Find another programme

First year courses

Research Master Specialisation Fundamental Neuroscience Year 1

Faculty of Psychology and Neuroscience

Introduction to Molecular Biochemical Techniques

Full course description

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.

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

- 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).

Students will be able to apply:

- acquisition of basic laboratory techniques, including preparation of buffers, pipetting, pH titration, a protein assay (standard curve), RNA extraction and DNA isolation, conventional PCR.

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.

PSY4311
Period 1
2 Sep 2024
25 Oct 2024
Print course description

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

ECTS credits:
5.0
Instruction language:
English
Coordinator:

- G.R.L. Kenis

Teaching methods:
Lecture(s), Assignment(s), Research, Skills, PBL
Assessment methods:
Attendance, Participation, Final paper, Written exam
Keywords:
RNA, DNA, protein, ELISA, RIA, PCR, Western blot
Faculty of Psychology and Neuroscience

Practical Training: Genes and Proteins

Full course description

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 basic laboratory techniques such as pipetting, pH titration and a protein assay. Specific techniques performed in the lab are DNA/RNA isolation and analysis, DNA synthesis and PCR

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

- standard techniques in molecular research laboratories;
- acquaintance with terms of molecular biology/biochemistry.

PSY4341
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- G.R.L. Kenis

Teaching methods:
Paper(s), Research, Skills, Work in subgroups
Assessment methods:

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

Attendance, Final paper, Observation
Keywords:
General laboratory techniques, RNA, DNA isolation, protein purification, ELISA, PCR/ RT-PCR, Western blot
Faculty of Psychology and Neuroscience

Introduction to Psychology

Full course description

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 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.

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

- psychological methods and designs;
- cognition, perception, personality, behaviour, consciousness.

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.

PSY4312
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
5.0
Instruction language:
English
Coordinator:

- E.L. Theunissen

Teaching methods:
Lecture(s), Assignment(s), Paper(s), PBL, Presentation(s)
Assessment methods:
Attendance, Final paper, Participation, Presentation

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

Keywords:
Introduction, behaviour, cognition, Psychology
Faculty of Psychology and Neuroscience

Applied Statistics I

Full course description

The course consists of eights units.

In the first four units, students 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 in multiple regression, simple slope analysis, dummy coding, centering covariates, different coding schemes, collinearity and residuals checks and data transformation.

The second half of the core course consists of four units, two on repeated measures ANOVA and two on mixed linear regression for repeated measures. The first two 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;
Subsequently, two units are devoted to mixed (multilevel) regression for repeated measures. This starts with a unit on marginal models for repeated measures as an alternative to repeated measures ANOVA in cases of missing data and/or of 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 and random slope model for repeated measures as a method to include individual effects into 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 inter-personal and intra-personal outcome variation.

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students are able to understand:

- 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
- repeated measures ANOVA for within-subject and split-plot (between x within) designs, mixed (multilevel) linear regression with random effects and autocorrelation, and so-called marginal models;
- Specifically, students are able to choose the correct method of analysis, and specify a statistical model to compare different models and choose the best model (based on checking

assumptions, model fit and parsimony on top of plausibility), and to interpret effect estimates and significance tests obtained with that model.

Prerequisites

Good understanding of descriptive and inferential statistics at the elementary and intermediate level, including t-tests

PSY4162
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- J. Schepers

Teaching methods:
Lecture(s), Skills, Assignment(s)
Assessment methods:
Attendance, Written exam, Assignment
Keywords:
Univariate analysis of variance, multivariate analysis of variance, regression analysis, Within-subject designs, repeated measures ANOVA, mixed (multilevel) regression, marginal versus random effects models
Faculty of Psychology and Neuroscience

Practical Training: Measuring Cognitive Functions

Full course description

You will participate in a practical session in which you will administer and perform cognitive tasks. You will be provided with experiment data and will be responsible for conducting data analysis, and presenting the findings on a poster. Additionally, you are expected to explore our faculty's Research Participation System (SONA) and obtain 1 credit by participating in one or more research studies. You will also be required to write a brief report detailing the study or studies' design and dependent variables.

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

- psychological experiment, measuring cognitive functions;
- data analysis;

- presenting (poster).

PSY4353
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- E.L. Theunissen

Teaching methods:
Research, Assignment(s), Skills
Assessment methods:
Attendance, Assignment
Keywords:
Cognitive functions; psychological experiment.
Faculty of Psychology and Neuroscience

Neuroanatomy

Full course description

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 connecting specific neurological or psychiatric disorders with particular brain areas. In addition, various other methods of modern brain imaging (both in vivo and ex vivo) are discussed.

The course also encompasses practical training in which students study human, sheep and rat macro and micro brain anatomy.

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

basic human neuroanatomy, brain imaging, microglia and macroglia, neurons, blood brain barrier, ventricular system, brain vasculature, immunohistochemistry.

PSY4313
Period 1

2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- J.M. Mey

Teaching methods:
Assignment(s), Lecture(s), PBL, Skills
Assessment methods:
Attendance, Written exam
Keywords:
neuroanatomy, glia, neurons, blood brain barrier, ventricular system, immunohistochemistry, brain imaging
Faculty of Psychology and Neuroscience

Practical Training: Mammalian Macro- and Microscopical Neuroanatomy

Full course description

You will participate in four practical training sessions to study human, sheep and rat neuroanatomy and learn basic techniques of histological staining, immunohistochemistry and light microscopy.

Practical training 1: Mammalian brain anatomy - dissect a sheep brain with specific emphasis on the limbic system, prepare drawings from sheep brain sections

Practical training 2: Human brain anatomy - study plastinated human brains, human brain sections and brain models

Practical training 3: Histology – stain rat brain slices with a histological method, perform an immunochemical (IHC) staining experiment

Practical training 4: Microscopy – evaluate your own IHC experiment, study general neuroanatomy and neurotransmitter systems in parasagittal and coronal sections of rat brains

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

human neuroanatomy, sheep neuroanatomy, rat neuroanatomy, microscopy,

immunohistochemical staining techniques.

