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.

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 2019
27 Sep 2019
Print course description
ECTS credits:
5.0
Instruction language:

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

English
Coordinator:

- G.R.L. Kenis

Teaching methods:
Lecture(s), Presentation(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

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 2019
25 Oct 2019
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:
Attendance, Final paper
Keywords:
General laboratory techniques, RNA, DNA isolation, protein purification, ELISA, PCR/ RT-PCR, Western blot

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 speak and how they 'know' things. The course focuses on 'normal' human performance, but malfunction and psychopathology are also covered. The major emphasis of the course is on understanding human behaviour by means of cognitive, non-biological theories and paradigms.

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 2019
27 Sep 2019
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
Keywords:
Introduction, behaviour, cognition, Psychology
Faculty of Psychology and Neuroscience

Practical Training: Measuring Cognitive Functions

Full course description

You will conduct an experiment in which you will test the effect of a (psychoactive) manipulation on cognitive functioning. You will also participate as a test subject in the experiments of your fellow students. Next, you have to analyse the data collected during the experiment and present the results to your fellow students.

Course objectives

Students will be able to understand:

- psychological experiment, measuring cognitive functions;
- data analysis;
- presenting (poster or oral).

PSY4353
Period 1
2 Sep 2019
25 Oct 2019
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- N.R.P.W. Hutten

Teaching methods:
Research
Assessment methods:
Attendance, Participation
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.

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

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

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
30 Sep 2019
25 Oct 2019
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- J.M. Mey

Teaching methods:
Assignment(s), Lecture(s), PBL, Skills, Training(s)
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 different practical training sessions to study human, sheep and rat macro and micro brain anatomy.

Practical training 1: Studying human brain anatomy macroscopically using plastic brain models and plastinated human brains;

Practical training 2: Dissecting a sheep brain and study mammalian brain anatomy. Special attention is paid to the limbic system and the basal ganglia;

Practical training 3: Staining of rat brain slices using histochemistry and enzymatic labelling with antibodies. Afterwards, these slices are studied microscopically to gain insight in the rat brain anatomy at a cellular level.

Course objectives

Students will be able to understand:

human neuroanatomy, sheep neuroanatomy, rat neuroanatomy, microscopy, immunohistochemical staining techniques.

PSY4344
Period 1
2 Sep 2019
25 Oct 2019
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- J.M. Mey

Teaching methods:
Skills, Training(s)
Assessment methods:
Attendance, Final paper
Keywords:
Neuroanatomy, immunohistochemistry, human, rat, sheep
Faculty of Psychology and Neuroscience

Advanced Statistics I

Full course description

The course consists of six units. In the first four units, participants will be given an in-depth training in the following standard statistical methods: factorial ANOVA for between-subject designs, analysis of covariance (ANCOVA), multivariate ANOVA (MANOVA), discriminant analysis and multiple linear regression. Students are assumed to have background knowledge of balanced two-way factorial ANOVA and multiple regression. These methods will be briefly reviewed. The following advanced topics will then be covered: unbalanced factorial designs, contrast analysis, interaction, simple slope analysis, dummy coding, centring covariates, different coding schemes, collinearity and residuals checks and data transformation. The distinction between confounders and mediators in regression and ANCOVA is also discussed, forming a bridge from regression to structural equations modelling (SEM). The latter is an advanced multivariate method that is gaining importance in psychology but still requires special software (such as Lisrel, EQS, AMOS or Mplus). SEM is introduced in two units, starting with causal modelling and mediation analysis in cross-sectional research and then extending to longitudinal research and latent variables (factors). Special attention is given to identifying models, model equivalence, global and local goodness of fit indices, parsimony, model modification and cross-validation. Some concepts from matrix algebra are needed for SEM, and these will be briefly discussed without going into technical detail.

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, path analysis, structural equation modeling, confirmatory factor analysis, structural models with latent variables.

PSY4106
Period 1
2 Sep 2019
20 Dec 2019
Print course description
ECTS credits:
3.0
Instruction language:
English
Coordinator:

- J. Schepers

Teaching methods:
Assignment(s), Lecture(s), Skills, Training(s)
Assessment methods:
Attendance, Written exam
Keywords:
Univariate analysis of variance, multivariatie analysis of variance, regression analysis, structural equation modeling
Faculty of Psychology and Neuroscience

Practical Training: SPSS I and Lisrel

Full course description

In order to make practical use of the statistical models that form the topic of the Advanced Statistics course, researchers must make use of statistical software. This course will utilise the traditional SPSS program, but also the specialised LISREL software. LISREL is a statistical program that allows structural equations models to be tested.

