition and analysis of fMRI experiments. In the first tutorial, each student group separately formulates an experimental question/hypothesis to be tested with fMRI and elaborates an appropriate experimental design. In a subsequent meeting, each group present to the other groups (in an oral presentation) its proposal for an fMRI study and all studies are discussed and evaluated; at the end of the meeting one study is selected. In the group meetings and independent study, all students are involved in implementing the experimental set-up required for performing the selected study (e.g. selection and preparation of stimuli, implementation of the design) and participating in the fMRI measurements. In the last meetings, all students perform the statistical analysis of the datasets. Assistance and prior preparation, especially in the implementation stage (stimulus programming) and data analysis stage (preparation of data in usable format for analysis in Brain Voyager QX), is provided by the tutors. Finally, students describe and discuss their findings in an individually written report.
Goals	Knowledge of: Experimental design, hypothesis formulation, operationalisation, fMRI blocked designs, fMRI event related designs, parameters for MRI scanning, MR safety and procedures, fMRI measurements, pre-processing fMRI data, statistical analysis fMRI data, results interpretation.
Instruction language	EN
Prerequisites	
Recommended literature	Huettel, S.A., Song, A.W., & McCarthy, G. (2009). Functional Magnetic Resonance Imaging (2nd ed.). Sunderland, MA: Sinauer, Associates, Inc.; Jezzard, P., Matthews, P.M., & Smith, S.S. (2001). Functional MRI: An introduction to methods. Oxford, UK: Oxford; University Press; Journal articles, book chapters.
Teaching methods	Lecture(s) Presentation(s) Research Skills Work in subgroups Working visit(s)
Assessment methods	Attendance

	Final paper
Key words	functional MRI, experimental design, fMRI data acquisition, fMRI data analysis

*PSY4108 Neuroanatomy will be offered in **CN**, NE, NP and PP.*

Title	**Neuroanatomy**
Period	3
Code	PSY4108
ECTS credits	1
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Jos Prickaerts
Descriptions	The aim of this practical training is to become acquainted with the neuroanatomical terminology and to gain insight into the spatial and functional organisation of the brain. It is essential to have a basic knowledge of the brain anatomy when working in the field of neuropsychology or neurobiology. Many specific brain areas can be linked to particular functions. Thus, knowledge of the brain anatomy and its main functions allows direct linkage of specific neurological or psychiatric disorders to particular brain areas. After a short theoretical introduction, students will study whole brains and brain material of mammals at both macroscopical (visual inspection) and microscopical level. The emphasis will be on major brain systems, including the basal ganglia and limbic system.
Goals	Knowledge of: Limbic system, basal ganglia, plastinated human brains, brain dissection, microscopical slices.
Instruction language	EN
Prerequisites	
Recommended literature	Papers from scientific journals and book chapters from books are provided.
Teaching methods	Lecture(s) Skills Work in subgroups
Assessment methods	Attendance Written exam
Key words	neuroanatomy, limbic system, basal ganglia

*PSY4224 is the same for **CN** and NE.*

Title	**Programming in Matlab Basic Course**
Period	5
Code	PSY4224
ECTS credits	2
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Giancarlo Valente
Descriptions	Matlab provides a powerful environment for numerical computation, data analysis and visualisation. It is, in essence, a programming environment that has built-in primitives for common scientific tasks that in other languages, such as C or Pascal, require many operations. Examples are tasks such as matrix algebra (used in statistical analysis of data), Fourier transforms (used in signal processing) and 2D or 3D plots for visualisation of data or analysis-results. Many complete packages for the analysis of cognitive neuroimaging data (e.g. fMRI data or EEG/MEG data) are implemented in Matlab. Thus, usage of these packages requires at least a basic understanding of Matlab. Furthermore, if more advanced analysis or visualisation is needed than what is offered by existing packages, developing new functionalities in Matlab is often the most convenient option. The first part of the course will deal with how Matlab primarily represents and processes data, i.e. as matrices. Subsequently, attention is focused on the usage of the environment: the prompt; the workspace; the help options; and loading, saving and visualising data. The principles behind programming will be introduced, with particular emphasis on neuroimaging applications.
Goals	Knowledge of: Matlab environment, Matlab variables, vectors, matrices, matrix algebra, 2D and 3D plots, conditional loops, scripts, functions, file Input-Output, structures, cells.
Instruction language	EN
Prerequisites	
Recommended literature	Andrew Knight – Basics of Matlab and beyond – Chapman and Hall/CRC, (Selected Chapters); Wallisch et al. Matlab for Neuroscientists , Associated Press (Selected Chapters)
Teaching methods	Assignment(s) Lecture(s) Skills Work in subgroups
Assessment methods	Attendance Computertest Final paper
Key words	programming principles, scripts and functions, data analysis

Title	Diffusion Weighted Imaging and Fibre Tracking
Period	4
Code	PSY4228
ECTS credits	1
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Alard Roebroeck
Descriptions	Diffusion weighted imaging and fibre tracking are a set of techniques that use the Magnetic Resonance (MR) scanner to probe fibre-bundles which connect different regions of the brain. Thus, instead of the cerebral grey matter, it is the white matter that is the object of study. The connections between brain-regions are the substrate of the interaction and communication between different brain systems. Thus, knowledge about the anatomy of these anatomical connections is of great importance to cognitive neuroscientists. The anatomy of fibre-tracts is imaged indirectly, by measuring the diffusion of water in the brain. Water diffuses more easily in a parallel way rather than perpendicular to the direction of surrounding axon bundles. Thus, by measuring the direction of local diffusion of water, inferences about the trajectories of fibre-bundles can be drawn. After completing this training, student will have knowledge of: i) how the MR scanner can be made sensitive to directed diffusion of water and how the resulting diffusion weighted images can be processed; ii) different models for local water diffusion within a voxel, along with useful quantities that can be derived from these models; iii) fibre tracking or tractography- how to get from local models of water diffusion to measures of global connectivity between brain regions. Furthermore, student will gain hands-on experience in analysing and visualising diffusion weighted MR data and in using tractography algorithms and assessing the results.
Goals	Knowledge of: How to make the MR scanner sensitive to directed diffusion of water and how the resulting diffusion weighted images can be processed; different models for local water diffusion within a voxel, along with useful quantities that can be derived from these models; fibre tracking or tractography - how to get from local models of water diffusion to measures of global connectivity between brain regions.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, handouts.
Teaching methods	Assignment(s) Lecture(s) Skills Training(s)
Assessment methods	Attendance
Key words	diffusion, MRI, DTI, tractography

*PSY5223 is the same for **CN** and NE.*

Title	**Programming in Matlab Advanced Course**
Period	1
Code	PSY5223
ECTS credits	1
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Giancarlo Valente
Descriptions	This course deals with advanced topics in Matlab programming. In particular, it will focus on how to implement efficient and re-usable programs for neuroimaging applications. Students will learn how to use existing Matlab toolboxes for neuroimaging and how to put the principles of efficient programming, such as debugging and profiling, into practice. Advanced topics in graphics and user interfaces will also be discussed.
Goals	Knowledge of: Debugging, efficient programming, graphical objects, graphical user interfaces.
Instruction language	EN
Prerequisites	PSY4224 Programming in Matlab Basic Course
Recommended literature	Material provided by the coordinator.
Teaching methods	Assignment(s) Lecture(s) Skills Work in subgroups
Assessment methods	Attendance Take home exam
Key words	efficient programming, debugging, graphical user interfaces

Methodological and technical workshops

PSY4112 Research Grant Writing Workshop will be offered in all RM specialisations.

Title	**Research Grant Writing Workshop**
Period	6
Code	PSY4112
ECTS credits	1
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eef Theunissen
Descriptions	During this workshop students will learn why and how to apply for research grants. The need for acquiring funding for research, the opportunities for, and availability of grant application funding will be discussed. Several researchers who have experience in applying for different types of grants will provide students with first-hand knowledge and tips. Students will learn fundamentals of good grant writing, general preparation of the grant application and how to deal with reviewer comments. These skills will be practiced during the workshop. Students will subsequently choose a topic (provided by senior researchers) on which they will write a research proposal during the second-year Research Grant Writing Course (see description of PSY5112).
Goals	Knowledge of: Opportunities for funding, how grants can be acquired, grant writing skills.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignments Lecture(s)
Assessment methods	Attendance Final paper
Key words	funding possibilities, grant applications, proposal writing

PSY4110 Scientific Writing will be offered in all RM specialisations. Offering times vary according to RM specialisation:
CN: Period 5
NE: Period 5
NP: Period 5
FN: Period 1
PP: Period 1

Title	**Scientific Writing**
Period	5
Code	PSY4110
ECTS credits	1
Organisational unit	Maastricht University Language Centre
Coordinator	Alice Wellum
Descriptions	The course is delivered in a series of three lectures, interspersed with three tutorials, during which students produce and revise a short research proposal or research article. The lectures aim to cover the broader principles of scientific writing (including clarity/readability, structure and coherence). It also covers the ethical issues surrounding the production of scientific texts (for example, plagiarism and non-biased writing). Lectures are interactive; students are assigned with analysis and discussion tasks to complete. In tutorials students apply the principles in the linguistic sense and discover how these apply to their own writing. In particular, the 'doors and windows' (abstracts, introductions, hypotheses and discussions) of scientific papers are analysed for their linguistic and stylistic content. In the tutorials, students develop the language awareness and critical skills required to review their own work as well as that of their peers. Individualised feedback on parallel block assignments is given at the end of the course by the instructor.
Goals	Knowledge of: Principles of scientific writing, conventions in scientific writing, the structure of scientific texts, ethics in scientific writing, plagiarism, editing skills, language in scientific writing, academic writing style, coherence in scientific writing, reporting sources.
Instruction language	EN
Prerequisites	
Recommended literature	Literature is provided in the course materials.
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Research Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	scientific writing, research proposal, empirical research article, literature review, peer review, language awareness.

Title	**Real-time fMRI and Neurofeedback**
Period	4
Code	PSY4231
ECTS credits	1
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Rainer Goebel
Descriptions	Recent progress in computer hard- and software allows the real-time analysis of fMRI data, providing the basis for brain-computer Interface (BCI) applications such as neurofeedback, control of external devices and communication. In neurofeedback studies, subjects can see selected areas of their own brain activity while they are being measured in the scanner. Neurofeedback is performed by reading, analysing and visualising the fMRI brain signals in real-time during an ongoing experiment. This real-time approach is in contrast to the standard analysis approach in which the huge amount of incoming fMRI signals are recorded first and then analysed hours or days after the experiment. During this course, there will be discussion of fMRI neurofeedback applications which have demonstrated that with sufficient practice, subjects are indeed able to learn to modulate activity in certain brain areas. These results are extremely important for basic neuroscience research, because they allow FPN researchers to study the degree to which the brain can modulate its own activity and to potentially unravel the function of hitherto unknown brain areas. Neurofeedback research also touches on deep philosophical issues, such as the neural correlates of free will. It might also be possible in the future to help people with pain or depression by regulating at will the activity in relevant brain areas. In fMRI-based communication studies, activation patterns evoked by participants are 'decoded' and interpreted online, e.g. as letters of the alphabet, offering the possibility for people with severe motor impairments to 'write' letters purely controlled by mental imagery. In this course, a number of online analysis strategies will be discussed for decoding mental states, including analysis of the mean signal of regions-of-interest (ROIs) and the use of pattern classifiers operating at the voxel level.
Goals	Knowledge of: Principles of real-time fMRI, setup and conduction of real-time fMRI scanning, serving as subjects (two students) in a real-time brain-computer interface (BCI) session, basics of real-time fMRI data analysis (Turbo-BrainVoyager software).
Instruction language	EN
Prerequisites	
Recommended literature	Articles and a users guide for the real-time analysis software.
Teaching methods	Lecture Work in subgroups
Assessment methods	Attendance Final paper
Key words	real-time fMRI, neurofeedback, brain-computer interface (BCI), brain reading

*PSY4233 is the same for **CN** and NE.*

Title	**Methods of Deactivation**
Period	3
Code	PSY4233
ECTS credits	1
Organisational unit	Cognitive Neuroscience (FPN)
Coordinators	Teresa Schuhmann, Peter De Weerd
Descriptions	In three consecutive practical training sessions, students acquire direct hands-on experience with non-invasive magnetic brain stimulation. Students learn how to use the brain stimulator devices, how to evoke muscle responses and how to induce visual experiences. Students act as both the experimenter, applying the brain stimulation, and the participant, receiving the magnetic pulses. Practical I: Technical Introduction/Motor Thresholds/Motor Excitability Practical II: TMS-induced Visual Experiences (phosphenes) Practical III: TMS Neuronavigation (frameless stereotaxy) There are a variety of ways in which activity in a brain region can be prevented or influenced. Some studies use anatomical lesion methods (in animals), while others use reversible methods such as cooling, and pharmacological or genetic manipulations in animals, or trans-cranial magnetic stimulation (TMS) in human subjects. The training will end with a lecture that provides an overview of these different methodologies, including a discussion of the advantages and limitations of the different techniques and of the issues related to data interpretation.
Goals	Knowledge of: Trans-cranial magnetic stimulation, application of TMS, motor threshold determination, phosphene threshold determination, Neuronavigation, cooling, various other deactivation methods.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Assignment(s) Lecture(s) Skills Training(s)
Assessment methods	Attendance Observation
Key words	Trans-cranial Magnetic Stimulation, Non-invasive Brain Stimulation, fMRI-guided Neuronavigation

Title	Basic Mathematical Methods
Period	5
Code	PSY4237
ECTS credits	2
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Giancarlo Valente
Descriptions	Recent developments in data analysis methods have led to their frequent usage in neuroscience research. The aim of this course is to provide participants with the basic 'tools' needed to gain a better understanding of the data analysis methodologies and to help participants develop methods and strategies to tackle their research problems. The course will cover the basic aspects of number representation, with an emphasis on complex numbers, and will then focus on basic algebra. The course will cover in detail vectors and matrices and their operations, including sums, products, inversion and eigenvalue decomposition and linear systems of equations. The course will also focus on the basic concepts of calculus, including infinitesimals, differential and integral calculus. Each session of the course has a practical component attached, in which the participants solve, with the aid of the tutor, a number of exercises. These are both pen-and-paper and MATLAB computer-based exercises. Furthermore, a selected range of applications of the illustrated concepts in the field of neuroscience are provided throughout the course.
Goals	Knowledge of: Trigonometry, exponentials and logarithms, complex numbers, polar representation, functions of one variable, algebra, solutions of a system of linear equations.
Instruction language	EN
Prerequisites	
Recommended literature	Material provided by the coordinator.
Teaching methods	Assignment(s) Lecture(s) Skills Work in subgroups
Assessment methods	Attendance Take home exam
Key words	algebra, complex numbers, pre-calculus

Title	Signal Analysis
Period	1
Code	PSY5231
ECTS credits	2
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Giancarlo Valente
Descriptions	Traditional and advanced statistics provide essential knowledge and tools for the correct formulation of scientific inferences and for summarising a research work. Nonetheless, modern techniques in neuroscience research have strongly increased the amount of information that can be extracted from experimental data and analysed, especially on account of the improved spatial and temporal resolution of the acquisition methods. Most of the new information can be recovered by including in the statistical modelling the 'signal' structure of the data, generally due to the physical dimensions of data, time and space. This Signal Analysis course introduces the practical implementation of the traditional and latest research approaches to time and space signal analysis in the context of neuroscience research. The course focuses on time series analysis from one- and multi-dimensional data. The basics of discrete time and space signal acquisition and modelling are presented and discussed in their practical neuroscience applications. The course has the objective to provide the participants with an operational understanding of the classical signal analysis techniques like preprocessing, analysis in the frequency, time and amplitude domains, Fourier series, Fourier Transform and FFT, spectral analysis, linear system theory and implementation of filters in time and frequency domains. Practical demonstrations from real world data reinforce concepts introduced in the lectures. MATLAB implementation of these techniques is also addressed throughout the meetings.
Goals	Knowledge of: Statistical modeling, stationary signals, sampling theorem and frequency, harmonics, Fourier Series, Fourier Transform, Discrete Fourier Transform, Linear Systems, Filters.
Instruction language	EN
Prerequisites	
Recommended literature	W. van Drongelen. Signal processing for neuroscientists: An Introduction to the analysis of physiological signals. Academic Press.
Teaching methods	Assignment(s) Lecture(s) Paper(s) Presentation(s) Skills Training(s) Work in subgroups
Assessment methods	Attendance Written exam
Key words	frequency representation, linear systems, filters

Electives

The following electives will be offered in all RM specialisations.

Title	**Elective: Course**
Period	throughout
Code	PSY4156
ECTS credits	Variable
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students can attend a course offered by an RM specialisation or a course from a regular master's programme at Maastricht University (local courses) or a course that is organised at a different university in The Netherlands or abroad (external courses). The content, format and organisation of local courses are described in this catalogue or in the course descriptions of other UM master's programmes. The content, format and organisation of external courses are determined by the host university. Elective courses do not overlap with required RM courses, but instead offer new knowledge and insights. Enrollment in an elective course is subject to approval by the Course Instructor as well as the RM Electives Coordinator. There is no limit to the number of electives courses that may be taken, but elective courses do not substitute for mandatory courses.
Goals	Knowledge of: Extracurricular interests, broadening academic scope, taking specialised courses.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Presentation(s) Skills Training(s)
Assessment methods	Attendance Computer test Final paper Observation Oral exam Participation Portfolio Presentation Take home exam Written exam
Key words	electives, external courses, external workshops

Title	Elective: Review
Period	throughout
Code	PSY4157
ECTS credits	3
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students write a critical literature review based on a specialised topic, under the supervision of a member of the scientific staff of Maastricht University. Students take the initiative to locate and arrange a supervisor for the review. The review topic, content and format will be determined by mutual agreement between student and supervisor. The review topic is also subject to approval by the RM Electives Coordinator. Students are expected to devote 84 hours to the Elective: Review. Each student may complete maximally one Elective: Review course The Elective: Review course must be completed and assessed prior to the start of the internship.
Goals	Knowledge of: Extracurricular interests, specialisation on topic of interest, supervised scientific writing, literature review.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Paper(s)
Assessment methods	Final paper
Key words	elective, review paper, paper assignment, literature review, writing assignment

Title	Elective: Research
Period	throughout
Code	PSY4158
ECTS credits	3
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students can participate in (parts of) an empirical research project that is conducted and supervised by a member of the FPN or FHML scientific staff. Students can apply for an available project from the list of project descriptions; available on the 'RM Electives' section on EleUM, which is published and updated in December of each year. The application procedure is also described on the 'RM Electives' section on EleUM. Students who are selected to participate in a research elective may assist in designing the experiment or observational study, acquire empirical data, be trained in using measurement equipment, analyse empirical data, or take part in other parts of the research project. Students must write a short research report of maximally 5 pages about the practical experience obtained. Students are expected to spend 84 hours on the Elective: Research course, which includes time spent on practical work and the research report. The principal investigator of the project will supervise the practical work and grade the research report. Each student may complete maximally one Elective: Research course. The Elective: Research course must be completed and graded before the start of the internship.
Goals	Knowledge of: Planning or designing empirical research, empirical data analysis, writing research report, quantitative methods, conducting research, skill learning of data acquisition techniques, functioning in a research team.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Lecture(s) Paper(s) Patient contact PBL Presentation(s) Research Skills Training(s) Work in subgroups
Assessment methods	Final paper Participation
Key words	elective, practical research, empirical research

Research Internship and Master's Thesis

1. *PSY5107 Research Proposal, PSY5102 Research Internship and PSY5103 Master's Thesis -> for [CN, NE, FN->50 credits] and [NP and PP->30 credits]*. *Internship coordinators are different per specialisation.*

50 credits apply to: CN, NE and FN and for the NP student that only chooses a research internship (not including the clinical part)

The NP student that chooses the combined internship (Research + Clinical) will obtain 30 credits for the Research Proposal + Research Internship + Master's Thesis + 20 credits for Clinical Internship, Research Proposal and Minor's Thesis. The combined version is compulsory to PP students.

2. Clinical Internship, Research Proposal and Minor's Thesis PSY5104, PSY5108, and PSY5105 Are the same for NP and PP. *Only the internship coordinators differ from each other.*

Title	**Research Proposal, Research Internship and Master's Thesis**
Period	2-6
Code	PSY5107, PSY5102, and PSY5103
ECTS credits	**30** ECTS (1, 19, and 10, respectively) for RM PP students and for RM NP students who choose to conduct both a research and a clinical internship (plus minor's thesis). The total research internship will be assigned 30 credits: 20 credits for the research activities, including the research proposal (1 credit; graded pass/fail) and the practical execution of the internship (19 credits; graded assessment), and 10 credits (graded assessment) for the master's thesis. **50 (1, 35, and 14, respectively)** for RM CN, NE, FN, NP students who do *not* complete a clinical internship and minor's thesis. The total research internship will be assigned 50 credits: 36 credits for the research activities, including the research proposal (1 credit; graded pass/fail), and the practical execution of the internship (35 credits; graded assessment) and 14 credits (graded assessment) for the master's thesis.
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Sandra Mulkens
Descriptions	The second part of the second year of the research master's programme is devoted to conducting a research internship. As a result of the many international research contacts that faculty members have established, a substantial number of students will conduct their research internship abroad. Students start their internship with the writing of a research proposal. Students finish the master's programme by writing a thesis based on their internship research project. The internship can be undertaken at Maastricht University or at external research institutes. In all cases, a student's research proposal and master's thesis will be evaluated by two assessors. At least one of these assessors must be a member of the Faculty of Psychology and Neuroscience (FPN) or the Faculty of Health, Medicine and Life Sciences (FHML). The other assessor might be a (senior) researcher at, for

	example, the institute where a student collected the data. A detailed guide on research internships and the master's thesis can be found on EleUM > Students Research Master Faculty of Psychology and Neuroscience > internships. - RM Cognitive Neuroscience Internships Coordinator: Amanda Kaas, Cognitive Neuroscience (FPN), Phone: (0)43 38 82172, 55 Oxfordlaan, Room 2.019, Email: a.kaas@maastrichtuniversity.nl - RM Neuroeconomics Internships Coordinator: Amanda Kaas, Cognitive Neuroscience (FPN), Phone: (0)43 38 82172, 55 Oxfordlaan, Room 2.019, Email: a.kaas@maastrichtuniversity.nl - RM Fundamental Neuroscience Internships Coordinator: Pilar Martinez, Psychiatry and Neuropsychology (FHML), Phone: (0)43 38 81042, 40 Universiteitssingel West, Room 2.574, Email: p.martinez@maastrichtuniversity.nl - RM Neuropsychology Internships Coordinator: Caroline van Heugten, Neuropsychology and Psychopharmacology (FPN), Phone (043) 38 84213, 40 Universiteitssingel East, Room 2.736, Email: caroline.vanheugten@maastrichtuniversity.nl - RM Psychopathology Internships Coordinator: Nicole Geschwind, Clinical Psychological Science (FPN), Phone (043) 38 81608, 40 Universiteitssingel East, Room 2.767, Email: Nicole.geschwind@maastrichtuniversity.nl
Goals	Knowledge of: Conducting a (supervised) empirical research project and summarising the research and findings in the form of a master's thesis.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Paper(s) Patient contact Research Skills Working visit(s)
Assessment methods	Attendance Final paper Observation Participation
Key words	internship, research, master's thesis

Specialisation in Neuroeconomics (NE)

The specialisation in Neuroeconomics is a truly interdisciplinary endeavor aiming at understanding human individual and social decision making processes by investigating their neuronal basis and underlying psychological processes. Neuroeconomics combines theoretical and empirical research methods and techniques from neuroscience, economics, and psychology into a unified approach. The resulting synthesis avoids the shortcomings that may arise from a single perspective approach and aims at an integrative understanding of human decision making, ranging from the neuronal foundations of simple decisions to explaining decisions in complex interactive situations. Core courses provide a solid basis in modern economic theories of human behaviour, the psychological processes underlying this behaviour as well as their neuronal basis. The Neuroeconomics group consists of economists, psychologists, and cognitive neuroscientists which guarantees an in-depth education in all fields essential for Neuroeconomics research. Students will have access to the facilities of the Faculty of Psychology and Neuroscience (FPN) and the School of Business and Economics (SBE). FPN has two 3-Tesla MRI research scanners and fully equipped EEG as well as TMS laboratories. In addition, the 'Brains Unlimited' project provides a unique research infrastructure with the newest ultra-high field (7-Tesla and 9.4-Tesla) imaging facilities. SBE has a research dedicated fully computerised state-of-the art behavioural and experimental laboratory for conducting individual and interactive experiments. Hence, students will not only gain a strong theoretical basis but will also gain hands-on experience in the design, execution, and analysis of experiments in Neuroeconomics.

Neuroeconomics Coordinator:
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t.schuhmann@maastrichtuniversity.nl

Overview RM in Neuroeconomics (NE)

Period	Research Master's in Neuroeconomics (NE) Year 1 (2013-2014): Arno Riedl
Period 0, 02-09-2013 - 06-09-2013	Introduction week **PSY 4950** PBL training for non-UM students*
Periode 1, 09-09-2013 - 25-10-2013	**Core Courses:** **EBC4182** Mathematical Research Tools (6.5 credits): Hans Peters, Arkadi Predtetchinski **PSY4106** Advanced Statistics I (total of 3 credits): Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers
	Skills training: **PSY4221** EEG and ERP (2 credits): Fren Smulders
Period 2, 28-10-2013 - 20-12-2013	**Core courses:** **EBC4061** Micoeconomics I (6.5 credits): Martin Strobel **PSY4711** Psychology meets Neuroscience meets Economics (4 credits): Teresa Schuhmann **PSY4106** Advanced Statistics I: Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers
Christmas break	
Period 3, 06-01-2014 - 31-01-2014	**Core course:** **PSY4216** Magnetic Brain Stimulation (TMS) (4 credits): Alexander Sack **PSY4106** Advanced Statistics I (total of 3 credits): Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers **PSY4107** Advanced Statistics II (total of 3 credits): Gerard van Breukelen *Practical training:* PSY4117 SPSS: Gerard van Breukelen
	Skills training: **PSY4108** Neuroanatomy (1 credit): Jos Prickaerts
	Workshop: **PSY4233** Methods of Deactivation (1 credit): Teresa Schuhmann, Peter De Weerd
	PSY4100 Colloquia (total of 1 credit): Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Period 4, 03-02-2014 t/m 04-04-2014	**Core course:** **EBC4204** Microeconomics II (6.5 credits): Arkadi Predtetchinski **PSY4712** Social Neuroscience (4 credits): Loes Kessels, Nicolette Siep **PSY4107** Advanced Statistics II: Gerard van Breukelen *Practical training:* PSY4117 SPSS: Gerard van Breukelen
	Workshop: **PSY4731** Neuroeconomics Meetings (total of 1,5 credits): Alexander Vostroknutov
	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson

Period 5, 07-04-2014 t/m 06-06-2014	**Core course:** **PSY4256** Timing Neural Processing with EEG and MEG (4 credits): Fren Smulders **PSY4107** Advanced Statistics II: Gerard van Breukelen *Practical training:* PSY4117 SPSS: Gerard van Breukelen **PSY4713** Functional Brain Imaging in Neuroeconomics(4 credits): Vincent van de Ven
	Skills training: **PSY4224** Programming in Matlab Basic Course (2 credits): Giancarlo Valente
	Workshop: **PSY4110** Scientific Writing (1 credit): Alice Wellum **PSY4731** Neuroeconomics Meetings: Alexander Vostroknutov
	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Period 6, 10-06-2014 t/m 04-07-2014	**Core course:** **EBS4026** Experimental Economics Methods (4 credits)
	Workshop: **PSY4731** Neuroeconomics Meetings: Alexander Vostroknutov **PSY4112** Research Grant Writing Workshop (1 credit): Eef Theunissen
	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson

**Students from Erasmus Rotterdam receive an exemption for PBL training.*

Period	**Research Master's in Neuroeconomics (NE) Year 2 (2014-2015)**
Period 1, To be announced in 2014	**Core course:** **PSY5112** Research Grant Writing Course (3 credits): Eef Theunissen **EBC4200** Behavioural Economics (6 credits): Matthew Embrey
	Skills training: **PSY5223** Programming in Matlab Advanced Course (1 credit): Giancarlo Valente
32 weeks	**PSY5107 Research Proposal, PSY5102 Research Internship & PSY5103 Master's Thesis** (50 credits): Sandra Mulkens

Period	**Research Master's in Neuroeconomics (NE) Year 2 (2013-2014)**
Period 1, 09-09-2014 - 25-10-2014	**Core course:** **PSY5110** Interdisciplinary Research Proposal (3 credits): Eef Theunissen **EBC4200** Behavioural Economics (6 credits): Matthew Embrey
	Skills training: **PSY5223** Programming in Matlab Advanced Course (1 credit): Giancarlo Valente
32 weeks	**PSY5107 Research Proposal, PSY5102 Research Internship & PSY5103 Master's Thesis** (50 credits) Sandra Mulkens

Colloquia

PSY4100 Colloquia will be offered in all RM specialisations.

