Lectures for PhD students WS 2021

Title: Neuroscience: Molecular Cell Biology of CNS Function

Lecturer in charge:	Federico Calegari and Marius Ader
Date:	Winter Semester (2 Nov – 2 Dec 2021)
Time:	13:00 - 14:00 14:00 - 15:00
Location:	CRTD Auditorium left, CRTD seminar rooms (SR1 and SR2, SR3 and SR4) or B CUBE seminar rooms (E75 and E74)
Target audience:	Preference to DIPP PhD Students
No of participants:	20
Registration deadline:	02 October 2021. A letter of motivation needs to be provided (half a page)
Prerequisites:	Basic knowledge is recommended in molecular cell biology, neuroscience, developmental biology, use of model organisms, etc.
Course requirements:	Full attendance and active participation in lectures and discussions; Examination
Course conclusion:	Written Examination

Introduction to the Lectures

This lecture series aims to provide students with a strong background in cellular and molecular neuroscience ranging from stem cell contribution to tissue formation during development to function during adulthood as well as neuropathology and neurodegenerative mechanisms of disease. The lectures will be structured following a chronological and functional excursus during organism's life starting with evolution and development of the vertebrate central nervous system and progressing through its physiology during adulthood, function in the processing of sensory and cognitive information and dysfunction upon injury, disease or ageing. Special emphasis will be dedicated to ad-hoc lectures focused on fundamental and arising technologies of broad use in the field of Neuroscience such as in electrophysiology, behavioral testing and computational neuroscience.

Learning goals

- To get an understanding of the basic principles of cellular and molecular neuroscience
- To get information on model organisms use in/for Neuroscience
- To get information on the use of organoids to mimic *in vivo* conditions
- To get an understanding on translational applications in psychiatry
- To get information on how technologies can be used for the benefit of Neuroscience

Lectures for PhD students WS 2021

Course Content:

From Evo-Devo to adult neurogenesis:

02 Nov 2021 (CRTD, Auditorium left): Lecture 1 – Neuro-Development and cell biology of neural stem cells – *Federico Calegari*

02 Nov 2021 (CRTD, Auditorium left): Lecture 2 – Evolution of the human brain - *Federico Calegari*

04 Nov 2021 (CRTD, Auditorium left): Lecture 3 – Spinal cord development – *Jared Sterneckert*

04 Nov 2021 (CRTD, Auditorium left): Lecture 4 – The eye: how it forms, how it works – *Marius Ader*

09 Nov 2021 (CRTD, Auditorium left): Lecture 5 – Aging - *Gerd Kempermann*

Modeling the brain

09 Nov 2021 (CRTD, Auditorium left): Lecture 6 – Model organisms of CNS regeneration – *Maximina Yun*

11 Nov 2021 (B CUBE; E74 and E75): Lecture 7 - Organoids as a model to study neurodevelopmental disorders - *Natalia Rodriguez-Muela*

When things go wrong

11 Nov 2021 (B CUBE; E74 and E75): Lecture 8 – Adult neural stem cell and aging – *Tomohisa Toda*

16 Nov 2021 (B CUBE; E74 and E75): Lecture 9 – Neurodevelopmental origin of psychiatric disorders - *Nadine Bernhardt*

16 Nov 2021 (B CUBE; E74 and E75): Lecture 10 – Translational psychiatry: development of treatments and preventive strategies - *Nadine Bernhardt*

18 Nov 2021 (CRTD, SR3, SR4): Lecture 11 – Intro to ALS/PD and therapeutics - *Jared Sterneckert*

18 Nov 2021 (CRTD, SR3, SR4): Lecture 12 – Spinal cord injury – *Catherina Becker*

22 Nov 2021 (CRTD, SR1, SR2): Lecture 13 – Also the brain needs some sleep – *Henrik Bringmann*

22 Nov 2021 (CRTD, SR1, SR2): Lecture 14 – Macula degeneration and other issues with your eyes – *Marius Ader*

Technologies

23 Nov 2021 (B CUBE; E74 and E75): Lecture 15 – Functional Bioelectrical Imaging approaches & optogenetic manipulation – *Hayder Amin*

23 Nov 2021 (B CUBE; E74 and E75): Lecture 16 – Brain-machine Interfacing and microtechnology for neuroscience - *Hayder Amin*

30 Nov 2021 (B CUBE; E74 and E75): Lecture 17 – Introduction to Quantitative Biology in Neuroscience - *Gerd Kempermann*

30 Nov 2021 (B CUBE; E74 and E75): Lecture 18 – Computational neuroscience - *Shonali Dhingra*

02 Dec 2021 (CRTD, Auditorium left): Lecture 19 – In vivo molecular screens – *Catherina Becker*

02 Dec 2021 (CRTD, Auditorium left): Lecture 20 – Microglia – *Michael Sieweke*

Preparation of Lectures:

We recommend to take a look at the following books as background material for the lectures:

- "Fundamental Neuroscience" Squire, Bloom, McConnell…
- "Adult Neurogenesis" Kempermann

Examination:

A written examination will be required for the successful completion of the lecture series. The examination mark can be used to replace one subject of the Rigorosum at the Schools of Medicine (tbc for the Science)

TECHNISCHE UNIVERSITÄT DRESDEN

dresden international phd program