

## Neuropsychology: 2D03

### Venue of lectures JHE/376

Time: M & W 11:30 am to 12:20 pm; F 1:30 pm to 2:20 pm

### COURSE-PLAN

Instructor: Dr. Ullal, G.

Contact: [ullalg@mcmaster.ca](mailto:ullalg@mcmaster.ca) (Ext. 21331) Department of Psychology, Neuroscience and Behaviour Room 108.

Teaching Assistants: Names and contacts of the TAs will be announced.

*There are no specific “Office Hours”. Please feel free to email any one of us and make an appointment for any day during the week. Around the mid-term examinations and before the final examination special time-slots will be provided.*

#### Course Objectives:

Neuropsychology is a branch of psychology that deals with behaviour as determined by the neural substrates. The traditional and most popular approach would be to gain insights with the help of unfortunate “experiments of nature” in the form of disorders or syndromes. On many occasions, classical case reports have been the “textbooks” for neuropsychology. Owing to the recent advancement in the non-invasive tools of investigations such as functional neuroimaging and electrophysiology, it has become possible to study the healthy individuals or animals while they are performing various tasks. In this course we will use syndromic approach, case-study approach and on several occasions study the healthy subjects.

The **text book** for the course: Bryan Kolb and Ian Q. Whishaw. Fundamentals of Human Neuropsychology 6<sup>th</sup> Edition, Worth Publishers USA. 2008. The chapters pertaining to each lecture are indicated in the Schedule below.

1. **Course website:** A scheme of every forthcoming lecture along with important slides will be posted on the *WebCT*. Students are encouraged to visit the site regularly to look for any important announcements that would appear periodically.

2. **Text:** In the Lecture Schedule provided below, page numbers of the helpful readings in text have been indicated. However, the lectures and examinations **DO NOT STRICTLY** adhere to the contents of the text book. Students are therefore advised to print the slides off the website and make notes during the lecture. **NOTE:** Examinations are based on lectures. The lectures will cover material from the textbook as well as from outside sources. Skeleton slides pertaining to the lecture in the form of PowerPoint and PDF will be posted prior to every class. Students are advised to make their own notes in class. **Material outside of the lecture will not be tested.**
3. **Home-Assignments:** Besides the textbook, two journal articles will be reviewed in the course. The PDF format of the papers will be posted at an appropriate time during the course.
  - a. Students are required to study the article and address a few questions pertaining to it in the form of home-assignments. The questions will be provided.
  - b. Both the assignments **together**, will be worth **20%** of the final grade.
  - c. Due dates for submission of both the assignments is indicated in the schedule provided below. **The assignments must be submitted prior to the specified dates.** A penalty of 10% /day will be applied for delayed submission. By 3<sup>rd</sup> day, the assignment will get a zero. In the event of an illness or any legitimate reasons, an official permission should be routed through the Administration excusing the delayed submission.
  - d. The assignments must be typed, with double-line spacing. **Emailing of assignments is not permitted.**
  - e. Language will not be an issue in the marking. Point-form of answers would suffice.
  - f. Please pay attention to the issues about **Academic Dishonesty** provided below.

**Assignment 1:** Paul K L *et al.* Agenesis of the corpus callosum. Genetic, developmental and functional connectivity. *Nature Reviews. Neuroscience.* 287-299. (2007). Assignment is due for submission on **26<sup>th</sup> September 2008**. PDF format of paper will be posted shortly.

**Assignment 2:** Koenigs M. *et al.* Focal brain damage protects against post-traumatic stress disorder in combat veterans. *Nature Neuroscience.* 232-237. (2008). Assignment is due for submission on **20<sup>th</sup> October 2008**. PDF format of paper will be posted shortly.

