Master's Programme

# Master Specialisation Cognitive Neuroscience

Faculty of Psychology and Neuroscience

# Practical Training: fMRI

## Full course description

The primary goal of this course is to provide hands-on experience in experimental design, acquisition and analysis of fMRI experiments. In the first tutorial, each student group will separately formulate an experimental question/hypothesis to be tested with fMRI and will select an appropriate experimental design. In a subsequent meeting, each group will give an oral presentation to the other groups. The proposal will comprise of an fMRI study. All studies are to be 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. During the latter course meetings, all students must 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.

## Course objectives

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.

## Recommended reading

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.

PSY4056
Period 2
31 Oct 2022
23 Dec 2022
Print course description
ECTS credits:
2.0
Instruction language:
English

Master Psychology Specialisation Cognitive Neuroscience

Coordinator:

- F. de Martino

Teaching methods:
Lecture(s), Presentation(s), Research, Working visit(s), Work in subgroups, Skills
Assessment methods:
Attendance, Final paper
Keywords:
functional MRI, experimental design, fMRI data acquisition, fMRI data analysis.
Faculty of Psychology and Neuroscience

# Neuroimaging: Functional MRI

## Full course description

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.

## Course objectives

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.

## Recommended reading

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.

Master Psychology Specialisation Cognitive Neuroscience

PSY4054
Period 2
31 Oct 2022
23 Dec 2022
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- E. Formisano

Teaching methods:
Lecture(s), PBL
Assessment methods:
Attendance, Written exam
Keywords:
Functional Neuroimaging, magnetic resonance imaging, experimental design, analysis methods.
Faculty of Psychology and Neuroscience

# Practical Training: EEG and ERP

## Full course description

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.

## Course objectives

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.

### Recommended reading

Journal articles, handbooks.

PSY4034
Period 1
5 Sep 2022
28 Oct 2022
Print course description
ECTS credits:
2.0
Instruction language:
English
Coordinator:

- F.T.Y. Smulders

Teaching methods:
Lecture(s), Paper(s), Skills, Training(s), Work in subgroups
Assessment methods:
Attendance, Final paper
Keywords:
Electroencephalography (EEG), Event-related potentials (ERP), electrophysiology, measurement, analysis of brain potentials.
Faculty of Psychology and Neuroscience

# Auditory and Higher Order Language Processing

## Full course description

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.

## Course objectives

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.

### Recommended reading

E-reader.

PSY4051
Period 1
5 Sep 2022
28 Oct 2022
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- B.M. Jansma

Teaching methods:
Lecture(s), PBL
Assessment methods:
Attendance, Written exam
Keywords:
Auditory processing, language comprehension, language production, cross modal integration.
Faculty of Psychology and Neuroscience

# Perception and Attention

### Full course description

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.

### Course objectives

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.

### Recommended reading

E-reader.

PSY4052
Period 1
5 Sep 2022
28 Oct 2022
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- P.H.M. de Weerd

Teaching methods:
Lecture(s), PBL
Assessment methods:
Attendance, Written exam
Keywords:
Visual system, illusions, Perception, Attention, neurophysiology, monkey.
Faculty of Psychology and Neuroscience

# Sensorimotor Processing

### Full course description

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.

### Course objectives

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.

### Recommended reading

Journal articles, book chapters.

PSY4055
Period 2
31 Oct 2022
23 Dec 2022
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- J. Reithler

Teaching methods:
PBL, Lecture(s)
Assessment methods:
Attendance, Written exam
Keywords:
Somatosensory perception, Sensorimotor coordination, reference frames, coordinate transformations, Motor learning, action selection, mirror neuron system.

# Research Internship

Faculty of Psychology and Neuroscience

# Research Internship Graded

### Full course description

The second part of the one-year master's program (from period 3 onwards), is devoted to conducting a research internship that involves 1) writing of a research proposal, and preparing and planning of the research project, 2) conducting the research project, and 3) analyzing the results of the research project. This work will result in an individually written 4) master's thesis. Step 1 will be done in period 3, steps 2 to 4 from period 4 onwards.

The internship can be carried out at Maastricht University, at an external research institute or at other, more practically oriented institutions. In all cases, a student's research proposal and master's thesis will be evaluated by two assessors. At least one of these assessors is a staff member at the Faculty of Psychology and Neuroscience (FPN). The other assessor can be an external researcher. One of the assessors must hold a PhD, the other can be a PhD candidate.

