School of Psychology and Neuroscience

Session 2019

Masters of Research in Neuroscience

Techniques and Skills in Neuroscience Research

PN5001

Module Organiser: Dr Stefan Pulver
(sp96@st-andrews.ac.uk)

PN5001

Module Descriptor

This seminar-based module offers a theoretical perspective on state-of-the-art neuroscience techniques through critical analysis of primary literature. It also provides opportunities to learn transferrable career skills that are of importance to neuroscientists irrespective of any one career path. Weekly seminars will cover current a variety of approaches to understanding neural function and will also provide a framework for discussing practical career skills. Learning will be both directed by faculty and self-directed by students.

Pre-requisites and anti-requisites

Students must be enrolled in the MRES in Neuroscience degree programme.

Module Aims and Outcomes

This module introduces some of the major techniques and methodologies in modern neuroscience, ranging from the molecular/genetic level through to whole animal behaviour. At the end of this module you should be able to read and interpret primary research papers in multiple areas of neuroscience. You should be able to give oral presentations that present the key findings of primary research articles in neuroscience. The course aim is to give you a broad understanding of the following topics:

- Neuroanatomical techniques
- Neurophysiological techniques
- Neuroimaging techniques
- Optogenetics
- Use of open access software for neuroscience research

Transferrable skills

PN5001 is an excellent vehicle for developing skills in logical thinking and deductive reasoning. You will be given the opportunity to hone your skills in reading and interpreting scientific literature. You will actively learn the process of orally presenting scientific work. You will also get the opportunity to learn how to create online presentations. In addition to reading and discussing primary literature, you will gain experience using open access software underpinning neuroscience research.

Faculty

Dr Stefan Pulver sp96@st-andrews.ac.uk Module Organiser

Content Delivery

The module consists of a series of seminar/discussion sessions. Lectures will be on Wednesday mornings, 10am-11:30pm. The format of these sessions will vary but will typically revolve around discussion of primary literature and recent findings in neuroscience. During weeks 1-7, you will typically read 2 papers ahead of class and should come prepared to discuss the papers in detail. Each week, different students will each present and lead a discussion of 1 article each. These presentations will not be assessed.

Module Timetable 2019

Date	Topic	Location	Time	Lecturer
Week 1				
Wed 18th Sep	Course Introduction Introduction to figure making in Inkscape	Bute C28	10-11:30	Dr Pulver
Week 2				
Wed 25st Sep	Neuroanatomical techniques Student presentation slots 1,2	Bute C28	10-11:30	Dr. Pulver
Week 3				
Wed 2th Oct Friday 4pm	Neurophysiological techniques Student presentation slots 3,4 Neurophysiology workshop	Bute C28 Bule 28	10-11:30 TBD	Dr Sillar Guest speaker Bruce Johnson
Week 4				
Wed 9th Oct	Live imaging of neuronal function Student presentation slots 5,6	Bute C28	10-11:30	Dr Zwart
Week 5				
Wed 16th Oct	Optogenetics Student presentation slot 7	Bute C28	10-11:30	Dr Pulver
Week 6	**Independent learning week**			
Week 7				
Wed 30th Oct	Measuring and quantifying animal behaviour 'Round Robin' discussion of article(s)	Bute C28	10-11:30	Dr LI
Week 8				
Wed 6th Nov	How to use arduinos to control electronic devices Arduino 'Hackathon':	Bute C28	10-11:30	Dr Bowman
Week 9				
Wed 13th Nov	Assessed oral presentation 2 afternoons CLASS - EXACT TIME TBD	Bute LTD	TBD	MFZ WC
Week 10				
Wed 20th Nov	TED Talk 'Hackathon': creating engaging online presentations	C28	10-11:30	Dr Pulver
Week 11				
Wed 27th Nov	Video editing and pencasting hackathon	C28	10-11:30	Dr Pulver
Week 12				
Wed 4th Dec	Revision week optional drop in session	C28	10-11:30	Dr Pulver
Week 13				
Wed 9 Dec	Exams Week TED Talk due			
Week 14				
Wed 18th Dec				

Recommended Reading

The course is not based on any single text in particular, but the following textbook is recommended:

Principles of Neural Science by Eric Kandel, James Schwartz, Thomas Jessell.
Contains just about everything you might want to know about medical neuroscience and neurobiology. Copies of the 4th and new 5th edition are held in the Main Library, JF Allen Library and St Mary's College Library. This textbook can also be accessed as an e-book via the University Library website.

Note: Staff will also direct you to read reviews and original articles which will be relevant to specific sections of the course.

Assessment

During weeks 1-7, you will each give 2 journal club presentations during which you and a partner lead a discussion of pre selected papers on a given topic. These presentations will not be assessed, but do represent an excellent opportunity to practice and prepare for the 2 assessed components. The module is assessed by two presentations, each of which is worth 50% of your final grade. **All work will be marked according to PGT 20-point mark descriptors.**

1) Journal Club Presentation **50% module grade**

You will give a 30 minute presentation in which you present a primary research article published in the last year that you think is important. Powerpoint slides are allowed as is background information surrounding the article. You will be assessed on the choice of article, the quality of your slides, the clarity of your presentation, how well you explain and interpret the data, and your ability to engage with the audience. Members of staff and other postgraduates may be invited to the talks.

- **Assessed journal club presentations will be held on or around 15th November. Note that we may need 3-4 hours in order to complete all presentations, so we will schedule the talks at a time that is convenient for all participants.**

2) Online presentation / TED Talk **50% module grade**

You will prepare a 10-18 minute online presentation in the style of a 'TED talk' in which you present an emerging methodology in neuroscience research that you think is exciting and important. You will be assessed on the choice of topic, clarity of your presentation, how well you explain and interpret work in the field, and the creativity of your presentation. The format is flexible and could include graphics, animations, 'pencasting', or simply a video of you explaining figures. Creativity in presentation style is encouraged.

- **The deadline for TED Talk submission is 11 December at 5pm. 1 copy of the video should be uploaded to MMS by this date. All late submissions should also be submitted to MMS.**