Course objectives

Students are able to understand:

- defining contrasts;
- building regression models;
- doing multivariate analyses;
- transforming data;
- testing simple slopes;
- creating and testing SEM models.

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

PSY4119
Period 1
2 Sep 2019
20 Dec 2019
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- J. Schepers

Teaching methods:
Assignment(s), Training(s)
Assessment methods:
Attendance
Keywords:
SPSS, LISREL, statistical software
Faculty of Psychology and Neuroscience

Scientific Writing

Full course description

The course is delivered in a series of one lecture and four tutorials, during which students produce and revise a short research proposal, literature research paper or research article. The lecture aims to cover the structure of the three genres, and ethical issues surrounding the production of scientific texts (for example, plagiarism and non-biased writing). In tutorials, students apply principles in the linguistic sense and discover how these apply to their own writing. In particular, the 'doors and windows' (abstracts, introductions, hypotheses and discussions) of scientific papers are analysed for their linguistic and stylistic content. Furthermore, students develop the language awareness and critical skills required to review their own work as well as that of their peers. The instructor gives individual feedback on parallel block assignments at the end of the course.

Course objectives

Students are able to understand:

principles of scientific writing, conventions in scientific writing, the structure of scientific texts, ethics in scientific writing, plagiarism, editing skills, ethics, language in scientific writing, academic writing style, coherence in scientific writing, reporting sources

PSY4113
Period 1
2 Sep 2019
25 Oct 2019
Print course description
ECTS credits:
1.0

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

Instruction language:
English
Coordinator:

- P.P.C. Wilms van Kersbergen

Teaching methods:
Assignment(s), Lecture(s), Paper(s), Research, Skills, Training(s), Work in subgroups
Assessment methods:
Attendance, Final paper
Keywords:
Scientific writing, Research proposal, empirical research article, literature review, peer review, language awareness
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.

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 2019
25 Oct 2019
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinator:

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

- G.R.L. Kenis

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.

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
Print course description
ECTS credits:
4.0
Instruction language:
English
Teaching methods:
Assignment(s), Lecture(s), Presentation(s), Research, Skills, Training(s), Work in subgroups, PBL
Assessment methods:
Attendance, Presentation, Written exam
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 neurofibrillary tangles (abnormal Tau) and to the staining will be evaluated afterwards using the multihead microscope.

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 Synucleinopathies: Parkinson disease, Multisystem atrophy;
- polyglutamine diseases: Huntington, and Spinocerebellar ataxias;
- mixed pathogies;
- diffuse Lewy body disease, early and late onset AD, Amyloid beta cascade hypothesis, amyloid precursor protein, Tau, ubiquitin, GFAP, gliosis, cytoarchitecture of hippocampus and neocortex.

PSY4351
Print course description
ECTS credits:
0.0
Instruction language:
English
Teaching methods:

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

Lecture(s), PBL, Research, Skills, Training(s)
Assessment methods:
Attendance, Observation, Take home exam
Keywords:
Tauopathies (e.g. Alzheimer's), synucleinopathies (e.g. Parkinson), polyglutamine diseases (Huntington), 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 macro- and microanatomy of the brain and on molecular, i.e. neurochemical and neurobiological, mechanisms related to neurotransmission, hormones and drug action. With respect to 'function', a detailed description is given of processes underlying sexual behaviour, affective behaviour, motivated behaviour and cognitive processes. The course also encompasses practical training in a neuropsychological experiment in which you will participate to investigate the link between biology and psychology. You have to analyse the data collected during the experiment and makes a poster of the results.

Course objectives

Students will be able to understand:

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

PSY4315
Period 2
28 Oct 2019
22 Nov 2019
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- J.H.H.J. Prickaerts

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.

Course objectives

Students will be able to understand:

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

PSY4343
Period 2
28 Oct 2019
20 Dec 2019
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- J.H.H.J. Prickaerts

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

Valorisation

Full course description

This workshop deals with the theory and practice of valorisation. 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’’. The main item in this workshop is to discover how economic value can be created form neurohealth research. What products, services, and tools with practical applicability and commercial spinoff can be derived from this work? Can we create patents, licenses, startups and/or research collaborations based on new findings? If so, how can this be envisaged? Who could be potential partners and how do we approach them to find appropriate developers, manfacturers, and

market parties? What are critical success factors to arrive at a favourable outcome? All of these matters will be dealt with in an interactive setting with students.