Information about research internships offered by faculty members can be found on AskPsy > Curriculum > internships/ stages.

Each specialisation has its own internship coordinator:

Legal Psychology: Kim van Oorsouw

Phone (043) 38 84050, 40 Universiteitssingel East, Room 3.767,

Email: k.vanoorsouw@maastrichtuniversity.nl

Health and Social Psychology: Ghislaine Schyns

Phone (043) 38 84523, 40 Universiteitssingel East, Room 4.777a,

Email: ghislaine.schyns@maastrichtuniversity.nl

Work and Social Psychology: Robert van Doorn

Phone (043) 38 81926, 40 Universiteitssingel East, Room 4.765,

Email: r.vandoorn@maastrichtuniversity.nl

Developmental Psychology: Hans Stauder

Phone (043) 38 81933, 55 Oxfordlaan, Room 2.009,

Email: h.stauder@maastrichtuniversity.nl

Cognitive Neuroscience: Amanda Kaas

Phone (043) 38 82172, 55 Oxfordlaan, Room 2.019,

Email: a.kaas@maastrichtuniversity.nl

Master Psychology Specialisation Cognitive Neuroscience

Neuropsychology:

Research internships: Michael Schwartze

Phone (043) 38 82802

Clinical internships: Ieke Winkens

Phone: (043) 38 84512,

Location: Universiteitssingel 40, East

Email:  fpn-np-internship@maastrichtuniversity.nl

This module is not applicable for students of the Master Neuropsychology that attend a clinical internship.

## Course objectives

Students are able to understand:

- conducting a supervised empirical research project and summarising this research in a master's thesis.

## Prerequisites

The Research Internship can only be started when at least 8 credits of the compulsory core courses have been obtained of the modules offered in periods 1 and 2.  The research proposal must be assessed as sufficient by both assessors and must be ethically approved before the start of the data collection. In addition:

certain Research Internships may require that practical or skills training(s) have been completed.

PSY4078
Year
6 Feb 2023
31 Aug 2023
Print course description
ECTS credits:
10.0
Instruction language:
English
Coordinator:

- G.C. Kraag

Teaching methods:
Working visit(s), Skills, Research, Assignment(s), Paper(s)
Assessment methods:
Final paper, Observation, Participation, Attendance

Master Psychology Specialisation Cognitive Neuroscience

Keywords:
Academic skills, Internship, Research, Research proposal, master's thesis
Faculty of Psychology and Neuroscience

# Research Proposal

PSY4074
Year
1 Sep 2022
31 Aug 2023
Print course description
ECTS credits:
5.0
Instruction language:
English
Coordinator:

- G.A. ten Hoor

Faculty of Psychology and Neuroscience

# Academic Skills

PSY4075
Year
1 Sep 2022
31 Aug 2023
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- G.A. ten Hoor

Faculty of Psychology and Neuroscience

# Research Internship Ungraded

PSY4079
Year
6 Feb 2023
31 Aug 2023
Print course description
ECTS credits:
15.0
Instruction language:
English
Coordinator:

- G.C. Kraag

Master Psychology Specialisation Cognitive Neuroscience

Teaching methods:
Assignment(s), Paper(s), Research, Skills, Working visit(s)
Assessment methods:
Attendance, Final paper, Observation, Participation
Master's Programme

# Master Specialisation Cognitive Neuroscience

Faculty of Psychology and Neuroscience

# Practical Training: fMRI

## Full course description

The primary goal of this course is to provide hands-on experience in experimental design, acquisition and analysis of fMRI experiments. In the first tutorial, each student group will separately formulate an experimental question/hypothesis to be tested with fMRI and will select an appropriate experimental design. In a subsequent meeting, each group will give an oral presentation to the other groups. The proposal will comprise of an fMRI study. All studies are to be 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. During the latter course meetings, all students must 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.

## Course objectives

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.

## Recommended reading

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.