Title	**Colloquia**
Period	3-6
Code	PSY4100
ECTS credits	1
Organisational unit	Cognitive Neuroscience (FPN), Department of Economics (SBE), Psychiatry and Neuropsychology (FHML), Neuropsychology and Psychopharmacology (FPN)
Coordinator	Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Descriptions	Colloquia are presented per specialisation (CN, NE, FN, NP and PP) by senior researchers from the UM faculties or visiting guest lecturers. Each colloquium focuses in depth on one of a wide range of topics, with issues transcending the courses and specialisations. Each colloquium lecture will be followed by active discussion, prepared and chaired by the lecturer (the UM host may fill this role for guest lecturers). A total of nine colloquia will be offered during the first year.
Goals	Knowledge of: Key research domains from different specialisations, interdisciplinary research, interacting with students from different specialisations.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Lecture(s)
Assessment methods	Attendance
Key words	interdisciplinary knowledge

Core courses

Title	**Psychology meets Neuroscience meets Economics**
Period	2
Code	PSY4711
ECTS credits	4
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Teresa Schuhmann
Descriptions	During this course, the students from different backgrounds will receive an introduction into the main topics of Psychology, Neuroscience and Economics. They will receive an overview about where those fields come together and why there is a requirement for the new research direction of Neuroeconomics . The students will gain insight into the anatomy and functioning of the brain, and will receive an introduction into cognitive and social neuroscience. The focus will be on using neuroscience methodology to empirically address relevant research questions in psychology and decision-making science. Specifically,, the following topics will be addressed: economical models of human decision making, including predictions based on game theory as well as other models used in behavioural economics, using functional brain imaging and brain interference techniques to study the neurobiology underlying human cognition and decision making, as well as examples from applied social neuroscience research. Lecturers representing these topics will be recruited from all three participating UM departments, namely the School of Business and Economics, the Cognitive Neuroscience department and the Work and Social Psychology department of the Faculty of Psychology and Neuroscience. The course will thus aim at providing a bridge between classical research themes in cognitive neuroscience, behavioural economics and neuroeconomics.
Goals	Knowledge of: Basic understanding of selected neuroscientific research tools including functional brain imaging and functional brain interference. Basic understanding of structural and functional architecture of the brain applications of neuroscience methodology in cognitive and social psychology, as well as (neuro)economics.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles.
Teaching methods	Assignment(s) Lecture(s) Paper(s)
Assessment methods	Attendance Final paper
Key words	cognitive neuroscience, social neuroscience, neuroeconomics, cognitive psychology

Title	Social Neuroscience
Period	4
Code	PSY4712
ECTS credits	4
Organisational unit	Work and Social Psychology (FPN)
Coordinator	Loes Kessels, Nicolette Siep
Descriptions	This course provides students with an advanced introduction to social neuroscience by discussing selected social-neuroscientific research topics. Social cognitive neuroscience (SCN) is an interdisciplinary field that investigates topics of interest in the social sciences such as emotion-regulation, self-reflection, and decision making. SCN uses methods employed by cognitive neuroscientists, such as functional brain imaging, and integrates theories and methods of its parent disciplines (social psychology, economics, political science, anthropology) It seeks to explain human behaviour in terms of the interaction between three levels of analysis: 1. The social level, which includes descriptions of experience, behaviour, and context; 2. The cognitive level, which specifies information processing mechanisms; 3. The neural level, which specifies neural systems that provide basis for these processes. SCN researchers are interested in questions such as: How are we able to know what other people feel? Why are we sometimes inclined to cooperate with others? How do we suppress feelings of prejudice? Throughout the course topics will be introduced that represent issues of much investigated social cognitive neuroscience.
Goals	Knowledge of: Neuroscience: fMRI, TMS, EEG; Social Neuroscience: social decision making, self-reflection, emotion-regulation, attitudes, empathy, moral judgment, mental effort.
Instruction language	EN
Prerequisites	
Recommended literature	Literature reviews and empirical articles.
Teaching methods	Assignment Lecture(s) PBL Presentation(s)
Assessment methods	Attendance Final paper Written exam
Key words	social neuroscience, social cognition, research proposal, neuroeconomics

Title	**Mathematical Research Tools**
Period	1
Code	EBC4182
ECTS credits	6.5
Organisational unit	Department of Quantitative Economics (SBE)
Coordinator	Hans Peters, Arkadi Predtetchinski
Descriptions	This course offers basic mathematical methods for economic research. The focus is on static and dynamic optimisation and on the underlying mathematics, necessary to understand and apply these optimisation methods. These tools are relevant for all specialisations within the Economic and Finance Research (EFR) master's programme and for the specialisation in Neuroeconomics within the research master's programme of Cognitive and Clinical Neuroscience.
Goals	Knowledge of: Multi-variable calculus, static optimisation methods in particular Lagrange and Kuhn-Tucker, connection with linear and non-linear programming, dynamic (discrete and non-discrete) optimisation methods (Bellman principle, calculus of variations, optimal control, Pontryagin maximum principle), basic elements of difference and differential equations and of dynamic systems.
Instruction language	EN
Prerequisites	
Recommended literature	Jehle G.A., Reny P.J. (2011) : Advanced microeconomic theory 3rd ed.), chapters A1 and A2. Pearson; Sydsaetter et al. (2008): Further mathematics for economic analysis., Chapter 9.1-9.6. Prentice Hall.
Teaching methods	Assignment(s) Lecture(s) PBL
Assessment methods	Written exam
Key words	mathematical methods

PSY4106 Advanced Statistics I will be offered in all RM specialisations.

Title	**Advanced Statistics I**
Period	1-3
Code	PSY4106
ECTS credits	3
Organisational unit	Faculty Office (FPN)
Coordinator	Nick Broers
Descriptions	The course consists of six units. In the first four units, participants will be given an in-depth training in the following standard statistical methods: factorial ANOVA for between-subject designs, analysis of covariance (ANCOVA), multivariate ANOVA (MANOVA), discriminant analysis and multiple linear regression. Students are assumed to have background knowledge of balanced two-way factorial ANOVA and multiple regression. These methods will be briefly reviewed. The following advanced topics will then be covered: unbalanced factorial designs, contrast analysis, interaction, simple slope analysis, dummy coding, centring covariates, different coding schemes, collinearity and residuals checks and data transformation. The distinction between confounders and mediators in regression and ANCOVA is also discussed, forming a bridge from regression to structural equations modelling (SEM). The latter is an advanced multivariate method that is gaining importance in psychology but still requires special software (such as Lisrel, EQS, AMOS or Mplus). SEM is introduced in two units, starting with causal modelling and mediation analysis in cross-sectional research and then extending to longitudinal research and latent variables (factors). Special attention is given to identifying models, model equivalence, global and local goodness of fit indices, parsimony, model modification and cross-validation. Some concepts from matrix algebra are needed for SEM, and these will be briefly discussed without going into technical detail.
Goals	Knowledge of: Oneway analysis of variance, contrast analysis, unbalanced designs, multivariate analysis of variance, discriminant analysis, linear regression with interaction terms, linear regression with dummy variables, data transformations, simple slope analysis, analysis of covariance, path analysis, structural equation modeling, confirmatory factor analysis, structural models with latent variables.
Instruction language	EN
Prerequisites	
Recommended literature	Diamantopoulos, A. (1994). Modelling with LISREL: A guide for the uninitiated. Journal of Marketing Management, 10, 105-136; Field, A. (2009). Discovering statistics using SPSS (3rd ed.). London: Sage; Howell, D.C. (2007). Statistical methods for psychology (6th ed.). Belmont (CA): Thomson/ Wadsworth; Kleinbaum, D.G., Kupper, L.L., Muller, K.E., & Nizam, A. (1998). Applied regression analysis and other multivariable methods

	(3rd ed.). Pacific Grove (CA): Brooks/Cole.
Teaching methods	Assignment(s) Lecture(s) Skills Training(s)
Assessment methods	Attendance Written exam
Key words	univariate analysis of variance, multivariatie analysis of variance, regression analysis, structural equation modeling

The practical training associated with PSY4106 Advanced Statistics I is PSY4119. Practical training: SPSS and Lisrel will be offered in all RM specialisations.

Title	**Practical training: SPSS and Lisrel**
Period	1-3
Code	PSY4119
ECTS credits	-
Organisational unit	Faculty Office (FPN)
Coordinator	Nick Broers
Descriptions	In order to make practical use of the statistical models that form the topic of the Advanced Statistics course, researchers must make use of statistical software. This course will utilise the traditional SPSS program, but also the specialised LISREL software. LISREL is a statistical program that allows structural equations models to be tested.
Goals	Defining contrasts, building regression models, doing multivariate analyses, transforming data, testing simple slopes, creating and testing SEM models
Instruction language	EN
Prerequisites	
Recommended literature	Handouts given during practicals.
Teaching methods	Assignment(s) Training(s)
Assessment methods	Attendance
Key words	SPSS, LISREL, statistical software

PSY4107 Advanced Statistics II will be offered in all RM specialisations.

Title	**Advanced Statistics II**
Period	3-5
Code	PSY4107
ECTS credits	3
Organisational unit	Faculty Office (FPN)
Coordinator	Gerard van Breukelen
Descriptions	The course consists of seven units. The first three units cover classical repeated measures ANOVA for the one- and two-way within-subject design and the split-plot (between x within) design. Special attention is given to: a) the choice between multivariate and univariate data formats and method of analysis, and the sphericity assumption; b) the distinction between the within-subjects and between-subjects part of a split-plot ANOVA, and how to obtain both using regression analysis; c) the surprising consequences of including covariates into repeated measures ANOVA; and d) the choice between different methods of analysis for randomised versus non-randomised group comparisons. Subsequently, a further three units are devoted to mixed (multilevel) regression for nested designs and longitudinal studies. This mixed regression starts with a unit on marginal models for repeated measures as an alternative to repeated measures ANOVA in cases of missing data or within-subject covariates. Students are shown the pros and cons of various models for the correlational structure of repeated measures, such as compound symmetry and AR1. The second unit covers the random intercept model for repeated measures as a method to include individual effects in marginal models for longitudinal data (growth curves) or single trial analyses of lab data (response times, ERP, fMRI). Students learn how this can be combined with e.g. ARMA modelling to distinguish between interpersonal and intrapersonal outcome variation. The random intercept model will also be applied to a cluster randomised trial, i.e. an RCT where organisations like schools or companies instead of individuals are randomised. The third and last unit on mixed regression covers random slope models for longitudinal data (individual differences in change over time), single trial analysis (individual differences in stimulus effects) and multicentre trials (RCT within each of a number of organisations). Finally, the topic of optimal design, sample size and power calculations is introduced in a seventh unit.
Goals	Knowledge of: Repeated measures ANOVA for within-subject and split-plot (between x within) designs, including factorial designs and covariates in repeated measures ANOVA; Mixed (multilevel) linear regression with random effects and autocorrelation; Optimal design and sample size calculations for experimental and observational studies.
Instruction language	EN
Prerequisites	Good understanding of descriptive and inferential statistics at the elementary and intermediate level, including t-tests, factorial ANOVA and multiple linear regression. Skilled in the

	use of SPSS for statistical data analyses.
Recommended literature	Lecture handouts and a suitable book chapter or article.
Teaching methods	Assignment(s Lecture(s Training(s)
Assessment methods	Attendance Written exam
Key words	within-subject designs, repeated measures ANOVA, mixed (multilevel) regression, marginal versus random effects models, optimal design, sample size, power

The practical training associated with PSY4107 Advanced Statistics II is PSY4117. Practical training SPSS will be offered in all RM specialisations.

Title	**Practical training: SPSS**
Period	3-5
Code	PSY4117
ECTS credits	-
Organisational unit	Faculty Office (FPN)
Coordinator	Gerard van Breukelen
Descriptions	This practical training forms part of the PSY4107 Advanced Statistics II course. The practical consists of six sessions in the computer rooms in which SPSS procedures for repeated measures and multilevel data are practised. The goal is to understand how proper analyses of such data can be done using SPSS.
Goals	Knowledge of: How to run with SPSS: repeated measures ANOVA for within-subject and split-plot (between x within) designs, including factorial designs and covariates; How to run SPSS for: mixed (multilevel) linear regression with random effects and autocorrelation.
Instruction language	EN
Prerequisites	Good understanding of descriptive and inferential statistics at the elementary and intermediate level, including t-tests, factorial ANOVA and multiple linear regression. Skilled in the use of SPSS for statistical data analyses.
Recommended literature	Field A (2009). Discovering statistics with SPSS (3rd ed.). London: Sage, plus the mandatory assignments on EleUM. For the theoretical part of course PSY4107 lecture handouts and suitable book chapters and articles are used.
Teaching methods	Training(s)
Assessment methods	Attendance
Key words	within-subject designs, repeated measures ANOVA, mixed (multilevel) regression, marginal versus random effects models

Title	**Microeconomics I**
Period	2
Code	EBC4061
ECTS credits	6.5
Organisational unit	Department of Economics (SBE)
Coordinator	Martin Strobel
Descriptions	The course follows the standard canons of microeconomic theory: consumer theory, expected utility theory, producer theory, and general equilibrium. These topics are treated rigorously, meaning that a substantial amount of time will be spent on mathematical proofs. Students learn to apply mathematical tools to model economic problems, to develop the theoretical framework of microeconomics and to prove its results.
Goals	Knowledge of: Preference relations, consumer theory, producer theory, general equilibrium theory, and their mathematical models and proofs.
Instruction language	EN
Prerequisites	Mathematical research tools
Recommended literature	Advanced microeconomics textbook such as: Mas-Colell A., Whinston M.D. & Green J.R. (1995). Microeconomic theory. Oxford University Press; Jehle G.A. and Reny P.J. (2011). Advanced microeconomic theory (3rd ed.). Prentice Hall.
Teaching methods	Assignment(s) Lecture(s)
Assessment methods	Attendance Final paper Oral exam Written exam
Key words	microeconomics, consumer, producer, general equilibrium

*PSY4216 is the same for **CN** and NE.*

Title	**Magnetic Brain Stimulation (TMS)**
Period	3
Code	PSY4216
ECTS credits	4
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Alexander Sack
Descriptions	This course will provide students with an in-depth knowledge of; non-invasive magnetic brain stimulation techniques, including the mechanisms of action; the physico-physiological principles; various application protocols; functional magnetic brain stimulation paradigms and approaches for combining brain stimulation with brain imaging techniques simultaneously within the same experimental session. Since the very beginning of experimental brain research, neuroscientists have dreamed about not only observing the brain at work, but actually changing and modulating the neuronal activity in the brain without causing harm to patients or subjects. With the development of Transcranial Magnetic Stimulation (TMS) it is now possible to non-invasively reach into the skull of a patient or healthy subject and to temporarily alter brain activity at a specific location. This possibilities of TMS opens the door to a wide range of experimental and clinical applications. In combination with methods of functional imaging, it is not only possible to passively measure the brain activity during the execution of a particular function, but TMS can alse be used to increase or decrease the neuronal activity in the task-related brain area and reveal behavioural changes in the actual task performance. This enables identification of those brain areas that are functionally relevant to a particular function. In a clinical context, TMS has also been used to treat neurological and psychiatric diseases that are accompanied by a pathologically increased or decreased activity in a specific brain region. Since TMS offers the possibility to increase or decrease neuronal activity beyond the stimulation itself, it might, in the future, become a powerful therapeutic tool to help treat diseases like depression or schizophrenia.
Goals	Knowledge of: Physics and mechanisms of action of TMS, physiological effects of TMS, TMS protocols and application paradigms, animal studies using TMS, TMS in human cognitive neuroscience, combining TMS with functional imaging, clinical applications of TMS.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles.
Teaching methods	Assignment(s) Lecture(s) Presentation(s) Work in subgroups
Assessment methods	Attendance Presentation Written exam

Key words	non-invasive brain stimulation, functional magnetic brain interference, multi-modal imaging.

Title	**Microeconomics 2**
Period	4
Code	EBC4204
ECTS credits	6.5
Organisational unit	Department of Economics (SBE)
Coordinator	Arkadi Predtetchinski
Descriptions	The course covers four subjects of central importance to microeconomic theory: 1. Game theory 2. Information economics 3. Auctions and mechanism design 4. Social choice.
Goals	Knowledge of: Nash equilibrium, Bayesian-Nash equilibrium, subgame perfect equilibrium, sequential equilibrium; adverse selection, signaling, screening; the four standard auctions, direct-selling mechanisms; arrow's impossibility theorem. These tools and models are relevant for all specialisations within the Economic and Finance Research (EFR) master's programme and the specialisation in Neuroeconomics within the Cognitive and Clinical Neuroscience research master's programme.
Instruction language	EN
Prerequisites	Quantitative Methods III (EBS 2001) or any comparable course.
Recommended literature	Jehle G.A., Reny P.J. (2011) : Advanced microeconomic theory (3rd ed.).Pearson; Mas-Colell, A., Whinston, M.D., and Green, J.R. (1995): Microeconomic theory. Oxford University Press.
Teaching methods	Assignment(s) Lecture(s) PBL
Assessment methods	Assignments Attendance Written exam
Key words	microeconomic theory, game theory

*PSY4256 is the same for **CN** and NE.*

Title	**Timing Neural Processing with EEG and MEG**
Period	5
Code	PSY4256
ECTS credits	4
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Fren Smulders
Descriptions	Cognitive neuroscientists can currently choose from a range of different imaging methods to investigate human brain function. Each of these methods has its own strengths and limitations, which determine its suitability for studying a particular research question. Both electroencephalography (EEG) and magnetoencephalography (MEG) are important in characterising the time course of activation of neural systems involved in perceptual and cognitive processes. These processes include auditory and visual perception, attention, language, memory and development. EEG and MEG signals reflect complementary aspects of brain activity, with MEG having some advantages over EEG in the localisation of underlying neural sources. This course provides detailed knowledge on EEG and MEG, both of which have a clear advantage over other neuroimaging methods in terms of temporal precision. The study of EEG and MEG experimental design, data acquisition and data analysis will be combined with detailed literature discussions on theoretical and methodological issues. Based on different types of empirical questions, there will be discussion of the potential of a range of methods for advanced EEG and MEG analysis, including analysis in the time and frequency domain, source localisation, the combination with functional magnetic resonance imaging (fMRI) and transcranial magnetic stimulation (TMS) methods, independent component analysis and analyses of functional connectivity.
Goals	Knowledge of: Electro-encephalography, event-related potentials, magneto-encephalography, dipole source analysis, distributed source analysis, Fourier analysis, wavelet analysis, independent component analysis, connectivity analysis, application: mental chronometry, application: attention, lateralised event-related potentials, combination electro-encephalography and functional magnetic resonance imaging, combination electro-encephalography and trans-cranial magnetic stimulation.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Lectures Paper Presentation Working visit
Assessment methods	Attendance Final paper Presentation
Key words	electroencephalography, magnetoencephalography, biological signal analysis, source localisation

Title	Experimental Economics Methods
Period	6
Code	EBS4026
ECTS credits	4
Organisational unit	Department of Economics (SBE)
Coordinator	Matthew Embrey
Descriptions	This course will cover the theoretical and methodological background, as well as practical issues of experimental work in economics and finance. The course will discuss methodological issues in the domain of economics experiments, internal validity, external validity, the role of experiments in theory testing and theory suggesting. It will also critically discuss norms and customs in experimental economics research, as well as the use of task related incentives and the no-deception paradigm. On the practical side the course will deal with the questions of: What makes an experimental design good or bad? What are the different degrees of independent observations? What are efficient dialogues with the data? Part of the course will be devoted to practical design issues and students will develop their own experiments as part of a final paper.
Goals	Knowledge of: Theory of experimental economics, controlled economic environments, induced value theory, internal validity, external validity, domain of experimental economics, methodological foundations of experimental design, paradigm of no deception, direct experimental control, between-subject design, within-subject design, indirect experimental control (randomisation), preference elicitation methods, selected topics from experimental economics.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Lecture(s) PBL Research Work in subgroups
Assessment methods	Attendance Final paper Presentation Written exam
Key words	economics experiments, methodology, design

PSY5112 Research Grant Writing Course will be offered in all RM specialisations.

Title	**Research Grant Writing Course**
Period	1
Code	PSY5112
ECTS credits	3
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eef Theunissen
Descriptions	In this course, students will apply what they have learned during the Research Grant Writing Workshop (PSY4112). Students will work together (groups of max. 5) to write a research proposal on their selected topic, including an original research hypothesis, experimental design and methods. This proposal should promote interdisciplinarity; therefore students are encouraged to think across boundaries of different scientific fields. A senior researcher will guide students during this writing process. The students will write their proposal in 3 steps, and they will receive feedback from their mentor and peers. The resulting proposals will be presented during a symposium by way of a poster or an oral presentation.
Goals	Knowledge of how to: Review literature, formulate a research hypothesis, design a research study, write a research proposal, present the proposal at a symposium (oral or poster).
Instruction language	EN
Prerequisites	This course is a continuation of the Research Grant Writing Workshop (PSY4112).
Recommended literature	
Teaching methods	Work in subgroups
Assessment methods	Attendance Final paper Presentation
Key words	research proposal, interdisciplinary, hypothesis, design, methods, research symposium, peer review

Title	Behavioural Economics
Period	1, Year 2
Code	EBC4200
ECTS credits	6
Organisational unit	Department of Economics (SBE)
Coordinator	Matthew Embrey
Descriptions	The course will first demonstrate and discuss observed behavioural regularities in economic and social decision situations, i.e. that are inconsistent with predictions of homo economicus economics. Building on this base, it will cover the most important and recent developments in behavioural economics. Students will learn about the various relaxations of the traditional assumptions and how these change predictions of human decision-making. A core competence will be the ability to make a critical evaluation of traditional economic theory in the light of field and experimental empirical evidence. New theoretical models will be assessed and weaknesses and possibilities for improvements discussed.
Goals	Knowledge of: Non-expected utility models of individual decision-making under risk and uncertainty, (e.g. heuristics in decision-making and prospect theory), models of inter-temporal choice,(e.g. hyperbolic and quasi-hyperbolic discounting), models of boundedly rational strategic behaviour (e.g. cognitive hierarchy/level-k and noisy equilibrium models), models of fairness and reciprocity, models incorporating norms and emotions, and formal models of dual-processes approaches to decision making.
Instruction language	EN
Prerequisites	Microeconomics I, Microeconomics II.
Recommended literature	Journal articles, book chapter.
Teaching methods	Assignment(s) Lecture(s) Presentation(s)
Assessment methods	Attendance Final paper Presentation Written exam
Key words	behavioural economics, psychological aspects, economic models

Title	Functional Brain Imaging in Neuroeconomics
Period	5
Code	PSY4713
ECTS credits	4
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	This core course is aimed at introducing basic knowledge and principles of functional brain imaging techniques, and discussing novel advances in relevant fields, such as clinical, animal and cognitive research. The course comprises of two versions that are tailored to two *a priori* levels of background. Version 1 introduces the basic principles of neuroimaging (intro to imaging methods, experimental design & analysis, fMRI signal, etc.) and some applications to clinical research, neuroeconomics, social neuroscience and similar fields. Version 2 introduces a number of technical and methodological advances (multimodal imaging techniques, connectivity analyses, mental chronometry and other matters), and assumes that participants possess *a priori* knowledge of items discussed in Version 1. Neuroeconomics students must follow Version 1, and are free to also follow Version 2 but will receive no extra credits for this. In addition, students will meet in a number of weekly tutorial meetings to discuss the application of fMRI methods, designs and analyses to relevant neuroeconomic questions. General description: The investigation of human brain anatomy and functions using a range of imaging methods represents the most influential development in psychology in the last few years. This course reviews essential facts about contemporary major structural and functional brain mapping techniques, but the focus will be on functional Magnetic Resonance Imaging (fMRI). The course discusses strengths and weaknesses of neuroimaging methods and focus on the description of relevant applications in neuroeconomics, decision making and related fields. These topics will be investigated through lectures, paper and group discussions, and a final skills session in which fMRI data is analysed. The final assessment is carried out via a paper assignment and student presentations.
Goals	Knowledge of: Functional brain imaging techniques and principles; pros and pitfalls of functional brain imaging; data analysis; experimental design for brain imaging research; hands-on data analysis and visualization experience; fMRI in neuroeconomics and decision making.
Instruction language	EN
Prerequisites	Basic knowledge of Brain anatomy, experimental design and statistics.
Recommended literature	Journal articles.
Teaching methods	Lecture(s) Paper(s) Presentation(s) Skills
Assessment methods	Attendance Final paper Presentation

Key words	Magnetic Resonance Imaging (MRI), functional MRI, structural MRI, positron emission tomography (PET), neuroimaging, data analysis, brain activity, neuroeconomics, decision making

Skills training

1. PSY4221 EEG and ERP is equal to the Master's module PSY4034 EEG and ERP (DP & CN)
2. PSY4221 EEG and ERP (in **CN,** NE, FN, NP. In NP it will be offered as an Elective).

Title	**EEG and ERP**
Period	1
Code	PSY4221
ECTS credits	2
Organisational unit	Cognitive Neuroscience
Coordinator	Fren Smulders
Descriptions	Electroencephalography (EEG) and Event Related Potentials (ERP) offer a combination of precise measurements for the time course of brain processes. These are low cost, non-invasive measurements and are widely available. For these reasons they make a unique contribution to cognitive neuroscience. Scientific interest in EEG and ERP is growing, and results have been increasingly integrated with other neuro-imaging techniques during the last few decades. Lectures and basic literature provide an introduction for students to the basics of EEG and ERP research, EEG and ERP terminology and the possibilities and limitations within EEG and ERP. One topic that students will learn is how to set up an experimental paradigm that is suitable for EEG and ERP measurements. Students also study practical measurement issues, such as electrode placement and types of artefacts. Finally, students must interpret the resulting data. Successful measurement requires an understanding of the basics of EEG and ERP signal analysis techniques, such as artefact management, spectral analysis, filtering, ERP averaging, time-frequency analysis etc. Students also receive hands-on training in smaller groups in running an ERP experiment, including electrode application, minimising artefacts, and health and safety in the lab. A number of simple experimental paradigms will be utilised; these provide interesting and reliable results. Data processing will include a number of common EEG analyses, e.g. analyses in the time and frequency domain.
Goals	Knowledge of: Basic EEG/ERP paradigms, EEG recording systems, measurement settings, electrode application, data quality verification, analogue-digital conversion, basic EEG / ERP components, interpreting topographical plots, neural origins of EEG, time domain analysis, frequency domain analysis, time-frequency analysis, filtering, ocular artefact control, muscle artefact control, choice of reference, re-referencing.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, handbooks.
Teaching methods	Lecture(s) Paper(s) Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	Electroencephalography (EEG), Event-related potentials (ERP), electrophysiology, measurement, analysis of brain

	potentials.

*PSY4108 Neuroanatomy will be offered in CN, **NE**, NP and PP.*

Title	**Neuroanatomy**
Period	3
Code	PSY4108
ECTS credits	1
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Jos Prickaerts
Descriptions	The aim of this practical training is to become acquainted with the neuroanatomical terminology and to gain insight into the spatial and functional organisation of the brain. It is essential to have a basic knowledge of the brain anatomy when working in the field of neuropsychology or neurobiology. Many specific brain areas can be linked to particular functions. Thus, knowledge of the brain anatomy and its main functions allows direct linkage of specific neurological or psychiatric disorders to particular brain areas. After a short theoretical introduction, students will study whole brains and brain material of mammals at both macroscopical (visual inspection) and microscopical level. The emphasis will be on major brain systems, including the basal ganglia and limbic system.
Goals	Knowledge of: Limbic system, basal ganglia, plastinated human brains, brain dissection, microscopical slices.
Instruction language	EN
Prerequisites	
Recommended literature	Papers from scientific journals and book chapters from books are provided.
Teaching methods	Lecture(s) Skills Work in subgroups
Assessment methods	Attendance Written exam
Key words	neuroanatomy, limbic system, basal ganglia

*PSY4224 is the same for CN and **NE.***

Title	**Programming in Matlab Basic Course**
Period	5
Code	PSY4224
ECTS credits	2
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Giancarlo Valente
Descriptions	Matlab provides a powerful environment for numerical computation, data analysis and visualisation. It is, in essence, a programming environment that has built-in primitives for common scientific tasks that in other languages, such as C or Pascal, require many operations. Examples are tasks such as matrix algebra (used in statistical analysis of data), Fourier transforms (used in signal processing) and 2D or 3D plots for visualisation of data or analysis-results. Many complete packages for the analysis of cognitive neuroimaging data (e.g. fMRI data or EEG/MEG data) are implemented in Matlab. Thus, usage of these packages requires at least a basic understanding of Matlab. Furthermore, if more advanced analysis or visualisation is needed than what is offered by existing packages, developing new functionalities in Matlab is often the most convenient option. The first part of the course will deal with how Matlab primarily represents and processes data, i.e. as matrices. Subsequently, attention is focused on the usage of the environment: the prompt; the workspace; the help options; and loading, saving and visualising data. The principles behind programming will be introduced, with particular emphasis on neuroimaging applications.
Goals	Knowledge of: Matlab environment, Matlab variables, vectors, matrices, matrix algebra, 2D and 3D plots, conditional loops, scripts, functions, file Input-Output, structures, cells.
Instruction language	EN
Prerequisites	
Recommended literature	Andrew Knight – Basics of Matlab and beyond – Chapman and Hall/CRC, (Selected Chapters); Wallisch et al. Matlab for Neuroscientists , Associated Press (Selected Chapters)
Teaching methods	Assignment(s) Lecture(s) Skills Work in subgroups
Assessment methods	Attendance Computertest Final paper
Key words	programming principles, scripts and functions, data analysis

*PSY5223 is the same for CN and **NE.***

Title	**Programming in Matlab Advanced Course**
Period	1
Code	PSY5223
ECTS credits	1
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Giancarlo Valente
Descriptions	This course deals with advanced topics in Matlab programming. In particular, it will focus on how to implement efficient and re-usable programs for neuroimaging applications. Students will learn how to use existing Matlab toolboxes for neuroimaging and how to put the principles of efficient programming, such as debugging and profiling, into practice. Advanced topics in graphics and user interfaces will also be discussed.
Goals	Knowledge of: Debugging, efficient programming, graphical objects, graphical user interfaces.
Instruction language	EN
Prerequisites	PSY4224 Programming in Matlab Basic Course
Recommended literature	Material provided by the coordinator.
Teaching methods	Assignment(s) Lecture(s) Skills Work in subgroups
Assessment methods	Attendance Take home exam
Key words	efficient programming, debugging, graphical user interfaces

Methodological and technical workshops

PSY4112 Research Grant Writing Workshop will be offered in all RM specialisations.

Title	**Research Grant Writing Workshop**
Period	6
Code	PSY4112
ECTS credits	1
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eef Theunissen
Descriptions	During this workshop students will learn why and how to apply for research grants. The need for acquiring funding for research, the opportunities for, and availability of grant application funding will be discussed. Several researchers who have experience in applying for different types of grants will provide students with first-hand knowledge and tips. Students will learn fundamentals of good grant writing, general preparation of the grant application and how to deal with reviewer comments. These skills will be practiced during the workshop. Students will subsequently choose a topic (provided by senior researchers) on which they will write a research proposal during the second-year Research Grant Writing Course (see description of PSY5112).
Goals	Knowledge of: Opportunities for funding, how grants can be acquired, grant writing skills.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignments Lecture(s)
Assessment methods	Attendance Final paper
Key words	funding possibilities, grant applications, proposal writing

PSY4110 Scientific Writing will be offered in all RM specialisations. Offering times vary according to RM specialisation:
CN: Period 5
NE: Period 5
NP: Period 5
FN: Period 1
PP: Period 1

Title	**Scientific Writing**
Period	5
Code	PSY4110
ECTS credits	1
Organisational unit	Maastricht University Language Centre
Coordinator	Alice Wellum
Descriptions	The course is delivered in a series of three lectures, interspersed with three tutorials, during which students produce and revise a short research proposal or research article. The lectures aim to cover the broader principles of scientific writing (including clarity/readability, structure and coherence). It also covers the ethical issues surrounding the production of scientific texts (for example, plagiarism and non-biased writing). Lectures are interactive; students are assigned with analysis and discussion tasks to complete. In tutorials students apply the principles in the linguistic sense and discover how these apply to their own writing. In particular, the 'doors and windows' (abstracts, introductions, hypotheses and discussions) of scientific papers are analysed for their linguistic and stylistic content. In the tutorials, students develop the language awareness and critical skills required to review their own work as well as that of their peers. Individualised feedback on parallel block assignments is given at the end of the course by the instructor.
Goals	Knowledge of: Principles of scientific writing, conventions in scientific writing, the structure of scientific texts, ethics in scientific writing, plagiarism, editing skills, language in scientific writing, academic writing style, coherence in scientific writing, reporting sources.
Instruction language	EN
Prerequisites	
Recommended literature	Literature is provided in the course materials.
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Research Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	scientific writing, research proposal, empirical research article, literature review, peer review, language awareness.