PSY4344

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- J.M. Mey

Teaching methods:
Skills
Assessment methods:
Attendance, Final paper
Keywords:
neuroanatomy, immunohistochemistry, human, rat, sheep
Faculty of Psychology and Neuroscience

Introduction in Genetics

Full course description

While genetic liability to neurological and psychiatric disorders has been established, the search for the responsible genetic factors is still ongoing. 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. 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.

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

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.

PSY4340
Period 1
2 Sep 2024
25 Oct 2024

Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinators:

- G.R.L. Kenis
- S.E. Pishva

Teaching methods:
Assignment(s), Lecture(s), Presentation(s), Work in subgroups
Assessment methods:
Attendance, Presentation, Final paper
Keywords:
DNA, RNA, genetic variation, polymorphism, gene expression, genetics, epigenetics, genetic association, heritability
Faculty of Psychology and Neuroscience

Neurodegeneration

Full course description

This course provides in-depth education into the biological factors and mechanisms underlying the development and course of commonly occurring neurodegenerative disorders, such as dementia and Parkinson's disease. Age-related neurodegenerative disorders bring about a huge impact on the afflicted patients, their family members but also on society as a whole. The range of neurodegenerative disorders are known to show shared but also strikingly distinct properties with respect to clinical manifestations, macroscopical and microscopical neuropathology, and the molecular and cellular mechanisms involved, such as at the levels of cellular stress, aberrant protein aggregations and selective neurovulnerability. The aim of this course is to gain insight into these properties and thus into neurodegenerative processes, such as the formation and deposition of aggregated proteins, the loss of neurons and synapses, alterations in neurogenesis and inflammatory processes, alterations in metabolic/oxidative state, and the course will open the discussions whether these properties and processes may cause or consequence. Moreover, this course furthermore covers the influences of genetic and environmental factors on onset and course of neurodegenerative disorders and strategies for therapy. Human studies and studies using model systems such as transgenic animal models and neural cell cultures will be discussed.

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

- biological changes in the brain during aging. Anatomical, genomic, biochemical, electrophysiological and behavioural aspects of age-related neurodegenerative disorders such as dementia, dementia of the Alzheimer's type, vascular dementia, frontal tempolar dementia, synucleinopathies (incl. Parkinson disease), and polyglutamine-delated disorders such as Huntington's disease;

- epidemiology and diagnostic aspects of dementia and other common age-related neurodegenerative disorders;
- amyloid beta cascade hypothesis, amyloid precursor protein, Presenelin 1 and 2, Tau, ubiquitin, ApoE polymorphism, risk factors, oxidative stress, loss of synapses, energy metabolism and mitochondrial dysfunction, cell death, plaques, tangles, epigenetics, neuronal loss, gliosis, immune system, cytoarchitecture of hippocampus and neocortex, neuroplasticity, neurogenesis, life-style interventions and pharmacotherapy.

Prerequisites

Laboratory skills are recommended.

PSY4314
Period 2
28 Oct 2024
20 Dec 2024
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- T. Vanmierlo

Teaching methods:
Assignment(s), Lecture(s), Presentation(s), Research, Skills, Work in subgroups
Assessment methods:
Written exam, Participation, Presentation
Keywords:
neurodegeneration, cognition, protein dysfunction and aggregation, Amyloid beta cascade hypothesis, neuro-immune-vasculature interplay
Faculty of Psychology and Neuroscience

Practical Training: Immunocytochemical Staining of Human Postmortem Tissue and Evaluation of the Staining Using the Multihead Microscope

Full course description

An immunocytochemical procedure will be followed to label plaques (ABeta) and the staining will be evaluated afterwards using the multihead microscope.

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

- collecting Postmortem tissue, fixation, paraffin, immunocytochemical staining, recognition of neuropathological hallmarks in Tauopathies: Alzheimer's disease (AD);
- plaques, tangles;
- early and late onset AD, Amyloid beta cascade hypothesis, amyloid precursor protein, Tau, ubiquitin, GFAP, gliosis, cytoarchitecture of hippocampus and neocortex.

PSY4351
Period 2
28 Oct 2024
20 Dec 2024
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- T. Vanmierlo

Teaching methods:
Lecture(s), Skills
Assessment methods:
Attendance, Observation, Assignment
Keywords:
Tauopathies (e.g. Alzheimer's), neurodegenerative mechanisms
Faculty of Psychology and Neuroscience

Biopsychological Neuroscience

Full course description

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 underlying molecular, i.e. neurochemical and neurobiological, mechanisms related to the different neurotransmitter and behavioral systems in the brain. This includes basic neurotransmission, learning and memory, the interaction between hormones and brain functioning, and motivation/reward.

The course also encompasses practical training in a neuropsychological experiment (PSY4343) in which you will participate to investigate the link between biology and psychology.

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

- biology underlying fundamental psychological processes;
- integrating biology and psychology to understand brain and behaviour functions.

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

PSY4315
Period 2
28 Oct 2024
20 Dec 2024
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- E. Nelissen

Teaching methods:
Paper(s), PBL, Presentation(s), Skills
Assessment methods:
Attendance, Final paper, Presentation, Participation
Keywords:
neurotransmitters, hormones, signal transduction, Memory, affect, Motivation
Faculty of Psychology and Neuroscience

Practical Training: Neuropsychological Experiment

Full course description

You will participate as a test subject in a neuropsychological experiment which investigates the link between a biological response and a psychological function, in particular cognitive function. Next, you have to analyse the data collected during the experiment and make a poster based on the results.

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

- neuropsychological experiment;
- data analysis;
- making poster.

