PSYC 3914 – Behavioural & Cognitive Neuroscience

Unit of Study Code: PSYC3914

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Tutors: TBA- Your tutor will advise you of their consultation times in the first tutorial.

Format of Unit: 2 x 1 hour lectures/week x 13 weeks
1 x 2 hour tutorial/week x 10 weeks

Credit Point Value: 6 Credit Points

Prerequisite: 1. PSYC (2011 or 2911 or 2111) and at least one other Intermediate Psychology Unit from PSYC (2012 or 2112), PSYC (2013 or 2113), PSYC (2014 or 2114) with marks of 75+.
OR
2. (PSYC2011 or 2911 or 2111 or 2013) and ANAT2010 and PCOL2011 with marks of 75+.
Assessment:

**Examination**: 50% of total mark: Half of the available marks from multiple-choice questions and half from short answer questions. This assesses your knowledge of materials covered in lectures and readings set by the lecturing staff.

**Written Assignment**: One 2000-2500 word essay/report (30%) due before 4pm 11 September (Week 7)

**Tutorial Quiz**: (Take home, due by 4pm 6 November) assessing the tutorial material not covered in the report (10%)

**Presentation**: delivery of a presentation critically evaluating original research (10%)

* Completion of these components is compulsory to pass this unit. Students who fail to do so will receive an Absent Fail, regardless of their marks in other assessments.

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<thead>
<tr>
<th>PSYC3914 Assessment Information</th>
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<tbody>
<tr>
<td><strong>What?</strong></td>
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<tr>
<td>Assignment (Essay) Compulsory</td>
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<tr>
<td>Exam Compulsory</td>
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<tr>
<td>Presentation Non-compulsory</td>
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<tr>
<td>Quiz Non-compulsory</td>
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#Last possible date and time for submission of this assignment with or without extensions.

NB: It is very important that you read the general administrative guidelines for submission of written work, penalties for late work, assessment criteria, procedures for applying for extensions and special consideration in the Undergraduate Student Guide – available on the e-learning site as well as here: [http://sydney.edu.au/science/psychology/current_students/doc/Psych_UG_Student_Guide.pdf](http://sydney.edu.au/science/psychology/current_students/doc/Psych_UG_Student_Guide.pdf)

**It is your responsibility to ensure that you are familiar and adhere to the Student Guide.**

Note that students who apply for and are granted either special arrangements or special consideration for examinations in units offered by the Faculty of Science will be expected to sit any replacement assessments in the two weeks immediately following the end of the formal examination period. Later dates for replacement assessments may be considered where the application is supported by appropriate documentation and provided that adequate resources are available to accommodate any later date. The format of any “third exam” may differ from the original.
Unit of study general description:

This unit of study will focus on approaches to studying neurosciences incorporating molecular, preclinical and clinical models of brain function. These biological models of brain function will be linked with behavioural, affective and cognitive function and dysfunction. The implications of focal cognitive deficits in neurological patients for models of normal cognitive function will also be explored. Specific topics to be covered will be selected from the following areas: the biological basis of feeding and appetite, psychoneuroimmunology, glial cell function, the neural basis of learning and memory, sensorimotor integration, neurodegenerative disease, social neuroscience, language, visual cognition and praxis. In addition to lectures, a practical component will cover basic neuroanatomy and introduce students to experimental and case-study approaches to studying neurosciences.

Graduate Attributes in Behavioural and Cognitive Neuroscience

This course is structured around the graduate attributes associated with the scientist-practitioner model, the basis for the training of psychologists in Australia and internationally. Graduate Attributes are the generic skills, abilities and qualities that students should acquire during their university experience and the School of Psychology is committed to providing an environment to promote these skills. In addition, this unit of study will provide students with generalised and transferable skills that will also be useful in careers outside psychology.

The following graduate attributes and student learning outcomes will be developed through lectures, practical classes and assessment activities. They will be assessed in the laboratory report, tutorial quiz, class debate and final exam.

1: Knowledge and Understanding of behavioural neuroscience and cognitive neuroscience

Display basic knowledge and understanding of major concepts, theoretical perspectives, empirical findings, and historical trends in behavioural and cognitive neuroscience

Student learning outcomes:
(i) An interest in and appreciation of the historical and current contribution of learning theorists, neuroscientists, psychopharmacologists, cognitive and sensory scientists to the understanding of the brain and behaviour and to the treatment of mental illness and neurological disorders.
(ii) Understanding basic neural processes and anatomical systems underlying different types of learning and memory.
(iii) Understanding the neural control of movement and its disorders
(iv) Understanding the clinical presentation and biological bases of dementia
(v) Understanding neural systems underlying speech and language and its disorders
(vi) Understanding of concepts of neural computation
(vii) Understanding neural correlates of sleep and wakefulness
(viii) Ability to describe, explain and evaluate research studies in these fields.
(ix) Skill in reporting experimental work using standard conventions.

