University of New South Wales
PSYC3051 Physiological Psychology
Session 2, 2016

Staff and contact details

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Time and Location

Lectures: Monday 10-11 (CLB 5)
Thur 4-5 (Mathews LT D)

Labs: Monday 11-1, (Weeks 3-9, 11-12 Mathews 203)
Tuesday 9-11 (Weeks 3-9, 11-12 Mathews 203)
Tuesday 1-3, (Weeks 3-9, 11-12 Mathews 203)
Wednesday 11-1, (Weeks 3-9, 11-12 Mathews 203)
Thursday 1-3, (Weeks 3-9, 11-12 Mathews 203)

Textbooks

There is no textbook set for this course. The course is organized around review articles taken from journals such as the Annual Review of Psychology, the Annual Review of Neuroscience, Trends in Neurosciences, Nature Neuroscience Reviews or similar. These articles can be downloaded via the University Library holdings or in some cases from the Moodle website. You may also find the textbooks listed below helpful. Please note that you are not required to purchase either of these books. They are listed simply to provide you with another source of information for some of the materials covered in the lectures.

Textbooks:

Carlson, N. R. (2012). *Physiology of Behavior*.11th Edn. Pearson Education.
Pearce, J.M. (2008). *Animal Learning & Cognition*. 3rd Edn. Psychology Press.

Journal Articles:

McNally:

Schultz W (2007) Behavioral dopamine signals. Trends in Neurosciences, 30(5) pp. 203 – 210. (doi:10.1016/j.tins.2007.03.007).
Tsai, H.C., Zhang, F., Adamanitis, A., Stuber, G.D., Bonci, A., de Lecea, L., & Deisseroth, K. (2009). Phasic firing in dopaminergic neurons is sufficient for behavioral conditioning. Science, 324, 1080-1084 (doi: 10.1126/science.1168878)
Maren S, Quirk GJ (2004). Neuronal signalling of fear memory. Nat Reviews Neuroscience 5, 844-852.
McNally, G.P., Johansen, J.P., & Blair, H.T. (2011). Placing prediction into the fear circuit. Trends in Neurosciences, 34, 283 – 292.

Bernstein JG, Boyden ES. (2011). Optogenetic tools for analyzing the neural circuits of behaviour. Trends in Cognitive Sciences, 15, 592-600. (doi: 10.1016/j.tics.2011.10.003).

Westbrook:

Pearce, J. M., & Bouton, M. E. (2001). Theories of associative learning in animals. Annual Review of Psychology, 52, 111-139. (doi:10.1146/annurev.psych.52.1.111)
Rescorla, R. A. (1988). Behavioral studies of Pavlovian conditioning. Annual Review of Neuroscience, 11, 329-352. (doi:10.1146/annurev.ne.11.030188.001553)
Dickinson, A. & Balleine, B.W. (2002). The role of learning in motivation. In CR Gallistel (Ed) Learning, Motivation & Emotion, Volume 3 of Steven's Handbook of Experimental Psychology, Third Edition (pp. 497-533). New York: John Wiley & Sons (copy available on Moodle)

Killcross:

Everitt, B.J. & Robbins, T.W. (2016) Drug Addiction: Updating Actions to Habits to Compulsions Ten Years On Annual Review of Psychology, 67, 23-50 (doi: 10.1146/annurev-psych-122414-033457)
Balleine, B.W. & O'Doherty, J. P. (2010) Human and Rodent Homologies in Action Control: Corticostriatal Determinants of Goal-Directed and Habitual Action. Neuropsychopharmacology, 35, 48-69 (doi: 10.1038/npp.2009.131)
Graybiel, A. M. (2008). Habits, rituals, and the evaluative brain. Annual Review of Neuroscience, 31, 359-387. (doi:10.1146/annurev.neuro.29.051605.112851)
Miller, E. K., & Cohen, J. D. (2001). An integrative theory of prefrontal cortex function. Annual Review of Neuroscience, 24, 167-202. (doi:10.1146/annurev.neuro.24.1.167)
Wallis, J. D. (2007). Orbitofrontal cortex and its contribution to decision-making. Annual Review of Neuroscience, 30, 31-56. (doi:10.1146/annurev.neuro.30.051606.094334)

Clemens:

Wise and Koob (2014) The development and maintenance of Drug Addiction Neuropsycholpharmacology 39, 254-262 http://www.ncbi.nlm.nih.gov/pubmed/24121188
Ahmed SH (2012) The science of making drug-addicted animals. Neuroscience, 211:107-25. doi: 10.1016/j.neuroscience.2011.08.014. http://www.ncbi.nlm.nih.gov/pubmed/21864653
Kenny et al. (2013) Dopamine D2 receptors and striatopallidal transmission in addiction and obesity. Curr Opin Neurobiol. 23(4):535-8. doi: 10.1016/j.conb.2013.04.012.
http://www.ncbi.nlm.nih.gov/pubmed/23726225
Nestler (2013) Cellular basis of memory for addiction Dialogues Clin Neurosci.15(4):431-43.
http://www.ncbi.nlm.nih.gov/pubmed/24459410

Assessment

1. Formative MCQ examples, released Friday 12th August, end Week 3

The formative midterm test will be released on Moodle on the Friday following Prof McNally's final lecture. It will be open to you to allow you to test yourself on the sorts of questions you will expect in the final exam, but will receive no formal mark. The material will be based on all lecturers across the course so you should not expect to be able to answer them all at this stage. Questions covering Lectures 1 – 6 (McNally) will be clearly indicated and can be used to test your understanding of the course up to this point. Additional questions will be relevant as the remainder of the course progresses. Feedback on the questions will be available in tutorials.