PSY4343
Period 2
28 Oct 2024
20 Dec 2024
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

- E. Nelissen

Teaching methods:
Research, Skills
Assessment methods:
Attendance, Participation
Keywords:
neuropsychological experiment, poster
Faculty of Psychology and Neuroscience

Valorisation

Full course description

Among the roles of the university is a responsibility to deliver research that will serve the needs and interests of society. The Drug Development and NeuroHealth research master teaches students the knowledge, skills and capabilities that are needed for the discovery and development of novel therapeutics for psychiatric and neurologic disorders. Our workshop “Commercialising Science & Technology” helps you to understand and master the initial steps of the entrepreneurial process. That is, how to translate science into innovative product ideas and valorise your novel scientific insights. Valorisation is defined as ‘’The process of value creation from knowledge, by making it applicable and available for economic or societal utilisation, and by translating it in the form of new business, products, services, or processes’’. CNS drug discovery is an exceptional long and complex process with high failure rates. It is of paramount importance for students to learn first-hand what the unmet medical needs of patients are. Therefore, we opted for a patient-centric approach. With the help of tools such as ‘personification’ and ‘business canvas’ you will develop your ideas for novel therapeutics and present these to an expert panel at the last workshop session.

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

- valorisation theory and practice;
- the creation of tangible output from neurohealth research in the form of products, services and/or tools and the role patents, licenses, startups and collaborations can play to arrive at that stage.

PSY4834
Period 2
28 Oct 2024
20 Dec 2024
Print course description
ECTS credits:
2.0
Instruction language:
English
Coordinator:

- R. Schreiber

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

Teaching methods:
Assignment(s), Lecture(s), PBL, Presentations, Work in subgroups
Assessment methods:
Assignment, Attendance
Keywords:
valorisation, value creation, startup, license, patent, collaboration
Faculty of Psychology and Neuroscience

Neurological Neuroscience

Full course description

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.

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

translational research approaches for neurological disorders including epilepsy and movement disorders.

PSY4320
Period 3
6 Jan 2025
31 Jan 2025
Print course description
ECTS credits:
5.0
Instruction language:
English

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

Coordinator:

- G. Hoogland

Teaching methods:
Lecture(s), PBL, Skills
Assessment methods:
Attendance, Presentation, Written exam
Keywords:
epilepsy, Movement disorders, Genetics, electrophysiology, functional neurosurgery
Faculty of Psychology and Neuroscience

Practical Training: Genotyping Your NMDA Receptor

Full course description

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.

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand genotyping, data analysis.

PSY4347
Period 3
6 Jan 2025
31 Jan 2025
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- G. Hoogland

Teaching methods:
Skills
Assessment methods:
Attendance, Participation
Keywords:
Genotyping, polymorphism, NMDA receptor
Faculty of Psychology and Neuroscience

Surgery for Intractable Movement and Psychiatric Disorders

Full course description

The aim of this workshop is to guide the participants through the first key steps of neuroscience experiments related to movement and psychiatric disorders. Students receive relevant knowledge via an interactive lecture and have the opportunity to apply this in a semi hands-on setting. Students are also shown stereotactic surgery that is 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 discussions on behavioral tests used to study the functional consequences of the neurosurgical interventions.

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

- stereotactic surgery for movement;
- psychiatric disorders.

PSY4332
Period 3
6 Jan 2025
31 Jan 2025
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinator:

- A. Jahanshahianvar

Teaching methods:
Lecture(s)
Assessment methods:
Attendance, Written exam
Keywords:
Stereotactic surgery, brain lesions, deep brain stimulation, drugs, electrophysiology
Faculty of Psychology and Neuroscience

Colloquia

Full course description

Each specialisation organizes two colloquia, in which senior researchers from Maastricht University or visiting lecturers present their scientific insights. 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, chaired by the lecturer or the host of the guest

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience lecturer. A total of ten colloquia will be offered.

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

Students are able to understand:

- key research domains from different specialisations;
- interdisciplinary research.
- Students are able to interact with students from different specialisations.

PSY4100
Period 3
6 Jan 2025
11 Jul 2025
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinator:

- R. Schreiber

Teaching methods:
Lecture(s)
Assessment methods:
Attendance
Keywords:
interdisciplinary knowledge
Faculty of Psychology and Neuroscience

Introduction to R

Full course description

R is a programming language and software environment for carrying out computations, manipulating and analyzing data, and creating various types of plots and graphics (https://www.r-project.org). R has become the 'lingua franca of statistics' and the software of choice for analyzing data in various disciplines. However, for many researchers, getting up and running with R remains a hurdle due to the command-driven nature of the software. The purpose of this course is to lay the necessary foundation for becoming a proficient R user.

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

Students will learn about the history and development of R, how to use and interact with R, understand its basic data structures, be able to import and export data files, inspect and manipulate

data and obtain summary statistics, create various types of data visualizations, apply standard statistical techniques (e.g., t-tests, correlation, regression, ANOVA), find/install/use add-on packages, know how and where to obtain help when getting stuck, be able to use basic programming structures (e.g., loops, if-else statements), and write documents with R Markdown.

PSY4373
Period 3
6 Jan 2025
4 Apr 2025
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinators:

- W. Viechtbauer
- S.E. Pishva

Teaching methods:
Work in subgroups, Skills, Paper(s), Assignment(s)
Assessment methods:
Attendance, Assignment
Keywords:
R, statistical software
Faculty of Psychology and Neuroscience

Neuroimmunology and Inflammation

Full course description

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 emphasizes the role of inflammatory cells and proinflammatory molecules such as lipids and antibodies 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 a relevant biochemical assay.

Course objectives

Students will be able to understand the interaction of the immune system with the nervous system in neuropsychiatric disorders.

PSY4360
Period 4

3 Feb 2025
4 Apr 2025
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinators:

- M.R. Losen
- M.P. Martinez Martinez

Teaching methods:
Lecture(s), PBL, Presentation(s), Work in subgroups
Assessment methods:
Attendance, Presentation, Written exam
Keywords:
neuroimmunology, inflammation, macrophages and microglia, B cells, T cells, dendritic cells, blood brain barrier (BBB), lipids, antibodies
Faculty of Psychology and Neuroscience

Practical Training: Neuroinflammation

Full course description

Students participate in a neuroinflammation practical, which will be based on ongoing experimental Research in the School for Mental health and Neuroscience.

These practicals focus on the characterization of autoantibodies against neuronal receptors, using techniques such as enzyme-linked immunosorbent assays (ELISA), cell-based assays (CBA) and immunofluorescence (IF) microscopic analysis.