PSY4056
Period 2
31 Oct 2022
23 Dec 2022
Print course description
ECTS credits:
2.0
Instruction language:

Master Psychology Specialisation Cognitive Neuroscience

English
Coordinator:

- F. de Martino

Teaching methods:
Lecture(s), Presentation(s), Research, Working visit(s), Work in subgroups, Skills
Assessment methods:
Attendance, Final paper
Keywords:
functional MRI, experimental design, fMRI data acquisition, fMRI data analysis.
Faculty of Psychology and Neuroscience

# Neuroimaging: Functional MRI

## Full course description

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.

## Course objectives

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.

## Recommended reading

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;

Master Psychology Specialisation Cognitive Neuroscience

Journal articles, book chapters.

PSY4054
Period 2
31 Oct 2022
23 Dec 2022
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- E. Formisano

Teaching methods:
Lecture(s), PBL
Assessment methods:
Attendance, Written exam
Keywords:
Functional Neuroimaging, magnetic resonance imaging, experimental design, analysis methods.
Faculty of Psychology and Neuroscience

# Practical Training: EEG and ERP

## Full course description

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.

## Course objectives

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.

### Recommended reading

Journal articles, handbooks.

PSY4034
Period 1
5 Sep 2022
28 Oct 2022
Print course description
ECTS credits:
2.0
Instruction language:
English
Coordinator:

- F.T.Y. Smulders

Teaching methods:
Lecture(s), Paper(s), Skills, Training(s), Work in subgroups
Assessment methods:
Attendance, Final paper
Keywords:
Electroencephalography (EEG), Event-related potentials (ERP), electrophysiology, measurement, analysis of brain potentials.
Faculty of Psychology and Neuroscience

## Auditory and Higher Order Language Processing

### Full course description

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.

### Course objectives

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.

### Recommended reading

E-reader.

PSY4051
Period 1
5 Sep 2022
28 Oct 2022
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- B.M. Jansma

Teaching methods:
Lecture(s), PBL
Assessment methods:
Attendance, Written exam
Keywords:
Auditory processing, language comprehension, language production, cross modal integration.
Faculty of Psychology and Neuroscience

# Perception and Attention

### Full course description

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.

### Course objectives

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.

### Recommended reading

E-reader.

PSY4052
Period 1
5 Sep 2022
28 Oct 2022
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- P.H.M. de Weerd

Teaching methods:
Lecture(s), PBL
Assessment methods:
Attendance, Written exam
Keywords:
Visual system, illusions, Perception, Attention, neurophysiology, monkey.
Faculty of Psychology and Neuroscience

## Sensorimotor Processing

### Full course description

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.

### Course objectives

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.

### Recommended reading

Journal articles, book chapters.

PSY4055
Period 2
31 Oct 2022
23 Dec 2022
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- J. Reithler

Teaching methods:
PBL, Lecture(s)
Assessment methods:
Attendance, Written exam
Keywords:
Somatosensory perception, Sensorimotor coordination, reference frames, coordinate transformations, Motor learning, action selection, mirror neuron system.

# Research Internship

Faculty of Psychology and Neuroscience

# Research Internship Graded

### Full course description

The second part of the one-year master's program (from period 3 onwards), is devoted to conducting a research internship that involves 1) writing of a research proposal, and preparing and planning of the research project, 2) conducting the research project, and 3) analyzing the results of the research project. This work will result in an individually written 4) master's thesis. Step 1 will be done in period 3, steps 2 to 4 from period 4 onwards.

Master Psychology Specialisation Cognitive Neuroscience

The internship can be carried out at Maastricht University, at an external research institute or at other, more practically oriented institutions. In all cases, a student's research proposal and master's thesis will be evaluated by two assessors. At least one of these assessors is a staff member at the Faculty of Psychology and Neuroscience (FPN). The other assessor can be an external researcher. One of the assessors must hold a PhD, the other can be a PhD candidate.

Information about research internships offered by faculty members can be found on AskPsy > Curriculum > internships/ stages.

