

Research Master Neuroscience Programme

Course Outline

Course Code	RMNS-1.1
Course Name	Basic (Neuro)science
Teaching Methods	Blended learning: lectures, assignments, workshops, self-study, group discussion
Aims of the Course	This module contains 3 courses: 1 mandatory course and 2 elective courses. The scientific method course is mandatory; its main aim is for you to learn what it takes to do research that is both valid and reproducible. In addition there are 3 elective courses: Basic statistics, Basic molecular biology and Basic neurophysiology. The students should choose the two courses that are most beneficial for them. At the end of the module all students should have a “baseline literacy” on the followed course topics.
Learning Goals	<p>The Scientific method course aims to achieve the following learning goals:</p> <ol style="list-style-type: none"> 1. The master student can indicate why it is important that experiments are reproducible. 2. The student can list the basic steps and characteristics of the scientific method. 3. The student can indicate the differences between exploratory and confirmatory research. 4. The student is familiar with several cognitive biases that can hamper reproducibility. 5. The student knows some of the factors that can limit reproducibility that are related to experimental resources such as antibodies, animals, cell lines, or chemicals. 6. The student is familiar with several statistical concepts that impact reproducibility, including p-value, base rate fallacy, positive predictive value, pseudo replication, P-hacking. 7. The student is able to design a blind/randomized experiment that includes a valid research question, a proposed causal diagram, appropriate controls, one or more nuisance variables and a power calculation. 8. The student is familiar with legislations, regulations and ethical rules concerning animal and human research. <p>The Basic statistics course aims to achieve the following learning goals:</p> <ol style="list-style-type: none"> 1. The master student is able to distinguish between different types of data. 2. The student is able to identify different measures of central tendency and dispersion. 3. The student is able to identify a data distribution. 4. The student understands the concept of parametric and non-parametric tests. 5. The student is able to test a hypothesis for single sample and paired sample cases as well as calculate confidence interval for a population parameter. 6. The student understands the concept of repeated measures and is able to use the appropriate statistical analysis method. 7. The student understands the concept of p-values.

The Basic molecular biology course aims to achieve the following learning goals:

1. The master students understand the structure and properties of DNA, RNA and amino acids.
2. The student is familiar with processes involved in transcription, splicing and translation.
3. The student understands the different kinds of mutations found in genes.
4. The student knows how we go from genomic DNA to a cloned cDNA copy of a specific gene.
5. The student understands transduction and transfection techniques and how to use these techniques to study protein function.
6. The student is familiar with the steps involved in creating a mouse model.

The Basic neurophysiology course aims to achieve the following learning goals:

1. The master student understands the ionic basis of the resting membrane potential.
2. The student understands how voltage-dependent ion channels generate an action potential.
3. The student understands how the passive electrical properties of the neuron.
4. The student is familiar with the basic steps in synaptic transmission.

Target Group	MSc Neuroscience students
Organisation	Erasmus MC – Department of Neuroscience
Level	2 (Master)
Credits	3 ECs: 1 EC mandatory course + 2 EC elective courses (in 3 weeks)
Study load	84 hrs.
Testing:	Written exams and assignments
Language	English
Number of Participants	1st year students MSc Neuroscience curriculum
Location	Erasmus MC – Education Center
Date	September
Registration	This course is part of the MSc Neuroscience curriculum. Separate registration is not necessary for admitted students.
Absent	If you are unable to attend class, you are kindly requested to report your absence in advance, via masterneuroscience@erasmusmc.nl .
Responsibility	Erasmus MC – Department of Neuroscience
Coordination	Dr. M.T.G. de Jeu
Contact	E. Buitenhuis-Linssen E-mail: masterneuroscience@erasmusmc.nl

Information	
	Summary of the Course This module focusses on basic science knowledge and skills. The elective courses help to reduce differences in the starting level of students with different educational backgrounds.
	Teaching Methods Blended Learning: lectures, assignments, workshops, self-study and group discussion.
Programme	
	Content <p>The Scientific methods course. In the first session we will discuss the scientific method, the importance of reproducibility, what a valid research question is, blinding and randomization. The second session will be about how important it is that research resources are identifiable and reliable, how to value research results, and the importance of doing studies with sufficient power. In the third session we will discuss an animal experiment you have designed yourself.</p> <p>The Basic statistics course. In three sessions the following statistical topics will be discussed: Types of data, descriptive statistics, distributions, confidence intervals, hypothesis testing, parametric and non-parametric, t-test, ANOVA's and p-values.</p> <p>The Basic molecular biology course. In three sessions the following molecular biology topics will be discussed: DNA, genes, cDNA, RNA, amino acids, transcription, splicing, translation, mutations, transduction and transfection techniques, vectors/constructs and mouse models.</p> <p>The Basic neurophysiology course. In three sessions the following neurophysiology topics will be discussed: biophysics of the neuron, ion channels (H-H) and neurotransmission.</p>
	Duration of the Course 3 weeks
	Expected Resources for Students Scientific literature, assignments and handouts provided by coordinator
	Teachers Prof. Dr. J.G.G. (Gerard) Borst – The Scientific method Dr. M.T.G. (Marcel) de Jeu – Basic statistics Dr. E. (Edwin) Mientjes – Basic molecular biology Dr. A.B. (Aaron) Wong – Basic Neurophysiology
	Graduate Attributes Upon completion of this course, if you have attended and actively participated in the classes, and when you passed the written exam and the assignments with sufficient results, you are awarded 3 ECs.
Testing and Assessments	
	Testing Written exam (70%) – assignments (30%)
	Testing Procedure The test will be assessed by a MSc faculty member. You will receive a grade on a scale from 1 (worst) to 10 (best). Grade appeal is subject to the rules laid out in the Teaching and Examinations Regulations of Erasmus MC.

	For every component of the exam, written exam and assignments, a 5,5 or higher must be scored.
Quality Management	
	<p>Course evaluation and development</p> <p>The MSc programme co-ordinators are open for suggestions from course participants on possible improvements. Course adjustments can be made on the basis of your direct feedback. Additionally, at the end of the course, you will receive an invitation for an online survey on the contents and setup of the course.</p> <p>Course contents and setup are re-evaluated periodically, at least once a year, by the course directors and MSc programme chair members.</p>