Such techniques are clinically relevant to detect autoantibodies from individuals with neuropsychiatric diseases, including for example myasthenia gravis or NMDA encephalitis.

Course objectives

Students will be able to understand:

- neuroinflammation markers;
- biochemical assays;
- data analysis.

PSY4349
Period 4
3 Feb 2025
4 Apr 2025
Print course description
ECTS credits:
0.0
Instruction language:

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

English
Coordinator:

- M.R. Losen

Teaching methods:
Research, Skills
Assessment methods:
Attendance, Final paper
Keywords:
neuroinflammation, ELISA, FACS, cell culture
Faculty of Psychology and Neuroscience

Neuroplasticity and Pain

Full course description

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 signaling. 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 signaling under pathological conditions. In the last decade, it has become clear that neuro-inflammation 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 neuro-inflammation 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).

Course objectives

Students will be able to understand:

- nerve injury and neuro-inflammation;
- cellular and molecular pain mechanisms;
- cellular and molecular plasticity;
- peripheral and central sensitization;
- pain management;

- cell culture techniques;
- translational research.

PSY4336
Period 4
3 Feb 2025
4 Apr 2025
Print course description
ECTS credits:
5.0
Instruction language:
English
Coordinators:

- G. Franken
- L.B. Creemers

Teaching methods:
Assignment(s), Lecture(s), Paper(s), PBL, Presentation(s), Skills
Assessment methods:
Attendance, Final paper, Presentation
Keywords:
pain conditions, cellular and molecular neuroplasticity, neuro-inflammation, translational research
Faculty of Psychology and Neuroscience

Practical Training: Cell Culture

Full course description

The practical ‘Introduction to basic cell culture procedures’ compromises a hands-on training, where each student will maintain his/her own cell culture, and will receive training on aseptic techniques and basic cell culture procedures. To this end, a human cell line will be used for practice. Various topics will be tackled, including aseptic techniques, thawing of cells, cell passage, cell counting, and cryopreservation of cells. The practical includes an introductory lecture and a workshop where (advanced) cell models of pain are presented to the students. Before coming to the practical session, the students are required to have completed a self-study exercise. The self-study exercise will be assessed by the supervisor(s) and discussed in subgroups before the start of each practical session.

Course objectives

Students will be able to understand:

- Asceptic techniques;
- Basic cell culture procedures;
- (Advanced) in vitro models of pain;
- Translational pain modelling.

PSY4346
Period 4
3 Feb 2025
4 Apr 2025

Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- R.J.M. Riemens

Teaching methods:
Work in subgroups, Skills
Assessment methods:
Attendance, Participation, Assignment
Keywords:
cell culture, asceptic techniques, pain in vitro models
Faculty of Psychology and Neuroscience

Biomedical Brain Imaging

Full course description

Neuroimaging techniques provide powerful insights into the distribution, binding, and other biological effects of pharmacological agents. For example, positron emission tomography can be used to directly assess the relationship between drug plasma concentration and target occupancy. Neuroimaging thus enables the possibility to test whether a new chemical entity reaches brain target tissue in sufficient amounts to be pharmacologically active, and to alter disease processes. This workshop will focus on how and whether neuroimaging techniques can yield biomarkers and surrogate endpoints that can aid the prediction of disease progression and (treatment) outcome.

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

Using the available literature, student presentations, and lectures, students will be able to understand and explain:

- the basic principles of various brain imaging methods (PET, SPECT, MRI, fMRI, MRS);
- how these approaches are typically used in clinical drug development stages (target identification, distribution, pharmacokinetics, target binding, drug efficacy, safety, personalized medicine);
- opportunities and challenges of biomedical imaging techniques during the different phases of drug development.

PSY4832
Period 4
3 Feb 2025
4 Apr 2025
Print course description
ECTS credits:
3.0
Instruction language:

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

English
Coordinator:

- D.M.J. Hernaus

Teaching methods:
Lecture(s), PBL, Presentation(s), Work in subgroups
Assessment methods:
Attendance, Presentation
Keywords:
biomedical imaging, drug development, PET, SPECT, MRS, ph-MRI
Faculty of Psychology and Neuroscience

Psychiatric Neuroscience

Full course description

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.

Course objectives

Students will be able to understand:

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.

PSY4323
Period 5
7 Apr 2025
6 Jun 2025
Print course description

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

ECTS credits:
4.0
Instruction language:
English
Coordinators:

- G.R.L. Kenis
- D.L.A. van den Hove
- S.E. Pishva

Teaching methods:
Assignment(s), Lecture(s), PBL, Presentations, Work in subgroups
Assessment methods:
Attendance, Presentation, Written exam
Keywords:
stress, depression, Anxiety disorders, panic disorder, schizophrenia, gene-environment (GxE) interactions
Faculty of Psychology and Neuroscience

Practical Training: Western Blotting

Full course description

The objective of this practical is to learn the principles of working with in-vitro model systems and to use Western Blotting to measure protein levels. 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 effects on neurotrophic factor signaling are determined by Western Blotting.

Course objectives

Students will be able to understand:

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.

PSY4352
Period 5
7 Apr 2025
6 Jun 2025
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinators:

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

- D.L.A. van den Hove
- G.R.L. Kenis
- S.E. Pishva

Teaching methods:
Assignment(s), Lecture(s), Paper(s), Presentation(s), Research, Skills
Assessment methods:
Attendance, Final paper
Keywords:
Western blot, stress, depression, Anxiety disorders, neurotrophic factors
Faculty of Psychology and Neuroscience

Electrophysiology: From Single Cell Activity to 'Cognitive' Markers

Full course description

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 that we can measure. This course is an introduction into the field of electrophysiology. Students first learn about how currents develop (i.e., role of molecules, ion channels and membrane) and how they can be measured in individual neurons (e.g., patch clamp or single cell recording), groups of neurons (local field potentials) and brain regions (electroencephalography). Students further examine differences in measurements across species. For instance, can electrodes be placed in humans using the same approach used for rats? Finally, students will learn how to interpret these currents in terms of event-related potentials, (de)synchronisation and functional connectivity measures. In addition to the theoretical basis, students will discuss some of the practical issues when performing electrophysiological recordings, such as measurement settings and electrode positions, and applications of electrophysiology in psychopharamacology and neurological disorders.