*PSY4233 is the same for CN and **NE.***

Title	**Methods of Deactivation**
Period	3
Code	PSY4233
ECTS credits	1
Organisational unit	Cognitive Neuroscience (FPN)
Coordinators	Teresa Schuhmann, Peter De Weerd
Descriptions	In three consecutive practical training sessions, students acquire direct hands-on experience with non-invasive magnetic brain stimulation. Students learn how to use the brain stimulator devices, how to evoke muscle responses and how to induce visual experiences. Students act as both the experimenter, applying the brain stimulation, and the participant, receiving the magnetic pulses. Practical I: Technical Introduction/Motor Thresholds/Motor Excitability Practical II: TMS-induced Visual Experiences (phosphenes) Practical III: TMS Neuronavigation (frameless stereotaxy) There are a variety of ways in which activity in a brain region can be prevented or influenced. Some studies use anatomical lesion methods (in animals), while others use reversible methods such as cooling, and pharmacological or genetic manipulations in animals, or trans-cranial magnetic stimulation (TMS) in human subjects. The training will end with a lecture that provides an overview of these different methodologies, including a discussion of the advantages and limitations of the different techniques and of the issues related to data interpretation.
Goals	Knowledge of: Trans-cranial magnetic stimulation, application of TMS, motor threshold determination, phosphene threshold determination, Neuronavigation, cooling, various other deactivation methods.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Assignment(s) Lecture(s) Skills Training(s)
Assessment methods	Attendance Observation
Key words	Trans-cranial Magnetic Stimulation, Non-invasive Brain Stimulation, fMRI-guided Neuronavigation

Title	**Neuroeconomics Meetings**
Period	4-6
Code	PSY4731
ECTS credits	1.5
Organisational unit	Department of Economics (SBE)
Coordinator	Alexander Vostroknutov
Descriptions	The neuroeconomics meetings are organised as seminars where students and internal and external junior and senior researchers will present and discuss basic and advanced research and research methods in neuroeconomics. In each meeting presentations will be given and presentations will focus in depth on research ideas in, and methods of, Neuroeconomics. Each meeting will be followed by active discussion. The meetings will take place on a bi-weekly basis. It is only compulsory in periods 4-6 of the first year but is also highly recommended for second year students.
Goals	Knowledge of: Key research domains in neuroeconomics, critical assessment of research projects, critical assessment of published research, interaction with other students and more senior researchers.
Instruction language	EN
Prerequisites	
Recommended literature	Glimcher et al. (2009). Neuroeconomics: Decision making and the brain, Academic Press; Scientific papers.
Teaching methods	Lecture(s) Presentation(s) Assignment(s)
Assessment methods	Attendance Presentations
Key words	basic knowledge neuroeconomics, advanced knowledge neuroeconomics

Electives

The following electives will be offered in all RM specialisations.

Title	**Elective: Course**
Period	throughout
Code	PSY4156
ECTS credits	Variable
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students can attend a course offered by an RM specialisation or a course from a regular master's programme at Maastricht University (local courses) or a course that is organised at a different university in The Netherlands or abroad (external courses). The content, format and organisation of local courses are described in this catalogue or in the course descriptions of other UM master's programmes. The content, format and organisation of external courses are determined by the host university. Elective courses do not overlap with required RM courses, but instead offer new knowledge and insights. Enrollment in an elective course is subject to approval by the Course Instructor as well as the RM Electives Coordinator. There is no limit to the number of electives courses that may be taken, but elective courses do not substitute for mandatory courses.
Goals	Knowledge of: Extracurricular interests, broadening academic scope, taking specialised courses.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Presentation(s) Skills Training(s)
Assessment methods	Attendance Computer test Final paper Observation Oral exam Participation Portfolio Presentation Take home exam Written exam
Key words	electives, external courses, external workshops

Title	Elective: Review
Period	throughout
Code	PSY4157
ECTS credits	3
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students write a critical literature review based on a specialised topic, under the supervision of a member of the scientific staff of Maastricht University. Students take the initiative to locate and arrange a supervisor for the review. The review topic, content and format will be determined by mutual agreement between student and supervisor. The review topic is also subject to approval by the RM Electives Coordinator. Students are expected to devote 84 hours to the Elective: Review. Each student may complete maximally one Elective: Review course The Elective: Review course must be completed and assessed prior to the start of the internship.
Goals	Knowledge of: Extracurricular interests, specialisation on topic of interest, supervised scientific writing, literature review.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Paper(s)
Assessment methods	Final paper
Key words	elective, review paper, paper assignment, literature review, writing assignment

Title	Elective: Research
Period	throughout
Code	PSY4158
ECTS credits	3
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students can participate in (parts of) an empirical research project that is conducted and supervised by a member of the FPN or FHML scientific staff. Students can apply for an available project from the list of project descriptions; available on the 'RM Electives' section on EleUM, which is published and updated in December of each year. The application procedure is also described on the 'RM Electives' section on EleUM. Students who are selected to participate in a research elective may assist in designing the experiment or observational study, acquire empirical data, be trained in using measurement equipment, analyse empirical data, or take part in other parts of the research project. Students must write a short research report of maximally 5 pages about the practical experience obtained. Students are expected to spend 84 hours on the Elective: Research course, which includes time spent on practical work and the research report. The principal investigator of the project will supervise the practical work and grade the research report. Each student may complete maximally one Elective: Research course. The Elective: Research course must be completed and graded before the start of the internship.
Goals	Knowledge of: Planning or designing empirical research, empirical data analysis, writing research report, quantitative methods, conducting research, skill learning of data acquisition techniques, functioning in a research team.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Lecture(s) Paper(s) Patient contact PBL Presentation(s) Research Skills Training(s) Work in subgroups
Assessment methods	Final paper Participation
Key words	elective, practical research, empirical research

Research Internship and Master's Thesis

1. ***PSY5107 Research Proposal, PSY5102 Research Internship and PSY5103 Master's Thesis -> for [CN, NE, FN->50 credits] and [NP and PP->30 credits]****. Internship coordinators are different per specialisation.*

50 credits apply to: CN, NE and FN and for the NP student that only chooses a research internship (not including the clinical part)

The NP student that chooses the combined internship (Research + Clinical) will obtain 30 credits for the Research Proposal + Research Internship + Master's Thesis + 20 credits for Clinical Internship, Research Proposal and Minor's Thesis. The combined version is compulsory to PP students.

2. Clinical Internship, Research Proposal and Minor's Thesis PSY5104, PSY5108, and PSY5105 Are the same for NP and PP*. Only the internship coordinators differ from each other.*

Title	**Research Proposal, Research Internship and Master's Thesis**
Period	2-6
Code	PSY5107, PSY5102, and PSY5103
ECTS credits	**30** ECTS (1, 19, and 10, respectively) for RM PP students and for RM NP students who choose to conduct both a research and a clinical internship (plus minor's thesis). The total research internship will be assigned 30 credits: 20 credits for the research activities, including the research proposal (1 credit; graded pass/fail) and the practical execution of the internship (19 credits; graded assessment), and 10 credits (graded assessment) for the master's thesis. **50 (1, 35, and 14, respectively)** for RM CN, NE, FN, NP students who do *not* complete a clinical internship and minor's thesis. The total research internship will be assigned 50 credits: 36 credits for the research activities, including the research proposal (1 credit; graded pass/fail), and the practical execution of the internship (35 credits; graded assessment) and 14 credits (graded assessment) for the master's thesis.
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Sandra Mulkens
Descriptions	The second part of the second year of the research master's programme is devoted to conducting a research internship. As a result of the many international research contacts that faculty members have established, a substantial number of students will conduct their research internship abroad. Students start their internship with the writing of a research proposal. Students finish the master's programme by writing a thesis based on their internship research project. The internship can be undertaken at Maastricht University or at external research institutes. In all cases, a student's research proposal and master's thesis will be evaluated by two assessors. At least one of these assessors must be a member of the Faculty of Psychology and Neuroscience (FPN) or the Faculty of Health, Medicine and Life Sciences (FHML). The other assessor might be a (senior) researcher at, for example, the institute where a student collected the data. A detailed guide on research internships and the master's

	thesis can be found on EleUM > Students Research Master Faculty of Psychology and Neuroscience > internships. - RM Cognitive Neuroscience Internships Coordinator: Amanda Kaas, Cognitive Neuroscience (FPN), Phone: (0)43 38 82172, 55 Oxfordlaan, Room 2.019, Email: a.kaas@maastrichtuniversity.nl - RM Neuroeconomics Internships Coordinator: Amanda Kaas, Cognitive Neuroscience (FPN), Phone: (0)43 38 82172, 55 Oxfordlaan, Room 2.019, Email: a.kaas@maastrichtuniversity.nl - RM Fundamental Neuroscience Internships Coordinator: Pilar Martinez, Psychiatry and Neuropsychology (FHML), Phone: (0)43 38 81042, 40 Universiteitssingel West, Room 2.574, Email: p.martinez@maastrichtuniversity.nl - RM Neuropsychology Internships Coordinator: Caroline van Heugten, Neuropsychology and Psychopharmacology (FPN), Phone (043) 38 84213, 40 Universiteitssingel East, Room 2.736, Email: caroline.vanheugten@maastrichtuniversity.nl - RM Psychopathology Internships Coordinator: Nicole Geschwind, Clinical Psychological Science (FPN), Phone (043) 38 81608, 40 Universiteitssingel East, Room 2.767, Email: Nicole.geschwind@maastrichtuniversity.nl
Goals	Knowledge of: Conducting a (supervised) empirical research project and summarising the research and findings in the form of a master's thesis.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Paper(s) Patient contact Research Skills Working visit(s)
Assessment methods	Attendance Final paper Observation Participation
Key words	internship, research, master's thesis

Specialisation in Fundamental Neuroscience (FN)

The specialisation in Fundamental Neuroscience provides students with both the theoretical background and practical experience of researchers at the interface between neuroscience and psychology. The other specialisations within the research master's programme offer a formal education in brain imaging at a macro level (observing brain activity), as well as neuropsychology (brain-behaviour relationships) and psychopathology (mental health). Fundamental Neuroscience adds the cellular micro level (investigations into single brain cells) and offers interdisciplinary cross-integration in a neuroscience context. The focus is on acquiring the molecular biological (e.g. proteomics, genomics), neuroanatomical (e.g. immunocytochemistry), electrophysiological (e.g. EEG, ERP) and behavioural techniques (e.g. rodent and human tests) necessary for preclinical basic research. In addition, the specialisation provides an in-depth study into state-of-the-art knowledge of physiological and pathophysiological mechanisms underlying psychological, psychiatric and neurological disorders (e.g. affective disorders, cognitive disorders, motor disorders). Within this context, the role of the emerging fields of neuroinflammation and pain is also studied. Main research topics include cell signalling, brain plasticity, neurodegeneration, regeneration, genetics and epigenetics in a translational setting (in both animal and human). Teaching is undertaken by a multidisciplinary team from the Faculty of Psychology and Neuroscience (FPN) and, in particular, the School for Mental Health and Neuroscience of the Faculty of Health, Medicine and Life Sciences (FHML). The staff consists of professionals from relevant disciplines and includes biological psychologists, molecular biologists, neuropsychologists, neurobiologists, neuroanatomists, psychopharmacologists, immunologists and psychiatrists. The specialisation in Fundamental Neuroscience trains researchers to be equipped for investigations into the underlying fundamental molecular mechanisms of psychological and psychiatric disorders in academic as well as industrial settings.

Fundamental Neuroscience Coordinator:
Jos Prickaerts, Psychiatry and Neuropsychology (FHML), Phone +31(0)43 38 81168,
40 Universiteitssingel West, Room 2.567, Email: jos.prickaerts@maastrichtuniversity.nl

Overview RM in Fundamental Neuroscience (FN)

Period	Research Master's in Fundamental Neuroscience (FN) Year 1 (2013-2014): Jos Prickaerts
Period 0, 02-09-2013 - 06-09-2013	Introduction week PSY 4950 PBL training for non-UM students*
Period 1, 09-09-2013 - 25-10-2013	**Core courses: **** **PSY4312***** Introduction to Psychology (5 credits): Eef Theunissen **PSY4313** Neuroanatomy (5 credits): Jochen De Vry *Practical training*: PSY4344 Mammalian macro- and microscopical neuroanatomy: Jochen De Vry **PSY4311***** Introduction to Molecular Biochemical Techniques (5 credits): Jörg Mey, Pilar Martinez-Martinez *Practical training:* PSY4341 Genes and Proteins: Jörg Mey, Pilar Martinez-Martinez **PSY4106** Advanced Statistics I (total of 3 credits): Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers
	Workshop: **PSY4110** Scientific Writing (1 credit): Alice Wellum
Period 2, 28-10-2013 - 20-12-2013	**Core courses:** **PSY4314** Neurodegeneration (4 credits): Fred van Leeuwen *Practical training*: PSY4351 Immunocytochemical staining of human postmortem tissue and evaluation of the staining using the multihead microscope: Fred van Leeuwen **PSY4315** Biopsychological Neuroscience (4 credits): Jos Prickaerts *Practical training:* PSY4343 Neuropsychological Experiment: Jos Prickaerts **PSY4106** Advanced Statistics I: Nick Broers *Practical training*: PSY4119 SPSS and Lisrel: Nick Broers
	Workshop: **PSY4339** Behavioural Tests and Models (1 credit): Jos Prickaerts
Christmas break	
Period 3, 06-01-2014 - 31-01-2014	**Core courses:** **PSY4336** Neuroplasticy and Pain (5 credits): Bert Joosten *Practical training*: PSY4346 Cell culture: Bert Joosten **PSY4106** Advanced Statistics I (total of 3 credits): Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers **PSY4107** Advanced Statistics II (total of 3 credits): Gerard van Breukelen *Practical training* PSY4117 SPSS: Gerard van Breukelen
	PSY4100 Colloquia (total of 1 credit): Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Period 4, 03-02-2014 t/m 04-04-2014	**Core courses:** **PSY4320** Neurological Neuroscience (5 credits): Govert Hoogland *Practical training*: PSY4347 Genotyping your NMDA receptor: Govert Hoogland **PSY4321** Psychiatric Neuroscience (5 credits): Daniel van den Hove, Gunter Kenis *Practical training*: PSY4352 Western Blotting: Daniel van den Hove, Gunter Kenis **PSY4107** Advanced Statistics II: Gerard van Breukelen *Practical training*: PSY4117 SPSS: Gerard van Breukelen
	Workshop: **PSY4332** Surgery for Intractable Movement and Psychiatric Disorders (1 credit): Yasin Temel **PSY4337** Commercialising Science and Technology (total of 2 credits): Jan Cobbenhagen

	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Period 5, 07-04-2014 t/m 06-06-2014	**Core courses:** **PSY4317** Neuroimmunology and Inflammation (5 credits): Mario Losen *Practical training*: PSY4349 Neuroinflammation: Mario Losen **PSY4338** Laboratory Animal Science Course (3 credits): Saskia Seeldrayers *Practical training:*PSY4350 Handling animals and small experimental manipulations: Saskia Seeldrayers **PSY4107**Advanced Statistics II: Gerard van Breukelen *Practical training*: PSY4117 SPSS: Gerard van Breukelen
	Workshop: **PSY4337** Commercialising Science and Technology: Jan Cobbenhagen **PSY4372** Functional Brain Imaging (2 credits): Vincent van de Ven
	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Period 6, 10-06-2014 t/m 04-07-2014	**Workshop:** **PSY4112** Research Grant Writing Workshop (1 credit): Eef Theunissen **PSY4371** Psychiatric Epidemiology (1 credit): Wolfgang Viechtbauer
	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson

**Students from Erasmus Rotterdam receive an exemption for PBL training*
*** Electives: 3 credits, throughout year 1:* Vincent van de Ven
**** PSY4311: This introduction course is required for students with a psychological background. The parallel course PSY4312 is required for students with a biological background. Thus, students enroll in either PSY4311 or PSY4312. The course coordinators of both courses evaluate which of the two courses a student is required to take.*

PSY4312: This introduction course is required for students with a biological background. The parallel course PSY4311 is required for students with a psychological background. Thus, students enroll in either PSY4311 or PSY4312. The course coordinators of both courses evaluate which of the two courses a student is required to take.

Period	**Research Master's in Fundamental Neuroscience (FN) Year 2 (2014-2015)**
Period 1, To be announced in 2013	**Core course:** **PSY5112** Research Grant Writing Course (3 credits): Eef Theunissen **PSY5311** Electrophysiology: From Single Cell Activity to 'Cognitive' Markers (4 credits): Anke Sambeth
	Skills training: **PSY4221** EEG and ERP (2 credits): Fren Smulders
	Workshop: **PSY5331** Molecular Genetics (1 credit): Gunter Kenis
32 weeks	**PSY5107 Research Proposal, PSY5102 Research Internship & PSY5103 Master's Thesis** (50 credits) Sandra Mulkens

Colloquia

PSY4100 Colloquia will be offered in all RM specialisations.

Title	**Colloquia**
Period	3-6
Code	PSY4100
ECTS credits	1
Organisational unit	Cognitive Neuroscience (FPN), Department of Economics (SBE), Psychiatry and Neuropsychology (FHML), Neuropsychology and Psychopharmacology (FPN)
Coordinator	Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Descriptions	Colloquia are presented per specialisation (CN, NE, FN, NP and PP) by senior researchers from the UM faculties or visiting guest lecturers. Each colloquium focuses in depth on one of a wide range of topics, with issues transcending the courses and specialisations. Each colloquium lecture will be followed by active discussion, prepared and chaired by the lecturer (the UM host may fill this role for guest lecturers). A total of nine colloquia will be offered during the first year.
Goals	Knowledge of: Key research domains from different specialisations, interdisciplinary research, interacting with students from different specialisations.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Lecture(s)
Assessment methods	Attendance
Key words	interdisciplinary knowledge

Core courses

Title	**Introduction to Molecular Biochemical Techniques**
Period	1
Code	PSY4311
ECTS credits	5
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Jörg Mey, Pilar Martinez-Martinez
Descriptions	This course focuses on fundamental biological concepts including cellular organisation, DNA, RNA and proteins. Additionally, this course provides students with a conceptual understanding of the most important concepts in molecular neuroscience. Students are made familiar with selected aspects of molecular biology that provide the non-specialist with the principles for understanding the structure and functional relationships of molecular biology techniques.
Goals	Knowledge of: Cell biology, molecular biology, biochemistry, regulation of gene and protein transcription, research methods in molecular cell biology and vocabulary (e.g. scientific and technical words). Skills: acquisition of basic laboratory techniques, including preparation of buffers, working under sterile conditions, RNA extraction, conventional PCR and Western blot, literature search, preparation of oral presentations, goal oriented group discussion of research problems.
Instruction language	EN
Prerequisites	This introductory course is required for students with a psychological background. The parallel course PSY4312 is required for students with a biological background. Thus, students enroll in either PSY4311 or PSY4312. The course coordinators of both courses evaluate which of the two courses a student is required to take.
Recommended literature	DNA Science: a first edition (2nd ed.). New York: CSHL press.
Teaching methods	Lecture(s) Paper(s) Presentation(s) Research Skills
Assessment methods	Attendance Presentation Written exam
Key words	RNA, DNA, protein, ELISA, RIA, PCR, Western blot

The practical training associated with PSY4311 Introduction to Molecular Biology and Biochemistry is PSY4341 Practical training: Genes and Proteins.

Title	**Practical training: Genes and Proteins**
Period	1
Code	PSY4341
ECTS credits	-
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Jörg Mey, Pilar Martinez-Martinez
Descriptions	This practical training provides students with a practical understanding of the most important techniques in molecular neuroscience. Students are made familiar with selected aspects of molecular biology that provide the non-specialist with the principles for understanding the structure and functional relationships of molecular biology techniques. This includes DNA manipulation, cloning, RNA isolation and characterisation, analysis of expression, copy DNA (cDNA) synthesis and Real-Time-PCR (RT-PCR). Students learn to purify native proteins and to produce recombinant proteins as well as to perform a radioimmunoassay (RIA) and an enzyme-linked immunosorbent assay (ELISA).
Goals	Knowledge of: Current biotechniques in research laboratories.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Paper(s) Research Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper/Lab report Written exam
Key words	laboratory techniques, RNA, DNA, protein, ELISA, RIA, PCR, Western blot

Title	Introduction to Psychology
Period	1
Code	PSY4312
ECTS credits	5
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eef Theunissen
Descriptions	In this course students acquire an overview of human cognitive psychology. A selected number of psychological themes are covered, surveying knowledge on how humans act and interact, how they differ from each other, how they reason and speak and how they 'know' things. The course focuses on 'normal' human performance, but malfunction and psychopathology are also covered. The major emphasis of the course is on understanding human behaviour by means of cognitive, non-biological theories and paradigms.
Goals	Knowledge of: Social psychology, motivation, perception, personality, behaviour, consciousness, psychological assessment, cognitive psychology.
Instruction language	EN
Prerequisites	This introductory course is required for students with a biological background. The parallel course PSY4311 is required for students with a psychological background. Thus, students enroll in either PSY4311 or PSY4312. The course coordinators of both courses evaluate which of the two courses a student is required to take.
Recommended literature	Journal articles, book chapters.
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Presentation(s)
Assessment methods	Attendance Final paper
Key words	introduction, behaviour, cognition, psychology

Title	**Biopsychological Neuroscience**
Period	2
Code	PSY4315
ECTS credits	4
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Jos Prickaerts
Descriptions	This course provides an in-depth description of biopsychological concepts that are relevant to the field of neuroscience. It covers elements from functional neuroanatomy, neurophysiology and psychopharmacology, as applied to brain and behaviour research. Major emphasis will be placed on the macro- and microanatomy of the brain and on molecular, i.e. neurochemical and neurobiological, mechanisms related to neurotransmission, hormones and drug action. With respect to 'function', a detailed description is given of processes underlying sexual behaviour, affective behaviour, motivated behaviour and cognitive processes. The course also encompasses practical training in a neuropsychological experiment in which students participate to investigate the link between biology and psychology. Each student analyses the data collected during the experiment and makes a poster of the results.
Goals	Knowledge of: Biology underlying fundamental psychological processes.
Instruction language	EN
Prerequisites	
Recommended literature	Papers from scientific journals and book chapters from books are provided.
Teaching methods	Assignment(s) Paper(s) PBL Presentation(s) Skills
Assessment methods	Attendance Final paper Presentation
Key words	neurotransmitters, hormones, signal transduction, memory, affect, motivation

The practical training associated with PSY4315 Biopsychological Neuroscience is PSY 4343 Practical training: Neuropsychological Experiment

Title	**Practical training: Neuropsychological Experiment**
Period	2
Code	PSY4343
ECTS credits	-
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Jos Prickaerts
Descriptions	Students participate in a neuropsychological experiment which investigates the link between biology and psychology. Each student analyses the data collected during the experiment and makes a poster based on the results.
Goals	Knowledge of: Neuropsychological experiment, data analysis, making poster.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Research
Assessment methods	Attendance Participation
Key words	neuropsychological experiment, poster

Title	**Neuroanatomy**
Period	1
Code	PSY4313
ECTS credits	5
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Jochen De Vry
Descriptions	It is essential to have a basic knowledge of the brain anatomy when working in the field of molecular neuroscience. The aim of the course is to acquaint students with the neuroanatomical terminology and provide insight into the spatial and functional organisation of the brain.. Many specific brain areas can be linked to particular functions. Thus, knowledge of the brain anatomy and its main functions allows direct linkage of specific neurological or psychiatric disorders to particular brain areas. In addition, various other methods of modern brain imaging (both *in vivo* and *ex vivo*) are discussed. The course also encompasses some practical training in which students participate in different practicals to study human, sheep and rat macro and micro brain anatomy.
Goals	Knowledge of: Basic human neuroanatomy, brain imaging, microglia and macroglia, neurons, blood brain barrier, ventricular system, brain vasculature, immunohistochemistry.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Assignment(s) Lecture(s) PBL Skills Training(s)
Assessment methods	Attendance Written exam
Key words	neuroanatomy, glia, neurons, blood brain barrier, ventricular system, immunohistochemistry

The practical training associated with PSY4313 Neuroanatomy is PSY4344 Practical training: Mammalian Macro- and Micro-scopical Neuroanatomy

Title	**Practical training: Mammalian Macro- and Micro-scopical Neuroanatomy**
Period	1
Code	PSY4344
ECTS credits	-
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Jochen De Vry
Descriptions	Students participate in different practical training sessions to study human, sheep and rat macro and micro brain anatomy. *Practical training 1*: Students study human brain anatomy macroscopically using plastic brain models and plastinated human brains; *Practical training 2*: Students dissect a sheep brain and study mammalian brain anatomy. Special attention is paid to the limbic system and the basal ganglia; *Practical training 3:* Students stain rat brain slices using histochemistry and multi-colour fluorescent labelling with antibodies. Afterwards, these slices are studied microscopically to gain insight in the rat brain anatomy at a cellular level.
Goals	Knowledge of: Human neuroanatomy, sheep neuroanatomy, rat neuroanatomy, microscopy, immunohistochemical staining techniques
Instruction language	EN
Prerequisites	
Recommended literature	Book chapters.
Teaching methods	Skills Training(s)
Assessment methods	Attendance
Key words	neuroanatomy, immunohistochemistry, human, rat, sheep

Title	Neurodegeneration
Period	2
Code	PSY4314
ECTS credits	4
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Fred van Leeuwen
Descriptions	This course provides an in-depth description of neurodegenerative processes that occur during the development of neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease and Huntington's disease, which are some of the most debilitating disorders that a person can have. Although clinical manifestations of these neurodegenerative diseases are different, they share common features in neuropathology and in the underlying molecular mechanisms. Since they share inclusions (e.g. plaques and tangles) with accumulations of aberrant proteins, the modern terminology for these diseases is conformational diseases. The aim of this course is to gain insight into the mechanisms of neurodegenerative processes, such as the deposition of aggregated proteins, the loss of neurons and synapses, alterations in neurogenesis and inflammatory processes, alterations in metabolic/oxidative state and discussion over whether these are the cause or consequence of the disease. Moreover, this course covers the influences of genetic and environmental factors on disease progression and strategies for therapy. Major emphasis is on the molecular, i.e. the neurochemical and neurobiological mechanisms that affect disease progression. Transgenic animal models as well as brain cell cultures are used to study these.
Goals	Knowledge of: Tauopathies: Alzheimer's disease(AD), Frontal tempolar dementia, Progressive supranuclear palsy, Pick's disease, Argyrophilic grain disease, Synucleinopathies: Parkinson disease, Multisystem atrophy. Polyglutamine diseases: Huntington,and Spinocerebellar ataxias. Mixed pathogies; Diffuse Lewy body disease, Number of affected persons; World wide, USA and The Netherlands, early and late onset AD, Aging, Amyloid beta cascade hypothesis, amyloid precursor protein, Presenelin 1 and 2, Tau, ubiquitin, ApoE polymorphism, risk factors, oxidative stress, loss of synapses, energy metabolism, plaques, tangles, neuronal loss, gliosis, cytoarchitecture of hippocampus and neocortex.
Instruction language	EN
Prerequisites	
Recommended literature,	Swaab, D.F., Alzheimer onderzoek: het begin van een beter einde, David de Wied Lezing 2000 (for starters only!). Querfurth, H.W., Mechanisms of Alzheimer's disease. The New England Of Medicine.
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Presentation(s) Research Skills

	Training(s) Work in subgroups
Assessment methods	Attendance Presentation Written exam
Key words	Tauopathies (e.g. Alzheimer's), Synucleinopathies (e.g. Parkinson), Polyglutamine diseases (Huntington), Neurodegenerative mechanisms

The practical training associated with PSY4314 Neurodegeneration is PSY 4351 Practical training: Immunocytochemical Staining of Human Postmortem Tissue and Evaluation of the Staining Using the Multihead Microscope.

Title	**Practical training: Immunocytochemical Staining of Human Postmortem Tissue and Evaluation of the Staining Using the Multihead Microscope**
Period	2
Code	PSY4351
ECTS credits	-
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Fred van Leeuwen
Descriptions	An immunocytochemical procedure will be followed to label plaques (ABeta) and neurofibrillary tangles (abnormal Tau) and to the staining will be evaluated afterwards using the multihead microscope.
Goals	Knowledge of: Collecting Postmortem tissue, fixation, paraffin, immunocytochemical staining, recognition of neuropathological hallmarks in Tauopathies: Alzheimer's disease(AD); plaques, tangles Synucleinopathies: Parkinson disease, Multisystem atrophy. Polyglutamine diseases: Huntington,and Spinocerebellar ataxias. Mixed pathogies; Diffuse Lewy body disease, early and late onset AD, Amyloid beta cascade hypothesis, amyloid precursor protein, Tau, ubiquitin, GFAP, gliosis, cytoarchitecture of hippocampus and neocortex.
Instruction language	EN
Prerequisites	
Recommended literature	Handbooks on practical immunohistochemistry (on EleUM).
Teaching methods	Lecture(s) PBL Research Skills Training(s)
Assessment methods	Attendance Observation Take home exam Written exam
Key words	Tauopathies (e.g. Alzheimer's), synucleinopathies (e.g. Parkinson), polyglutamine diseases (Huntington), neurodegenerative mechanisms

PSY4106 Advanced Statistics I will be offered in all RM specialisations.

Title	**Advanced Statistics I**
Period	1-3
Code	PSY4106
ECTS credits	3
Organisational unit	Faculty Office (FPN)
Coordinator	Nick Broers
Descriptions	The course consists of six units. In the first four units, participants will be given an in-depth training in the following standard statistical methods: factorial ANOVA for between-subject designs, analysis of covariance (ANCOVA), multivariate ANOVA (MANOVA), discriminant analysis and multiple linear regression. Students are assumed to have background knowledge of balanced two-way factorial ANOVA and multiple regression. These methods will be briefly reviewed. The following advanced topics will then be covered: unbalanced factorial designs, contrast analysis, interaction, simple slope analysis, dummy coding, centring covariates, different coding schemes, collinearity and residuals checks and data transformation. The distinction between confounders and mediators in regression and ANCOVA is also discussed, forming a bridge from regression to structural equations modelling (SEM). The latter is an advanced multivariate method that is gaining importance in psychology but still requires special software (such as Lisrel, EQS, AMOS or Mplus). SEM is introduced in two units, starting with causal modelling and mediation analysis in cross-sectional research and then extending to longitudinal research and latent variables (factors). Special attention is given to identifying models, model equivalence, global and local goodness of fit indices, parsimony, model modification and cross-validation. Some concepts from matrix algebra are needed for SEM, and these will be briefly discussed without going into technical detail.
Goals	Knowledge of: Oneway analysis of variance, contrast analysis, unbalanced designs, multivariate analysis of variance, discriminant analysis, linear regression with interaction terms, linear regression with dummy variables, data transformations, simple slope analysis, analysis of covariance, path analysis, structural equation modeling, confirmatory factor analysis, structural models with latent variables.
Instruction language	EN
Prerequisites	
Recommended literature	Diamantopoulos, A. (1994). Modelling with LISREL: A guide for the uninitiated. Journal of Marketing Management, 10, 105-136; Field, A. (2009). Discovering statistics using SPSS (3rd ed.). London: Sage; Howell, D.C. (2007). Statistical methods for psychology (6th ed.). Belmont (CA): Thomson/ Wadsworth; Kleinbaum, D.G., Kupper, L.L., Muller, K.E., & Nizam, A. (1998). Applied regression analysis and other multivariable methods

	(3rd ed.). Pacific Grove (CA): Brooks/Cole.
Teaching methods	Assignment(s) Lecture(s) Skills Training(s)
Assessment methods	Attendance Written exam
Key words	univariate analysis of variance, multivariatie analysis of variance, regression analysis, structural equation modeling

The practical training associated with PSY4106 Advanced Statistics I is PSY4119. Practical training: SPSS and Lisrel will be offered in all RM specialisations.

Title	**Practical training: SPSS and Lisrel**
Period	1-3
Code	PSY4119
ECTS credits	-
Organisational unit	Faculty Office (FPN)
Coordinator	Nick Broers
Descriptions	In order to make practical use of the statistical models that form the topic of the Advanced Statistics course, researchers must make use of statistical software. This course will utilise the traditional SPSS program, but also the specialised LISREL software. LISREL is a statistical program that allows structural equations models to be tested.
Goals	Defining contrasts, building regression models, doing multivariate analyses, transforming data, testing simple slopes, creating and testing SEM models
Instruction language	EN
Prerequisites	
Recommended literature	Handouts given during practicals.
Teaching methods	Assignment(s) Training(s)
Assessment methods	Attendance
Key words	SPSS, LISREL, statistical software

PSY4107 Advanced Statistics II will be offered in all RM specialisations.