Each specialisation has its own internship coordinator:

Legal Psychology: Kim van Oorsouw

Phone (043) 38 84050, 40 Universiteitssingel East, Room 3.767,

Email: k.vanoorsouw@maastrichtuniversity.nl

Health and Social Psychology: Ghislaine Schyns

Phone (043) 38 84523, 40 Universiteitssingel East, Room 4.777a,

Email: ghislaine.schyns@maastrichtuniversity.nl

Work and Social Psychology: Robert van Doorn

Phone (043) 38 81926, 40 Universiteitssingel East, Room 4.765,

Email: r.vandoorn@maastrichtuniversity.nl

Developmental Psychology: Hans Stauder

Phone (043) 38 81933, 55 Oxfordlaan, Room 2.009,

Email: h.stauder@maastrichtuniversity.nl

Cognitive Neuroscience: Amanda Kaas

Phone (043) 38 82172, 55 Oxfordlaan, Room 2.019,

Email: a.kaas@maastrichtuniversity.nl

Master Psychology Specialisation Cognitive Neuroscience

Neuropsychology:

Research internships: Michael Schwartze

Phone (043) 38 82802

Clinical internships: Ieke Winkens

Phone: (043) 38 84512,

Location: Universiteitssingel 40, East

Email:  fpn-np-internship@maastrichtuniversity.nl

This module is not applicable for students of the Master Neuropsychology that attend a clinical internship.

## Course objectives

Students are able to understand:

- conducting a supervised empirical research project and summarising this research in a master's thesis.

## Prerequisites

The Research Internship can only be started when at least 8 credits of the compulsory core courses have been obtained of the modules offered in periods 1 and 2.  The research proposal must be assessed as sufficient by both assessors and must be ethically approved before the start of the data collection. In addition:

certain Research Internships may require that practical or skills training(s) have been completed.

PSY4078
Year
6 Feb 2023
31 Aug 2023
Print course description
ECTS credits:
10.0
Instruction language:
English
Coordinator:

- G.C. Kraag

Teaching methods:
Working visit(s), Skills, Research, Assignment(s), Paper(s)
Assessment methods:
Final paper, Observation, Participation, Attendance

Master Psychology Specialisation Cognitive Neuroscience

Keywords:
Academic skills, Internship, Research, Research proposal, master's thesis
Faculty of Psychology and Neuroscience

# Research Proposal

PSY4074
Year
1 Sep 2022
31 Aug 2023
Print course description
ECTS credits:
5.0
Instruction language:
English
Coordinator:

- G.A. ten Hoor

Faculty of Psychology and Neuroscience

# Academic Skills

PSY4075
Year
1 Sep 2022
31 Aug 2023
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- G.A. ten Hoor

Faculty of Psychology and Neuroscience

# Research Internship Ungraded

PSY4079
Year
6 Feb 2023
31 Aug 2023
Print course description
ECTS credits:
15.0
Instruction language:
English
Coordinator:

- G.C. Kraag

Master Psychology Specialisation Cognitive Neuroscience

Teaching methods:
Assignment(s), Paper(s), Research, Skills, Working visit(s)
Assessment methods:
Attendance, Final paper, Observation, Participation
Thesis

# Master's Thesis

Faculty of Psychology and Neuroscience

# Master's Thesis

## Full course description

The second part of the one-year master's programme (from period 3 onwards), is devoted to arranging and conducting a research internship and training in professional skills. For the research internship students explore a research issue within their specialisation. Students start their internship with the writing of a research proposal. Students complete the master's programme by writing a thesis on research undertaken during their internship. The internship can be completed at Maastricht University or at an external host institution. In all cases, a student's research proposal and master's thesis will be evaluated by two assessors. At least one of these assessors is a (senior) researcher at the Faculty of Psychology and Neuroscience (FPN). The other assessor might be a (senior) researcher at, for example, the institute where the student collected their data. Information about research internships offered by external institutes or faculty members can be found on EleUM > Students Faculty of Psychology and Neuroscience > internships. This site also provides a detailed guide with practical information about the criteria for the research internship and the master's thesis.

## Course objectives

Knowledge of: Conducting a supervised empirical research project and summarising their research in a master's thesis.

## Prerequisites

At least 2 of the 4 compulsory theoretical courses of the Master's track must be passed.

PSY4091
Year
6 Feb 2023
31 Aug 2023
Print course description
ECTS credits:
10.0
Instruction language:
English
Coordinator:

- G.C. Kraag

Teaching methods:
Assignment(s), Paper(s), Research, Skills, Working visit(s)
Assessment methods:
Attendance, Final paper, Observation, Participation
Keywords:
Academic skills, Internship, Research, Research proposal, master’s thesis