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students:

- can explain neuronal electrochemical processes, patch clamp measurements and single neuron recording techniques;
- have basic understanding of how EEG is measured;
- can interpret event-related potentials from different species, EEG frequencies, event-related (de)synchronisation, and source localization;
- can design electrophysiological studies with a link to (psycho)pharmacology and neurological disorders.

PSY4322
Period 5
7 Apr 2025
6 Jun 2025
Print course description

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

ECTS credits:
4.0
Instruction language:
English
Coordinator:

- L.K. Goller

Teaching methods:
Lecture(s), PBL
Assessment methods:
Attendance, Written exam
Keywords:
electrophysiology, signal transduction, patch clamp, single cell recording, electroencephalography, Translational Neuroscience
Faculty of Psychology and Neuroscience

Applied Statistics II: A

Full course description

Theme 1, Period 4, offered in PSY4163 & PSY4164

Course lecturer: Gerard van Breukelen

Sample size calculation and nested designs: This course provides an introduction to sample size/power calculation for elementary and often encountered research designs in psychology and neuroscience. First, sample size calculation is explained and practiced for comparing two independent samples (e.g. parallel groups or between-subject design) and for comparing two dependent samples (e.g. crossover or within-subject design) on a quantitative dependent variable (outcome). Subsequently, this is extended to a) correlation between two quantitative variables, b) the comparison of two groups on a binary outcome, and c) two-way factorial designs (BS*BS, WS*WS, BS*WS). The opposite effects of a covariate on the sample size needed in randomized and nonrandomized studies are also explained and practiced. Finally, the data analysis and sample size calculation are covered for some popular nested designs, specifically cluster randomized trials and multicenter/multisite trials. Sample size calculations will be done with GPower and possibly some free software for nested designs, and with pencil-and-paper assignments.

Theme 2, Period 4, offered in PSY4163 & PSY4165

Course lecturer: Nick Broers

Structural equation modeling: Structural equation modeling (SEM) 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.

Theme 3, Period 5, offered in PSY4164 & PSY4165

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

Course Lecturer: Jan Schepers

Resampling methods in statistics: Many modern statistical analyses make use of resampling methods in applications where theoretical statistics cannot readily provide answers for making statistical inferences from the data at hand. This elective provides an introduction to three important resampling methods, bootstrapping, permutation testing and cross- validation, for obtaining measures of accuracy for parameters of a model or for studying model fit. The methods will be practiced using the software R.

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students are able to choose the correct formula for computing the sample size for basic and often used research designs, and to compute the sample size with that formula (Theme 1)

Students are able to understand path analysis, structural equation modeling, confirmatory factor analysis, structural models with latent variables, creating and testing SEM models (Theme 2)

Students are able to understand bootstrap sampling, permutation testing, cross-validation, bias, bootstrap confidence interval, bootstrap standard error, prediction error (Theme 3)

Prerequisites

All electives: good understanding of basic and intermediate statistics, including factorial ANOVA and multiple regression

Good working knowledge of R for theme 3: basic programming skills such as for-loops, logical operators, vectors

PSY4163
Period 4
3 Feb 2025
4 Apr 2025
Print course description
ECTS credits:
2.0
Instruction language:
English
Coordinator:

- J. Schepers

Teaching methods:
Lecture(s), Skills, Assignment(s)
Assessment methods:
Attendance, Written exam, Assignment
Keywords:
sample size, power, structural equation modeling, LISREL, bootstrapping, permutation test, cross-validation
Faculty of Psychology and Neuroscience

Applied Statistics II: B

Full course description

Theme 1, Period 4, offered in PSY4163 & PSY4164

Course lecturer: Gerard van Breukelen

Sample size calculation and nested designs: This course provides an introduction to sample size/power calculation for elementary and often encountered research designs in psychology and neuroscience. First, sample size calculation is explained and practiced for comparing two independent samples (e.g. parallel groups or between-subject design) and for comparing two dependent samples (e.g. crossover or within-subject design) on a quantitative dependent variable (outcome). Subsequently, this is extended to a) correlation between two quantitative variables, b) the comparison of two groups on a binary outcome, and c) two-way factorial designs (BS*BS, WS*WS, BS*WS). The opposite effects of a covariate on the sample size needed in randomized and nonrandomized studies are also explained and practiced. Finally, the data analysis and sample size calculation are covered for some popular nested designs, specifically cluster randomized trials and multicenter/multisite trials. Sample size calculations will be done with GPower and possibly some free software for nested designs, and with pencil-and-paper assignments.

Theme 2, Period 4, offered in PSY4163 & PSY4165

Course lecturer: Nick Broers

Structural equation modeling: Structural equation modeling (SEM) 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.

Theme 3, Period 5, offered in PSY4164 & PSY4165

Course Lecturer: Jan Schepers

Resampling methods in statistics: Many modern statistical analyses make use of resampling methods in applications where theoretical statistics cannot readily provide answers for making statistical inferences from the data at hand. This elective provides an introduction to three important resampling methods, bootstrapping, permutation testing and cross- validation, for obtaining measures of accuracy for parameters of a model or for studying model fit. The methods will be practiced using the software R.

