University of St Andrews

600 YEARS

PN5000

Research Design in Neuroscience

School of Psychology and Neuroscience

Semester 1

PN5000

Module Descriptor

An introductory module to Masters study in neuroscience. Students are introduced to basic concepts in neuroscience, discuss in depth how to choose research questions, and study how to critically analysing scientific literature and the methodology behind scientific work. Students will work to develop an early career research proposal and present their ideas to a mock panel of scientists. In response to feedback, students will select a significant paper in neuroscience and write a mini-review of the paper.

Pre-requisites and anti-requisites

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

Module Aims and Outcomes

- Develop a cohesive cohort of students studying neuroscience at the masters level
- Develop the ability to formulate research questions
- Enhance skills of critically analysing scientific literature
- Enhance scientific writing skills; developing a critical approach to writing
- Develop an understanding of how to propose research projects to funding bodies
- Develop an understanding of research paper production, submission and review

Transferrable Skills

PN5000 is an excellent vehicle for developing skills in logical thinking, deductive reasoning. You will be given the opportunity to hone your skills in discriminating amongst research questions and publications. You will actively learn the process of writing and orally defending a research proposal. You will utilise both primary and secondary literature as well as websites to help construct coherent arguments. You will be given the opportunity to reflect upon and learn from feedback, before submitting your final written piece of assessment. The final written assessment will give you an opportunity to prepare a mini-review in the format of an actual type of published article.

Lecturers

Dr Stefan Pulver	sp96@st-andrews.ac.uk	Module Organiser
Dr Maarten Zwart	mfz@st-andrews.ac.uk	Lecturer
Dr. Erin Robbins	er70@st-andrews.ac.uk	Lecturer

Course Assistants

Roxy Pulver	sp96@st-andrews.ac.uk	Orientation Assistant

Content Delivery

The module will be conducted over the course of 5 days in late August. Exact schedule is below.

Timetable

Monday 26th August:	9:30	**St Mary's Quad (Entrance to School of P&N)**
	9:30	Overview of module, tour of school and labs
	10:30	Coffee
	11:00	Walk to Registry to confirm matriculation
	12:00	Lunch at East Sands (create sand neurons)
	13:30	Students introduce themselves and their objectives for the upcoming year (**no powerpoint slides allowed!**)
	14:30	Discussion 1: What is neuroscience?
	15:30	Tea time
	16:00	Research Seminar: Dr. Erin Robbins
	17:00	Wine and Cheese Reception, School of Divinity
Tuesday 27th August:	09:30	Discussion 2: How do you choose research questions?
	10:30	Coffee
	11:00	Discussion 3: Emerging methodologies in neuroscience, fitting methods to questions
	12:00	Lunch (free time)
	13:30	How do you write a research proposal?
	14:30	Group work: 'Pick and Pitch' find gaps in neuroscience research, pitch approaches for bridging gaps
	15:30	Teatime
	16:00	Research Seminar: Dr. Maarten Zwart
	17:00	Optional: pub trip with speaker
Wednesday 28st August	09:30	Discussion 5: What makes an amazing research article?
	10:30	Coffee
	11.00	Discussion 6: How do you write a commentary on an article?
	12:00	Lunch (Free time)
	13:30	Individual work: Preparation for Research proposal
	15:30	Teatime
	16:00	Individual work: Preparation for Research proposal
Thursday 29th August	09:30	Discussion 7: Researching researchers: How do you evaluate the people doing neuroscience research?
	10:30	Coffee
	11.00	Discussion 8: Researching Institutions: How do you evaluate quality of host institutions?
	12:00	Lunch (free time)
	13:30	Individual work: Preparation for Research proposal
	15:30	Teatime
	16:00	Individual work: Preparation for Research proposal
Friday 30st August:	09:30	Written assessment due Preparation for oral presentation
	12:00	lunch (free time)
	13:00	Oral defense of research proposal 10 min presentation (**no powerpoint slides!),** 10 min Q&A
	16:30	Expedition to Crail (local fishing village where Stefan and Maarten live), Sushi making party at Stefan's House

Recommended reading and preparation

All reading for the module will be provided by the module organiser during the module. On day one of the module you will be asked to do 2 things: 1) Create a sand sculpture of your favorite neuron with as many anatomical features as possible (including intracellular organelles) 2) Give a short talk about yourself, your previous work and about your goals for the coming year (no powerpoint slides allowed!). These are not assessed exercises, but obviously you should prepare in whatever way you think is best.