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.

PSY4831
Period 2
28 Oct 2019
20 Dec 2019
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinators:

- M.J.G. Govers
- J.H.H.J. Prickaerts
- R. Schreiber

Teaching methods:
Assignment(s), Lecture(s), PBL, Presentation(s), 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.

Course objectives

Students will be able to understand:

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

PSY4320
Period 3
6 Jan 2020
31 Jan 2020
Print course description
ECTS credits:
5.0
Instruction language:
English
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.

Course objectives

Students will be able to understand genotyping, data analysis.

PSY4347
Period 3
6 Jan 2020
31 Jan 2020

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

- G. Hoogland

Teaching methods:
Research
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.

Course objectives

Students will be able to understand:

- stereotactic surgery for movement;
- psychiatric disorders.

PSY4332
Period 3
6 Jan 2020
31 Jan 2020
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinator:

- A. Jahanshahianvar

Teaching methods:
Lecture(s)

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

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 lecturer. A total of twelve colloquia will be offered.

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 2020
3 Jul 2020
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

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.

PSY4317
Period 4
9 Mar 2020
3 Apr 2020
Print course description
ECTS credits:
5.0
Instruction language:
English
Coordinators:

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

Teaching methods:
Lecture(s), Paper(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 2020
3 Apr 2020
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- M.R. Losen

Teaching methods:
Research
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 2020
6 Mar 2020
Print course description
ECTS credits:
5.0
Instruction language:
English
Coordinator:

- E.A.J. Joosten

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

Practical Training: Cell Culture

Full course description

During this practical session, students acquire skills in cell culturing. To this end, a murine cell line will be used to assess toxicity of materials used as treatments of neuropathic conditions. Moreover,

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

demonstrations about animal models of pain, and behavioural tests to assess pain, are presented to students. Each student analyses data collected during the practical session and produces a short written report.

Course objectives

Students will be able to understand:

- cell culture;
- animal models of pain;
- behavioural tests for pain assessment;
- translational pain modelling.

PSY4346
Period 4
3 Feb 2020
3 Apr 2020
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- E.A.J. Joosten

Teaching methods:
Presentation(s), Skills, Training(s)
Assessment methods:
Attendance, Final paper
Keywords:
Cell culture, pain models, pain assessment
Faculty of Psychology and Neuroscience

Advanced Statistics II

Full course description

The course consists of seven units.

The first three units cover classical repeated measures ANOVA for the one- and two-way within-subject design and the split-plot (between x within) design. Special attention is given to: a) the choice between multivariate and univariate data formats and method of analysis, and the sphericity assumption; b) the distinction between the within-subjects and between-subjects part of a split-plot ANOVA, and how to obtain both using regression analysis; c) the surprising consequences of including covariates into repeated measures ANOVA; and d) the choice between different methods of analysis for randomised versus non-randomised group comparisons.

Subsequently, a further three units are devoted to mixed (multilevel) regression for nested designs and longitudinal studies. This mixed regression starts with a unit on marginal models for repeated measures as an alternative to repeated measures ANOVA in cases of missing data or within-subject

covariates. Students are shown the pros and cons of various models for the correlational structure of repeated measures, such as compound symmetry and AR1. The second unit covers the random intercept model for repeated measures as a method to include individual effects in marginal models for longitudinal data (growth curves) or single trial analyses of lab data (response times, ERP, fMRI). Students learn how this can be combined with e.g. ARMA modelling to distinguish between interpersonal and intrapersonal outcome variation. The random intercept model will also be applied to a cluster randomised trial, i.e. an RCT where organisations like schools or companies instead of individuals are randomised. The third and last unit on mixed regression covers random slope models for longitudinal data (individual differences in change over time), single trial analysis (individual differences in stimulus effects) and multicentre trials (RCT within each of a number of organisations).

Finally, the topic of optimal design, sample size and power calculations is introduced in a seventh unit.

Course objectives

Students are able to understand:

- repeated measures ANOVA for within-subject and split-plot (between x within) designs, including factorial designs and covariates in repeated measures ANOVA;
- mixed (multilevel) linear regression with random effects and autocorrelation;
- optimal design and sample size calculations for experimental and observational studies.