Title	**Advanced Statistics II**
Period	3-5
Code	PSY4107
ECTS credits	3
Organisational unit	Faculty Office (FPN)
Coordinator	Gerard van Breukelen
Descriptions	The course consists of seven units. The first three units cover classical repeated measures ANOVA for the one- and two-way within-subject design and the split-plot (between x within) design. Special attention is given to: a) the choice between multivariate and univariate data formats and method of analysis, and the sphericity assumption; b) the distinction between the within-subjects and between-subjects part of a split-plot ANOVA, and how to obtain both using regression analysis; c) the surprising consequences of including covariates into repeated measures ANOVA; and d) the choice between different methods of analysis for randomised versus non-randomised group comparisons. Subsequently, a further three units are devoted to mixed (multilevel) regression for nested designs and longitudinal studies. This mixed regression starts with a unit on marginal models for repeated measures as an alternative to repeated measures ANOVA in cases of missing data or within-subject covariates. Students are shown the pros and cons of various models for the correlational structure of repeated measures, such as compound symmetry and AR1. The second unit covers the random intercept model for repeated measures as a method to include individual effects in marginal models for longitudinal data (growth curves) or single trial analyses of lab data (response times, ERP, fMRI). Students learn how this can be combined with e.g. ARMA modelling to distinguish between interpersonal and intrapersonal outcome variation. The random intercept model will also be applied to a cluster randomised trial, i.e. an RCT where organisations like schools or companies instead of individuals are randomised. The third and last unit on mixed regression covers random slope models for longitudinal data (individual differences in change over time), single trial analysis (individual differences in stimulus effects) and multicentre trials (RCT within each of a number of organisations). Finally, the topic of optimal design, sample size and power calculations is introduced in a seventh unit.
Goals	Knowledge of: Repeated measures ANOVA for within-subject and split-plot (between x within) designs, including factorial designs and covariates in repeated measures ANOVA; Mixed (multilevel) linear regression with random effects and autocorrelation; Optimal design and sample size calculations for experimental and observational studies.
Instruction language	EN
Prerequisites	Good understanding of descriptive and inferential statistics at the elementary and intermediate level, including t-tests, factorial ANOVA and multiple linear regression. Skilled in the

	use of SPSS for statistical data analyses.
Recommended literature	Lecture handouts and a suitable book chapter or article.
Teaching methods	Assignment(s Lecture(s Training(s)
Assessment methods	Attendance Written exam
Key words	within-subject designs, repeated measures ANOVA, mixed (multilevel) regression, marginal versus random effects models, optimal design, sample size, power

The practical training associated with PSY4107 Advanced Statistics II is PSY4117. Practical training SPSS will be offered in all RM specialisations.

Title	**Practical training: SPSS**
Period	3-5
Code	PSY4117
ECTS credits	-
Organisational unit	Faculty Office (FPN)
Coordinator	Gerard van Breukelen
Descriptions	This practical training forms part of the PSY4107 Advanced Statistics II course. The practical consists of six sessions in the computer rooms in which SPSS procedures for repeated measures and multilevel data are practised. The goal is to understand how proper analyses of such data can be done using SPSS.
Goals	Knowledge of: How to run with SPSS: repeated measures ANOVA for within-subject and split-plot (between x within) designs, including factorial designs and covariates; How to run SPSS for: mixed (multilevel) linear regression with random effects and autocorrelation.
Instruction language	EN
Prerequisites	Good understanding of descriptive and inferential statistics at the elementary and intermediate level, including t-tests, factorial ANOVA and multiple linear regression. Skilled in the use of SPSS for statistical data analyses.
Recommended literature	Field A (2009). Discovering statistics with SPSS (3rd ed.). London: Sage, plus the mandatory assignments on EleUM. For the theoretical part of course PSY4107 lecture handouts and suitable book chapters and articles are used.
Teaching methods	Training(s)
Assessment methods	Attendance
Key words	within-subject designs, repeated measures ANOVA, mixed (multilevel) regression, marginal versus random effects models

Title	**Neuroplasticity and Pain**
Period	3
Code	PSY4336
ECTS credits	5
Organisational unit	Anesthesiology (FHML)
Coordinator	Bert Joosten
Descriptions	Acute (physiological) nociceptive pain is protective and helps us to deal with potentially threatening or damaging environmental stimuli. However, pain is not always considered adaptive and beneficial to our survival. Pain can become chronic and can also become very resistant to pain medicine in the present drug arsenal. Finding out which molecular and cellular mechanisms are involved in the transition from acute to chronic pain and/or the ability to mediate chronic pain itself is expected to result in an improved pain management as it allows for mechanism-based treatment approaches. This course covers the basic understanding of nociceptive signalling. Moreover, it will be discussed how nociception can be modulated. Conditions of pain amplification will be then be discussed with particular attention to neuropathic pain and post-surgical pain. Peripheral and central sensitization will be discussed as processes of molecular neuroplasticity, which lays the foundation for amplification of nociceptive signalling under pathological conditions. In the last decade it has become clear that neuroinflammation and particularly the activation of non-neuronal cells such as central glia (microglia and astrocytes) contribute largely to amplification of pain (e.g. chronic pain) during such pathological conditions. Glial activation, via release of pro-inflammatory factors and other neuroactive mediators, is an important contributor to neuroplasticity and includes central sensitization. A better understanding of processes of neuroinflammation and neuroplasticity in conditions of chronic pain are thought to aid in development of novel, more effective pain therapies. This course is subdivided into three parts. The first part focuses on nociceptive and inflammatory pain, discussing processes of neuroplasticity and pain, with special attention paid to the cellular and molecular nature of peripheral and central sensitization. The second part covers chronic pain conditions and underlying cellular and molecular mechanisms. The third part aims to integrate the knowledge obtained in the first two parts of the course in a translational way (bench-to-bedside-and-back-to-bench approach).
Goals	Knowledge of: Nerve injury and neuroinflammation, cellular and molecular pain mechanisms, cellular and molecular plasticity, peripheral and central sensitization, pain management, cell culture techniques, translational research.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Presentation(s) Skills

	Training(s)
Assessment methods	Attendance Final paper Observation Participation Presentation Written exam
Key words	pain conditions, cellular and molecular neuroplasticity, neuroinflammation, translational research

The practical training associated with PSY4336 Neuroplasticity and Pain is PSY4346 Practical training: Cell Culture

Title	**Practical training: Cell Culture**
Period	3
Code	PSY4346
ECTS credits	-
Organisational unit	Anesthesiology (FHML)
Coordinator	Bert Joosten
Descriptions	During this practical session, students acquire skills in cell culturing. To this end, a murine cell line will be used to assess toxicity of materials used as treatments of neuropathic conditions. Moreover, demonstrations about animal models of pain, and behavioural tests to assess pain, are presented to students. Each student analyses data collected during the practical session and produces a short written report.
Goals	Knowledge of: Cell culture, animal models of pain, behavioural tests for pain assessment.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Presentation(s) Skills Training(s)
Assessment methods	Attendance
Key words	cell culture, pain models

Title	Psychiatric Neuroscience
Period	4
Code	PSY4321
ECTS credits	5
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Daniel van den Hove, Gunter Kenis
Descriptions	The main aim of this course is to gain insights into the molecular neurobiology of psychiatric disorders and how these phenotypes can be studied in animal models (i.e. the principle of translation). The first part of this course focuses on the psychobiology of stress, emotions and associated disorders such as depression and anxiety disorders. Chronic and/or excessive stress may lead to the development of psychiatric conditions such as depression and anxiety, diseases in which a patient shows inadequate coping associated with a severe disruption of daily life. A major challenge in research on stress and related disorders is to unravel the molecular basis of persistent changes in behaviour that explain the symptoms of mental illness and their (partial) reversal during treatment. A major focus during the course is on the limbic system, the sympathetic nervous system and the hypothalamo-pituitary-adrenal axis as key players of emotional regulation in health and disease. Furthermore, the roles of different neurotransmitter systems such as the serotonergic system will be discussed in depth. The second part of the course deals with the neurobiology of major psychotic disorders such as schizophrenia. In particular, this course addresses the molecular processes that influence psychosis-related cognitive domains from a translational point of view. Students will also study the mechanisms by which adverse environmental exposures de-regulate key brain structures that influence the mesocorticolimbic dopaminergic system - a core phenomenon in psychosis pathophysiology.
Goals	Knowledge of: Psychobiology of stress, neurobiology of psychiatric disorders, anxiety, anxiety disorders, panic disorder, major depression, psychosis, schizophrenia, molecular psychiatry, gene-environment (GxE) interactions, environmental exposure, functional neuroanatomy, (neuro)psychiatric (endo)phenotypes, animal models for psychiatric disorders, translational neuropsychiatry, the pathophysiology of mental disorders, hypothalamic-pituitary-adrenal axis, mesocorticolimbic system.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Presentation(s) Work in subgroups
Assessment methods	Attendance Final paper Presentation Written exam

Key words	stress, depression, anxiety disorders, panic disorder, schizophrenia, gene-environment (GxE) interactions

The practical training associated with PSY4321 Psychiatric Neuroscience is PSY4352 Practical training: Western Blotting

Title	**Western Blotting**
Period	4
Code	PSY4352
ECTS credits	-
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Daniel van den Hove, Gunter Kenis
Descriptions	The objective of this practical is to learn to work with *in-vitro* model systems and to use Western Blotting to measure protein levels; *In-vitro* evaluation of the neurotrophic properties of stress hormones. After an introduction, students will design their own small research project. During the entire course, students work on this project and conduct the necessary experiments. Students use human cell lines to examine the neuroplastic/toxic effects of stress hormones (e.g. cortisol) in relation to molecular biological changes. The induction of neurotrophic factor synthesis is determined by Western Blotting.
Goals	Knowledge of: Western blotting, cell culture, neuroplasticity, psychopharmacology, protein chemistry, psychobiology of stress, neurobiology of psychiatric disorders, anxiety, anxiety disorders, major depression, molecular psychiatry, environmental exposure, functional neuroanatomy, (neuro)psychiatric (endo)phenotypes, animal models for psychiatric disorders, translational neuropsychiatry, the pathophysiology of mental disorders.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Assignment(s) Lecture(s) Paper(s) Presentation(s) Research Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper Presentation
Key words	Western blot, stress, depression, anxiety disorders, neurotrophic factors

Title	**Neurological Neuroscience**
Period	4
Code	PSY4320
ECTS credits	5
Organisational unit	Neurosurgery/ Psychiatry and Neuroscience (FHML)
Coordinator	Govert Hoogland
Descriptions	Neurological disorders such as epilepsy and movement disorders (e.g. Parkinson's disease, Huntington's disease) arise from a primary structural/molecular lesion (e.g. trauma, disrupted brain development, gene defect) followed by a chronic process of neuronal network reorganisation. Once this process has reached a critical stage the patient will manifest clinically observable symptoms. Though drug therapy is the first choice in treating patients with neurological disorders, this introduces side effects and pharmacoresistance in a considerable number of patients. Hence, alternative treatment options are explored, some of which are established and some which are still in an experimental stage. Surgical treatment strategies aim at restoring the function of the pathologic neuronal network by i) electrical modulation of the network, ii) disrupting or isolating the pathologic network by resective surgery and iii) building new networks by gene therapy, stem cell transplantation or induction of cytogenesis. One of the challenges that this approach faces is the anatomical and functional demarcation of the pathologic network. As with any therapy, its efficacy depends on selecting suitable candidates, which implies a multidisciplinary workup. The course focuses on the underlying molecular mechanisms as well as the (lack of) rationale behind the treatment options. Students gain experience with the multidisciplinary workup and the molecular assays that are currently explored to characterise these disorders. The course also encompasses practical training in which students have to genotype their own NMDA receptor.
Goals	Knowledge of: Translational research approaches for neurological disorders including epilepsy and movement disorders.
Instruction language	EN
Prerequisites	
Recommended literature	Papers from scientific journals and book chapters from books.
Teaching methods	Lecture(s) PBL Skills
Assessment methods	Attendance Presentation Written exam
Key words	epilepsy, movement disorders, genetics, electrophysiology, functional neurosurgery

The practical training associated with PSY4320 Neurological Neuroscience is PSY4347 Genotyping your NMDA Receptor

Title	**Genotyping your NMDA Receptor**
Period	4
Code	PSY4347
ECTS credits	-
Organisational unit	Neurosurgery/ Psychiatry and Neuroscience (FHML)
Coordinator	Govert Hoogland
Descriptions	Students isolate their own DNA and use this in a restriction fragment polymorphism assay to analyse their individual NMDA genotype. The data is discussed in groups in the light of seizure susceptibility based on journal articles.
Goals	Knowledge of: Genotyping, data analysis.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Research
Assessment methods	Attendance Participation
Key words	genotyping, polymorphism, NMDA receptor

Title	**Neuroimmunology and Inflammation**
Period	5
Code	PSY4317
ECTS credits	5
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Mario Losen
Descriptions	Neuroimmunology is the study of interactions between the immune and the nervous systems. Immune mechanisms and inflammatory processes play an important role in maturation and aging during normal life span. Moreover, brain and spinal cord trauma, neurodegenerative brain diseases and autoimmune diseases involve activation of immune mechanisms and inflammation, which in turn contribute to disease development. This course explains the function of the immune system in general with a special focus on the immune privileged central nervous system. In particular, the course emphasises the role of inflammatory cells and proinflammatory molecules in Alzheimer's disease, multiple sclerosis, Parkinson's disease and mood disorders. A special focus is placed on the molecular basis of novel treatment approaches for these diseases and regulation of the inflammatory mediators in neurodegeneration. The course also encompasses a practical on neuroinflammation in which students learn to use different relevant biochemical assays.
Goals	Knowledge of: The immune system and its interaction with the nervous system in health and disease.
Instruction language	EN
Prerequisites	
Recommended literature	Janeway, C.A. Jr. et al. Immunobiology, The immune system in health and disease.
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Presentation(s) Skills Work in subgroups
Assessment methods	Attendance Final paper Presentation Written exam
Key words	neuroimmunology, inflammation, macrophages and microglia, B cells, T cells, dendritic cells, blood brain barrier (BBB)

Th practical training associated with PSY4317 Neuroimmunology and Inflammation is PSY4349 Practical training: Neuroinflammation

Title	**Neuroinflammation**
Period	5
Code	PSY4349
ECTS credits	-
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Mario Losen
Descriptions	Students participate in a neuroinflammation practical which consists of 3 training sessions: 1: PBMC isolation and primary cell culture. Analysis of immunosuppression using *in vitro* analysis; ELISA and FACS 2: PBMC isolation and protein and gene expression of inflammation markers by FACS 3: microscopic live cell imaging of macrophages and microglia; endocytosis assay and FACS analysis.
Goals	Knowledge of: Neuroinflammation markers, biochemical assays and data analysis.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Research
Assessment methods	Attendance Final paper
Key words	neuroinflammation, ELISA, FACS

Title	Laboratory Animal Science Course
Period	5
Code	PSY4338
ECTS credits	3
Organisational unit	Central Animal Facilities (CPV)
Coordinator	Saskia Seeldrayers
Descriptions	Societal and scientific aspects of animal experiments and its alternatives are covered in this course. Students will learn which factors determine the choice of laboratory animal to use. Housing, feeding, pathology and microbiology of laboratory animals will also be considered. Other topics involve: animal genetics (including modification and standardisation), designing animals studies (including statistics) and experimental techniques (including reproducibility and reliability). The course includes explanations of how animal welfare and discomfort must be evaluated in parallel with considerations of the ethics and legislation related to experimental protocols. The course also encompasses practical training in handling of animals, and small experimental manipulations in which students learn to handle different species of small laboratory animals. In addition, they will perform dissections and practice small manipulations including injections. More information on: http://www.maastrichtuniversity.nl/web/Faculties/FHML/TargetGroup/PhDStudents/GeneralCourses/LabAnimalScience.htm
Goals	Knowledge of: Designing and performing animal experiments, conscientious use of laboratory animals.
Instruction language	EN
Prerequisites	
Recommended literature	Principles of laboratory animal science (Eds. Zupthen, Baumans and Beynen). Revised edition.
Teaching methods	Assignment(s) Lecture(s) Presentation(s) Skills Work in subgroups
Assessment methods	Attendance Written exam
Key words	experimental designs, ethics, animal welfare, humane use, legislation

The practical training associated with PSY4338 Laboratory Animal Science Course is PSY4350 Practical training: Handling Animals and Small Experimental Manipulations

Title	**Practical training: Handling Animals and Small Experimental Manipulations**
Period	5
Code	PSY4350
ECTS credits	-
Organisational unit	Central Animal Facilities (CPV)
Coordinator	Saskia Seeldrayers
Descriptions	Students learn to handle different species of small laboratory animals. In addition, they will perform dissections and practice small manipulations including injections.
Goals	Knowledge of: Handling of small animals, dissections of animals, types of injections.
Instruction language	EN
Prerequisites	
Recommended literature	Principles of laboratory animal science (Eds. Zupthen, Baumans and Beynen). Revised edition.
Teaching methods	Skills Work in subgroups
Assessment methods	Attendance Observation
Key words	handling animals, dissections, injections

PSY4112 Research Grant Writing Workshop will be offered in all RM specialisations.

Title	**Research Grant Writing Workshop**
Period	6
Code	PSY4112
ECTS credits	1
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eef Theunissen
Descriptions	During this workshop students will learn why and how to apply for research grants. The need for acquiring funding for research, the opportunities for, and availability of grant application funding will be discussed. Several researchers who have experience in applying for different types of grants will provide students with first-hand knowledge and tips. Students will learn fundamentals of good grant writing, general preparation of the grant application and how to deal with reviewer comments. These skills will be practiced during the workshop. Students will subsequently choose a topic (provided by senior researchers) on which they will write a research proposal during the second-year Research Grant Writing Course (see description of PSY5112).
Goals	Knowledge of: Opportunities for funding, how grants can be acquired, grant writing skills.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignments Lecture(s)
Assessment methods	Attendance Final paper
Key words	funding possibilities, grant applications, proposal writing

Title	Electrophysiology: From Single Cell Activity to 'Cognitive' Markers
Period	1
Code	PSY5311
ECTS credits	4
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Anke Sambeth
Descriptions	Our brain is busy all the time, whether we are awake or asleep. There are thousands of neurons which are in constant communication with each other. Neurotransmitters and electrical currents convey information from one cell to another, which in turn produces electrical signals. This course is an introduction into the field of brain electricity. Students first learn about how currents develop (i.e. role of molecules, ion channels or membrane). Next, discussions focus on how these currents are perceived in the EEG. Students also determine what the differences are in measurements using various species. For instance, can electrodes be placed in humans using the same approach that is used for rats? Finally, students will learn what these currents mean in terms of e.g. event-related potentials or (de)synchronisation measures. In addition to the theoretical basis, students will also discuss some of the practical issues when performing EEG recordings, such as measurement settings and electrode positions. This is accompanied by the presentation of pictures and short videos on how measurements in animals and humans are performed.
Goals	Knowledge of: Electrochemical processes in neurons, single-neuron recordings, event-related potentials in various species, EEG frequencies and event-related (de)synchronisation, source localisation, electrophysiology in memory research.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters, research reviews.
Teaching methods	Lecture(s) PBL Presentation(s)
Assessment methods	Attendance Final paper Presentation
Key words	signal transduction, neurophysiology, electrophysiology, frequency domain, event-related potentials

Skills training

1. PSY4221 EEG and ERP is equal to the Master's module PSY4034 EEG and ERP (DP & CN)
2. PSY4221 EEG and ERP (in CN**,** NE, **FN,** NP. In NP it will be offered as an Elective).

Title	**EEG and ERP**
Period	1
Code	PSY4221
ECTS credits	2
Organisational unit	Cognitive Neuroscience
Coordinator	Fren Smulders
Descriptions	Electroencephalography (EEG) and Event Related Potentials (ERP) offer a combination of precise measurements for the time course of brain processes. These are low cost, non-invasive measurements and are widely available. For these reasons they make a unique contribution to cognitive neuroscience. Scientific interest in EEG and ERP is growing, and results have been increasingly integrated with other neuro-imaging techniques during the last few decades. Lectures and basic literature provide an introduction for students to the basics of EEG and ERP research, EEG and ERP terminology and the possibilities and limitations within EEG and ERP. One topic that students will learn is how to set up an experimental paradigm that is suitable for EEG and ERP measurements. Students also study practical measurement issues, such as electrode placement and types of artefacts. Finally, students must interpret the resulting data. Successful measurement requires an understanding of the basics of EEG and ERP signal analysis techniques, such as artefact management, spectral analysis, filtering, ERP averaging, time-frequency analysis etc. Students also receive hands-on training in smaller groups in running an ERP experiment, including electrode application, minimising artefacts, and health and safety in the lab. A number of simple experimental paradigms will be utilised; these provide interesting and reliable results. Data processing will include a number of common EEG analyses, e.g. analyses in the time and frequency domain.
Goals	Knowledge of: Basic EEG/ERP paradigms, EEG recording systems, measurement settings, electrode application, data quality verification, analogue-digital conversion, basic EEG / ERP components, interpreting topographical plots, neural origins of EEG, time domain analysis, frequency domain analysis, time-frequency analysis, filtering, ocular artefact control, muscle artefact control, choice of reference, re-referencing.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, handbooks.
Teaching methods	Lecture(s) Paper(s) Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	Electroencephalography (EEG), Event-related potentials

	(ERP), electrophysiology, measurement, analysis of brain potentials.

Methodological and technical workshops

PSY4112 Research Grant Writing Workshop will be offered in all RM specialisations.

Title	**Research Grant Writing Workshop**
Period	6
Code	PSY4112
ECTS credits	1
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eef Theunissen
Descriptions	During this workshop students will learn why and how to apply for research grants. The need for acquiring funding for research, the opportunities for, and availability of grant application funding will be discussed. Several researchers who have experience in applying for different types of grants will provide students with first-hand knowledge and tips. Students will learn fundamentals of good grant writing, general preparation of the grant application and how to deal with reviewer comments. These skills will be practiced during the workshop. Students will subsequently choose a topic (provided by senior researchers) on which they will write a research proposal during the second-year Research Grant Writing Course (see description of PSY5112).
Goals	Knowledge of: Opportunities for funding, how grants can be acquired, grant writing skills.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignments Lecture(s)
Assessment methods	Attendance Final paper
Key words	funding possibilities, grant applications, proposal writing

PSY4110 Scientific Writing will be offered in all RM specialisations. Offering times vary according to RM specialisation:
CN: Period 5
NE: Period 5
NP: Period 5
FN: Period 1
PP: Period 1

Title	**Scientific Writing**
Period	1
Code	PSY4110
ECTS credits	1
Organisational unit	Maastricht University Language Centre
Coordinator	Alice Wellum
Descriptions	The course is delivered in a series of three lectures, interspersed with three tutorials, during which students produce and revise a short research proposal or research article. The lectures aim to cover the broader principles of scientific writing (including clarity/readability, structure and coherence). It also covers the ethical issues surrounding the production of scientific texts (for example, plagiarism and non-biased writing). Lectures are interactive; students are assigned with analysis and discussion tasks to complete. In tutorials students apply the principles in the linguistic sense and discover how these apply to their own writing. In particular, the 'doors and windows' (abstracts, introductions, hypotheses and discussions) of scientific papers are analysed for their linguistic and stylistic content. In the tutorials, students develop the language awareness and critical skills required to review their own work as well as that of their peers. Individualised feedback on parallel block assignments is given at the end of the course by the instructor.
Goals	Knowledge of: Principles of scientific writing, conventions in scientific writing, the structure of scientific texts, ethics in scientific writing, plagiarism, editing skills, language in scientific writing, academic writing style, coherence in scientific writing, reporting sources.
Instruction language	EN
Prerequisites	
Recommended literature	Literature is provided in the course materials.
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Research Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	scientific writing, research proposal, empirical research article, literature review, peer review, language awareness.

Title	Behavioural Tests and Models
Period	2
Code	PSY4339
ECTS credits	1
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Jos Prickaerts
Descriptions	Neuroscience research involves the use of a wide variety of behavioural tests and models with laboratory animals. There are several criteria that neuroscientists can use to select behavioural tests and models. Eventually data has to be analysed, integrated and interpreted. How is this all done? Examples from mainly cognitive and affective tests and models are given. Students learn about these issues by analysing, interpreting and presenting data from experiments as well as from literature.
Goals	Knowledge of: Concepts of behavioural animal testing, raw data management, interpretation of behavioural data.
Instruction language	EN
Prerequisites	
Recommended literature	Papers from scientific journals and book chapters from books are provided.
Teaching methods	Assignment(s) Lecture(s) Paper(s) Presentation(s)
Assessment methods	Attendance Final paper Presentation
Key words	test, model, *in vivo*, validity, translation

Title	Molecular Genetics
Period	1
Code	PSY5331
ECTS credits	1
Organisational unit	Psychiatry and Psychology (FHML)
Coordinator	Gunter Kenis
Descriptions	There is currently a lot of research effort and activity in the identification of genes for susceptibility to psychiatric and neurological disorders. This workshop focuses on how genetic variations confer risk of complex diseases. Students will gain insight, by using theoretical models, into how these alterations affect DNA transcription, RNA processing and protein synthesis, ultimately leading to variation in phenotype expression. An initial overview is given of sources of genetic variation, ranging from large scale alterations in the genome structure to common variations such as single nucleotide polymorphisms. Advantages and disadvantages of current strategies in genomic research, such as genome wide association studies, will be examined. Regulation of gene expression including epigenetic processes such as DNA methylation and histone modifications are then discussed. Students also study advances in molecular genetic technologies, including next generation sequencing strategies, and how these can be efficiently incorporated in future studies on the genetic basis of neurological and psychiatric disorders. At the end of this course, students will be able to better understand, interpret and critically evaluate recent reports on large scale genetic studies of common complex diseases.
Goals	Knowledge of: Genetic variation, polymorphisms, copy number variations, haplotypes, linkage analysis, linkage disequilibrium, mendelian inheritance, population genetics, epigenetics, genetics of complex neuropsychiatric diseases, genome wide association studies, regulation of gene expression, DNA methylation, histone modifications, gene-environment interplay, micro-RNA.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Assignment(s) Lecture(s) Presentation(s) Work in subgroups
Assessment methods	Attendance Presentation
Key words	DNA, RNA, genetic variation, polymorphism, gene expression, genetics, epigenetics, genetic association, heritability

Title	**Surgery for Intractable Movement and Psychiatric Disorders**
Period	4
Code	PSY4332
ECTS credits	1
Organisational unit	Neurosurgery/ Psychiatry and Neuroscience (FHML)
Coordinator	Yasin Temel
Descriptions	The aim of this course is to guide the participants through the first key steps of neuroscience experiments related to movement and psychiatric disorders. Students receive relevant knowledge via lectures and will have the opportunity to practically apply this in a hands-on setting. Students are also shown general neurosurgical techniques that are used to selectively lesion brain areas, to chronically infuse drugs into brain areas and to deep brain stimulate and electrophysiologically record from brain areas. Also, there are demonstrations and discussions on behavioural tests used to study the functional consequences of the neurosurgical interventions.
Goals	Knowledge of: Neurosurgical techniques for movement and psychiatric disorders.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Lecture(s) Research
Assessment methods	Attendance Written exam
Key words	brain lesions, deep brain stimulation, drugs, electrophysiology

Title	Commercialising Science and Technology
Period	4,5
Code	PSY4337
ECTS credits	2
Organisational unit	Maastricht Centre for Entrepreneurship
Coordinator	Jan Cobbenhagen
Descriptions	This course focuses on the process of turning science into products and products into businesses. University labs and corporate Research and Development departments increasingly rely on professionals that help to bridge science production (conference presentations, scientific publications and patents) to value creation (revenues, funding for fundamental and applied research). Understanding the bridging of science and business is essential, not only for those who want to work in a commercial setting, but also for those who aspire to a career in (academic) research. In this course, students will learn how and why universities and companies engage in technology licencing. Students will explore how technology transfer and licencing can be instrumental to research funding. They will learn how the dynamics of science production and deployment have implications for scholarly publication. These aspects are of increasing importance to academic researchers as universities seek to enlarge their research budgets by selling or licencing their intellectual property. Consequently, research funds such as the Dutch STW insist that grant applications document how research outcomes will impact society (in addition to papers, patents, and publications). In the course students will also explore legal and governance issues that pertain to the licensing of university (or corporate) know-how to entrepreneurial start-ups or established companies.
Goals	Knowledge of: Commercialisation, entrepreneurship, patents, licensing, research funding, industry-university relationships.
Instruction language	EN
Prerequisites	
Recommended literature	Reader with papers and cases.
Teaching methods	Assignment(s) Lecture(s) PBL
Assessment methods	Attendance Final paper
Key words	commercialising science and technology, patents, entrepreneurship, licensing

*PSY4371 Psychiatric Epidemiology will be offered in **FN**, NP and PP.*

Title	**Psychiatric Epidemiology**
Period	6
Code	PSY4371
ECTS credits	1
Organisational unit	Psychiatry and Psychology (FHML)
Coordinator	Wolfgang Viechtbauer
Descriptions	The course will provide an introduction to the methodologies and analytical strategies of epidemiology as applied to mental health outcomes. The principles and practice of various study types (cohort, case-control, RCT, ecological) will be taught, with emphasis on interpreting associations and possible causality thereof. Consideration will be given to such issues as confounding, bias, and moderation. Further topics to be covered include the use and interpretation of diagnostic studies, the basic principles of analysing dichotomous and time-to-event outcomes, and the use of systematic reviews and meta-analysis for building cumulative knowledge.
Goals	Knowledge of: Different epidemiological study types, including their purpose, advantages, and disadvantages; calculation and interpretation of effect size and outcome measures for dichotomous and time-to-event outcomes; principles of analysing epidemiological studies; the basic steps of conducting a systematic review and meta-analysis.
Instruction language	EN
Prerequisites	
Recommended literature	Rothman, K. J., & Greenland, S. (1998). Modern epidemiology (2nd ed.). Philadelphia, PA: Lippincott-Raven Publishers.
Teaching methods	Assignment(s) Lecture(s) PBL Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	epidemiology, methodology, statistics, experimental studies, observational studies, diagnostic studies, systematic reviews, meta-analysis

*PSY4372 Functional Brain Imaging will be offered in **FN,** NP and PP.*

Title	**Functional Brain Imaging**
Period	6
Code	PSY4372
ECTS credits	2
Organisational unit	Cognitive Neuroscience (CN)
Coordinator	Vincent van de Ven
Descriptions	This workshop is aimed at introducing basic knowledge and principles of functional brain imaging techniques, and at discussing novel advances in relevant fields, such as clinical, animal and cognitive research. The workshop comprises two versions that are tailored to two *a priori* levels of background that may exist within the Research Master cohort. Version 1 introduces the basic principles of neuroimaging (intro to imaging methods, experimental design & analysis, fMRI signal, etc.) and some applications to clinical research, neuroeconomics, social neuroscience and similar fields. Version 2 introduces a number of technical and methodological advances (multimodal imaging techniques, connectivity analyses, mental chronometry and other matters), and assumes that participants possess *a priori* knowledge of items discussed in version 1. Assignment to a workshop version is via allocation on an individual basis; participants must follow at least one version. Participants can opt to follow both versions, but will receive no extra credits. General description: The investigation of human brain anatomy and functions using a range of imaging methods represents the most influential development in psychology in the last few years. This workshop reviews essential facts about contemporary major structural and functional brain mapping techniques, but the focus will be on functional Magnetic Resonance Imaging (fMRI). Also, the workshop discusses strengths and weaknesses of neuroimaging methods and on the description of relevant applications in the normal and pathological brain. These topics will be investigated through lectures, paper and group discussions, and a final skills session in which fMRI data is analysed. The final assessment is via a paper assignment.
Goals	Knowledge of: Functional brain imaging techniques and principles, pros and pitfalls of functional brain imaging, data analysis, experimental design for brain imaging research, hands-on data analysis and visualisation experience.
Instruction language	EN
Prerequisites	Basic knowledge of Brain anatomy, experimental design and statistics.
Recommended literature	Journal articles.
Teaching methods	Lecture(s) Paper(s) Skills
Assessment methods	Attendance Final paper
Key words	Magnetic Resonance Imaging (MRI), functional MRI, structural MRI, positron emission tomography (PET),

	neuroimaging, data analysis, brain activity

Electives

The following electives will be offered in all RM specialisations.