2: Research Methods in behavioural and cognitive neuroscience

Understand, apply and evaluate basic research methods in behavioural and cognitive neuroscience, including design of laboratory and clinical research, data collection, analysis and interpretation, literature searches and review. Demonstrate understanding of technologies used to study brain function and activity.

Student learning outcomes:
(i) To develop a critical understanding of the major methods of research in these areas.
(ii) To critically assess the major theories and research findings in these areas.
(iii) To interpret statistical analyses.
(iv) Use basic web-search, word-processing, database, email, spreadsheet, and data analysis programs.
(v) Design and conduct basic studies to address psychological questions: frame research questions; undertake literature searches; critically analyse theoretical and empirical studies; formulate testable hypotheses; operationalise variables; choose an appropriate methodology; make valid and reliable measurements; analyse data and interpret results; and write research reports.
3: Critical Thinking Skills in behavioural and cognitive neuroscience

Respect and use critical and creative thinking, skeptical inquiry, and the scientific approach to solve problems related to the neuroscientific bases of behaviour. Develop ability to identify and evaluate the purposes, research questions, data, perspectives, inferences, concepts, implications and assumptions associated with research presented during the course.

Student learning outcomes:
(i) Demonstrate an attitude of critical thinking that includes persistence, open-mindedness, and intellectual engagement.
(ii) Evaluate the quality of information, including differentiating empirical evidence from speculation.
(iii) Evaluate issues and behaviour using different theoretical and methodological approaches.
(iv) Use reasoning and evidence to recognise, develop, defend, and criticise arguments and persuasive appeals.

4: Values in behavioural and cognitive neuroscience

Student learning outcomes:
(i) Value empirical evidence; tolerate ambiguity during the search for greater understanding of behaviour and knowledge structures
(ii) Use information in an ethical manner (e.g., acknowledge and respect the work and intellectual property rights of others through appropriate citations in oral and written communication)
(iii) Be able to recognise and promote ethical practice in research.
(iv) Promote evidence-based approaches and rigour in the understanding of behaviour.
(v) Be aware of ethical issues pertaining to clinical interventions.
(iv) Respect diversity associated with cognitive and neurological disorders

5: Communication Skills in behavioural and cognitive neuroscience

Student learning outcomes:
(i) Write a standard research report using American Psychological Association (APA) structure and formatting conventions.
(ii) Write effectively in a variety of other formats (e.g., essays, research proposals, reports) and for a variety of purposes (e.g., informing, arguing).
(iii) Demonstrate effective oral communication skills in various formats (e.g., debate, group discussion, presentation) and for various purposes.
(iv) Collaborate effectively, demonstrating an ability to: work with groups to complete projects within reasonable timeframes; manage conflicts appropriately and ethically.

6: Learning and the application of behavioural and cognitive neuroscience

Student learning outcomes:
(i) To develop an awareness of the applications of the theories and research findings in learning, control of movement, memory, language, visual processing, computational modeling and sleep.
(ii) Apply psychological concepts, theories, and research findings to solve problems in everyday life and in society.
(iii) Understand major areas of applied psychology and neuroscience.
(iv) Understand how basic research in psychopharmacology and neuroscience gives rise to treatments for addictions, movement and memory disorders and other neurological disorders.
(v) Develop a capacity for independent learning that will sustain personal and professional development in the rapidly changing field of neuroscience
(iv) self-assess performance accurately; incorporate feedback for improved performance; purposefully evaluate the quality of one’s thinking (metacognition, part of critical thinking).
LECTURE AND TUTORIAL TIMETABLE

