

## REQUIREMENTS

Semmelweis University	Faculty, Department:
Faculty of Medicine, Department of Anatomy, Histology and Embryology	
Name of the course: Systems Neuroscience	
Type of course: optional course-unit	
code: AOSANT494_1A	
credit: 2	
Name of the responsible person: Dr. Gábor Gerber	
Academic year: 2016/2017 second semester	
<b>Role of the course in the training of the Department:</b>	
<p>The Systems Neuroscience program follows the approach of systems theory in understanding the brain. The aim is to provide students a view of the brain as a whole via unfolding, at least in part, its immense complexity. This is a major challenge of all time, but the right answer should be one that can integrate actual knowledge. As we are in the fortunate period of time when high performance tools (both hardware and software) and large datasets are getting more and more available, systems thinking is inevitable in brain research. Therefore, throughout the course students will learn how different approaches - reductionist, holist and functionalist - are all useful and necessary in understanding the brain.</p>	
<p>In one way the course is structured by introducing the students the different levels of organization all being complex systems themselves. After an introductory about the systems science approach of the brain (course 2) we discuss the molecular machineries at the subcellular level (course 3) then turn into the cellular level by learning why and why not the neuron is considered as the unit of brain organization (course 4). In the next step it is shown how billions of neurons make up the cerebral cortex and how this evolutionarily new structure can perform diverse cognitive and other functions (course 5). Finally, whole brain functions and functioning will be approached via its role in behavior (course 6).</p>	
<p>In other way, each course will show how the brain functions at lower organizational levels such that synaptic and neuronal populations of different structures as well as a whole. Such holistic approaches have high importance in recent efforts made in deciphering the neurobiological basis of neuropsychiatric and neurological diseases (courses 5,6). Finally, with the closing series of lectures (course 7,8) we aim to provide tools, rules and examples, which help integrating knowledge acquired throughout the courses and also provide an outlook whereby the brain can be compared to other complex systems (course 2). Another notable feature of the Systems Neuroscience program is its interdisciplinary nature: it will introduce the students into several state of the art methods both experimental (molecular biology, cellular and extracellular physiology, different kinds of imaging) and theoretical (data and network analyses, simulation and modelling).</p>	
<p>Each course includes visiting the lecturers' lab.</p>	
<p>The course will start with an introductory about the history and culture of the geopolitical region thought as Central Europe.</p>	

**The program of the course:**

**Weekly schedule of the Courses**

- 1. Central European Culture**
- 2. Introduction to Systems Neuroscience**
- 3. Genomic analysis of single neurons. Neuronal proteomics.**
- 4. Single neurons and beyond**
- 5. Neocortex: from structure to function**
- 6. Neural rhythms: normal and pathological. Brain imaging: from normal to pathological.**
- 7. Neuroelectricity**
- 8. Statistics and the Brain**

**Practical courses: introduction into cutting edge research techniques during the lab visits**

**Consultations: personally with the actual course leader**

**Requirements of course participation and options to recover missed hours:**

- 1. Total absence allowed: 10% of the total course hours**
- 2. Recovering missing hours: studying the material provided by the course leaders, consultation**

**Eligibility: US grade point average (GPA) of 3.0. Students with a GPA lower than 3.0 should inquire with the Directors on the possibility of a waiver.**

**Justification of absence from course hours or exams:**

**Hungarian medical certificate**

**Number and schedule of the examinations:**

**The course is divided into eight blocks each covering different fields and scheduled in a weekly basis. Each block ends with an exam in the last teaching day of the actual week.**

**Requirements of the successful completion of the program:**

**written or oral test in each course material**

**Marks:**

**In case of a written test grades are given after obtaining points as follows: 0-50% fail, 51-60% pass, 61-75% fair, 76-90% good, above 90% excellent.**

**Types of exam: test, essay, verbal**

**Requirements of the examinations:**

**Verbal and electronic etc. material provided by the lecturers. Syllabus is available upon opening the program on the web page.**

**Registration for exams: NEPTUN**

**Rescheduling the tests:**

**N/A**

**Each student has to take an examination in each block of the course.**

**Justification of absence from the exam:**

**Hungarian medical certificate (see above).**

**List of useful literature (books, papers etc):**

**It is made available for the students two weeks before the first lecture.**