Title	**Elective: Course**
Period	throughout
Code	PSY4156
ECTS credits	Variable
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students can attend a course offered by an RM specialisation or a course from a regular master's programme at Maastricht University (local courses) or a course that is organised at a different university in The Netherlands or abroad (external courses). The content, format and organisation of local courses are described in this catalogue or in the course descriptions of other UM master's programmes. The content, format and organisation of external courses are determined by the host university. Elective courses do not overlap with required RM courses, but instead offer new knowledge and insights. Enrollment in an elective course is subject to approval by the Course Instructor as well as the RM Electives Coordinator. There is no limit to the number of electives courses that may be taken, but elective courses do not substitute for mandatory courses.
Goals	Knowledge of: Extracurricular interests, broadening academic scope, taking specialised courses.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Presentation(s) Skills Training(s)
Assessment methods	Attendance Computer test Final paper Observation Oral exam Participation Portfolio Presentation Take home exam Written exam
Key words	electives, external courses, external workshops

Title	Elective: Review
Period	throughout
Code	PSY4157
ECTS credits	3
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students write a critical literature review based on a specialised topic, under the supervision of a member of the scientific staff of Maastricht University. Students take the initiative to locate and arrange a supervisor for the review. The review topic, content and format will be determined by mutual agreement between student and supervisor. The review topic is also subject to approval by the RM Electives Coordinator. Students are expected to devote 84 hours to the Elective: Review. Each student may complete maximally one Elective: Review course The Elective: Review course must be completed and assessed prior to the start of the internship.
Goals	Knowledge of: Extracurricular interests, specialisation on topic of interest, supervised scientific writing, literature review.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Paper(s)
Assessment methods	Final paper
Key words	elective, review paper, paper assignment, literature review, writing assignment

Title	Elective: Research
Period	throughout
Code	PSY4158
ECTS credits	3
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students can participate in (parts of) an empirical research project that is conducted and supervised by a member of the FPN or FHML scientific staff. Students can apply for an available project from the list of project descriptions; available on the 'RM Electives' section on EleUM, which is published and updated in December of each year. The application procedure is also described on the 'RM Electives' section on EleUM. Students who are selected to participate in a research elective may assist in designing the experiment or observational study, acquire empirical data, be trained in using measurement equipment, analyse empirical data, or take part in other parts of the research project. Students must write a short research report of maximally 5 pages about the practical experience obtained. Students are expected to spend 84 hours on the Elective: Research course, which includes time spent on practical work and the research report. The principal investigator of the project will supervise the practical work and grade the research report. Each student may complete maximally one Elective: Research course. The Elective: Research course must be completed and graded before the start of the internship.
Goals	Knowledge of: Planning or designing empirical research, empirical data analysis, writing research report, quantitative methods, conducting research, skill learning of data acquisition techniques, functioning in a research team.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Lecture(s) Paper(s) Patient contact PBL Presentation(s) Research Skills Training(s) Work in subgroups
Assessment methods	Final paper Participation
Key words	elective, practical research, empirical research

Research Internship and Master's Thesis

1. ***PSY5107 Research Proposal, PSY5102 Research Internship and PSY5103 Master's Thesis -> for [CN, NE, FN->50 credits] and [NP and PP->30 credits]****. Internship coordinators are different per specialisation.*

50 credits apply to: CN, NE and FN and for the NP student that only chooses a research internship (not including the clinical part)

The NP student that chooses the combined internship (Research + Clinical) will obtain 30 credits for the Research Proposal + Research Internship + Master's Thesis + 20 credits for Clinical Internship, Research Proposal and Minor's Thesis. The combined version is compulsory to PP students.

2. Clinical Internship, Research Proposal and Minor's Thesis PSY5104, PSY5108, and PSY5105
Are the same for NP and PP*. Only the internship coordinators differ from each other.*

Title	**Research Proposal, Research Internship and Master's Thesis**
Period	2-6
Code	PSY5107, PSY5102, and PSY5103
ECTS credits	**30** ECTS (1, 19, and 10, respectively) for RM PP students and for RM NP students who choose to conduct both a research and a clinical internship (plus minor's thesis). The total research internship will be assigned 30 credits: 20 credits for the research activities, including the research proposal (1 credit; graded pass/fail) and the practical execution of the internship (19 credits; graded assessment), and 10 credits (graded assessment) for the master's thesis. **50 (1, 35, and 14, respectively)** for RM CN, NE, FN, NP students who do *not* complete a clinical internship and minor's thesis. The total research internship will be assigned 50 credits: 36 credits for the research activities, including the research proposal (1 credit; graded pass/fail), and the practical execution of the internship (35 credits; graded assessment) and 14 credits (graded assessment) for the master's thesis.
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Sandra Mulkens
Descriptions	The second part of the second year of the research master's programme is devoted to conducting a research internship. As a result of the many international research contacts that faculty members have established, a substantial number of students will conduct their research internship abroad. Students start their internship with the writing of a research proposal. Students finish the master's programme by writing a thesis based on their internship research project. The internship can be undertaken at Maastricht University or at external research institutes. In all cases, a student's research proposal and master's thesis will be evaluated by two assessors. At least one of these assessors must be a member of the Faculty of Psychology and Neuroscience (FPN) or the Faculty of Health, Medicine and Life Sciences (FHML). The other assessor might be a (senior) researcher at, for example, the institute where a student collected the data. A detailed guide on research internships and the master's

	thesis can be found on EleUM > Students Research Master Faculty of Psychology and Neuroscience > internships. - RM Cognitive Neuroscience Internships Coordinator: Amanda Kaas, Cognitive Neuroscience (FPN), Phone: (0)43 38 82172, 55 Oxfordlaan, Room 2.019, Email: a.kaas@maastrichtuniversity.nl - RM Neuroeconomics Internships Coordinator: Amanda Kaas, Cognitive Neuroscience (FPN), Phone: (0)43 38 82172, 55 Oxfordlaan, Room 2.019, Email: a.kaas@maastrichtuniversity.nl - RM Fundamental Neuroscience Internships Coordinator: Pilar Martinez, Psychiatry and Neuropsychology (FHML), Phone: (0)43 38 81042, 40 Universiteitssingel West, Room 2.574, Email: p.martinez@maastrichtuniversity.nl - RM Neuropsychology Internships Coordinator: Caroline van Heugten, Neuropsychology and Psychopharmacology (FPN), Phone (043) 38 84213, 40 Universiteitssingel East, Room 2.736, Email: caroline.vanheugten@maastrichtuniversity.nl - RM Psychopathology Internships Coordinator: Nicole Geschwind, Clinical Psychological Science (FPN), Phone (043) 38 81608, 40 Universiteitssingel East, Room 2.767, Email: Nicole.geschwind@maastrichtuniversity.nl
Goals	Knowledge of: Conducting a (supervised) empirical research project and summarising the research and findings in the form of a master's thesis.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Paper(s) Patient contact Research Skills Working visit(s)
Assessment methods	Attendance Final paper Observation Participation
Key words	internship, research, master's thesis

Specialisation in Neuropsychology (NP)

The specialisation in Neuropsychology focuses on the relationship between brain and behaviour. This specialisation focuses on understanding cognitive (memory, perception, planning, attention, psycho-motor functions) and emotional-affective (e.g. mood, anxiety, motivation, arousal) behaviour starting from the perspective of brain structure and function. This is measured on a continuum ranging from normal behaviour to pathological psychiatric dysfunctions (e.g. depression, anxiety, Korsakoff's syndrome, schizophrenia, dementia, ADHD). In addition, in the context of psychopharmacology, the brain-behaviour relationship is thoroughly studied by pharmacological manipulation of brain neurochemistry and function in human and animal models, including the use of interventional psychoactive substances (e.g. hormones, drugs, medicine and foods or dietary ingredients) in combination with behavioural, psychophysiological and neurofunctional research techniques. An integrated programme is presented that includes most aspects of basic and applied neuroscience. In addition, students work in a multidisciplinary team of psychologists, biologists and psychiatrists and have access to state-of-the art clinical, behavioural and neuroimaging facilities and biopsychological laboratories.

Neuropsychology Coordinator:
Rob Markus, Neuropsychology and Psychopharmacology (FPN), Phone +31(0)43 38 82 474,
40 Universiteitssingel East, Room 2.765, Email: r.markus@maastrichtuniversity.nl

Overview RM in Neuropsychology (NP)

Period	Research Master's in Neuropsychology (NP) Year 1 (2013-2014): Rob Markus
Period 0, 02-09-2013 - 06-09-2013	Introduction week PSY 4950 PBL training for non-UM students*
Period 1, 09-09-2013 - 25-10-2013	**Core courses: **** **PSY4407** Brain Damage (4 credits): Martin van Boxtel **PSY4408** Behavioural Disorders (4 credits): Kim Kuypers **PSY4106** Advanced Statistics I (total of 3 credits): Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers
	Skills training: **PSY4433** Neuropsychological Assessments (2 credits): Sven Stapert
Period 2, 28-10-2013 - 20-12-2013	**Core courses:** **PSY4409** Arousal and Attention (4 credits): Annemiek Vermeeren **PSY4416** Ageing (4 credits): Arjan Blokland **PSY4106** Advanced Statistics I: Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers
	Skills training: **PSY4434** Basic Cognitive Psychological Skills (3 credits): Eric Vuurman
Christmas break	
Period 3, 06-01-2014 - 31-01-2014	**Core course:** **PSY4411** Biopsychology (4 credits): Anke Sambeth **PSY4106** Advanced Statistics I: Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers **PSY4107** Advanced Statistics II (total of 3 credits): Gerard van Breukelen *Practical training:* PSY4117 SPSS: Gerard van Breukelen
	Skills training: **PSY4108** Neuroanatomy (1 credit): Jos Prickaerts
	PSY4100 Colloquia (total of 1 credit): Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Period 4, 03-02-2014 t/m 04-04-2014	**Core course:** **PSY4417** Stress, the Brain and Depression (3 credits): Rob Markus **PSY4413** Executive Functions and Control of Action (4 credits): Eric Vuurman **PSY4107** Advanced Statistics II: Gerard van Breukelen *Practical training:* PSY4117 SPSS: Gerard van Breukelen
	Skills training: **PSY4422** Psychophysiological Skills (1 credit): Eric Vuurman **PSY4423** Neuropsychology in Practice: From Tests Results to Report and Advice (total of 2 credits): Caroline van Heugten, Rudolf Ponds
	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Period 5, 07-04-2014 t/m 06-06-2014	**Core course:** **PSY4414** Neuropsychiatric Disorders (3 credits): Saartje Burgmans **PSY4415** Neuropsychopharmacology (total of 3 credits): Jan Ramaekers **PSY4107** Advanced Statistics II: Gerard van Breukelen *Practical training:* PSY4117 SPSS: Gerard van Breukelen

	Workshop: **PSY4110** Scientific Writing (1 credit): Alice Wellum **PSY4335** Psychopharmacology (1 credit): Arjan Blokland **PSY4372** Functional Brain Imaging (2 credits)
	Skills training: **PSY4423** Neuropsychology in Practice: From Test Results to Report and Advice: Caroline van Heugten, Rudolf Ponds **PSY4424** Neuropsychological Rehabilitation (total of 2 credit): Caroline van Heugten
	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Period 6, 10-06-2014 t/m 04-07-2014	**Core course:** **PSY4415** Neuropsychopharmacology: Jan Ramaekers
	Workshop: **PSY4112** Research Grant Writing Workshop (1 credit): Eef Theunissen **PSY4371** Psychiatric Epidemiology (1 credit): Wolfgang Viechtbauer
	Skills training: **PSY4424** Neuropsychological Rehabilitation: Caroline van Heugten
	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson

**Students from Erasmus Rotterdam receive an exemption for PBL training*
*** Electives: 3 credits,* throughout year 1: Vincent van de Ven

Period	**Research Master's in Neuropsychology (NP) Year 2 (2014-2015)**
Period 1, To be announced in 2014	**Core course:** **PSY5112** Research Grant Writing Course (3 credits): Eef Theunissen **PSY5411** Cognitive Development (3 credits): Petra Hurks **PSY5414** Brain, Learning and Memory (3 credits): Arjan Blokland
	Workshop: **PSY5431** Neuropsychological Assessment in Children (1 credit): Peter Stiers
	Skills training: **PSY4221** ERP and EEG (Elective) (2 credits): Fren Smulders
32 weeks	**PSY5107 Research Proposal,PSY5102 Research Internship & PSY5103 Master's Thesis** (30 or 50 credits): Sandra Mulkens
	PSY5108 Research Proposal, PSY5104 Clinical Internship & PSY5105 Minor's Thesis (20 credits); Sandra Mulkens

Colloquia

PSY4100 Colloquia will be offered in all RM specialisations.

Title	**Colloquia**
Period	3-6
Code	PSY4100
ECTS credits	1
Organisational unit	Cognitive Neuroscience (FPN), Department of Economics (SBE), Psychiatry and Neuropsychology (FHML), Neuropsychology and Psychopharmacology (FPN)
Coordinator	Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Descriptions	Colloquia are presented per specialisation (CN, NE, FN, NP and PP) by senior researchers from the UM faculties or visiting guest lecturers. Each colloquium focuses in depth on one of a wide range of topics, with issues transcending the courses and specialisations. Each colloquium lecture will be followed by active discussion, prepared and chaired by the lecturer (the UM host may fill this role for guest lecturers). A total of nine colloquia will be offered during the first year.
Goals	Knowledge of: Key research domains from different specialisations, interdisciplinary research, interacting with students from different specialisations.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Lecture(s)
Assessment methods	Attendance
Key words	interdisciplinary knowledge

Core Courses

Is equal to the Master's module PSY4061

Title	**Brain Damage**
Period	1
Code	PSY4407
ECTS credits	4
Organisational unit	Neuropsychology and Psychopharmacology
Coordinator	Martin van Boxtel
Descriptions	Students are introduced to the fields of Behavioural Neurology and Neuropsychology via questions such as: What do the effects of pathological conditions on brain structure and/or function tell us about the relationship between brain and behaviour? Much of what we know about cognitive processes and affective functioning comes from close observation of patients with damage to the central nervous system. This course reviews mechanisms of the relationship between brain and certain behaviours that form the basis of neuropsychological dysfunctions in people who suffer from brain damage. Students acquire knowledge about the causes and neurobiological effects of brain lesions, and become acquainted with the aetiology and taxonomy of common neurological and neuropsychological syndromes. Functional disturbances that occur after focal or diffuse lesions in different cortical areas, in connecting tracts, in limbic and other subcortical brain structures are discussed, together with the neurocognitive assessment procedures that are commonly used to identify such deficits, including disorders of memory, praxis, language, visual spatial abilities and executive function. This knowledge forms an essential basis for an understanding of the principles of neuropsychological rehabilitation, which can be used to support or even improve residual function after brain damage and can ameliorate the life quality of neurological patients.
Goals	Knowledge of: Functional brain anatomy, cerebral vascularisation, Neurophysiology of brain repair, neurological diseases, stroke, epilepsia, traumatic brain injury, alcohol-induced brain dysfunction, Korsakoff's disease, cognitive control, neuropsychological syndromes, brain plasticity, history of neurospychology, neuropsychological assessment, cognitive rehabilitation.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Lecture(s) PBL Skills
Assessment methods	Attendance Written exam
Key words	neuropsychology, history of neuropsychology, brain disease, neuroanatomy, neurology, neuropsychological assessment, rehabilitation, brain plasticity

Is equal to the Master's module PSY4062

Title	**Behavioural Disorders**
Period	1
Code	PSY4408
ECTS credits	4
Organisational unit	Neuropsychology and Psychopharmacology
Coordinator	Kim Kuypers
Descriptions	The course covers the range of cognitive and behavioural problems that accompany the most common neuropsychiatric and neurological disorders (i.e. psychosis, schizophrenia, ADHD, autism and acquired brain injuries). The course provides insight into the underlying neurobiological and psychological mechanisms, and intervention possibilities from a behavioural and pharmacological perspective. Finally, the course touches on the principle of vulnerability, protective/risk factors and psychopharmacology in the aetiology of behavioural disorders.
Goals	Knowledge of: Neuropsychological assessment and- intervention, psychological mechanism, neurobiology, functional neuroanatomy, imaging, psychopharmacology, epidemiology, developmental-, psychiatric- and neurological disorders, neuropsychiatric syndromes.
Instruction language	EN
Prerequisites	
Recommended literature	Research and review articles, case studies, book chapters.
Teaching methods	Lecture(s) PBL
Assessment methods	Attendance Written exam
Key words	behavioural disorders, development, neuropsychiatry, acquired brain injury, neuropsychology, intervention, psychopharmacology

Is equal to the Master's module PSY4064

Title	**Arousal and Attention**
Period	2
Code	PSY4409
ECTS credits	4
Organisational unit	Neuropsychology and Psychopharmacology
Coordinator	Annemiek Vermeeren
Descriptions	This course familiarises students with key concepts and controversies in the study of arousal and alertness in attention and cognitive performance, with an emphasis on the role of neurotransmitters. It is known that human performance fluctuates depending on the state of alertness; when we are sleepy or tired we are less attentive to events going on around us than when we are fully awake and alert. However, people who are extremely stressed or highly aroused can also be too 'hyper' to effectively focus their attention (e.g. ADHD, anxiety disorders). The nature and mechanisms underlying the relation between arousal, attention and performance have been the subject of extensive research in psychology. Therefore this course will review current knowledge on subcortical arousal systems, attention networks and the neurotransmitters involved, in addition to a critical discussion of the classic Arousal Theory. Throughout the course, psychopharmacological studies will be presented that illustrate the role of different neurotransmitters in arousal and attention.
Goals	Knowledge of: Arousal Theory, inverted-U model, Yerkes-Dodson law, Ascending Reticular Activating System, Cognitive Energetic Model, Additive Factors Method, Posner's attentional networks, orienting attention, cueing paradigm, Corbetta's model of attentional control, alerting, sustained attention, vigilance, noradrenergic locus coeruleus activity, clonidine, Signal Detection Theory, executive attention, prefrontal dopaminergic activity, methylphenidate, Borbely's model of sleep regulation, caffeine, neurocognitive theory of insomnia, benzodiazepines, flip-flop mechanism of sleep-wake regulation, antihistamines.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Lecture(s) PBL
Assessment methods	Attendance Written exam
Key words	arousal, alertness, attention networks, brainstem arousal systems, sleep-wake regulation

Title	**Biopsychology**
Period	3
Code	PSY4411
ECTS credits	4
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Anke Sambeth
Descriptions	This course provides an in-depth description of biopsychological concepts of brain function. It will cover elements from functional neuroanatomy, neurophysiology and psychopharmacology as they are applied to brain and behaviour research. The students will first review the macro- and microanatomy of the brain, and also neurochemical and neurobiological mechanisms related to neurotransmission. Special attention will be paid to basic cellular processes leading to disturbances in the brain. The students will discuss questions such as: How do the chemicals in our brain influence neurons? What is the specific role of second messengers in these processes? Additionally, the students will deal with the biological mechanisms of neurogenesis and cell differentiation, and how this may be linked to behaviour. Next, the students will discuss the role of hormones in behaviour and cognition and discuss questions such as how do hormones determine our gender, and why do males tend to be more aggressive than females? With respect to specific cognitive functions, descriptions will be given about processes underlying the effect of acute stress on memory. Students will discuss how the brain regulates memory and can even improve cognitive performance under stress. Finally, the students will discuss aspects associated with the physiological processes of motivation and addiction.
Goals	Knowledge of: Electrochemical processes in neurons, second messenger systems, hormones and gender differences, biology of acute stress, effects of stress on cognition, neurobiology of motivation.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters, research reviews.
Teaching methods	Lecture(s) Paper(s) PBL Presentation(s)
Assessment methods	Attendance Final paper Presentation
Key words	action potentials, second messengers, neurotransmitters, hormones, stress-related cognition, motivation

Is equal to the Master's module PSY4067

Title	**Ageing**
Period	2
Code	PSY4416
ECTS credits	4
Organisational unit	Neuropsychology and Psychopharmacology
Coordinator	Arjan Blokland
Descriptions	This course covers a broad range of topics in the field of Cognitive Ageing. There is an initial focus on the normal ageing process since a thorough knowledge is considered essential before issues in abnormal ageing can be addressed. Important questions covered include: What is ageing? What neurobiological and cognitive mechanisms determine whether a person ages pathologically, normally, or successfully? Can the ageing process be influenced? To address these questions, students will critically reflect on influential theories, state-of-the-art research, established research methods, and clinical interventions. General themes are physical ageing, neural ageing, cognitive ageing, pathological ageing (mild cognitive impairment, Alzheimer's disease, and other types of dementia), intervention strategies, and methodological issues in ageing research.
Goals	Knowledge of: Physical ageing, evolutionary theories of ageing, neural aging, amyloid cascade hypothesis, temporal lobe dysfunction, frontal lobe dysfunction, processing-speed theory, white matter decline, decline of cognitive control, inhibitory-deficit hypothesis, sensory ageing, default-mode network dysfunction, parietal lobe dysfunction, mild cognitive impairment, Alzheimer's disease, vascular dementia, successful ageing, reserve theories, emotional ageing, fronto-temporal dementia, semantic dementia.
Instruction language	EN
Prerequisites	
Recommended literature	E-reader.
Teaching methods	Lecture(s) PBL
Assessment methods	Attendance Written exam
Key words	cognitive, neural, and physical ageing, dementias

Title	**Brain, Learning, and Memory**
Period	1
Code	PSY5414
ECTS credits	3
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Arjan Blokland
Descriptions	There has been a rapid increase in our understanding of the basic mechanisms underlying the consolidation of new information and its subsequent retrieval. Both data from preclinical research in animal models and in preclinical human models and neuroimaging experiments will be used in this course, together with seminal experiments in patients. Recent theories and experimental data illustrate how a multidimensional view of learning and memory can help elucidate the relevant mechanisms both in terms of neurobiology and cognition. The influences of drugs on information processing and memory are also discussed in depth.
Goals	Knowledge of: The role of the hippocampus in memory functions, the role of other limbic structures in learning and memory, the role of neurotransmitters in learning and memory. The use and critical evaluation of animal models in learning and memory research.
Instruction language	EN
Prerequisites	Basic knowledge in learning and memory.
Recommended literature	Literature will be made available on ELeUM.
Teaching methods	Assignment(s) Lecture(s) Paper(s) Presentation(s)
Assessment methods	Attendance Final paper Presentation
Key words	prefrontal cortex, hippocampus, limbic system, neurotransmitters, working memory, short-term memory, long-term memory, acquisition, consolidation, retrieval

Let op: de huidige eerstejaars RM NP, die dus zijn gestart in 2012, behouden dit als hun 1ste jaars vak in 2012-2013 (bestaande code: PSY4412, periode 4). Voor hen wijzigt er niets. In hun 2e jaar volgen zij ook gewoon Stress, the brain and Depression (bestaande code: PSY5413, periode 1). Echter, voor de starters in 2013-2014, geldt dat ze in hun eerste jaar Stress, the Brain and Depression (periode 4) volgen en in hun tweede Brain, Learning, and Memory (periode 1).

Title	Executive Functions and Control of Action
Period	4
Code	PSY4413
ECTS credits	4
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eric Vuurman
Descriptions	A key element in the current understanding of behavioural organisation is cognitive control. At present, a redefinition of related concepts (such as inhibition, working memory and executive functioning) is taking place, based on insights from cognitive neuroscience. Based on data from imaging studies, the behavioural models of cognitive control are being restructured. Throughout the course, emphasis will be on mechanisms of attention, working memory, cognitive shifting, preparation for action, sensorimotor integration, behavioural planning and monitoring. Various experimental approaches are evaluated and discussed in the light of recent literature. Experts in the field of executive and motor control research will present their current work, and students will be able to discuss their own papers and topics with them.
Goals	Knowledge of: Cognitive control, motor control, executive functions, brain activation.
Instruction language	EN
Prerequisites	
Recommended literature	Journal article, book chapters.
Teaching methods	Lecture(s) Paper(s) PBL Presentation(s)
Assessment methods	Attendance Final paper Presentation
Key words	executive functions, motor control, frontal cortex

Title	Neuropsychiatric Disorders
Period	5
Code	PSY4414
ECTS credits	3
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Saartje Burgmans
Descriptions	This course provides basic and advanced knowledge of neuropsychiatric disorders. Several neuropsychiatric disorders will be extensively discussed from a biopsychosocial perspective. In particular, the focus will be on new knowledge and developments within the neuropsychiatry, related to both research and clinical practice. The course covers main findings, biopsychosocial theories and controversies related to several neuropsychiatric disorders, with an emphasis on brain mechanisms and behavioural and cognitive dysfunction. The course discusses disorders at the interface between neuropsychiatry and cognitive/behavioural neurology. Each tutorial meeting covers another neuropsychiatric disorder, for example late onset psychosis, Gilles de la Tourette, pediatric delirium and anxiety disorder. Specific attention is given to neuropathology related to functional and structural brain imaging, neurochemistry as well as psychosocial factors. In short, this course deals with all major aspects of a number of specific neuropsychiatric disorders , including: basic and advanced knowledge; biopsychosocial theories; neurobiological mechanisms; cognitive and behavioural implications; treatment and research. Students learn to integrate all the previously mentioned aspects of the disorders in order to increase their general knowledge of neuropsychiatry. The tutorial meetings will be led by renowned experts in the field and will provide an excellent learning experience for students who want to focus on working within neuropsychiatry.
Goals	Knowledge of: Neuropsychiatry, biopsychosocial theories of neuropsychiatric disorders, neurobiologic mechanisms, gene environment interactions, behavioural and cognitive problems, neurotransmitters, neuroimaging, scientific and clinical developments, etiology, treatment, clinical practice, late onset psychosis, Tourette, Pediatric delirium and anxiety.
Instruction language	EN
Prerequisites	
Recommended literature	Recent state-of-the-art publications and literature will be provided by the several experts.
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Presentation(s) Work in subgroups
Assessment methods	Attendance Final paper Presentation
Key words	neuropsychiatric disorders, brain mechanisms, biological theories, psychosocial theories, research, treatment

Title	Stress, the Brain and Depression
Period	4
Code	PSY4417
ECTS credits	3
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Rob Markus
Descriptions	It has become increasingly clear that stress is one of the most important triggers for several cognitive-affective disorders. For instance, a tremendous amount of biological and cognitive-psychological research has been conducted on the onset and course of stress-related affective disorders like depression. Cognitively oriented psychologists have shown that the chance of developing stress-related depression is enhanced as a result of negative and dysfunctional (stress-inducing) thoughts, whereas biologically oriented psychologists and psychiatrists particularly emphasise the importance of biochemical brain dysfunction. Yet, despite intensive research over the past decades, unidirectional biological and cognitive achievements have not yet produced definitive conclusions about critical psychobiological risk factors involved in stress-related affective disorders like depression. In addition, and contrary to a one-dimensional approach, this course will concentrate on mutual interactions between stress and the human brain in explaining and defining enhanced susceptibility for stress-related psychopathology.
Goals	Knowledge of: Brain mechanisms in stress, biochemistry of depression, genes and depression, stress and psychopathology, theories of stress, gese and depression.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles and book chapters on EleUM.
Teaching methods	Lecture(s) Paper(s) Presentation(s)
Assessment methods	Final paper (research Proposal) Presentation Written exam
Key words	stress, brain, depression, psychopharmacology

Let op: de huidige eerstejaars RM NP, die dus zijn gestart in 2012, behouden dit als hun 2e jaars vak in 2013-2014. Voor hen wijzigt er niks. Code blijft ook gelijk.

Title	Stress, the Brain and Depression
Period	1
Code	PSY5413
ECTS credits	3
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Rob Markus

Title	**Neuropsychopharmacology**
Period	5, 6
Code	PSY4415
ECTS credits	3
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Jan Ramaekers
Descriptions	This course addresses the influence of drugs upon normal functioning and on disease states. Neurobiological and neurochemical mechanisms are presented with the aim to deepen insight into the various mechanisms of drug action. The course will review major classes of drugs that are used frequently in the treatment of mental disorders and neurological disease, but also other classes of drugs that have side effects on the central nervous system. Other topics in this course are behavioural toxicology, experimental designs used in treatment studies, drugs of abuse and recreational drugs.
Goals	Knowledge of: Neurobiology of drugs andmental disorders.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	PBL
Assessment methods	Attendance Final paper Presentation
Key words	drug action, psychopharmacology of CNS disorders, behavioural toxicity

PSY4106 Advanced Statistics I will be offered in all RM specialisations.

Title	**Advanced Statistics I**
Period	1-3
Code	PSY4106
ECTS credits	3
Organisational unit	Faculty Office (FPN)
Coordinator	Nick Broers
Descriptions	The course consists of six units. In the first four units, participants will be given an in-depth training in the following standard statistical methods: factorial ANOVA for between-subject designs, analysis of covariance (ANCOVA), multivariate ANOVA (MANOVA), discriminant analysis and multiple linear regression. Students are assumed to have background knowledge of balanced two-way factorial ANOVA and multiple regression. These methods will be briefly reviewed. The following advanced topics will then be covered: unbalanced factorial designs, contrast analysis, interaction, simple slope analysis, dummy coding, centring covariates, different coding schemes, collinearity and residuals checks and data transformation. The distinction between confounders and mediators in regression and ANCOVA is also discussed, forming a bridge from regression to structural equations modelling (SEM). The latter is an advanced multivariate method that is gaining importance in psychology but still requires special software (such as Lisrel, EQS, AMOS or Mplus). SEM is introduced in two units, starting with causal modelling and mediation analysis in cross-sectional research and then extending to longitudinal research and latent variables (factors). Special attention is given to identifying models, model equivalence, global and local goodness of fit indices, parsimony, model modification and cross-validation. Some concepts from matrix algebra are needed for SEM, and these will be briefly discussed without going into technical detail.
Goals	Knowledge of: Oneway analysis of variance, contrast analysis, unbalanced designs, multivariate analysis of variance, discriminant analysis, linear regression with interaction terms, linear regression with dummy variables, data transformations, simple slope analysis, analysis of covariance, path analysis, structural equation modeling, confirmatory factor analysis, structural models with latent variables.
Instruction language	EN
Prerequisites	
Recommended literature	Diamantopoulos, A. (1994). Modelling with LISREL: A guide for the uninitiated. Journal of Marketing Management, 10, 105-136; Field, A. (2009). Discovering statistics using SPSS (3rd ed.). London: Sage; Howell, D.C. (2007). Statistical methods for psychology (6th ed.). Belmont (CA): Thomson/ Wadsworth; Kleinbaum, D.G., Kupper, L.L., Muller, K.E., & Nizam, A. (1998). Applied regression analysis and other multivariable methods

	(3rd ed.). Pacific Grove (CA): Brooks/Cole.
Teaching methods	Assignment(s) Lecture(s) Skills Training(s)
Assessment methods	Attendance Written exam
Key words	univariate analysis of variance, multivariatie analysis of variance, regression analysis, structural equation modeling

The practical training associated with PSY4106 Advanced Statistics I is PSY4119. Practical training: SPSS and Lisrel will be offered in all RM specialisations.

