

Translational Neuroscience (E092930)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size (nominal values; actual values may depend on programme)
Credits 3.0 Study time 90 h Contact hrs 30.0 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 2)	English	Gent	microteaching	15.0 h
			lecture	15.0 h

Lecturers in academic year 2020-2021

Larsen, Lars Emil	TW06	staff member
Vanhove, Christian	TW06	lecturer-in-charge
Raedt, Robrecht	GE34	co-lecturer

Offered in the following programmes in 2020-2021

	crdts	offering
Master of Science in Biomedical Engineering	3	A
International Master of Science in Biomedical Engineering	3	A
Master of Science in Biomedical Engineering	3	A

Teaching languages

English

Keywords

Neuroimaging, preclinical studies, optogenetics, chemogenetics.

Position of the course

In a report of the World Health Organization from 2006, neurological disorders contribute to 6.3% of the global burden of disease. This report estimates that the number of healthy life years lost because of neurological disorders will increase from 92 million in 2005 to 103 million in 2030, approximately a 12% increase mainly due to the aging population. Hence, there is still an important interest in neuroscience research to study the brain under normal and pathological conditions, even though, therapeutic successes have been few. Especially translational aims have been a remarkable engine for driving research investment in the neurosciences. Translational neuroscience is defined as:

- 1 Experimental non-human and non-clinical (basic science) studies conducted with the specific intent to discover mechanisms, biomarkers, pathogenesis or treatments of nervous system disorders;
- 2 Clinical studies that provide a foundation for developing, or that directly test, novel therapeutic strategies for humans with nervous system disorders.

In other words, translational neuroscience will bring basic preclinical knowledge (from the bench) to clinical practice (to the bedside) to expand understanding of brain structure, function and disease, and translate this knowledge into clinical applications and novel therapies of nervous system disorders. Thus, translational neuroscience is the process of using all technological advances to bring novel therapies with measurable outcomes to patients with neurological diseases. In this course, emphasis will be on translational neuroimaging, where multiple imaging techniques are used to bridge the gap between preclinical research and clinic practice. These imaging methods need to fulfil certain criteria such as being non-invasive (MRI), or at least minimal invasive (PET), and providing quantitative information to simplify the process of translating preclinical findings into the clinic.

Contents

- The importance neuroimaging;
- Setting up a small animal experiment;
- Translational aspects in neuroscience (from bed-to-bench and from bench-to-bed);

- Optogenetics;
- Chemogenetics;
- Examples of translational neuroscience experiments at our university.
- Microteaching: A recent publication in the field of neuroscience should be presented during 1 hour, so that the content of the publication is understandable to someone at Bachelor's level. The presentation will be evaluated by the teachers and fellow students. The presentation is followed by a session of questions. All students will be encouraged to ask questions. The publications and presentations will also be used as teaching material for the exam.

Initial competences

Physical principles of different imaging techniques, including SPECT, PET, CT, MRI and EEG.

Final competences

- 1 Critical evaluation of the advantages and disadvantages of the different neuroimaging techniques.
- 2 Capability to setup a preclinical imaging study.
- 3 Capability to understand the principles of optogenetics
- 4 Capability to understand the principles of chemogenetics.
- 5 Critical evaluation of different imaging techniques that can be applied in the field of translational neuroscience
- 6 Critical evaluation of the findings presented in recent research papers
- 7 Succinctly review recent progress in the domain of translational neuroscience

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, microteaching, online lecture

Extra information on the teaching methods

Microteaching: A recent publication in the field of neuroscience should be presented during 1 hour, so that the content of the publication is understandable to someone at Bachelor's level. The presentation will be evaluated by the teachers and fellow students. The presentation is followed by a session of questions. All students will be encouraged to ask questions. The publications and presentations will also be used as teaching material for the exam.

Learning materials and price

PowerPoint presentations of lectures and microteaching.

References

Course content-related study coaching

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Oral examination

Examination methods in case of periodic evaluation during the second examination period

Oral examination

Examination methods in case of permanent evaluation

Assignment, peer assessment

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

Periodic evaluation: oral examination with written preparation

Permanent evaluation: microteaching

Calculation of the examination mark

Periodic evaluation (exam) = 50%

Permanent evaluation (microteaching) = 50%

Because of COVID19 modified forms of work can be rolled out if necessary.