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students are able to choose the correct formula for computing the sample size for basic and often used research designs, and to compute the sample size with that formula (Theme 1)

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

Students are able to understand path analysis, structural equation modeling, confirmatory factor analysis, structural models with latent variables, creating and testing SEM models (Theme 2)

Students are able to understand bootstrap sampling, permutation testing, cross-validation, bias, bootstrap confidence interval, bootstrap standard error, prediction error (Theme 3)

Prerequisites

All electives: good understanding of basic and intermediate statistics, including factorial ANOVA and multiple regression

Good working knowledge of R for theme 3: basic programming skills such as for-loops, logical operators, vectors

PSY4164
Period 4
3 Feb 2025
4 Apr 2025
Print course description
ECTS credits:
2.0
Instruction language:
English
Coordinator:

- J. Schepers

Teaching methods:
Lecture(s), Skills, Assignment(s)
Assessment methods:
Attendance, Written exam, Assignment
Keywords:
sample size, power, structural equation modeling, LISREL, bootstrapping, permutation test, cross-validation
Faculty of Psychology and Neuroscience

Applied Statistics II: C

Full course description

Theme 1, Period 4, offered in PSY4163 & PSY4164

Course lecturer: Gerard van Breukelen

Sample size calculation and nested designs: This course provides an introduction to sample size/power calculation for elementary and often encountered research designs in psychology and neuroscience. First, sample size calculation is explained and practiced for comparing two independent samples (e.g. parallel groups or between-subject design) and for comparing two dependent samples (e.g. crossover or within-subject design) on a quantitative dependent variable (outcome). Subsequently, this is extended to a) correlation between two quantitative variables, b) the comparison of two groups on a binary outcome, and c) two-way factorial designs (BS*BS,

WS*WS, BS*WS). The opposite effects of a covariate on the sample size needed in randomized and nonrandomized studies are also explained and practiced. Finally, the data analysis and sample size calculation are covered for some popular nested designs, specifically cluster randomized trials and multicenter/multisite trials. Sample size calculations will be done with GPower and possibly some free software for nested designs, and with pencil-and-paper assignments.

Theme 2, Period 4, offered in PSY4163 & PSY4165

Course lecturer: Nick Broers

Structural equation modeling: Structural equation modeling (SEM) 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.

Theme 3, Period 5, offered in PSY4164 & PSY4165

Course Lecturer: Jan Schepers

Resampling methods in statistics: Many modern statistical analyses make use of resampling methods in applications where theoretical statistics cannot readily provide answers for making statistical inferences from the data at hand. This elective provides an introduction to three important resampling methods, bootstrapping, permutation testing and cross- validation, for obtaining measures of accuracy for parameters of a model or for studying model fit. The methods will be practiced using the software R.

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students are able to choose the correct formula for computing the sample size for basic and often used research designs, and to compute the sample size with that formula (Theme 1)

Students are able to understand path analysis, structural equation modeling, confirmatory factor analysis, structural models with latent variables, creating and testing SEM models (Theme 2)

Students are able to understand bootstrap sampling, permutation testing, cross-validation, bias, bootstrap confidence interval, bootstrap standard error, prediction error (Theme 3)

Prerequisites

All electives: good understanding of basic and intermediate statistics, including factorial ANOVA and multiple regression

Good working knowledge of R for theme 3: basic programming skills such as for-loops, logical operators, vectors

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PSY4165
Period 4
3 Feb 2025
4 Apr 2025
Print course description
ECTS credits:
2.0
Instruction language:
English
Coordinator:

- J. Schepers

Teaching methods:
Lecture(s), Skills, Assignment(s)
Assessment methods:
Attendance, Written exam
Keywords:
sample size, power, structural equation modeling, LISREL, bootstrapping, permutation test, cross-validation
Faculty of Psychology and Neuroscience

Psychiatric Epidemiology

Full course description

The course provides 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, genetic epidemiology, and the use of systematic reviews and meta-analysis for building cumulative knowledge.

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

- 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;
- genetic epidemiology;
- the basic steps of conducting a systematic review and meta-analysis.

PSY4371
Period 6

9 Jun 2025
4 Jul 2025
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinator:

- W. Viechtbauer

Teaching methods:
Assignment(s), Lecture(s), Skills, Work in subgroups
Assessment methods:
Attendance, Final paper
Keywords:
Epidemiology, Methodology, statistics, experimental studies, observational studies, diagnostic studies, systematic reviews, meta-analysis
Faculty of Psychology and Neuroscience

Research Grant Writing Workshop

Full course description

Research is expensive. Finding appropriate funding sources and writing a convincing grant application is therefore a core comptency of scientists. During this workshop, students will learn why and how to apply for research grants and they will be taught academic writing skills. The need for acquiring funding for research, the opportunities for, and availability of grant application funding will be discussed. Students will start by chosing a topic (from a list of topics) and write an abstract on their research idea. Subsequently, they work in teams to discuss individual ideas and decide on a joint research idea that will serve as a basis for writing a full grant proposal during the second-year Research Grant Writing Course with guidance of a mentor (see description of PSY5112). Mentors are researchers from all RM tracks who have experience in applying for different types of grants and 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. Ethical issues including feasibility and acceptability of the research, and the role of the local research ethics committee will be discussed.

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

- students will acquire skills on general academic writing as well as grant writing
- students will learn about the importance of grant writing for an academic career;
- students will recognize opportunities for funding, ethical aspects of grants and how grants can be acquired;
- students will develop a first outline of a grant proposal with peers.

PSY4114
Period 6
9 Jun 2025

4 Jul 2025
Print course description
ECTS credits:
2.0
Instruction language:
English
Coordinators:

- S. Köhler
- R.L.H. Handels

Teaching methods:
Lecture(s), Skills, Assignment(s), Work in subgroups
Assessment methods:
Final paper, Attendance
Keywords:
Funding possibilities, grant applications, academic writing, team science
Second year courses

Research Master Specialisation Fundamental Neuroscience Year 2

Faculty of Psychology and Neuroscience

Research Grant Writing Course

Full course description

Research is expensive. Finding appropriate funding sources and writing a convincing application is therefore a core comptenency of scientists. In this course, students will apply what they have learned during the Research Grant Writing Workshop (PSY4114) by going through a full grant proposal writing and review process. Students will work together (groups of 4-6 students) to write a joint research proposal as group on their selected topic, including an original research hypothesis, design, methods, motivation and valorization. Students are encouraged to think across boundaries of different scientific fields. A mentor (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 along the way. The resulting grant proposals will be reviewed by two assessors and presented during a symposium by way of a group-based oral presentation.

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students are able to:

- review literature;
- formulate a research hypothesis;
- design a innovative research study;

- write a competitive grant proposal;
- present and illustrate a grant proposal at a symposium.