Title	**Practical training: SPSS and Lisrel**
Period	1-3
Code	PSY4119
ECTS credits	-
Organisational unit	Faculty Office (FPN)
Coordinator	Nick Broers
Descriptions	In order to make practical use of the statistical models that form the topic of the Advanced Statistics course, researchers must make use of statistical software. This course will utilise the traditional SPSS program, but also the specialised LISREL software. LISREL is a statistical program that allows structural equations models to be tested.
Goals	Defining contrasts, building regression models, doing multivariate analyses, transforming data, testing simple slopes, creating and testing SEM models
Instruction language	EN
Prerequisites	
Recommended literature	Handouts given during practicals.
Teaching methods	Assignment(s) Training(s)
Assessment methods	Attendance
Key words	SPSS, LISREL, statistical software

PSY4107 Advanced Statistics II will be offered in all RM specialisations.

Title	**Advanced Statistics II**
Period	3-5
Code	PSY4107
ECTS credits	3
Organisational unit	Faculty Office (FPN)
Coordinator	Gerard van Breukelen
Descriptions	The course consists of seven units. The first three units cover classical repeated measures ANOVA for the one- and two-way within-subject design and the split-plot (between x within) design. Special attention is given to: a) the choice between multivariate and univariate data formats and method of analysis, and the sphericity assumption; b) the distinction between the within-subjects and between-subjects part of a split-plot ANOVA, and how to obtain both using regression analysis; c) the surprising consequences of including covariates into repeated measures ANOVA; and d) the choice between different methods of analysis for randomised versus non-randomised group comparisons. Subsequently, a further three units are devoted to mixed (multilevel) regression for nested designs and longitudinal studies. This mixed regression starts with a unit on marginal models for repeated measures as an alternative to repeated measures ANOVA in cases of missing data or within-subject covariates. Students are shown the pros and cons of various models for the correlational structure of repeated measures, such as compound symmetry and AR1. The second unit covers the random intercept model for repeated measures as a method to include individual effects in marginal models for longitudinal data (growth curves) or single trial analyses of lab data (response times, ERP, fMRI). Students learn how this can be combined with e.g. ARMA modelling to distinguish between interpersonal and intrapersonal outcome variation. The random intercept model will also be applied to a cluster randomised trial, i.e. an RCT where organisations like schools or companies instead of individuals are randomised. The third and last unit on mixed regression covers random slope models for longitudinal data (individual differences in change over time), single trial analysis (individual differences in stimulus effects) and multicentre trials (RCT within each of a number of organisations). Finally, the topic of optimal design, sample size and power calculations is introduced in a seventh unit.
Goals	Knowledge of: Repeated measures ANOVA for within-subject and split-plot (between x within) designs, including factorial designs and covariates in repeated measures ANOVA; Mixed (multilevel) linear regression with random effects and autocorrelation; Optimal design and sample size calculations for experimental and observational studies.
Instruction language	EN
Prerequisites	Good understanding of descriptive and inferential statistics at the elementary and intermediate level, including t-tests, factorial ANOVA and multiple linear regression. Skilled in the

	use of SPSS for statistical data analyses.
Recommended literature	Lecture handouts and a suitable book chapter or article.
Teaching methods	Assignment(s Lecture(s Training(s)
Assessment methods	Attendance Written exam
Key words	within-subject designs, repeated measures ANOVA, mixed (multilevel) regression, marginal versus random effects models, optimal design, sample size, power

The practical training associated with PSY4107 Advanced Statistics II is PSY4117. Practical training SPSS will be offered in all RM specialisations.

Title	**Practical training: SPSS**
Period	3-5
Code	PSY4117
ECTS credits	-
Organisational unit	Faculty Office (FPN)
Coordinator	Gerard van Breukelen
Descriptions	This practical training forms part of the PSY4107 Advanced Statistics II course. The practical consists of six sessions in the computer rooms in which SPSS procedures for repeated measures and multilevel data are practised. The goal is to understand how proper analyses of such data can be done using SPSS.
Goals	Knowledge of: How to run with SPSS: repeated measures ANOVA for within-subject and split-plot (between x within) designs, including factorial designs and covariates; How to run SPSS for: mixed (multilevel) linear regression with random effects and autocorrelation.
Instruction language	EN
Prerequisites	Good understanding of descriptive and inferential statistics at the elementary and intermediate level, including t-tests, factorial ANOVA and multiple linear regression. Skilled in the use of SPSS for statistical data analyses.
Recommended literature	Field A (2009). Discovering statistics with SPSS (3rd ed.). London: Sage, plus the mandatory assignments on EleUM. For the theoretical part of course PSY4107 lecture handouts and suitable book chapters and articles are used.
Teaching methods	Training(s)
Assessment methods	Attendance
Key words	within-subject designs, repeated measures ANOVA, mixed (multilevel) regression, marginal versus random effects models

PSY5112 Research Grant Writing Course will be offered in all RM specialisations.

Title	**Research Grant Writing Course**
Period	1
Code	PSY5112
ECTS credits	3
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eef Theunissen
Descriptions	In this course, students will apply what they have learned during the Research Grant Writing Workshop (PSY4112). Students will work together (groups of max. 5) to write a research proposal on their selected topic, including an original research hypothesis, experimental design and methods. This proposal should promote interdisciplinarity; therefore students are encouraged to think across boundaries of different scientific fields. A senior researcher will guide students during this writing process. The students will write their proposal in 3 steps, and they will receive feedback from their mentor and peers. The resulting proposals will be presented during a symposium by way of a poster or an oral presentation.
Goals	Knowledge of how to: Review literature, formulate a research hypothesis, design a research study, write a research proposal, present the proposal at a symposium (oral or poster).
Instruction language	EN
Prerequisites	This course is a continuation of the Research Grant Writing Workshop (PSY4112).
Recommended literature	
Teaching methods	Work in subgroups
Assessment methods	Attendance Final paper Presentation
Key words	research proposal, interdisciplinary, hypothesis, design, methods, research symposium, peer review

Title	Cognitive Development
Period	1
Code	PSY5411
ECTS credits	3
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Petra Hurks
Descriptions	The focus of the course is on childhood and adolescence, viewed from a clinical and cognitive neuroscientific perspective. The aim is to learn more about scientific views on normal cognitive development as well as disorders in cognitive development. The influence of biological and psychosocial factors is discussed, as well as problems that scientists are frequently confronted with while studying neuropsychology. Examples of topics that are discussed during the course are clinical expressions of behaviour, affect and cognition, epidemiology, diagnostic procedures and treatment.
Goals	Knowledge of: Theoretical and methodological issues in studies of cognitive development from childhood to adolescence.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Paper(s) PBL Work in subgroups
Assessment methods	Attendance Final paper Presentation
Key words	child neuropsychology, individual differences, cognitive development

Skills training

Is almost equal to the Master's course PSY4063. In the Master's degree it is practical training; in the RM it is skills training.

Title	**Neuropsychological Assessment**
Period	1
Code	PSY4433
ECTS credits	2
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Sven Stapert
Descriptions	Neuropsychological assessment runs parallel to the courses Brain Damage and Behavioural Disorders. The core elements in mastering this skill involves the clinical data gathering process which results in interpreting cognitive, emotional and behavioural data in order to support neurological or neuropsychiatric diagnosis. The skills training commences with an introductory lecture covering the principles and interpretation of neuropsychological assessment. During a 7-week period, students are trained in neuropsychological history taking, observing patient behaviour, cognitive testing and interpreting cognitive and behavioural data. Finally, each student writes a comprehensive neuropsychological report based on a simulated clinical case.
Goals	Knowledge of: Students obtain the basic skills of neuropsychological assessment, i.e. observing, interviewing, neuropsychological testing, combining and interpreting behavioural and cognitive data and neuropsychological report writing.
Instruction language	EN
Prerequisites	introductory knowledge on psychodiagnostics and related psychometrics
Recommended literature	Lezak. M.D. , Howieson, M.D., Bigler, E.D., & Tranel, D. (2012). Neuropsychological Assessment. New York: Oxford University Press; R.D. Vanderploeg (2000). Clinician's Guide to Neuropsychological Assessment. New Jersey: Lawrence Erlbaum Associates.
Teaching methods	Assignment(s) Lecture(s) Paper(s) Patient contact Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper Participation
Key words	neuropsychological assessment, cognitive disorders, brain disease, brain injury, test taking, interviewing, observations, psychometry

Is almost equal to the Master's course PSY4066:

1. *in the Master's degree it is practical training; in the RM it is skills training*
2. *in the Master it's 2 ECTS credits; in the RM 3 ECTS credits.*

Title	**Basic Cognitive Psychological Skills**
Period	2
Code	PSY4434
ECTS credits	3
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eric Vuurman
Descriptions	This course focuses on the acquisition and training of basic skills needed in cognitive performance research. The course is centred around a psychological experiment in which students study the detrimental effects of arousal manipulation (environmental noise) on cognitive processing. Students will learn how to perform a field experiment and how to go through the various stages necessary to acquire and analyse the data and report the results. Students will be required to recruit a small number of subjects and administer the test battery according to a pre-defined protocol. The test battery consists of paper and pencil tests that will have been presented and discussed in previous courses. After data acquisition, a number of interactive sessions are planned in which students learn to explore and analyse their data with SPSS and to interpret the results. Students conclude the course by writing a paper in APA format describing the experiment. Furthermore, an overview of techniques and tests will be given; these are currently used to evaluate performance in a number of cognitive domains, such as language, perception, attention and executive functions.
Goals	Knowledge of: Psychological testing, data preparation, data analysis, report writing.
Instruction language	EN
Prerequisites	
Recommended literature	Field, A. (2009). Discovering statistics using SPSS (3rd ed.). London: Sage.
Teaching methods	Assignment(s) Lecture(s) PBL
Assessment methods	Attendance Final paper
Key words	field experiment, applied behavioural testing, data reduction and analysis techniques, report writing

*PSY4108 Neuroanatomy will be offered in CN, NE, **NP** and PP.*

Title	**Neuroanatomy**
Period	3
Code	PSY4108
ECTS credits	1
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Jos Prickaerts
Descriptions	The aim of this practical training is to become acquainted with the neuroanatomical terminology and to gain insight into the spatial and functional organisation of the brain. It is essential to have a basic knowledge of the brain anatomy when working in the field of neuropsychology or neurobiology. Many specific brain areas can be linked to particular functions. Thus, knowledge of the brain anatomy and its main functions allows direct linkage of specific neurological or psychiatric disorders to particular brain areas. After a short theoretical introduction, students will study whole brains and brain material of mammals at both macroscopical (visual inspection) and microscopical level. The emphasis will be on major brain systems, including the basal ganglia and limbic system.
Goals	Knowledge of: Limbic system, basal ganglia, plastinated human brains, brain dissection, microscopical slices.
Instruction language	EN
Prerequisites	
Recommended literature	Papers from scientific journals and book chapters from books are provided.
Teaching methods	Lecture(s) Skills Work in subgroups
Assessment methods	Attendance Written exam
Key words	neuroanatomy, limbic system, basal ganglia

Title	**Neuropsychology in Practice: From Test Results to Report and Advice**
Period	4, 5
Code	PSY4423
ECTS credits	2
Organisational unit	Neuropsychology and Psychopharmacology (FPN), Psychiatry and Neuropsychology (FHML)
Coordinator	Caroline van Heugten, Rudolf Ponds
Descriptions	The aim of this skills training is to learn to integrate several aspects of a neuropsychological examination. This kind of examination can be used both in clinical settings and in clinical research and contains the following aspects: interview, clinical impression, test results, rating scales, questionnaires, etc. Learning to interpret and integrate the different aspects will result in a coherent neuropsychological report and conclusion. Tests and theoretical and practical knowledge will be presented in the current skills training to help students achieve the course goals. Note that the major focus of this skills training is not to test a patient or a subject participating in a study, but to interpret the data. The skills training consists of eight meetings. In the first two meetings, an overview will be presented of the skills needed to form a conclusion about the data acquired by testing a patient or research subject. Furthermore, students will practise performing and interpreting tests, rating scales and questionnaires. The use of normative data, the concept of validity and what to do when a subject's performance is lower, or otherwise deviant from what would be expected, will also be addressed. Meetings three to eight will be led by clinical experts. Video segments of different patients with a neuropsychological or psychiatric problem (e.g. patients from the departments of psychiatry, neurology and geriatrics) will form the basis of a group discussion and presentations, in which the emphasis will be on the interpretation of patient material.
Goals	Knowledge of: Clinical neuropsychology, assessment, diagnostic techniques, test results, cognitive dysfunctioning, neuropsychiatric disorders, acquired brain injury, Alzheimers disease, dementia, stroke, emotional consequences, behavioural disorders.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Assignment(s) Lecture(s) Paper(s) Presentation(s) Skills
Assessment methods	Attendance Presentation
Key words	clinical neuropsychology, assessment, cognitive dysfunctioning, emotional problems, behavioural problems

Skills training
1.PSY4221 EEG and ERP is equal to the Master's module PSY4034 EEG and ERP (DP & CN)
2.PSY4221 EEG and ERP (in CN, NE, FN, **NP**. In NP it will be offered as an Elective).

Title	**EEG and ERP**
Period	1
Code	PSY4221
ECTS credits	2
Organisational unit	Cognitive Neuroscience
Coordinator	Fren Smulders
Descriptions	Electroencephalography (EEG) and Event Related Potentials (ERP) offer a combination of precise measurements for the time course of brain processes. These are low cost, non-invasive measurements and are widely available. For these reasons they make a unique contribution to cognitive neuroscience. Scientific interest in EEG and ERP is growing, and results have been increasingly integrated with other neuro-imaging techniques during the last few decades. Lectures and basic literature provide an introduction for students to the basics of EEG and ERP research, EEG and ERP terminology and the possibilities and limitations within EEG and ERP. One topic that students will learn is how to set up an experimental paradigm that is suitable for EEG and ERP measurements. Students also study practical measurement issues, such as electrode placement and types of artefacts. Finally, students must interpret the resulting data. Successful measurement requires an understanding of the basics of EEG and ERP signal analysis techniques, such as artefact management, spectral analysis, filtering, ERP averaging, time-frequency analysis etc. Students also receive hands-on training in smaller groups in running an ERP experiment, including electrode application, minimising artefacts, and health and safety in the lab. A number of simple experimental paradigms will be utilised; these provide interesting and reliable results. Data processing will include a number of common EEG analyses, e.g. analyses in the time and frequency domain.
Goals	Knowledge of: Basic EEG/ERP paradigms, EEG recording systems, measurement settings, electrode application, data quality verification, analogue-digital conversion, basic EEG / ERP components, interpreting topographical plots, neural origins of EEG, time domain analysis, frequency domain analysis, time-frequency analysis, filtering, ocular artefact control, muscle artefact control, choice of reference, re-referencing.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, handbooks.
Teaching methods	Lecture(s) Paper(s) Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	Electroencephalography (EEG), Event-related potentials (ERP), electrophysiology, measurement, analysis of brain

	potentials.

Title	**Neuropsychological Rehabilitation**
Period	5, 6
Code	PSY4424
ECTS credits	2
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Caroline van Heugten
Descriptions	The course will address the content of neuropsychological interventions as well as the procedures and designs that can be used for the execution of evidence-based research. Throughout the meetings, the basic premises and 'pitfalls' in this type of research will be elaborated and the possibilities to circumvent these problems by proper choice of approach and design will be discussed. Various research designs will be compared in terms of their strengths and weaknesses (e.g. experimental studies, quasi-experimental designs, intention-to-treat, single case designs, challenge-studies, depletion studies). Various forms of neuropsychological treatments will be discussed and students will receive practical training in rehabilitation principles. Skills will be developed that can be applied in cognitive training and psycho-education. Forms of complex behavioural treatment will also be discussed.
Goals	Knowledge of: Clinical neuropsychology, treatment, rehabilitation, cognitive dysfunctioning, emotional problems, behavioural disorders, acquired brain injury, Alzheimers disease, neuropsychiatric disorders, randomised clinical trials, treatment effects, outcome measurement.
Instruction language	EN
Prerequisites	
Recommended literature	Jounral articles, book chapters.
Teaching methods	Assignment(s) Lecture(s) Presentation(s) Skills
Assessment methods	Attendance Final paper
Key words	rehabilitation, treatment, acquired brain damage, effectiveness

Methodological and technical workshops

PSY4112 Research Grant Writing Workshop will be offered in all RM specialisations.

Title	**Research Grant Writing Workshop**
Period	6
Code	PSY4112
ECTS credits	1
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eef Theunissen
Descriptions	During this workshop students will learn why and how to apply for research grants. The need for acquiring funding for research, the opportunities for, and availability of grant application funding will be discussed. Several researchers who have experience in applying for different types of grants will provide students with first-hand knowledge and tips. Students will learn fundamentals of good grant writing, general preparation of the grant application and how to deal with reviewer comments. These skills will be practiced during the workshop. Students will subsequently choose a topic (provided by senior researchers) on which they will write a research proposal during the second-year Research Grant Writing Course (see description of PSY5112).
Goals	Knowledge of: Opportunities for funding, how grants can be acquired, grant writing skills.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignments Lecture(s)
Assessment methods	Attendance Final paper
Key words	funding possibilities, grant applications, proposal writing

PSY4110 Scientific Writing will be offered in all RM specialisations. Offering times vary according to RM specialisation:
CN: Period 5
NE: Period 5
NP: Period 5
FN: Period 1
PP: Period 1

Title	**Scientific Writing**
Period	5
Code	PSY4110
ECTS credits	1
Organisational unit	Maastricht University Language Centre
Coordinator	Alice Wellum
Descriptions	The course is delivered in a series of three lectures, interspersed with three tutorials, during which students produce and revise a short research proposal or research article. The lectures aim to cover the broader principles of scientific writing (including clarity/readability, structure and coherence). It also covers the ethical issues surrounding the production of scientific texts (for example, plagiarism and non-biased writing). Lectures are interactive; students are assigned with analysis and discussion tasks to complete. In tutorials students apply the principles in the linguistic sense and discover how these apply to their own writing. In particular, the 'doors and windows' (abstracts, introductions, hypotheses and discussions) of scientific papers are analysed for their linguistic and stylistic content. In the tutorials, students develop the language awareness and critical skills required to review their own work as well as that of their peers. Individualised feedback on parallel block assignments is given at the end of the course by the instructor.
Goals	Knowledge of: Principles of scientific writing, conventions in scientific writing, the structure of scientific texts, ethics in scientific writing, plagiarism, editing skills, language in scientific writing, academic writing style, coherence in scientific writing, reporting sources.
Instruction language	EN
Prerequisites	
Recommended literature	Literature is provided in the course materials.
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Research Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	scientific writing, research proposal, empirical research article, literature review, peer review, language awareness.

*PSY4371 Psychiatric Epidemiology will be offered in FN, **NP** and PP.*

Title	**Psychiatric Epidemiology**
Period	6
Code	PSY4371
ECTS credits	1
Organisational unit	Psychiatry and Psychology (FHML)
Coordinator	Wolfgang Viechtbauer
Descriptions	The course will provide an introduction to the methodologies and analytical strategies of epidemiology as applied to mental health outcomes. The principles and practice of various study types (cohort, case-control, RCT, ecological) will be taught, with emphasis on interpreting associations and possible causality thereof. Consideration will be given to such issues as confounding, bias, and moderation. Further topics to be covered include the use and interpretation of diagnostic studies, the basic principles of analysing dichotomous and time-to-event outcomes, and the use of systematic reviews and meta-analysis for building cumulative knowledge.
Goals	Knowledge of: Different epidemiological study types, including their purpose, advantages, and disadvantages; calculation and interpretation of effect size and outcome measures for dichotomous and time-to-event outcomes; principles of analysing epidemiological studies; the basic steps of conducting a systematic review and meta-analysis.
Instruction language	EN
Prerequisites	
Recommended literature	Rothman, K. J., & Greenland, S. (1998). Modern epidemiology (2nd ed.). Philadelphia, PA: Lippincott-Raven Publishers.
Teaching methods	Assignment(s) Lecture(s) PBL Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	epidemiology, methodology, statistics, experimental studies, observational studies, diagnostic studies, systematic reviews, meta-analysis

*PSY4372 Functional Brain Imaging will be offered in FN**, NP** and PP.*

Title	**Functional Brain Imaging**
Period	6
Code	PSY4372
ECTS credits	2
Organisational unit	Cognitive Neuroscience (CN)
Coordinator	Vincent van de Ven
Descriptions	This workshop is aimed at introducing basic knowledge and principles of functional brain imaging techniques, and at discussing novel advances in relevant fields, such as clinical, animal and cognitive research. The workshop comprises two versions that are tailored to two *a priori* levels of background that may exist within the Research Master cohort. Version 1 introduces the basic principles of neuroimaging (intro to imaging methods, experimental design & analysis, fMRI signal, etc.) and some applications to clinical research, neuroeconomics, social neuroscience and similar fields. Version 2 introduces a number of technical and methodological advances (multimodal imaging techniques, connectivity analyses, mental chronometry and other matters), and assumes that participants possess *a priori* knowledge of items discussed in version 1. Assignment to a workshop version is via allocation on an individual basis; participants must follow at least one version. Participants can opt to follow both versions, but will receive no extra credits. General description: The investigation of human brain anatomy and functions using a range of imaging methods represents the most influential development in psychology in the last few years. This workshop reviews essential facts about contemporary major structural and functional brain mapping techniques, but the focus will be on functional Magnetic Resonance Imaging (fMRI). Also, the workshop discusses strengths and weaknesses of neuroimaging methods and on the description of relevant applications in the normal and pathological brain. These topics will be investigated through lectures, paper and group discussions, and a final skills session in which fMRI data is analysed. The final assessment is via a paper assignment.
Goals	Knowledge of: Functional brain imaging techniques and principles, pros and pitfalls of functional brain imaging, data analysis, experimental design for brain imaging research, hands-on data analysis and visualisation experience.
Instruction language	EN
Prerequisites	Basic knowledge of Brain anatomy, experimental design and statistics.
Recommended literature	Journal articles.
Teaching methods	Lecture(s) Paper(s) Skills
Assessment methods	Attendance Final paper
Key words	Magnetic Resonance Imaging (MRI), functional MRI, structural MRI, positron emission tomography (PET),

	neuroimaging, data analysis, brain activity

*PSY4335 will be offered in **NP** and PP.*

Title	**Psychopharmacology**
Period	5
Code	PSY4335
ECTS credits	1
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Arjan Blokland
Descriptions	Students will become acquainted with current topics in psychopharmacology, i.e. how current knowledge of neuropsychiatric disease processes relates to existing medicinal drugs and research and development of new medicinal drugs. Topics will also include testing new drugs in animal models and the use of healthy volunteers and patients in new drug studies, in order to cover the cycle of new medicine development from bench to bedside.
Goals	Knowledge of: Examples of psychopharmacological studies; present/prepare a presentation on a topic of psychopharmacology.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Lecture(s) Presentation(s)
Assessment methods	Attendance Presentation
Key words	psychopharmacology

Title	**Neuropsychological Assessment in Children**
Period	1
Code	PSY5431
ECTS credits	1
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Peter Stiers
Descriptions	The aim of this workshop is to acquaint students with neuropsychological testing in children and with the interpretation of clinical data in relation to a conceptual model of brain-behaviour relationships. The constructs and assessment of cognitive functions in children will be discussed, with special attention given to methodological aspects of assessment. A number of cognitive tests for children will be presented during the workshop. Models of cognitive psychology will be considered in the context of developmental disorders, including memory, attention, language, information processing and intelligence. The focus is on test paradigms from the field of child neuropsychology used to probe domain-specific functions, with an emphasis on the need to integrate information from different sources: medical history, neurological disorders, radiology, interview, test results, scientific literature, etc.
Goals	Knowledge of: Multiple disability, mental retardation, specific impairments, assessing differential deficits, congenital brain disorders, developmental amnesia, cerebral visual impairment, attention, clinical report writing.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Presentation(s) Skills Work in subgroups
Assessment methods	Attendance Final paper
Key words	multiple disability, neuropediatrics, specific impairment, neuropsychological methods, congenital disorders, magnetic resonance imaging

Electives

The following electives will be offered in all RM specialisations.

Title	**Elective: Course**
Period	throughout
Code	PSY4156
ECTS credits	Variable
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students can attend a course offered by an RM specialisation or a course from a regular master's programme at Maastricht University (local courses) or a course that is organised at a different university in The Netherlands or abroad (external courses). The content, format and organisation of local courses are described in this catalogue or in the course descriptions of other UM master's programmes. The content, format and organisation of external courses are determined by the host university. Elective courses do not overlap with required RM courses, but instead offer new knowledge and insights. Enrollment in an elective course is subject to approval by the Course Instructor as well as the RM Electives Coordinator. There is no limit to the number of electives courses that may be taken, but elective courses do not substitute for mandatory courses.
Goals	Knowledge of: Extracurricular interests, broadening academic scope, taking specialised courses.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Presentation(s) Skills Training(s)
Assessment methods	Attendance Computer test Final paper Observation Oral exam Participation Portfolio Presentation Take home exam Written exam
Key words	electives, external courses, external workshops

Title	Elective: Review
Period	throughout
Code	PSY4157
ECTS credits	3
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students write a critical literature review based on a specialised topic, under the supervision of a member of the scientific staff of Maastricht University. Students take the initiative to locate and arrange a supervisor for the review. The review topic, content and format will be determined by mutual agreement between student and supervisor. The review topic is also subject to approval by the RM Electives Coordinator. Students are expected to devote 84 hours to the Elective: Review. Each student may complete maximally one Elective: Review course The Elective: Review course must be completed and assessed prior to the start of the internship.
Goals	Knowledge of: Extracurricular interests, specialisation on topic of interest, supervised scientific writing, literature review.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Paper(s)
Assessment methods	Final paper
Key words	elective, review paper, paper assignment, literature review, writing assignment

Title	Elective: Research
Period	throughout
Code	PSY4158
ECTS credits	3
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students can participate in (parts of) an empirical research project that is conducted and supervised by a member of the FPN or FHML scientific staff. Students can apply for an available project from the list of project descriptions; available on the 'RM Electives' section on EleUM, which is published and updated in December of each year. The application procedure is also described on the 'RM Electives' section on EleUM. Students who are selected to participate in a research elective may assist in designing the experiment or observational study, acquire empirical data, be trained in using measurement equipment, analyse empirical data, or take part in other parts of the research project. Students must write a short research report of maximally 5 pages about the practical experience obtained. Students are expected to spend 84 hours on the Elective: Research course, which includes time spent on practical work and the research report. The principal investigator of the project will supervise the practical work and grade the research report. Each student may complete maximally one Elective: Research course. The Elective: Research course must be completed and graded before the start of the internship.
Goals	Knowledge of: Planning or designing empirical research, empirical data analysis, writing research report, quantitative methods, conducting research, skill learning of data acquisition techniques, functioning in a research team.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Lecture(s) Paper(s) Patient contact PBL Presentation(s) Research Skills Training(s) Work in subgroups
Assessment methods	Final paper Participation
Key words	elective, practical research, empirical research

Internships

1. *PSY5107 Research Proposal, PSY5102 Research Internship and PSY5103 Master's Thesis -> for [CN, NE, FN->50 credits] and [NP and PP->30 credits]*. *Internship coordinators are different per specialisation.*

50 credits apply to: CN, NE and FN and for the NP student that only chooses a research internship (not including the clinical part)

The NP student that chooses the combined internship (Research + Clinical) will obtain 30 credits for the Research Proposal + Research Internship + Master's Thesis + 20 credits for Clinical Internship, Research Proposal and Minor's Thesis. The combined version is compulsory to PP students.

2. Clinical Internship, Research Proposal and Minor's Thesis PSY5104, PSY5108, and PSY5105 Are the same for NP and PP. *Only the internship coordinators differ from each other.*

Title	**Research Proposal, Research Internship and Master's Thesis**
Period	2-6
Code	PSY5107, PSY5102, and PSY5103
ECTS credits	**30** ECTS (1, 19, and 10, respectively) for RM PP students and for RM NP students who choose to conduct both a research and a clinical internship (plus minor's thesis). The total research internship will be assigned 30 credits: 20 credits for the research activities, including the research proposal (1 credit; graded pass/fail) and the practical execution of the internship (19 credits; graded assessment), and 10 credits (graded assessment) for the master's thesis. **50 (1, 35, and 14, respectively)** for RM CN, NE, FN, NP students who do *not* complete a clinical internship and minor's thesis. The total research internship will be assigned 50 credits: 36 credits for the research activities, including the research proposal (1 credit; graded pass/fail), and the practical execution of the internship (35 credits; graded assessment) and 14 credits (graded assessment) for the master's thesis.
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Sandra Mulkens
Descriptions	The second part of the second year of the research master's programme is devoted to conducting a research internship. As a result of the many international research contacts that faculty members have established, a substantial number of students will conduct their research internship abroad. Students start their internship with the writing of a research proposal. Students finish the master's programme by writing a thesis based on their internship research project. The internship can be undertaken at Maastricht University or at external research institutes. In all cases, a student's research proposal and master's thesis will be evaluated by two assessors. At least one of these assessors must be a member of the Faculty of Psychology and Neuroscience (FPN) or the Faculty of Health, Medicine and Life Sciences (FHML). The other assessor might be a (senior) researcher at, for

	example, the institute where a student collected the data. A detailed guide on research internships and the master's thesis can be found on EleUM > Students Research Master Faculty of Psychology and Neuroscience > internships. - RM Cognitive Neuroscience Internships Coordinator: Amanda Kaas, Cognitive Neuroscience (FPN), Phone: (0)43 38 82172, 55 Oxfordlaan, Room 2.019, Email: a.kaas@maastrichtuniversity.nl - RM Neuroeconomics Internships Coordinator: Amanda Kaas, Cognitive Neuroscience (FPN), Phone: (0)43 38 82172, 55 Oxfordlaan, Room 2.019, Email: a.kaas@maastrichtuniversity.nl - RM Fundamental Neuroscience Internships Coordinator: Pilar Martinez, Psychiatry and Neuropsychology (FHML), Phone: (0)43 38 81042, 40 Universiteitssingel West, Room 2.574, Email: p.martinez@maastrichtuniversity.nl - RM Neuropsychology Internships Coordinator: Caroline van Heugten, Neuropsychology and Psychopharmacology (FPN), Phone (043) 38 84213, 40 Universiteitssingel East, Room 2.736, Email: caroline.vanheugten@maastrichtuniversity.nl - RM Psychopathology Internships Coordinator: Nicole Geschwind, Clinical Psychological Science (FPN), Phone (043) 38 81608, 40 Universiteitssingel East, Room 2.767, Email: Nicole.geschwind@maastrichtuniversity.nl
Goals	Knowledge of: Conducting a (supervised) empirical research project and summarising the research and findings in the form of a master's thesis.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Paper(s) Patient contact Research Skills Working visit(s)
Assessment methods	Attendance Final paper Observation Participation
Key words	internship, research, master's thesis

Title	**Clinical Internship, Research Proposal and Minor's Thesis**
Period	2-6
Code	PSY5104, PSY5108, and PSY5105
ECTS credits	**20** (15, 1, and 4, respectively)
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Sandra Mulkens
Descriptions	Students specialising in psychopathology are required to, and students specialising in neuropsychology may choose to, conduct a 13-week clinical internship in an approved setting. The clinical internship can be conducted in conjunction with the research internship or separately. Students are required to submit an additional research proposal and scientific report (the minor's thesis) based on client/patient-based investigations performed during the clinical internship. The aims of the clinical internship are twofold. Firstly, the internship is meant to provide experience in conducting research in a clinical setting; a small-scale research project culminates in the minor's thesis. Secondly, the internship provides an introduction to the organisation and practice of mental health care, as well as basic experience in clinical diagnosis and therapeutic interventions. For neuropsychology students who choose to undertake a clinical internship, the internship and minor's thesis will be assigned 20 credits, and the research internship and thesis will be assigned 30 credits. A detailed guide on clinical internships and the minor's thesis can be found on EleUM > FPN Research Master Students > Internships. Although it is not a requirement of the research master's programme, students who wish to meet Dutch requirements for admission to advanced clinical training programmes are advised to extend their clinical internship by at least two weeks. - RM Psychopathology Internships Coordinator: Nicole Geschwind, Clinical Psychological Science (FPN), Phone (043) 38 81608, 40 Universiteitssingel East, Room 2.767, Email: Nicole.geschwind@maastrichtuniversity.nl - RM Neuropsychology Internships Coordinator: Caroline van Heugten, Neuropsychology and Psychopharmacology (FPN), Phone (043) 38 84213, 40 Universiteitssingel East, Room 2.736, Email: caroline.vanheugten@maastrichtuniversity.nl
Goals	Knowledge of: The work environment of the clinical psychologist. This internship gives students the opportunity to practise clinical skills in a real-life setting and to design and conduct a small-scale clinical research project.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Paper(s) Patient contact Research Skills Training(s) Working visit(s)

Assessment methods	Attendance Final paper Observation Participation
Key words	clinical research, clinical practice, clinical training, psychodiagnostics, patient contact

Specialisation in Psychopathology (PP)

The specialisation in Psychopathology provides students with the theoretical background and clinical insights necessary for future research in the various fields of mental health, in particular experimental psychopathology, clinical psychology, and psychiatry. Interactive core seminars cover biopsychosocial theories and state-of-the-art research on the epidemiology, genetics, psychological and neurobiological mechanisms underlying onset and course, treatment and prevention of mental disorders throughout the life cycle. In addition to the coverage of specific disorders and underlying processes, attention is paid to positive psychology and to broader issues and controversies, such as gender and cultural differences, the validity of experimental and animal models of psychopathology and gene-environment interactions. The programme includes training in diagnostic and other clinical skills, as well as research experience in health care settings. All students complete both a research internship/master's thesis and a shorter clinical internship/minor's thesis in the second year. The possibility of designing individualised electives, choosing elective courses from other specialisations, or participating in a research elective affords students not only an in-depth understanding of the multidisciplinary approaches to psychopathology, but also gives them the opportunity to tailor the programme along the lines of their personal research interests. Although the primary emphasis of the curriculum is on research, this specialisation also prepares students who wish to later pursue advanced clinical training, in accordance with the scientist-practitioner model.