More specifically, students are able to choose the correct method of analysis, and specify a statistical model, for repeated measurements, 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. Students are furthermore 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.

Prerequisites

Good understanding of descriptive and inferential statistics at the elementary and intermediate level, including t-tests, factorial ANOVA and multiple linear regression. Skilled in the use of SPSS for statistical data analyses.

PSY4107
Period 4
3 Feb 2020
5 Jun 2020
Print course description
ECTS credits:
3.0
Instruction language:
English
Coordinator:

- G.J.P. van Breukelen

Teaching methods:

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

Assignment(s), Lecture(s), Training(s)
Assessment methods:
Attendance, Written exam
Keywords:
Within-subject designs, repeated measures ANOVA, mixed (multilevel) regression, marginal versus random effects models, optimal design, sample size, power
Faculty of Psychology and Neuroscience

Practical Training: SPSS II

Full course description

This practical training forms part of the PSY4107 Advanced Statistics II course. The practical consists of seven sessions in the computer rooms. In the first six sessions SPSS procedures for repeated measures and multilevel data are practised. The goal is to understand how proper analyses of such data can be done using SPSS. In the last session GPower will be used to practice sample size (power) calculations for some elementary research designs.

Course objectives

Students are able to understand and apply:

- how to run with SPSS: repeated measures ANOVA for within-subject and split-plot (between x within) designs, including factorial designs and covariates;
- how to run SPSS for: mixed (multilevel) linear regression with random effects and autocorrelation;
- how to use GPower for sample size (power) calculations for your own research (master thesis, grant application).

Prerequisites

Good understanding of descriptive and inferential statistics at the elementary and intermediate level, including t-tests, factorial ANOVA and multiple linear regression. Skilled in the use of SPSS for statistical data analyses.

PSY4117
Period 4
3 Feb 2020
5 Jun 2020
Print course description
ECTS credits:
0.0
Instruction language:
English
Coordinator:

- G.J.P. van Breukelen

Teaching methods:
Training(s)

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

Assessment methods:
Attendance
Keywords:
Within-subject designs, repeated measures ANOVA, mixed (multilevel) regression, marginal versus random effects models, sample size, power, effect size
Faculty of Psychology and Neuroscience

Biomedical Brain Imaging

Full course description

Imaging technologies provide powerful insights into the distribution, binding, and other biological effects of pharmaceuticals. Imaging techniques enable direct assessment of the relationship between drug plasma concentration and target occupancy. Neuroimaging thus enables to possibility to test whether a new chemical entity reaches brain target tissue in sufficient amounts to be pharmacologically active. Therefore, neuroimaging can yield important biomarkers and surrogate endpoints during assessment of disease progression and treatment outcome.

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, Optical Imaging, MRS)
- How these approaches are 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 will be discussed.

PSY4832
Period 4
3 Feb 2020
3 Apr 2020
Print course description
ECTS credits:
3.0
Instruction language:
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.

PSY4321
Period 5
6 Apr 2020
8 May 2020
Print course description
ECTS credits:
5.0
Instruction language:
English
Coordinators:

- D.L.A. van den Hove
- G.R.L. Kenis

Teaching methods:
Assignment(s), Lecture(s), Paper(s), PBL, Presentation(s), Work in subgroups
Assessment methods:
Attendance, Final paper, Presentation, Written exam

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

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
Image:

Title:
Improving healthcare with big data
Introduction:

World Health Day 7 April 2020

Link:
Keep reading
Print course description
ECTS credits:
5.0
Instruction language:
English
Coordinators:

- D.L.A. van den Hove
- G.R.L. Kenis

Teaching methods:
Assignment(s), Lecture(s), Paper(s), Presentation(s), Research, Skills, Work in subgroups, Training(s)
Assessment methods:
Attendance, Final paper, Presentation
Keywords:
Western blot, stress, depression, Anxiety disorders, neurotrophic factors

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. This course is an introduction into the field of brain electricity. Students first learn about how currents develop (i.e., role of molecules, ion channels or membrane) and how they can be measured (e.g., patch clamp or single-cell recording). Next, discussions focus on how these currents are perceived in electrophysiology. Students also determine what the differences are in measurements using various species. For instance, can electrodes be placed in humans using the same approach that is used for rats? Finally, students will learn what these currents mean in terms of e.g., event-related potentials or (de)synchronisation measures. In addition to the theoretical basis, students will discuss some of the practical issues when performing electrophysiological recordings, such as measurement settings and electrode positions. This is accompanied by the presentation of pictures and short videos on how measurements in animals and humans are performed.