Prerequisites

This course is a continuation of the Research Grant Writing Workshop (PSY4112).

PSY5112
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
3.0
Instruction language:
English
Coordinators:

- S. Köhler
- R.L.H. Handels

Teaching methods:
Work in subgroups, Skills, Assignment(s)
Assessment methods:
Attendance, Final paper, Presentation
Keywords:
grant proposal, interdisciplinary, hypothesis, design, methods, research symposium
Faculty of Psychology and Neuroscience

EEG and ERP

Full course description

Electroencephalography (EEG) can measure oscillatory electrical brain activity and Event Related Potentials (ERP) allow for precise measurement of the time course of brain processes. They are low cost, non-invasive methods 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 methods 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 of EEG and ERP. For a Midterm paper students study an empirical data article from the literature and answer questions about its EEG and ERP methods and interpretation based on lectures, basic literature and other sources. Students also study practical measurement issues, such as electrode placement and types of artefacts. Finally, students will 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 training 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 used that provide interesting and reliable results. Data processing will include a number of common EEG analyses, e.g. analyses in the time and frequency domain.

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students are able to understand:

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.

PSY4221
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
2.0
Instruction language:
English
Coordinator:

- F.T.Y. Smulders

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

Behavioural Tests and Models

Full course description

As a neuroscientist, you will encounter behavioral animal experiments e.g. by working with animals or behavioral animal datasets yourself, or by reading publications that involve behavioral animal studies. Within the neuroscientific field, pre-clinical research still largely involves animal experiments, and such experiments require many considerations:

- Which models and tests are available and which should I use to answer my research question?

- What are the criteria for choosing the right model or test?

- How does this translate to a human situation?

Most importantly, behavioral animal experiments are a very careful balance between science and ethics to translate your research most optimally to a human situation.

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

The final assessment for this course is pass or fail - and not a numerical grade between 0,0 and 10,0.

Course objectives

Students will be able to understand:

- Concepts of behavioral animal testing

- How to critically interpret and analyze behavioral results

- How to report animal studies in scientific journals, including ethical considerations

PSY5332
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinators:

- D.L.A. van den Hove
- E. Nelissen

Teaching methods:
Work in subgroups, Skills, Paper(s), Presentations
Assessment methods:
Attendance, Final paper, Presentation
Keywords:
Test, model, in vivo, validity, translation
Faculty of Psychology and Neuroscience

Advanced Genetics

Full course description

Recent advances in genetics and stem cell technology have generated unprecedented possibilities for molecular and behavioural neuroscience. Genetic editing techniques allow modulating the expression of genes in selective neuronal or glia subtypes. Using optogenetics, specific neuronal subtypes can be tuned on and off in living, freely moving animals in order to examine their effect on behavioural responses, including cognition. At the cellular level, differentiation of patient-derived pluripotent stem cells into neurons enables to study differential responses of neurons from patients and healthy humans. Even further, patient-derived cells can be steered to organize functional 3D networks, which open new strategies for personalized treatment investigations.

In this course, students will be thought the basic principles of these emerging techniques, some of which will be used during internship projects. Besides theoretical lectures, assignments on the use of bioinformatics tools and applications in experimental paradigms will be given.

Course objectives

Students will be able to understand:

- genome editing tools: TALEN, Zn-fingers, CRISPR/Cas system;
- generation of induced pluripotent stem cells (iPSCs), differentiation to neuronal subtypes, and 3D network formation (i.e. brain organoids);
- applications of iPSCs and organoids for molecular neuroscience;
- principles and application of optogenetics in behavioural neuroscience;
- generation and use of transgenic and knock-out animals.

PSY5333
Period 1
2 Sep 2024
25 Oct 2024
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinator:

- G.R.L. Kenis

Teaching methods:
Assignment(s), Lecture(s), Presentation(s), Work in subgroups
Assessment methods:
Attendance, Presentation, Assignment
Keywords:
genomic editing, CRISPR/Cas, optogenetics, neuronal stem cells, induced pluripotent stem cells, brain organoids, gene knock-out, transgenic mice
Internships

Research Internship

Faculty of Psychology and Neuroscience

Research Proposal

Full course description

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 completed 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), the Faculty of Health, Medicine and Life Sciences (FHML), or the School of Business and Economics

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience (SBE). Both assessors must hold a PhD degree.

A detailed guide on research internships and the master's thesis can be found on AskPsy > Curriculum > Internships.

Each specialisation has its own internship coordinator:

- RM Cognitive Neuroscience: to be announced

Lars Hausfeld, Cognitive Neuroscience (FPN),

Phone: (0) 43 38 84521, 55 Oxfordlaan, Room S.1.018

Email: lars.hausfeld@maastrichtuniversity.nl

- RM Fundamental Neuroscience:

Pilar Martínez, Psychiatry and Neuropsychology (FHML),

Phone: (0)43 38 81042, 40 Universiteitssingel, Room 2.574,

Email: p.martinez@maastrichtuniversity.nl

- RM Neuropsychology:

Michael Schwartze, Neuropsychology and Psychopharmacology (FPN),

Phone (043) 38 82802, 40 Universiteitssingel, Room A2.765,

Email: michael.schwartze@maastrichtuniversity.nl

For the clinical part:

Ieke Winkens, Neuropsychology and Psychopharmacology (FPN),

Phone (043) 38 84512, 40 Universiteitssingel, Room A2.761,

Email: fpn-np-internship@maastrichtuniversity.nl

- RM Clinical Psychology:
Nicole Geschwind, Clinical Psychological Science (FPN),

Phone (043) 38 81487, 40 Universiteitssingel, Room 2.767,

Email: nicole.geschwind@maastrichtuniversity.nl

- RM Drug Development and Neurohealth:

Jacco Briedé, Toxicogenomics,

Phone (043)3881094, 50 Universiteitssingel, Room 4.114,

Email: j.briede@maastrichtuniversity.nl

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students are able to understand and apply:

conducting a (supervised) empirical research project and summarising the research and findings in the form of a master's thesis.

Prerequisites

The research internship cannot be started until:

- at least 60 credits have been attained during the programme;
- the above mentioned 60 credits must include the courses Advanced Statistics I and II.