Psychopathology Coordinator:
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Overview RM in Psychopathology (PP)

Period	Research Master's in Psychopathology (PP) Year 1 (2013-2014)
Period 0, 02-09-2013 - 06-09-2013	Introduction week PSY 4950 PBL training for non-UM students*
Period 1, 09-09-2013 - 25-10-2013	**Core course:** ** **PSY4511** Anxiety Disorders (4 credits): Arnoud Arntz **PSY4512** Mood Disorders (total of 4 credits): Frenk Peeters **PSY4106** Advanced Statistics I (total of 3 credits): Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers
	Workshop: **PSY4110** Scientific Writing (1 credit): Alice Wellum
	Skills training: **PSY4531** Research Practicum Psychometrics (total of 2 credits): Jeffrey Roelofs **PSY4532** Clinical Skills I: Interviewing Skills (2 credits): Inge Drost **PSY4534** Clinical Assessment Instruments (total of 2 credits): Nancy Nicolson
Period 2, 28-10-2013 - 20-12-2013	**Core course:** **PSY4512** Mood Disorders: Frenk Peeters **PSY4513** Stress and Trauma (4 credits): Nancy Nicolson **PSY4106** Advanced Statistics I: Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers
	Skills training: **PSY4531** Research Practicum Psychometrics: Jeffrey Roelofs **PSY4533** Clinical Skills II: Diagnostic Test Procedures (2 credits): Petra Hurks, Dymphie in de Braek **PSY4534** Clinical Assessment Instruments: Nancy Nicolson
Christmas break	
Period 3, 06-01-2014 - 31-01-2014	**Core course:** **PSY4521** Bodily Distress Disorders (4 credits): Johan Vlaeyen **PSY4106** Advanced Statistics I (total of 3 credits): Nick Broers *Practical training:* PSY4119 SPSS and Lisrel: Nick Broers **PSY4107** Advanced Statistics II (total of 3 credits): Gerard van Breukelen *Practical training:* PSY4117 SPSS: Gerard van Breukelen
	Skills training: **PSY4108** Neuroanatomy (1 credit): Jos Prickaerts **PSY4534** Clinical Assessment Instruments: Nancy Nicolson
	PSY4100 Colloquia (Total of 1 credit): Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Period 4, 03-02-2014 t/m 04-04-2014	**Core course:** **PSY4514** Developmental Psychopathology (4 credits): Peter Muris **PSY4519** Eating Disorders (4 credits): Anita Jansen **PSY4107** Advanced Statistics II: Gerard van Breukelen *Practical training:* PSY4117 SPSS: Gerard van Breukelen
	Skills training: **PSY4422** Psychophysiological Skills (1 credit) **PSY4534** Clinical Assessment Instruments: Nancy Nicolson

	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Period 5, 07-04-2014 t/m 06-06-2014	**Core course:** **PSY4516** Psychosis (4 credits): Jim van Os **PSY4520** Mental Health and Happiness (total of 3 credits): Madelon Peters **PSY4107** Advanced Statistics II: Gerard van Breukelen *Practical training:* PSY4117 SPSS: Gerard van Breukelen
	Workshop: **PSY4335** Psychopharmacology (1 credit) **PSY4372** Functional Brain Imaging (2 credits)
	Skills training: **PSY4534** Clinical Assessment Instruments: Nancy Nicolson
	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Period 6, 10-06-2014 t/m 04-07-2014	**Core course:** **PSY4520** Mental Health and Happiness: Madelon Peters
	Workshop: **PSY4542** The Application of Cognitive Methods in Psychopathology Research (1 credit): Katrijn Houben **PSY4112** Research Grant Writing Workshop (1 credit): Eef Theunissen **PSY4371** Psychiatric Epidemiology (1 credit): Wolfgang Viechtbauer
	Skills training: **PSY4534** Clinical Assessment Instruments: Nancy Nicolson
	PSY4100 Colloquia: Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson

**Students from Erasmus Rotterdam receive an exemption for PBL training*
*** Electives: 5 credits,* throughout year 1: Vincent van de Ven

Period	**Research Master's in Psychopathology (PP) Year 2 (2014-2015)**
Period 1, To be announced in 2013	**Core course:** **PSY5112** Research Grant Writing Course (3 credits): Eef Theunissen **PSY5511** Personality Disorders (4 credits): David Bernstein
	Skills training: **PSY5531** Clinical Skills III: Clinical Interview for the DSM IV (SCIDI and SCID II) (1 credit): Reinier Kreutzkamp **PSY5523** Clinical Skills IV: Intervention Techniques (2 credit): Marisol Voncken
32 weeks	**PSY5107 Research Proposal, PSY5102 Research Internship & PSY5103 Master's Thesis** (30 credits): Sandra Mulkens
	PSY5108 Research Proposal, PSY5104 Clinical Internship & PSY5105 Minor's Thesis (20 credits): Sandra Mulkens

Colloquia

PSY4100 Colloquia will be offered in all RM specialisations.

Title	**Colloquia**
Period	3-6
Code	PSY4100
ECTS credits	1
Organisational unit	Cognitive Neuroscience (FPN), Department of Economics (SBE), Psychiatry and Neuropsychology (FHML), Neuropsychology and Psychopharmacology (FPN)
Coordinator	Milene Bonte, Arno Riedl, Jos Prickaerts, Rob Markus, Nancy Nicolson
Descriptions	Colloquia are presented per specialisation (CN, NE, FN, NP and PP) by senior researchers from the UM faculties or visiting guest lecturers. Each colloquium focuses in depth on one of a wide range of topics, with issues transcending the courses and specialisations. Each colloquium lecture will be followed by active discussion, prepared and chaired by the lecturer (the UM host may fill this role for guest lecturers). A total of nine colloquia will be offered during the first year.
Goals	Knowledge of: Key research domains from different specialisations, interdisciplinary research, interacting with students from different specialisations.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Lecture(s)
Assessment methods	Attendance
Key words	interdisciplinary knowledge

Title	Anxiety Disorders
Period	1
Code	PSY4511
ECTS credits	4
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Arnoud Arntz
Descriptions	This course covers the main findings and controversies related to anxiety disorders. Although treatment issues are dealt with, the emphasis of the course is on biological and psychological mechanisms that are involved in the origin and maintenance of the various anxiety disorders. In industrialised countries (USA, Canada and Western Europe), anxiety disorders are the largest group of mental disorders for which patients are referred, and without appropriate treatment the natural course is often chronic. Luckily, anxiety disorders are relatively well studied and understood, and the outcome of treatment is relatively favourable. Students will first learn what the features of normal and pathological anxiety are. A special emphasis will be placed on brain processes and the role of conscious and non-conscious processes in fear responses. As regards the aetiology of anxiety disorders, the focus will be on the role of social (life events), biological, conditioning and information processing factors. With regard to the maintenance of the disorders, the course concentrates first of all on anxiety-related aberrations in the processing of negatively valenced information. Such selective processing is studied as it relates to perception, attention, memory, reasoning and interpretation. Furthermore, students study the maintaining role of 'safety behaviours', which are attempts to prevent a feared catastrophe, with the ironic effect that anxiety is reinforced. As to biological factors, the role of the various neurotransmitters in anxiety disorders is highlighted. Students learn various experimental (laboratory) paradigms that are typically employed in the study of the cognitive psychology/biological psychology of anxiety disorders: carbon dioxide inhalation, dot-probe methodology, various tests to measure interpretation biases, etc. Lastly, biological and psychological treatments and the underlying mechanisms of change will be covered.
Goals	Knowledge of: Current theories of anxiety disorders, normal-abnormal anxiety distinction, controversies about anxiety (disorders), classification of anxiety disorders, etiology of anxiety disorders, maintenance processes of anxiety disorders, current treatment approaches.
Instruction language	EN
Prerequisites	
Recommended literature	Barlow, D.H. (2002). Anxiety and its Disorders (2nd ed.), New York & London: The Guilford Press; Journal articles, provided or suggested during the course.
Teaching methods	Lecture(s) Presentation(s) Work in subgroups
Assessment methods	Attendance

	Final paper Written exam
Key words	anxiety, anxiety disorders, phobia, obsessive compulsive disorder, posttraumatic stress disorder

Title	**Mood Disorders**
Period	1, 2
Code	PSY4512
ECTS credits	4
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Frenk Peeters
Descriptions	This course is intended to give the student an overview of current concepts and research in the field of mood disorders. During the course, fundamental aspects of onset and course of the most important mood disorders (major depression, bipolar disorder and dysthymia) will be addressed. Over the last couple of decades, it has become increasingly clear that mood disorders are chronic psychiatric disorders characterised by acute episodes, relapses, recurrences and residual symptomatology. Both onset and course of mood disorders are the result of complex interactions between distal (e.g. genetic and developmental) and proximal (e.g. severe life-events) risk factors. This is illustrated by discussion of mood disorders across the life span in the light of biological, psychological and social approaches. Current research strategies aimed at clarifying the role of these different aspects will be the central theme throughout the course. Based on this framework, state-of-the-art treatments for mood disorders are addressed and illustrated where possible.
Goals	Knowledge of: Epidemiology, etiology of mood disorders, course, treatment, major depression, bipolar disorder, dysthymia, diagnostic issues, kindling, scar, personality, genes, environment, gene-environment interaction, efficacy, effectiveness, cognitive behavioural therapy, interpersonal therapy, electroconvulsive therapy, gender, life stressors.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Assignment(s) Lecture(s) Presentation(s) Work in subgroups
Assessment methods	Attendance Presentation Final paper
Key words	epidemiology, aetiology, course, treatment, major depression, bipolar disorder, dysthymia

Title	**Stress and Trauma**
Period	2
Code	PSY4513
ECTS credits	4
Organisational unit	Psychiatry and Psychology (FHML)
Coordinator	Nancy Nicolson
Descriptions	This course is designed to give students an in-depth overview of key concepts and controversies in current stress research, with an emphasis on the role stress is thought to play in the aetiology, pathophysiology and course of psychiatric disorders over the lifespan. The first half of the course will focus on the interrelationship of biological and psychological processes in healthy adaptation as well as in psychopathology. In the second half, this detailed knowledge about how individuals respond to and cope with various forms of stress will be applied in order to understand aspects of posttraumatic stress disorder (PTSD): epidemiology, risk and protective factors, prevention, and evidence-based treatment options. Throughout the course, attention will be paid to how current theories about stress and trauma can be translated into testable hypotheses and feasible research designs. In addition, the generalisability and clinical relevance of findings from experimental stress exposure paradigms and studies in animal models will be considered.
Goals	Knowledge of: Conceptualisation and measurement of stress, appraisal and coping processes, sympathetic-adrenal medullary system, hypothalamic-pituitary-adrenal axis, experimental stress paradigms, long-term effects of prenatal stress and childhood adversity, gene-environment interactions, environmental sensitivity, epidemiology of trauma exposure, risk and protective factors, social support, resilience, diagnostic criteria, acute stress disorder, posttraumatic stress disorder, cognitive mechanisms, biological mechanisms, prevention, clinical trials, treatment approaches (rationale and efficacy), barriers to translating research into clinical practice, writing a research proposal and a peer review, giving a brief empirical presentation.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters, online sources.
Teaching methods	Assignment(s) Lecture(s) Paper(s) Presentation(s) Work in subgroups
Assessment methods	Attendance Final paper Presentation
Key words	stress, childhood adversity, life events, psychoneuroendocrinology, posttraumatic stress disorder

Title	**Bodily Distress Disorders**
Period	3
Code	PSY4521
ECTS credits	4
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Johan Vlaeyen
Descriptions	Why do a relatively large number of individuals complain about longstanding bodily complaints, and continue to seek medical care despite the absence of a medical cause of their complaints? This course focuses on the mental representations of bodily symptoms, and their effects on observable behaviours, which can be quite disabling. Interestingly, a shift in scientific focus has occurred in the last decade from stable individual traits towards more dynamic transdiagnostic psychological processes. The emphasis of this course is on the cognitive and behavioural mechanisms (e.g. conditioning, reasoning, attention, avoidance) that play a role in the aetiology and maintenance of chronic pain, shortness of breath (dyspnea), ringing in the ears, and fear of serious illnesses. Evidence-based cognitive-behavioural interventions are discussed. Because of its prototypical character, the problem of chronic pain and pain disorder will be the main focus of this course. The course starts with three introductory sessions during which a modern approach of somatoform disorders is presented, In each of the four subsequent 'meet-the-expert' sessions, a lecturer specialised in a particular somatoform disorder from a collaborating university lab is invited, and students will be given the opportunity to actively interact with the experts. If possible, a visit to one of the experts' labs will be organised. Usually, this is the lab of the research group Health Psychology at the University of Leuven (Belgium). The course ends with an interactive mini-symposium during which students present their research paper.
Goals	Knowledge of: Theoretical approaches of symptom perception and body appearance concerns, catastrophic (mis)interpretations of bodily symptoms, congenital insensitivity to pain, gate-control theory of pain, sensory-discriminative and affective dimension of interception, neural correlates of pain, pain matrix, descending modulation, theories of health anxiety, fear-avoidance model of pain, interoceptive conditioning, safety behaviours, attentional processes, stress, coping and acceptance, communal coping model, self-consciousness, self-discrepancies, air hunger, differences and communalities between pain and dyspnea, experimental pain and dyspnea induction methods, cognitive-behavioural treatment for somatoform disorders, exposure.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Lecture(s) PBL Presentation(s) Work in subgroups

	Working visit(s)
Assessment methods	Attendance Final paper Presentation
Key words	bodily complaints, chronic pain, dyspnea, tinnitus, health anxiety

Title	Developmental psychopathology
Period	4
Code	PSY4514
ECTS credits	4
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Peter Muris
Descriptions	The aim of this course is to introduce students to the field of developmental psychopathology, an interdisciplinary field that employs the framework of normal development to understand psychopathology as it unfolds throughout the natural lifespan. Developmental psychopathology integrates research findings from developmental and clinical psychology, behavioural genetics, neuropsychology and psychiatry into models that explain how psychopathology develops. The focus of this seminar will be to examine child psychopathology through the lens of developmental psychopathology. The sessions will cover broad conceptual and methodological issues in developmental psychopathology research, as well as genetic, environmental influences and family factors in the development of psychopathology. Additional sessions will address current theory and research in specific types of childhood psychopathology, such as anxiety, depression, conduct disorders and autism. In each of these sessions findings from developmental research will be integrated with clinical studies.
Goals	Knowledge of: Child psychopathology, oppositional-defiant disorder, conduct disorder, antisocial personality disorder, primum non nocere, bullying, KOPP-kinderen, parental rearing, Munchhausen by proxy, mental retardation, assessment, Tourette's syndrome, autism, Pica, rumination disorder, conversion disorder, childhood schizophrenia.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles.
Teaching methods	Assignment(s) Lecture(s) Work in subgroups
Assessment methods	Attendance Portfolio
Key words	developmental psychopathology, child and adolescent disorders, etiology, treatment

Title	Eating Disorders
Period	4
Code	PSY4519
ECTS credits	4
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Anita Jansen
Descriptions	Eating disorders are among the most prevalent disorders in adolescent and young adult females. Their exact aetiologies are largely unknown, although it has become evident that a range of factors influences an individual's vulnerability to eating disorders (ranging from genetic to environmental factors, like low self-esteem, dieting, body image bias, reward sensitivity and impulsivity). An initial aim of the course is to discuss influential state-of-the art theories and empirical papers about the origin or maintenance of eating disorders. The question of whether obesity is an eating disorder or not is also discussed. Secondly, special attention will be paid to experimental psychopathology research methods for testing hypotheses on the origin, maintenance and reduction of these disorders. Thirdly, the gap with clinical practice is scrutinised. What is the best treatment a patient can get? And why is it so difficult to implement the evidence-based treatments in clinical practice?
Goals	Knowledge of: 1.Clinical pictures and diagnostic criteria of eating disorders and obesity, relation between dieting and overeating, beauty ideal and eating disorders, body image bias, conditioned craving and overeating, effective treatments for eating disorders, cognitive behaviour therapy; 2. a training in writing short popular scientific articles, reviewing popular science, and working through the process of revision and submission of revised work to an editor of a journal; 3. working out a cognitive formulation and intervention for a patient with an eating disorder.
Instruction language	EN
Prerequisites	
Recommended literature	There is no recommended literature. To stimulate discussion and skills the student searches for and studies articles of interest, related to the theme under discussion.
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL
Assessment methods	Attendance Final paper
Key words	eating disorders, obesity, body image, dieting

Title	Psychosis
Period	5
Code	PSY4516
ECTS credits	4
Organisational unit	Psychiatry and Psychology (FHML)
Coordinator	Jim van Os
Descriptions	The course aims to provide the student with an overview of current thinking and unresolved issues in psychosis research. The process of psychotic disorder and psychosis transition has been the subject of intense study in the last decade. Early epidemiological approaches have been complemented with studies of cognitive mechanisms, psychopathology, neuroimaging and, finally, treatment trials. There is now evidence to suggest that the onset of psychotic disorder is the endpoint of a process of interactive aetiological forces that involve genetic background factors associated with low-grade, non-clinical expression of psychosis in the general population, environmental stressors such as cannabis use and childhood trauma and a number of cognitive vulnerabilities in the realm of neuropsychology and social cognition. In addition, it has become increasingly clear that the process of onset of psychosis is associated with neurocognitive changes and progressive sensitisation to dopaminergic stimulation, greater quantities of which may predict subsequent brain changes and poorer outcomes.
Goals	Knowledge of: A better understanding of psychosis, in particular its overlap with normal mentation; its ontogeny; diagnostic conundrums; linking brain and mind; linking genes and experience; and how to help patients.
Instruction language	EN
Prerequisites	
Recommended literature	van Os, J., and Kapur, S. Schizophrenia. Lancet, 374: 635-45, 2009; van Os, J., Kenis, G., and Rutten, B.P. The environment and schizophrenia. Nature, 468: 203-12, 2010.
Teaching methods	Assignment(s) Lecture(s) Paper(s) Presentation(s) Work in subgroups
Assessment methods	Attendance Final paper Observation Written exam
Key words	psychosis, diagnosis, treatment, aetiology, phenotype, research

PSY4106 Advanced Statistics I will be offered in all RM specialisations.

Title	**Advanced Statistics I**
Period	1-3
Code	PSY4106
ECTS credits	3
Organisational unit	Faculty Office (FPN)
Coordinator	Nick Broers
Descriptions	The course consists of six units. In the first four units, participants will be given an in-depth training in the following standard statistical methods: factorial ANOVA for between-subject designs, analysis of covariance (ANCOVA), multivariate ANOVA (MANOVA), discriminant analysis and multiple linear regression. Students are assumed to have background knowledge of balanced two-way factorial ANOVA and multiple regression. These methods will be briefly reviewed. The following advanced topics will then be covered: unbalanced factorial designs, contrast analysis, interaction, simple slope analysis, dummy coding, centring covariates, different coding schemes, collinearity and residuals checks and data transformation. The distinction between confounders and mediators in regression and ANCOVA is also discussed, forming a bridge from regression to structural equations modelling (SEM). The latter is an advanced multivariate method that is gaining importance in psychology but still requires special software (such as Lisrel, EQS, AMOS or Mplus). SEM is introduced in two units, starting with causal modelling and mediation analysis in cross-sectional research and then extending to longitudinal research and latent variables (factors). Special attention is given to identifying models, model equivalence, global and local goodness of fit indices, parsimony, model modification and cross-validation. Some concepts from matrix algebra are needed for SEM, and these will be briefly discussed without going into technical detail.
Goals	Knowledge of: Oneway analysis of variance, contrast analysis, unbalanced designs, multivariate analysis of variance, discriminant analysis, linear regression with interaction terms, linear regression with dummy variables, data transformations, simple slope analysis, analysis of covariance, path analysis, structural equation modeling, confirmatory factor analysis, structural models with latent variables.
Instruction language	EN
Prerequisites	
Recommended literature	Diamantopoulos, A. (1994). Modelling with LISREL: A guide for the uninitiated. Journal of Marketing Management, 10, 105-136; Field, A. (2009). Discovering statistics using SPSS (3rd ed.). London: Sage; Howell, D.C. (2007). Statistical methods for psychology (6th ed.). Belmont (CA): Thomson/ Wadsworth; Kleinbaum, D.G., Kupper, L.L., Muller, K.E., & Nizam, A. (1998). Applied regression analysis and other multivariable methods

	(3rd ed.). Pacific Grove (CA): Brooks/Cole.
Teaching methods	Assignment(s) Lecture(s) Skills Training(s)
Assessment methods	Attendance Written exam
Key words	univariate analysis of variance, multivariatie analysis of variance, regression analysis, structural equation modeling

The practical training associated with PSY4106 Advanced Statistics I is PSY4119. Practical training: SPSS and Lisrel will be offered in all RM specialisations.

Title	**Practical training: SPSS and Lisrel**
Period	1-3
Code	PSY4119
ECTS credits	-
Organisational unit	Faculty Office (FPN)
Coordinator	Nick Broers
Descriptions	In order to make practical use of the statistical models that form the topic of the Advanced Statistics course, researchers must make use of statistical software. This course will utilise the traditional SPSS program, but also the specialised LISREL software. LISREL is a statistical program that allows structural equations models to be tested.
Goals	Defining contrasts, building regression models, doing multivariate analyses, transforming data, testing simple slopes, creating and testing SEM models
Instruction language	EN
Prerequisites	
Recommended literature	Handouts given during practicals.
Teaching methods	Assignment(s) Training(s)
Assessment methods	Attendance
Key words	SPSS, LISREL, statistical software

PSY4107 Advanced Statistics II will be offered in all RM specialisations.

Title	**Advanced Statistics II**
Period	3-5
Code	PSY4107
ECTS credits	3
Organisational unit	Faculty Office (FPN)
Coordinator	Gerard van Breukelen
Descriptions	The course consists of seven units. The first three units cover classical repeated measures ANOVA for the one- and two-way within-subject design and the split-plot (between x within) design. Special attention is given to: a) the choice between multivariate and univariate data formats and method of analysis, and the sphericity assumption; b) the distinction between the within-subjects and between-subjects part of a split-plot ANOVA, and how to obtain both using regression analysis; c) the surprising consequences of including covariates into repeated measures ANOVA; and d) the choice between different methods of analysis for randomised versus non-randomised group comparisons. Subsequently, a further three units are devoted to mixed (multilevel) regression for nested designs and longitudinal studies. This mixed regression starts with a unit on marginal models for repeated measures as an alternative to repeated measures ANOVA in cases of missing data or within-subject covariates. Students are shown the pros and cons of various models for the correlational structure of repeated measures, such as compound symmetry and AR1. The second unit covers the random intercept model for repeated measures as a method to include individual effects in marginal models for longitudinal data (growth curves) or single trial analyses of lab data (response times, ERP, fMRI). Students learn how this can be combined with e.g. ARMA modelling to distinguish between interpersonal and intrapersonal outcome variation. The random intercept model will also be applied to a cluster randomised trial, i.e. an RCT where organisations like schools or companies instead of individuals are randomised. The third and last unit on mixed regression covers random slope models for longitudinal data (individual differences in change over time), single trial analysis (individual differences in stimulus effects) and multicentre trials (RCT within each of a number of organisations). Finally, the topic of optimal design, sample size and power calculations is introduced in a seventh unit.
Goals	Knowledge of: Repeated measures ANOVA for within-subject and split-plot (between x within) designs, including factorial designs and covariates in repeated measures ANOVA; Mixed (multilevel) linear regression with random effects and autocorrelation; Optimal design and sample size calculations for experimental and observational studies.
Instruction language	EN
Prerequisites	Good understanding of descriptive and inferential statistics at the elementary and intermediate level, including t-tests, factorial ANOVA and multiple linear regression. Skilled in the

	use of SPSS for statistical data analyses.
Recommended literature	Lecture handouts and a suitable book chapter or article.
Teaching methods	Assignment(s Lecture(s Training(s)
Assessment methods	Attendance Written exam
Key words	within-subject designs, repeated measures ANOVA, mixed (multilevel) regression, marginal versus random effects models, optimal design, sample size, power

The practical training associated with PSY4107 Advanced Statistics II is PSY4117. Practical training SPSS will be offered in all RM specialisations.

Title	**Practical training: SPSS**
Period	3-5
Code	PSY4117
ECTS credits	-
Organisational unit	Faculty Office (FPN)
Coordinator	Gerard van Breukelen
Descriptions	This practical training forms part of the PSY4107 Advanced Statistics II course. The practical consists of six sessions in the computer rooms in which SPSS procedures for repeated measures and multilevel data are practised. The goal is to understand how proper analyses of such data can be done using SPSS.
Goals	Knowledge of: How to run with SPSS: repeated measures ANOVA for within-subject and split-plot (between x within) designs, including factorial designs and covariates; How to run SPSS for: mixed (multilevel) linear regression with random effects and autocorrelation.
Instruction language	EN
Prerequisites	Good understanding of descriptive and inferential statistics at the elementary and intermediate level, including t-tests, factorial ANOVA and multiple linear regression. Skilled in the use of SPSS for statistical data analyses.
Recommended literature	Field A (2009). Discovering statistics with SPSS (3rd ed.). London: Sage, plus the mandatory assignments on EleUM. For the theoretical part of course PSY4107 lecture handouts and suitable book chapters and articles are used.
Teaching methods	Training(s)
Assessment methods	Attendance
Key words	within-subject designs, repeated measures ANOVA, mixed (multilevel) regression, marginal versus random effects models

Title	**Mental Health and Happiness**
Period	5,6
Code	PSY4520
ECTS credits	3
Organisational unit	Clinical Psychological Science
Coordinator	Madelon Peters (FPN)
Descriptions	This course will familiarise students with concepts and ideas from 'positive psychology'. Positive psychology was introduced by Martin Seligman around 2000 and can be viewed as a supplementary approach to clinical psychology. The positive psychological movement formulated three aims: (1) to focus on well-being and happiness instead of abnormal behaviour and psychopathology, (2) to be concerned with building positive qualities and strengths instead of repairing damage and (3) to prevent future problems instead of correcting past and present problems. The course starts with a general introduction to the field of positive psychology. The main concepts will be introduced and clarified, and an overview of the results of happiness studies will be presented. In subsequent meetings, various more specific topics will be discussed by means of lectures and group discussions. These topics include positive psychology and physical health, resilience and positive personality traits, positive psychotherapy and resilience-building interventions. The value of positive psychology as an addition to more traditional clinical psychological approaches will be discussed.
Goals	Knowledge of: Positive psychology, happiness, life satisfaction, wellbeing, resilience, determinants of happiness, genetics and neurobiology of resilience, positive emotions, optimism, strengths and virtues, positive interventions, mindfulness, self-compassion, positive health psychology.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles.
Teaching methods	Assignment(s) Lecture(s) Paper(s) Presentation(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	positive psychology, happiness, wellbeing, mental and physical health, resilience

PSY5112 Research Grant Writing Course will be offered in all RM specialisations.