Course objectives

Students:

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

PSY4322
Print course description
ECTS credits:
4.0
Instruction language:
English
Coordinator:

- T.W. Boonstra

Teaching methods:
Lecture(s), PBL, Presentation(s)
Assessment methods:
Attendance, Participation, Presentation, Take home exam
Keywords:
electrophysiology, signal transduction, patch clamp, single-cell recording, electroencephalography, translational
Faculty of Psychology and Neuroscience

Research Grant Writing Workshop

Full course description

During this workshop students will learn why and how to apply for research grants. The need for acquiring funding for research, the opportunities for, and availability of grant application funding will be discussed. Several researchers who have experience in applying for different types of grants will provide students with first-hand knowledge and tips. Students will learn fundamentals of good grant writing, general preparation of the grant application and how to deal with reviewer comments. Ethical issues including feasibility and acceptability of the research, and the role of the local research ethics committee will be discussed. Students will subsequently choose a topic (from a list of topics) and work in teams to develop a research idea based on abstracts that will serve as a basis for writing a full research proposal during the second-year Research Grant Writing Course with guidance of a mentor (see description of PSY5112).

Course objectives

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

PSY4112
Period 6
8 Jun 2020
3 Jul 2020
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinators:

- S. Köhler
- R.L.H. Handels

Teaching methods:
Assignment(s), Lecture(s), Work in subgroups
Assessment methods:
Attendance, Final paper
Keywords:
Funding possibilities, grant applications, proposal writing, team science
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.

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
8 Jun 2020
3 Jul 2020
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinator:

- W. Viechtbauer

Teaching methods:
Assignment(s), Lecture(s), Skills, Training(s), Work in subgroups
Assessment methods:
Attendance, Final paper
Keywords:
epidemiology, Methodology, statistics, experimental studies, observational studies, diagnostic studies, systematic reviews, meta-analysis
Second year courses

Research Master Specialisation Fundamental Neuroscience Year 2

Faculty of Psychology and Neuroscience

Research Grant Writing Course

Full course description

In this course, students will apply what they have learned during the Research Grant Writing Workshop (PSY4112) by going through a full grant proposal writing and review process. Students

will work together (groups of max. 5-6 students) to write a research proposal on their selected topic, including an original research hypothesis, design, methods 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. The resulting proposals will be reviewed by two assessors and presented during a symposium by way of an oral presentation.

Course objectives

Students are able to:

- review literature;
- formulate a research hypothesis;
- design a research study;
- write a final research proposal;
- present and illustrate a research proposal at a symposium.

Prerequisites

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

PSY5112
Period 1
2 Sep 2019
25 Oct 2019
Print course description
ECTS credits:
3.0
Instruction language:
English
Coordinators:

- S. Köhler
- R.L.H. Handels

Teaching methods:
Work in subgroups
Assessment methods:
Attendance, Final paper, Presentation
Keywords:
Research proposal, Interdisciplinary, hypothesis, design, methods, research symposium
Faculty of Psychology and Neuroscience

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 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 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 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.

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 2019
25 Oct 2019
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

Behavioural Tests and Models

Full course description

Neuroscience research involves the use of a wide variety of behavioural tests and models with laboratory animals. There are several criteria that neuroscientists can use to select behavioural tests and models. Eventually data has to be analysed, integrated and interpreted. How is this all done? Examples from mainly cognitive and affective tests and models are given. You will learn about these issues by analysing, interpreting and presenting data from experiments as well as from literature.

Course objectives

Students will be able to understand:

- concepts of behavioural animal testing including validity;
- raw data management and analysis;
- interpretation of behavioural data.

PSY5332
Period 1
2 Sep 2019
25 Oct 2019
Print course description
ECTS credits:
1.0
Instruction language:
English
Coordinator:

- J.H.H.J. Prickaerts

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

Research Master Cognitive and Clinical Neuroscience Specialisation Fundamental Neuroscience

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 2019
25 Oct 2019
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, Final paper
Keywords:
genomic editing, CRISPR/Cas, optogenetics, neuronal stem cells, induced pluripotent stem cells, brain organoids, gene knock-out, transgenic mice