Lectures are held on Mondays Thursdays at 11am in Bosch Lecture Theatre 3

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture #</th>
<th>Topic</th>
<th>Lecturer</th>
<th>Tutorial (2 hrs)</th>
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<tbody>
<tr>
<td>27 July</td>
<td>1</td>
<td>Introduction and History of Neuroscience</td>
<td>LC</td>
<td>No tutorial</td>
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<tr>
<td>Week 1</td>
<td>2</td>
<td>Long term potentiation</td>
<td>LC</td>
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<tr>
<td>3 Aug</td>
<td>3</td>
<td>Neural bases of Pavlovian conditioning</td>
<td>LC</td>
<td>Behavioural Neuroscience</td>
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<tr>
<td>Week 2</td>
<td>4</td>
<td>Neural bases of extinction</td>
<td>LC</td>
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<tr>
<td>10 Aug</td>
<td>5</td>
<td>Sleep</td>
<td>LC</td>
<td>Neuroanatomy</td>
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<tr>
<td>Week 3</td>
<td>6</td>
<td>Biological Rhythms</td>
<td>LC</td>
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<tr>
<td>17 Aug</td>
<td>7</td>
<td>Psychopharmacology I</td>
<td>IM</td>
<td>Behavioural Neuroscience</td>
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<tr>
<td>Week 4</td>
<td>8</td>
<td>Psychopharmacology II</td>
<td>IM</td>
<td>II</td>
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<td>24 Aug</td>
<td>9</td>
<td>Psychopharmacology III</td>
<td>IM</td>
<td>Behavioural Neuroscience</td>
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<td>Week 5</td>
<td>10</td>
<td>Psychopharmacology IV</td>
<td>IM</td>
<td>III</td>
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<td>31 Aug</td>
<td>11</td>
<td>Psychopharmacology V</td>
<td>IM</td>
<td>Behavioural Neuroscience</td>
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<tr>
<td>Week 6</td>
<td>12</td>
<td>Movement and motor control I</td>
<td>JH</td>
<td>IV</td>
</tr>
<tr>
<td>7 Sept</td>
<td>13</td>
<td>Movement and motor control II</td>
<td>JH</td>
<td>No tutorial: finalize your report</td>
</tr>
<tr>
<td>Week 7</td>
<td>14</td>
<td>Biological Bases of Dementias</td>
<td>JH</td>
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<tr>
<td>14 Sep</td>
<td>15</td>
<td>Dementia: Clinical Syndromes</td>
<td>IH</td>
<td>Clinical Research Methods</td>
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<tr>
<td>Week 8</td>
<td>16</td>
<td>Episodic Memory</td>
<td>IH</td>
<td>I</td>
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<tr>
<td>21 Sept</td>
<td>17</td>
<td>Semantic Memory</td>
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<td>Clinical Research Methods</td>
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<tr>
<td>Week 9</td>
<td>18</td>
<td>Language</td>
<td>IH</td>
<td>II</td>
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<tr>
<td>28 Sep</td>
<td>-</td>
<td>Study Break</td>
<td></td>
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<td>Week 10</td>
<td>19</td>
<td>High Level Visual Processing I</td>
<td>IH</td>
<td>No tutorials</td>
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<tr>
<td>12 Oct</td>
<td>20</td>
<td>High Level Visual Processing II</td>
<td>IH</td>
<td></td>
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<tr>
<td>19 Oct</td>
<td>22</td>
<td>Brains vs. Computers II</td>
<td>AH</td>
<td></td>
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<tr>
<td>Week 12</td>
<td>23</td>
<td>Attention and the parietal lobe I</td>
<td>AH</td>
<td>Student Presentations: Critical assessment of neuroscience methods.</td>
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<tr>
<td>26 Oct</td>
<td>24</td>
<td>Attention and the parietal lobe II</td>
<td>AH</td>
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<tr>
<td>2 Nov</td>
<td>-</td>
<td>Study Break</td>
<td></td>
<td>No classes</td>
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<tr>
<td>Week 14</td>
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<tr>
<td>9 Nov</td>
<td>-</td>
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<td>No classes</td>
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<tr>
<td>Week 15</td>
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<tr>
<td>16 Nov</td>
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<tr>
<td>Week 16</td>
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LC = Laura Corbit, IM = Iain McGregor, JH = Justin Harris, IH = Irina Harris, AH = Alex Holcombe

Textbook

This is the recommended text for the course. Most of you would have used it in PSYC2011 and the lecturers will refer to this text.

Some of you may also have the following if you took PSYC2011 prior to 2011 and it may also be a useful reference:

There are many other texts available that will touch on topics from the course. You are free to use these as additional sources but be aware that content in this field changes quickly and older texts can often contain inaccuracies. Lectures may also provide references to other sources for you to study (e.g. research or review articles, chapters from other texts) where the most current research output may not be addressed in the textbook.