Assessment

All work will be marked according to PGT 20-point mark descriptors.

1) Early Career Research Proposal: **40% module grade**

You will identify a promising area of neuroscience research, and a Laboratory Head working in the field. You will then write a research proposal for a postgraduate position in their laboratory and defend the proposal in front of a panel of faculty. Throughout the week, you will have both formal and informal discussions about how the content of these assessments. These exercises are based directly on current practices for selecting PhD students. They are designed to give you expertise doing background research on a field and the people in the field and give you real world experience communicating with scientists:

Written Proposal (1000 words): You will select an area of neuroscience research and host laboratory anywhere in the world. You will write a research proposal, in which you introduce yourself, propose a research project that you could carry out as an early career postgraduate researcher and justify the choice of host laboratory. *The proposal will have 3 sections:*

i) *Career summary/Personal statement (250 words) Succinctly describe your scientific qualifications and rationale for pursuing a career in neuroscience*

ii) *Project proposal (500 words) Propose a novel research project. Proposal should include a clear statement of the biological question and motivation, an articulation of specific aim(s) of your project, a description of methodologies to be used, and a statement outlining potential outcomes and impact of the work. A maximum of 5 references may be cited (references not counted in word limit)*

iii) *Justification of Host laboratory and institution (250 words) Explain why the proposed host laboratory and host institution are the best place to conduct the proposed research*

20*% module grade*

20 minute 'Chalk talk':. You will give a 20 minute oral defense of your research proposal. First you will give a 10 minute presentation in which you 'pitch' your research proposal to a panel of staff members using only a whiteboard. You will be expected to discuss your previous work, explain your reasons for wanting to do post graduate research, outline your research plan, and provide justification for the chosen host laboratory. This should be done in a concise and professional way, but unconventional and engaging approaches are welcome. After the presentation, you will be cross-examined by at least two members of staff during during a 10 min Q&A session.

.

20% module grade

- **The early career research proposal and presentation will be completed by the end of the module.**

2) Mini-review of a research article: Identifying outstanding papers for teaching neuroscience
60% module grade
Word Limit: 2000

One of the jobs of a researcher is evaluate the importance of research articles and then use those articles to teach others. It is not easy to keep abreast of cutting edge research. As a result many journals publish small engaging mini-reviews of recent research articles to help researchers and educators keep up to date. Your mission is to write a mini-review of a neuroscience article of your choice in the format of an 'Amazing Paper' article in the Journal of Undergraduate Neuroscience Education. The goal is to find papers that describe important advances in neuroscience, but also have exceptional value for teaching principles of neuroscience. They can be new or classic publications; there is no 'age limit' on the publication. You will go through exactly the same steps that an actual author would go through in preparing the manuscript and you will be evaluated on the content and how well the manuscript follows the rules set out for submission to the journal. Note that the point of the article is to identify research articles that can be used for teaching neuroscience to undergraduates. Consequently, approximately half of the content of your articles should be about the value of the article for teaching and about how exactly the publication could be used in a classroom setting. You will be asked to submit your choice of article for approval before beginning the assignment.

Further information on the article type is available here:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5105974/
http://www.funjournal.org/

- **The deadline for the amazing paper submission is Monday 15th October at 5pm. 1 copy of the report should be uploaded to MMS by this date. All late submissions should also be submitted to MMS.**

IMPORTANT: All assessments are individual pieces of work and as such **MUST** be completed on your own and should represent your own work.

Return of work and Feedback

Feedback and marks will be provided online following standard MMS procedures. Individual feedback sessions can be scheduled if requested.

Procedures and Regulations

All aspects of this module are compulsory, including discussions, group work and assessment.

The procedures and regulations followed by the School of Psychology and Neuroscience are outlined in the University Handbook and in the School of Psychology and Neuroscience Taught Postgraduate Handbook.

Specific School regulations relating to absence reporting, penalties and rules for late submission of work, extensions for coursework, return of coursework, S-coding, Good Academic Practice and Academic Alert are stated in the School of Psychology and Neuroscience Taught Postgraduate (PGT) Handbook and students are required to carefully read these regulations. Please note that there are multiple PGT programmes in the School of Psychology and Neuroscience and some regulations for psychology students may not apply to MRES neuroscience students.

Students are also referred to the University Handbook, available at:
http://www.st-andrews.ac.uk/studenthandbook/