PSY5107
Year
28 Oct 2024
31 Aug 2025
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinator:

- G.C. Kraag

Teaching methods:
Assignment(s), Paper(s), Research, Skills
Assessment methods:
Attendance, Final paper, Observation, Participation
Keywords:
internship, Research, master's thesis
Faculty of Psychology and Neuroscience

Research Internship Graded

Full course description

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 completed 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), the

Faculty of Health, Medicine and Life Sciences (FHML), or the School of Business and Economics (SBE). Both assessors must hold a PhD degree.

A detailed guide on research internships and the master's thesis can be found on AskPsy > Curriculum > Internships.

Each specialisation has its own internship coordinator:

- RM Cognitive Neuroscience: to be announced

Lars Hausfeld, Cognitive Neuroscience (FPN),

Phone: (0) 43 38 84521, 55 Oxfordlaan, Room S.1.018

Email: lars.hausfeld@maastrichtuniversity.nl

- RM Fundamental Neuroscience:

Pilar Martínez, Psychiatry and Neuropsychology (FHML),

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Email: p.martinez@maastrichtuniversity.nl

- RM Neuropsychology:

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For the clinical part:

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- RM Drug Development and Neurohealth:

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Phone (043)3881094, 50 Universiteitssingel, Room 4.114,

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

Email: j.briede@maastrichtuniversity.nl

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students are able to understand and apply:

conducting a (supervised) empirical research project and summarising the research and findings in the form of a master's thesis.

Prerequisites

The research internship cannot be started until:

- at least 60 credits have been attained during the programme;
- the above mentioned 60 credits must include the courses Advanced Statistics I and II.

PSY5120
Year
28 Oct 2024
31 Aug 2025
Print course description
ECTS credits:
10.0
Instruction language:
English
Coordinator:

- G.C. Kraag

Teaching methods:
Assignment(s), Paper(s), Research, Skills
Assessment methods:
Attendance, Final paper, Observation, Participation
Keywords:
Internship, Research, master's thesis
Faculty of Psychology and Neuroscience

Research Internship Ungraded

Full course description

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 completed 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), the Faculty of Health, Medicine and Life Sciences (FHML), or the School of Business and Economics (SBE). Both assessors must hold a PhD degree.

A detailed guide on research internships and the master's thesis can be found on AskPsy > Curriculum > Internships.

Each specialisation has its own internship coordinator:

- RM Cognitive Neuroscience: to be announced

Lars Hausfeld, Cognitive Neuroscience (FPN),

Phone: (0) 43 38 84521, 55 Oxfordlaan, Room S.1.018

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- RM Fundamental Neuroscience:

Pilar Martínez, Psychiatry and Neuropsychology (FHML),

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Email: p.martinez@maastrichtuniversity.nl

- RM Neuropsychology:

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For the clinical part:

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Email: fpn-np-internship@maastrichtuniversity.nl

- RM Clinical Psychology:
Nicole Geschwind, Clinical Psychological Science (FPN),

Phone (043) 38 81487, 40 Universiteitssingel, Room 2.767,

Email: nicole.geschwind@maastrichtuniversity.nl

- RM Drug Development and Neurohealth:

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Phone (043)3881094, 50 Universiteitssingel, Room 4.114,

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

Email: j.briede@maastrichtuniversity.nl

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students are able to understand and apply:

conducting a (supervised) empirical research project and summarising the research and findings in the form of a master's thesis.

Prerequisites

The research internship cannot be started until:

- at least 60 credits have been attained during the programme;
- the above mentioned 60 credits must include the courses Advanced Statistics I and II.

PSY5121
Year
28 Oct 2024
31 Aug 2025
Print course description
ECTS credits:
25.0
Instruction language:
English
Coordinator:

- G.C. Kraag

Teaching methods:
Assignment(s), Paper(s), Research, Skills
Assessment methods:
Attendance, Final paper, Observation, Participation
Keywords:
Internship, research, master's thesis
Thesis

Master's Thesis

Faculty of Psychology and Neuroscience

Master's Thesis

Full course description

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.

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

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 completed 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), the Faculty of Health, Medicine and Life Sciences (FHML), or the School of Business and Economics (SBE). Both assessors must hold a PhD degree.

A detailed guide on research internships and the master's thesis can be found on AskPsy > Curriculum > Internships.

Each specialisation has its own internship coordinator:

- RM Cognitive Neuroscience: to be announced

Lars Hausfeld, Cognitive Neuroscience (FPN),

Phone: (0) 43 38 84521, 55 Oxfordlaan, Room S.1.018

Email: lars.hausfeld@maastrichtuniversity.nl

- RM Fundamental Neuroscience:

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- RM Neuropsychology:

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Email: michael.schwartze@maastrichtuniversity.nl

For the clinical part:

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Email: fpn-np-internship@maastrichtuniversity.nl

- RM Clinical Psychology:
Nicole Geschwind, Clinical Psychological Science (FPN),

Phone (043) 38 81487, 40 Universiteitssingel, Room 2.767,

Email: nicole.geschwind@maastrichtuniversity.nl

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience - RM Drug Development and Neurohealth:

Jacco Briedé, Toxicogenomics,

Phone (043)3881094, 50 Universiteitssingel, Room 4.114,

Email: j.briede@maastrichtuniversity.nl

The final assessment for this course is a numerical grade between 0,0 and 10,0.

Course objectives

Students are able to understand and apply:

conducting a (supervised) empirical research project and summarising the research and findings in the form of a master's thesis.

Prerequisites

The research internship cannot be started until:

- at least 60 credits have been attained during the programme;
- the above mentioned 60 credits must include the courses Advanced Statistics I and II.

PSY5103
Year
28 Oct 2024
31 Aug 2025
Print course description
ECTS credits:
14.0
Instruction language:
English
Coordinator:

- G.C. Kraag

Teaching methods:
Assignment(s), Paper(s), Research, Skills
Assessment methods:
Attendance, Final paper, Observation, Participation
Keywords:
internship, Research, master's thesis