2. Research Proposal and poster preparation (worth 40% of your final mark for the course; assessment by presentations in tutorials in weeks 4, 7, 8 and 9 and poster submitted end week 10 on template made available in week 3)

You are expected to conceive, design, and propose a research project in Behavioural Neuroscience. The specific research area and research question is determined by you. However, it is expected to be based upon the current literature. You will be expected to review systematically the relevant literature, identify an outstanding question of interest, and design an experiment that will address this question. This project will be assessed in two parts. The first part comprises oral presentations of your research proposal in Weeks 4, 7-9 laboratory classes (10% of your final mark). In the first presentation (5 minutes maximum) you will very briefly review your proposed topic area and identify a research question, together with a brief description of how you would approach this. Your tutor will provide you with feedback in the time available – if your presentation takes the full time allotted, then there will be little or no time for feedback, so plan your presentation carefully. Satisfactory completion of this presentation will result in award of a fixed 3% of the 10% available for this component. Based on this feedback, you will prepare a second presentation, which

covers in more detail you research question, a proposed experiment, and some potential findings and possible interpretations and implications. You will have 10 minutes for this and can earn up to 7% of your final mark. **Completion of all oral presentations is a condition of completing the entire assessment.** The second part is a poster presenting your proposed experiment, based on a template to be supplied to you in week 3. An electronic copy of your poster must be submitted at the end of week 10 following the procedures below (30% of your final mark). This poster will be based on the presentations given in class, allowing you to incorporate feedback from your presentations (and those of others) into your final completed work.

3. Final examination (worth 60% of your mark for the course)
The final examination will be held in the usual end of session examination period, and will assess the lecture material, excluding that assessed in the midterm. This will take the format of an 75-question multiple choice examination over 2 hours, with 15 questions from each of the 4 sections of the course delivered by different lecturers (lecture content and associated readings), and 15 questions derived from practical classes in weeks 5, 6, 11, 12 and associated readings.

Please see the Psychology Student Manual for general advice and regulations concerning assessment, class attendance, and other relevant matters. Please also note that this course may require work outside of scheduled class-time.

Course Materials

A website is available via Moodle (http://telt.unsw.edu.au). This site will contain usual course materials (overheads, readings etc.) as well as a link to digital streaming lecture recordings, where available.

Course Aims and Objectives

Lectures
This course deals with elementary learning processes and their neurobiological substrates. These include: an overview of the role of appetitive and aversive motivation in learning, behavior and psychopathology. learning about relations between stimuli (e.g., Pavlovian conditioning); learning about relations between actions and outcomes (e.g., instrumental conditioning); how goals are represented and how they drive behavior; and the development of habitual and compulsive behaviours. Emphasis will be placed on contemporary theories and approaches, including discussion of the role of molecular signaling cascades and neuronal coding in learning and memory, the role of neural systems in supporting behaviour, and examples of where changes in such systems are thought to underpin human mental disorders.
The course is divided into four sections:

McNally: Neural circuits of appetitive and aversive motivation
Killcross: Neural basis of action and choice
Clemens: Neurobiology of addiction and animal models of mental disorders
Westbrook: Behavioural studies of learning

Lab course
The primary goal of laboratory component of the course is to provide “hands on” experience in various aspects of research in physiological psychology. As such, a significant component of the course will involve handling and experimentation on animal subjects (rats). Given the “hands on” approach in this tutorial course, it is imperative that you contact your lecturer as soon as possible if obligations of any kind prevent you from taking part in these activities.

Course Guide

McNally (6 lectures, weeks 1-3):
Neural circuits of appetitive and aversive motivation

Clemens (6 lectures, weeks 4-6):
Neurobiology of addiction and animal models of mental disorders

Westbrook (6 lectures, weeks 7-9):
Behavioural studies of learning

Killcross (5* lectures, weeks 10-12):
Neural basis of action and choice

*No lecture Monday 3 Oct, Week 10 (Labour Day)

Laboratory classes (Weeks 3 – 12)
Please note: Labs commence in Week 3.and run for weeks 3-9, 11- 12 in Mathews 203.

Week 3: Introduction to research proposal and poster presentation
Week 4: Research proposal and poster presentation 1
Week 5: Introduction to practical sessions
Laboratory practical 1
Week 6: Laboratory practical 2
Week 7: Research proposal and poster presentation 2
Week 8: Research proposal and poster presentation 3
Week 9: Research proposal and poster presentation 4
Week 10: No Labs, Submission of final Poster
Week 11: Laboratory practical 3
Week 12: Laboratory practical 4