Title	**Research Grant Writing Course**
Period	1
Code	PSY5112
ECTS credits	3
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eef Theunissen
Descriptions	In this course, students will apply what they have learned during the Research Grant Writing Workshop (PSY4112). Students will work together (groups of max. 5) to write a research proposal on their selected topic, including an original research hypothesis, experimental design and methods. This proposal should promote interdisciplinarity; therefore students are encouraged to think across boundaries of different scientific fields. A senior researcher will guide students during this writing process. The students will write their proposal in 3 steps, and they will receive feedback from their mentor and peers. The resulting proposals will be presented during a symposium by way of a poster or an oral presentation.
Goals	Knowledge of how to: Review literature, formulate a research hypothesis, design a research study, write a research proposal, present the proposal at a symposium (oral or poster).
Instruction language	EN
Prerequisites	This course is a continuation of the Research Grant Writing Workshop (PSY4112).
Recommended literature	
Teaching methods	Work in subgroups
Assessment methods	Attendance Final paper Presentation
Key words	research proposal, interdisciplinary, hypothesis, design, methods, research symposium, peer review

Title	Personality Disorders
Period	1
Code	PSY5511
ECTS credits	4
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	David Bernstein
Descriptions	Personality disorders are chronic patterns of thought, emotion and behaviour that first appear in adolescence or young adulthood and cause dysfunction in relationships, work and other areas. They affect approximately 10% of the general population and are one of the most prevalent forms of psychopathology seen in mental health care settings. Over the past 30 years, there have been significant advances in the understanding of personality disorders, including their phenomenology and classification, development and aetiology. Moreover, while many personality disorder patients were traditionally thought to be untreatable, recent advances in psychotherapy and medication are showing promising indications of effectiveness in this challenging population. This course aims to provide students with an overview of theories, classification issues and treatment models of personality disorders, with an emphasis on current scientific debate. Topics include personality theories relating to personality disorders; biological models of personality disorders (e.g. genetic and neurotransmitter models); psychological models of personality disorders (e.g. modern psychodynamic, conditioning, cognitive, interpersonal, integrative models); sociological perspectives on personality disorders; classifications issues (e.g. DSM-IV diagnosis, Axis I vs. Axis II, categorical vs. dimensional models, polythetic definition, diagnostic techniques); aetiological issues; epidemiological issues; and treatment options.
Goals	Knowledge of: Personality theories; biological models of personality disorders; psychological models of personality disorders; sociological perspectives on personality disorders; classification issues; etiological issues; epidemiological issues; treatment options.
Instruction language	EN
Prerequisites	
Recommended literature	Millon, T. et al. (2004). *Personality Disorders in Modern Life* (*2nd* ed.). New York: Wiley; E-reader.
Teaching methods	Lecture(s) PBL Presentation(s)
Assessment methods	Attendance Presentation Written exam
Key words	personality disorders, DSM-IV, classification, aetiology, epidemiology, treatment

Skills training

Title	Research Practicum Psychometrics
Period	1-2
Code	PSY4531
ECTS credits	2
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Jeffrey Roelofs
Descriptions	This skills training will focus on providing students with hands-on experience of the application of psychometrics. Topics that are covered include factor analysis (both exploratory and confirmatory), reliability analysis (e.g. internal consistency, test-retest stability) and indices of validity (e.g. construct validity, predictive validity). Beyond the primary goal of learning more about how to evaluate and improve the psychometric properties of research instruments, students will also become acquainted with current research on psychopathology which is being conducted by senior staff, postdocs, and PhD students at the UM.
Goals	Knowledge of: Reliability, internal consistency, test-retest stability, validity, face-validity, construct validity, predictive validity, exploratory factor analysis, confirmatory factor analysis.
Instruction language	EN
Prerequisites	
Recommended literature	Tabachnick, B. G., and Fidell, L. S. (2007). Using Multivariate Statistics (5th ed.). Boston: Allyn and Bacon.
Teaching methods	Assignment(s) Lecture(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	factor analysis, psychometrics, reliability, validity

Title	**Clinical Skills I: Interviewing Skills**
Period	1
Code	PSY4532
ECTS credits	2
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Inge Drost
Descriptions	The aim of this skills training is to teach students basic clinical interview skills needed for interviewing patients suffering from psychopathology. After this course, students will be able to administer semi-structured interviews covering the reason for referral, chief complaint, history of the presented problem(s), mental status and the developmental and social assessment and diagnoses (DSM-IV-R). Students should become able to diagnose the presented problem(s) and to suggest the type of treatment required.
Goals	Knowledge of: Clinical assessment, interviewing skills, psychopathology, administering semi-structured interviews.
Instruction language	EN
Prerequisites	
Recommended literature	Morrison, J. (2008). The First Interview (3rd ed.). New York: The Guilford Press.
Teaching methods	Lecture(s) Paper(s) Patiëntcontact Skills Training(s)
Assessment methods	Attendance Final paper Observation
Key words	interviewing skills, psychopathology, assessment

Title	Clinical Skills II: Diagnostic Test Procedures
Period	2
Code	PSY4533
ECTS credits	2
Organisational unit	Neuropsychology and Psychopharmacology (FPN) and Psychiatry and Neuropsychology (FHML)
Coordinator	Petra Hurks, Dymphie in de Braek
Descriptions	Students will learn to conduct a psychodiagnostic interview with adult clients with psychiatric diagnoses and caregivers of children with developmental problems. Students should also extend their experience in neuropsychological test administration and observation. They will acquire skills in writing a formal report and in communicating their conclusions to the patient. Following an introduction to the main cognitive domains in relation to brain areas and relevant neuropsychological and psychopathological test procedures, the skills training will focus on five disorders: developmental disorders (including disorders of executive functioning and disorders of learning and attention); schizophrenia; bipolar disorder; depression; and personality functioning. These conditions will be discussed in relation to the principles of assessment of psychopathology and neuropsychology outlined in the first session. Students will practise their interviewing skills in real client interviews. In addition, students will be trained in neuropsychological history taking and test administration.
Goals	Knowledge of: The procedures for psychodiagnostic and neuropsychological testing that are needed for assessing type, severity and extent of psychopathology and neuropsychological problems in individuals with psychiatric disorders.
Instruction language	EN
Prerequisites	
Recommended literature	Book chapters.
Teaching methods	Lecture(s) Patient contact
Assessment methods	Attendance Final paper
Key words	clinical skills training, psychodiagnostic and neuropsychological testing, interview techniques, test administration

*PSY4108 Neuroanatomy will be offered in CN, NE, NP and **PP**.*

Title	**Neuroanatomy**
Period	3
Code	PSY4108
ECTS credits	1
Organisational unit	Psychiatry and Neuropsychology (FHML)
Coordinator	Jos Prickaerts
Descriptions	The aim of this practical training is to become acquainted with the neuroanatomical terminology and to gain insight into the spatial and functional organisation of the brain. It is essential to have a basic knowledge of the brain anatomy when working in the field of neuropsychology or neurobiology. Many specific brain areas can be linked to particular functions. Thus, knowledge of the brain anatomy and its main functions allows direct linkage of specific neurological or psychiatric disorders to particular brain areas. After a short theoretical introduction, students will study whole brains and brain material of mammals at both macroscopical (visual inspection) and microscopical level. The emphasis will be on major brain systems, including the basal ganglia and limbic system.
Goals	Knowledge of: Limbic system, basal ganglia, plastinated human brains, brain dissection, microscopical slices.
Instruction language	EN
Prerequisites	
Recommended literature	Papers from scientific journals and book chapters from books are provided.
Teaching methods	Lecture(s) Skills Work in subgroups
Assessment methods	Attendance Written exam
Key words	neuroanatomy, limbic system, basal ganglia

*PSY4422 Psychophysiological Skills will be offered in NP and **PP.***

Title	**Psychophysiological Skills**
Period	4
Code	PSY4422
ECTS credits	1
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eric Vuurman
Descriptions	The goal of this skills training is to acquire basic skills in major peripheral psychophysiological measures and to study the relationship between cognitive and psychophysiological variables, such as memory load, mental effort and attention. In addition, general methodological concepts and issues, such as tonic (baseline) activity, phasic activity and the 'law of initial value' will be discussed. Training consists of four meetings. In the first meeting, an overview lecture will be given on the psychophysiological methods that are relevant to both experimental clinical psychology and neuropsychology. The second meeting is devoted to major domains in psychophysiology, such as heart rate variability, blood pressure, galvanic skin responses. During this meeting, students become acquainted with a selection of psychophysiological techniques in the laboratory. The third and fourth meetings are practical sessions, in which an existing dataset will be provided for analysis and report writing.
Goals	Knowledge of: Peripheral psychophysiology, measuring psychophysiological functions.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Lecture(s) Research Skills Work in subgroups
Assessment methods	Attendance Final paper Participation
Key words	peripheral psychophysiology, methodology

Title	Clinical Assessment Instruments
Period	1-6
Code	PSY4534
ECTS credits	2
Organisational unit	Psychiatry and Psychology (FHML)
Coordinator	Nancy Nicolson
Descriptions	Parallel to the core courses throughout year 1, this series of skills training sessions cover the range of rating scales, questionnaires, interview and observational instruments most commonly used in clinical practice and research. The first session will provide an overview of the classes of available instruments and their applications in clinical and research contexts. Later sessions will focus on instruments designed to assess specific symptoms and the severity of the disorders which are covered in the current core course. The last sessions will focus on a subset of broader measures of personality, psychopathology and adjustment (e.g., MMPI, SCL-90, quality of life, social adjustment or coping scales). Working with case materials, students will learn how to choose appropriate assessment instruments for clarifying individual diagnoses, planning interventions and monitoring their effects. These skills training sessions will provide students with basic background information and hands-on experience in the use of valid and reliable instruments for assessing psychopathology.
Goals	Knowledge of: Available research and clinical instruments for assessing psychopathology; state and trait measures; retrospective measures; projective methods; evaluating validity and reliability of assessment methods; self-report, clinician-rated and informant-rated measures; ethical issues in data collection, analysis and reporting; sources of bias and measurement error; presentation and interpretation of test results in research and clinical practice; continuous vs. categorical measures (symptoms vs. diagnoses); assessing clinical change; broad vs. specific measures; instruments designed or adapted for special populations (e.g., children, different cultures, cognitive impairment).
Instruction language	EN
Prerequisites	
Recommended literature	Scientific articles, book chapters.
Teaching methods	Lecture(s) Skills Training(s) Work in subgroups
Assessment methods	Assignments Attendance
Key words	questionnaires, interviews, observational measures, clinical evaluation, reliability, validity, psychodiagnostics, treatment response

Title	**Clinical Skills III: Clinical Interview for the DSM IV (SCID I and SCID II)**
Period	1
Code	PSY5531
ECTS credits	1
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Reinier Kreutzkamp
Descriptions	The aim of this skills training is to teach students how to conduct the semi-structured clinical interview for DSM-IV-Tr Axis I (SCID I) and Axis II (SCID II) diagnoses. Students will learn to carry out the interview and to interpret the outcomes, to establish differential diagnoses and to summarise findings in a written report. Special emphasis lies on comparing the patient's answer to a question and the clinical judgement of stating whether or not a certain behavioural criterion is met.
Goals	Knowledge of: Structured clinical interview of psychiatric disorders , structured clinical interview of personality disorders.
Instruction language	EN
Prerequisites	
Recommended literature	First, M., Spitzer R., Gibbon M. & Williams J. (2000). User's guide for the Structured Clinical Interview for DSM-IV Axis I Disorders Clinician version. Washington DC: American Psychiatric Press, Inc.; First, M., Spitzer R., Gibbon M. & Williams J. (1997). User's guide for the Structured Clinical Interview for DSM-IV Axis II Disorders. Washington DC: American Psychiatric Press, Inc.
Teaching methods	Skills Training(s) Work in subgroups
Assessment methods	Attendance Observation
Key words	standardised interview, psychiatric classification, judging behavioural criteria

Title	Clinical Skills IV: Intervention Techniques
Period	1
Code	PSY5523
ECTS credits	2
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Marisol Voncken
Descriptions	Cognitive behavioural therapy (CBT) is a widely used treatment regime that is considered as the evidence-based treatment for a wide range of psychopathological disorders, including anxiety disorders and depression. The behavioural component, exposure, was developed in the sixties by researchers like Skinner and was considered a breakthrough for specific phobias and obsessive-compulsive disorder. These disorders were seen as untreatable at that time. In the eighties, the cognitive component started to develop. Aaron Beck, who, in those days was trained as a psychoanalytic therapist, was able to treat depression within a few months using his cognitive approach. This was also considered a breakthrough, since psychoanalytic treatments for depression at that time normally took years of treatment. Researchers and therapists started to combine the behavioural and cognitive techniques, resulting in cognitive behavioural therapy. Over the years, many studies have shown the effectiveness of this treatment and, in the Netherlands CBT is included in the official professional guidelines for various psychopathological disorders.
Goals	Knowledge of: Elementary therapeutic procedures (CBT), making a case conceptualisation, explaining the rationale, applying exposure and cognitive therapy, writing a verbatim report of therapy sessions.
Instruction language	EN
Prerequisites	
Recommended literature	Roth Ledley, D. et al. (2005). Making cognitive-behavioural therapy work. New York: The Guilford Press.
Teaching methods	Assignment(s) Paper(s) Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper Observation
Key words	therapeutic skills, cognitive behavioural treatment, CBT, case conceptualisation, exposure, cognitive techniques

Methodological and technical workshops

PSY4112 Research Grant Writing Workshop will be offered in all RM specialisations.

Title	**Research Grant Writing Workshop**
Period	6
Code	PSY4112
ECTS credits	1
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Eef Theunissen
Descriptions	During this workshop students will learn why and how to apply for research grants. The need for acquiring funding for research, the opportunities for, and availability of grant application funding will be discussed. Several researchers who have experience in applying for different types of grants will provide students with first-hand knowledge and tips. Students will learn fundamentals of good grant writing, general preparation of the grant application and how to deal with reviewer comments. These skills will be practiced during the workshop. Students will subsequently choose a topic (provided by senior researchers) on which they will write a research proposal during the second-year Research Grant Writing Course (see description of PSY5112).
Goals	Knowledge of: Opportunities for funding, how grants can be acquired, grant writing skills.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignments Lecture(s)
Assessment methods	Attendance Final paper
Key words	funding possibilities, grant applications, proposal writing

PSY4110 Scientific Writing will be offered in all RM specialisations. Offering times vary according to RM specialisation:
CN: Period 5
NE: Period 5
NP: Period 5
FN: Period 1
PP: Period 1

Title	**Scientific Writing**
Period	1
Code	PSY4110
ECTS credits	1
Organisational unit	Maastricht University Language Centre
Coordinator	Alice Wellum
Descriptions	The course is delivered in a series of three lectures, interspersed with three tutorials, during which students produce and revise a short research proposal or research article. The lectures aim to cover the broader principles of scientific writing (including clarity/readability, structure and coherence). It also covers the ethical issues surrounding the production of scientific texts (for example, plagiarism and non-biased writing). Lectures are interactive; students are assigned with analysis and discussion tasks to complete. In tutorials students apply the principles in the linguistic sense and discover how these apply to their own writing. In particular, the 'doors and windows' (abstracts, introductions, hypotheses and discussions) of scientific papers are analysed for their linguistic and stylistic content. In the tutorials, students develop the language awareness and critical skills required to review their own work as well as that of their peers. Individualised feedback on parallel block assignments is given at the end of the course by the instructor.
Goals	Knowledge of: Principles of scientific writing, conventions in scientific writing, the structure of scientific texts, ethics in scientific writing, plagiarism, editing skills, language in scientific writing, academic writing style, coherence in scientific writing, reporting sources.
Instruction language	EN
Prerequisites	
Recommended literature	Literature is provided in the course materials.
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Research Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	scientific writing, research proposal, empirical research article, literature review, peer review, language awareness.

Title	The Application of Cognitive Methods in Psychopathology Research
Period	6
Code	PSY4542
ECTS credits	1
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Katrijn Houben
Descriptions	The goal of this course is to introduce the students to the most important paradigms in cognitive psychology that are often used in psychopathology research to study biased cognitive processing. Biased cognitive processes play an important role in many kinds of psychopathology, such as depression, anxiety disorders and eating disorders. The most intensively studied processes involve attention, memory, interpretation and associations. To study these processes, experimental paradigms from cognitive psychology have been adapted to the needs of clinical psychology. Most of these experimental tasks involve the measurement of reaction times. Unlike other techniques (e.g., eye-tracking, fMRI, EEG), they are easy to program and often run on a standard PC. This course will introduce the students to the most popular tasks in the areas of attention (emotional Stroop task, dot probe task) and associations (Implicit Association Test, (extrinsic) affective Simon Task, affective priming paradigm). At the end of this course, students will understand the pros and cons of each task well enough to choose an appropriate task for a given research question, and will be able to change the features of the chosen task to fit their own research needs. During the course, students are given a number of introductory papers about the tasks. There are two lectures in which the various paradigms are explained and briefly demonstrated and their applications in several forms of psychopathology are discussed. An important aspect of the lectures will be a discussion of the pros and cons of the various paradigms. Students also take part in a short practical, consisting of three meetings. During these practical sessions they will (1) analyse results of an experiment with a response latency based measure of associations, (2) experience and 'beat' the Implicit Association Test and (3) discuss the pros and cons of a paradigm of choice.
Goals	Knowledge of: Biased cognitive processing, analysis of response latencies, Implicit Association Test, Affective Priming Paradigm, Emotional Stroop task, implicit measures, indirect measurement procedures.
Instruction language	EN
Prerequisites	
Recommended literature	Journal articles, book chapters.
Teaching methods	Assignment(s) Lecture(s) Paper Research Skills

	Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	cognitive psychology, response latencies, experiments

*PSY4371 Psychiatric Epidemiology will be offered in FN, NP and **PP.***

Title	**Psychiatric Epidemiology**
Period	6
Code	PSY4371
ECTS credits	1
Organisational unit	Psychiatry and Psychology (FHML)
Coordinator	Wolfgang Viechtbauer
Descriptions	The course will provide an introduction to the methodologies and analytical strategies of epidemiology as applied to mental health outcomes. The principles and practice of various study types (cohort, case-control, RCT, ecological) will be taught, with emphasis on interpreting associations and possible causality thereof. Consideration will be given to such issues as confounding, bias, and moderation. Further topics to be covered include the use and interpretation of diagnostic studies, the basic principles of analysing dichotomous and time-to-event outcomes, and the use of systematic reviews and meta-analysis for building cumulative knowledge.
Goals	Knowledge of: Different epidemiological study types, including their purpose, advantages, and disadvantages; calculation and interpretation of effect size and outcome measures for dichotomous and time-to-event outcomes; principles of analysing epidemiological studies; the basic steps of conducting a systematic review and meta-analysis.
Instruction language	EN
Prerequisites	
Recommended literature	Rothman, K. J., & Greenland, S. (1998). Modern epidemiology (2nd ed.). Philadelphia, PA: Lippincott-Raven Publishers.
Teaching methods	Assignment(s) Lecture(s) PBL Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	epidemiology, methodology, statistics, experimental studies, observational studies, diagnostic studies, systematic reviews, meta-analysis

PSY4110 Scientific Writing will be offered in all RM specialisations. Offering times vary according to RM specialisation:
CN: Period 5
NE: Period 5
NP: Period 5
FN: Period 1
PP: Period 1

Title	**Scientific Writing**
Period	1
Code	PSY4110
ECTS credits	1
Organisational unit	Maastricht University Language Centre
Coordinator	Alice Wellum
Descriptions	The course is delivered in a series of three lectures, interspersed with three tutorials, during which students produce and revise a short research proposal or research article. The lectures aim to cover the broader principles of scientific writing (including clarity/readability, structure and coherence). It also covers the ethical issues surrounding the production of scientific texts (for example, plagiarism and non-biased writing). Lectures are interactive; students are assigned with analysis and discussion tasks to complete. In tutorials students apply the principles in the linguistic sense and discover how these apply to their own writing. In particular, the 'doors and windows' (abstracts, introductions, hypotheses and discussions) of scientific papers are analysed for their linguistic and stylistic content. In the tutorials, students develop the language awareness and critical skills required to review their own work as well as that of their peers. Individualised feedback on parallel block assignments is given at the end of the course by the instructor.
Goals	Knowledge of: Principles of scientific writing, conventions in scientific writing, the structure of scientific texts, ethics in scientific writing, plagiarism, editing skills, language in scientific writing, academic writing style, coherence in scientific writing, reporting sources.
Instruction language	EN
Prerequisites	
Recommended literature	Literature is provided in the course materials.
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Research Skills Training(s) Work in subgroups
Assessment methods	Attendance Final paper
Key words	scientific writing, research proposal, empirical research article, literature review, peer review, language awareness.

*PSY4372 Functional Brain Imaging will be offered in FN**,** NP and **PP.***

Title	**Functional Brain Imaging**
Period	6
Code	PSY4372
ECTS credits	2
Organisational unit	Cognitive Neuroscience (CN)
Coordinator	Vincent van de Ven
Descriptions	This workshop is aimed at introducing basic knowledge and principles of functional brain imaging techniques, and at discussing novel advances in relevant fields, such as clinical, animal and cognitive research. The workshop comprises two versions that are tailored to two *a priori* levels of background that may exist within the Research Master cohort. Version 1 introduces the basic principles of neuroimaging (intro to imaging methods, experimental design & analysis, fMRI signal, etc.) and some applications to clinical research, neuroeconomics, social neuroscience and similar fields. Version 2 introduces a number of technical and methodological advances (multimodal imaging techniques, connectivity analyses, mental chronometry and other matters), and assumes that participants possess *a priori* knowledge of items discussed in version 1. Assignment to a workshop version is via allocation on an individual basis; participants must follow at least one version. Participants can opt to follow both versions, but will receive no extra credits. General description: The investigation of human brain anatomy and functions using a range of imaging methods represents the most influential development in psychology in the last few years. This workshop reviews essential facts about contemporary major structural and functional brain mapping techniques, but the focus will be on functional Magnetic Resonance Imaging (fMRI). Also, the workshop discusses strengths and weaknesses of neuroimaging methods and on the description of relevant applications in the normal and pathological brain. These topics will be investigated through lectures, paper and group discussions, and a final skills session in which fMRI data is analysed. The final assessment is via a paper assignment.
Goals	Knowledge of: Functional brain imaging techniques and principles, pros and pitfalls of functional brain imaging, data analysis, experimental design for brain imaging research, hands-on data analysis and visualisation experience.
Instruction language	EN
Prerequisites	Basic knowledge of Brain anatomy, experimental design and statistics.
Recommended literature	Journal articles.
Teaching methods	Lecture(s) Paper(s) Skills
Assessment methods	Attendance Final paper
Key words	Magnetic Resonance Imaging (MRI), functional MRI, structural MRI, positron emission tomography (PET),

	neuroimaging, data analysis, brain activity

*PSY4335 will be offered in NP and **PP.***

Title	**Psychopharmacology**
Period	5
Code	PSY4335
ECTS credits	1
Organisational unit	Neuropsychology and Psychopharmacology (FPN)
Coordinator	Arjan Blokland
Descriptions	Students will become acquainted with current topics in psychopharmacology, i.e. how current knowledge of neuropsychiatric disease processes relates to existing medicinal drugs and research and development of new medicinal drugs. Topics will also include testing new drugs in animal models and the use of healthy volunteers and patients in new drug studies, in order to cover the cycle of new medicine development from bench to bedside.
Goals	Knowledge of: Examples of psychopharmacological studies; present/prepare a presentation on a topic of psychopharmacology.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Lecture(s) Presentation(s)
Assessment methods	Attendance Presentation
Key words	psychopharmacology

Electives

The following electives will be offered in all RM specialisations.

Title	**Elective: Course**
Period	throughout
Code	PSY4156
ECTS credits	Variable
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students can attend a course offered by an RM specialisation or a course from a regular master's programme at Maastricht University (local courses) or a course that is organised at a different university in The Netherlands or abroad (external courses). The content, format and organisation of local courses are described in this catalogue or in the course descriptions of other UM master's programmes. The content, format and organisation of external courses are determined by the host university. Elective courses do not overlap with required RM courses, but instead offer new knowledge and insights. Enrollment in an elective course is subject to approval by the Course Instructor as well as the RM Electives Coordinator. There is no limit to the number of electives courses that may be taken, but elective courses do not substitute for mandatory courses.
Goals	Knowledge of: Extracurricular interests, broadening academic scope, taking specialised courses.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Lecture(s) Paper(s) PBL Presentation(s) Skills Training(s)
Assessment methods	Attendance Computer test Final paper Observation Oral exam Participation Portfolio Presentation Take home exam Written exam
Key words	electives, external courses, external workshops

Title	Elective: Review
Period	throughout
Code	PSY4157
ECTS credits	3
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students write a critical literature review based on a specialised topic, under the supervision of a member of the scientific staff of Maastricht University. Students take the initiative to locate and arrange a supervisor for the review. The review topic, content and format will be determined by mutual agreement between student and supervisor. The review topic is also subject to approval by the RM Electives Coordinator. Students are expected to devote 84 hours to the Elective: Review. Each student may complete maximally one Elective: Review course The Elective: Review course must be completed and assessed prior to the start of the internship.
Goals	Knowledge of: Extracurricular interests, specialisation on topic of interest, supervised scientific writing, literature review.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Paper(s)
Assessment methods	Final paper
Key words	elective, review paper, paper assignment, literature review, writing assignment

Title	Elective: Research
Period	throughout
Code	PSY4158
ECTS credits	3
Organisational unit	Cognitive Neuroscience (FPN)
Coordinator	Vincent van de Ven
Descriptions	Students can participate in (parts of) an empirical research project that is conducted and supervised by a member of the FPN or FHML scientific staff. Students can apply for an available project from the list of project descriptions; available on the 'RM Electives' section on EleUM, which is published and updated in December of each year. The application procedure is also described on the 'RM Electives' section on EleUM. Students who are selected to participate in a research elective may assist in designing the experiment or observational study, acquire empirical data, be trained in using measurement equipment, analyse empirical data, or take part in other parts of the research project. Students must write a short research report of maximally 5 pages about the practical experience obtained. Students are expected to spend 84 hours on the Elective: Research course, which includes time spent on practical work and the research report. The principal investigator of the project will supervise the practical work and grade the research report. Each student may complete maximally one Elective: Research course. The Elective: Research course must be completed and graded before the start of the internship.
Goals	Knowledge of: Planning or designing empirical research, empirical data analysis, writing research report, quantitative methods, conducting research, skill learning of data acquisition techniques, functioning in a research team.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Lecture(s) Paper(s) Patient contact PBL Presentation(s) Research Skills Training(s) Work in subgroups
Assessment methods	Final paper Participation
Key words	elective, practical research, empirical research

Internships

1. *PSY5107 Research Proposal, PSY5102 Research Internship and PSY5103 Master's Thesis -> for [CN, NE, FN->50 credits] and [NP and PP->30 credits]*. *Internship coordinators are different per specialisation.*

50 credits apply to: CN, NE and FN and for the NP student that only chooses a research internship (not including the clinical part)

The NP student that chooses the combined internship (Research + Clinical) will obtain 30 credits for the Research Proposal + Research Internship + Master's Thesis + 20 credits for Clinical Internship, Research Proposal and Minor's Thesis. The combined version is compulsory to PP students.

2. Clinical Internship, Research Proposal and Minor's Thesis PSY5104, PSY5108, and PSY5105 Are the same for NP and PP. *Only the internship coordinators differ from each other.*

Title	**Research Proposal, Research Internship and Master's Thesis**
Period	2-6
Code	PSY5107, PSY5102, and PSY5103
ECTS credits	**30** ECTS (1, 19, and 10, respectively) for RM PP students and for RM NP students who choose to conduct both a research and a clinical internship (plus minor's thesis). The total research internship will be assigned 30 credits: 20 credits for the research activities, including the research proposal (1 credit; graded pass/fail) and the practical execution of the internship (19 credits; graded assessment), and 10 credits (graded assessment) for the master's thesis. **50 (1, 35, and 14, respectively)** for RM CN, NE, FN, NP students who do *not* complete a clinical internship and minor's thesis. The total research internship will be assigned 50 credits: 36 credits for the research activities, including the research proposal (1 credit; graded pass/fail), and the practical execution of the internship (35 credits; graded assessment) and 14 credits (graded assessment) for the master's thesis.
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Sandra Mulkens
Descriptions	The second part of the second year of the research master's programme is devoted to conducting a research internship. As a result of the many international research contacts that faculty members have established, a substantial number of students will conduct their research internship abroad. Students start their internship with the writing of a research proposal. Students finish the master's programme by writing a thesis based on their internship research project. The internship can be undertaken at Maastricht University or at external research institutes. In all cases, a student's research proposal and master's thesis will be evaluated by two assessors. At least one of these assessors must be a member of the Faculty of Psychology and Neuroscience (FPN) or the Faculty of Health, Medicine and Life Sciences (FHML). The other assessor might be a (senior) researcher at, for

	example, the institute where a student collected the data. A detailed guide on research internships and the master's thesis can be found on EleUM > Students Research Master Faculty of Psychology and Neuroscience > internships. - RM Cognitive Neuroscience Internships Coordinator: Amanda Kaas, Cognitive Neuroscience (FPN), Phone: (0)43 38 82172, 55 Oxfordlaan, Room 2.019, Email: a.kaas@maastrichtuniversity.nl - RM Neuroeconomics Internships Coordinator: Amanda Kaas, Cognitive Neuroscience (FPN), Phone: (0)43 38 82172, 55 Oxfordlaan, Room 2.019, Email: a.kaas@maastrichtuniversity.nl - RM Fundamental Neuroscience Internships Coordinator: Pilar Martinez, Psychiatry and Neuropsychology (FHML), Phone: (0)43 38 81042, 40 Universiteitssingel West, Room 2.574, Email: p.martinez@maastrichtuniversity.nl - RM Neuropsychology Internships Coordinator: Caroline van Heugten, Neuropsychology and Psychopharmacology (FPN), Phone (043) 38 84213, 40 Universiteitssingel East, Room 2.736, Email: caroline.vanheugten@maastrichtuniversity.nl - RM Psychopathology Internships Coordinator: Nicole Geschwind, Clinical Psychological Science (FPN), Phone (043) 38 81608, 40 Universiteitssingel East, Room 2.767, Email: Nicole.geschwind@maastrichtuniversity.nl
Goals	Knowledge of: Conducting a (supervised) empirical research project and summarising the research and findings in the form of a master's thesis.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Paper(s) Patient contact Research Skills Working visit(s)
Assessment methods	Attendance Final paper Observation Participation
Key words	internship, research, master's thesis

Title	Clinical Internship, Research Proposal and Minor's Thesis
Period	2-6
Code	PSY5104, PSY5108, and PSY5105
ECTS credits	**20** (15, 1, and 4, respectively)
Organisational unit	Clinical Psychological Science (FPN)
Coordinator	Sandra Mulkens
Descriptions	Students specialising in Psychopathology are required to, and students specialising in Neuropsychology may choose to, conduct a 13-week clinical internship in an approved setting. The clinical internship can be conducted in conjunction with the research internship or separately. Students are required to submit an additional research proposal and scientific report (the minor's thesis) based on client/patient-based investigations performed during the clinical internship. The aims of the clinical internship are twofold. Firstly, the internship is meant to provide experience in conducting research in a clinical setting; a small-scale research project culminates in the minor's thesis. Secondly, the internship provides an introduction to the organisation and practice of mental health care, as well as basic experience in clinical diagnosis and therapeutic interventions. For neuropsychology students who choose to undertake a clinical internship, this internship and minor's thesis will be assigned 20 credits, and the research internship and thesis 30 credits. A detailed guide on clinical internships and the minor's thesis can be found on EleUM > FPN Research Master Students > Internships. Although not a requirement by the research master's programme, students who wish to meet Dutch requirements for admission to advanced clinical training programmes are advised to extend their clinical internship by at least two weeks. - RM Psychopathology Internships Coordinator: Nicole Geschwind, Clinical Psychological Science (FPN), Phone (043) 38 81608, 40 Universiteitssingel East, Room 2.767, Email: Nicole.geschwind@maastrichtuniversity.nl - RM Neuropsychology Internships Coordinator: Caroline van Heugten, Neuropsychology and Psychopharmacology (FPN), Phone (043) 38 84213, 40 Universiteitssingel East, Room 2.736, Email: caroline.vanheugten@maastrichtuniversity.nl
Goals	Knowledge of: The work environment of the clinical psychologist. This internship provides students with the opportunity to practise clinical skills in a real-life setting and to design and conduct a small-scale clinical research project.
Instruction language	EN
Prerequisites	
Recommended literature	
Teaching methods	Assignment(s) Paper(s) Patient contact Research

	Skills Training(s) Working visit(s)
Assessment methods	Attendance Final paper Observation Participation
Key words	clinical research, clinical practice, clinical training, psychodiagnostics, patient contact