#### **4. Evaluations**

1. **First midterm examination:** The midterm examinations will be worth **20%** of the final grade. Only material covered in class in all the lectures prior to 1<sup>st</sup> midterm examination will be on 1<sup>st</sup> midterm examination. Besides **multiple choice questions** there will be a few **short answer** type questions comprising of definitions and some important concepts discussed in class.
2. **Second midterm examination:** The midterm examinations will be worth **20%** of the final grade. Only material covered in class in all the lectures after the 1<sup>st</sup> midterm examination and prior to 2<sup>nd</sup> midterm examination will be tested. Besides **multiple choice questions** there will be a few **short answer** type questions comprising of definitions and some important concepts discussed in class.
3. **Final examination:** It will be worth **40%** of final grade. It will test the material covered in the entire course. Besides **multiple choice questions** there will be a few **short answer** type questions comprising of definitions and some important concepts discussed in class.
4. Dates for the midterm examinations are indicated in the schedule below. Date for the final examination will be determined by the Registrar's Office.

5. **Assignments:** There will be **TWO** take home assignments, **together** worth **20%** of the final grade. They will be based on two journal articles that will be provided. **They have to be submitted by the absolute deadlines provided in the schedule below. They may be handed-in in class.**

**NOTE:** A penalty of 10% /day will be applied for delayed submission. By 3<sup>rd</sup> day, the assignment will get a zero. In the event of an illness or any legitimate reasons, an official permission should be routed through the Administration excusing the delayed submission.

**Remarking of Assignments or Short Answers:** Requests for remarking of an Assignment or a Short Answer is only considered after a student provides a written request giving the reasons for the request to either, Dr. Ullal or the concerned TA.

**MISSED EXAMINATIONS:** There will **NOT** be a re-examination for missing any of the midterm examinations. However, if a student misses any examination owing to an illness or any other legitimate reason, the final examination will be rated proportionately higher provided an official permission is routed through the University Administration. No examination will be re-scheduled unless there is cancellation of the class by the University.

**CONFLICT OF EXAMINATIONS:** Both the midterm examinations are conducted during the regular class-hour. If any other examination conflicts with this examination, please contact the authorities conducting the other examination.

**“IMPORTANT ANNOUNCEMENTS”:** Important announcements regarding the course will be periodically posted in the **Announcement Box** of the course. Please remain updated.

**MCMASTER UNIVERSITY GRADING SCALE:**

Grade	Equivalent Grade Point	Equivalent Percentages
A+	12	90-100
A	11	85-89
A-	10	80-84
B+	9	77-79
B	8	73-76
B-	7	70-72
C+	6	67-69
C	5	63-66
C-	4	60-62
D+	3	57-59
D	2	53-56
D-	1	50-52
F	0	0-49

## Schedule of Lectures

**PLEASE NOTE:**

*More elaborate information about every session will be posted on the course website periodically before every lecture.*

*All examination questions will **only** come from **material covered in the lecture***

*Suggested readings are meant to assist in the understanding of the course material. They do not confine to the text.*

*There will be material in the lectures which is outside of the textbook*

	<u>Learning Objectives</u>	<u>Helpful readings</u> <u>6<sup>th</sup> Edition</u>	<u>Helpful readings</u> <u>5<sup>th</sup> Edition</u>
<u>Lecture 1</u> <b>Course Outlines</b> 5 <sup>th</sup> September	<ol style="list-style-type: none"> <li>1. Course Objectives</li> <li>2. Evaluation Strategies</li> </ol>		
<u>Lecture 2</u> <b>Realms of Neuropsychology</b> 8 <sup>th</sup> September	<ol style="list-style-type: none"> <li>1. Heart versus Brain: Cause for the confusion: What Drives? The Capilano-Bridge Experiment</li> <li>2. Mind-Body Problem; Dualism and Monism</li> <li>3. Epilepsy-Madness-Witchcraft</li> <li>4. Realms of Neuropsychology: Syndrome-Single Case- Normal Function.</li> <li>5. Phrenology: Are we after all glorified Phrenologists?</li> <li>6. Cranioscopy and Trephining</li> <li>7. Localization of Brain Functions: Types Epilepsies</li> </ol>	p. 2-28	p. 2-25

Contd.

	8. “Two Minds in one Brain”: The Split Brain Syndrome 9. Acallosal Syndrome. 10. What/Who is to blame? The Whitman Case	p. 473-474	p. 434-435
<u>Lecture 3</u> <b>General Organization of Nervous System</b> 10 <sup>th</sup> September	1. Lateralization of Brain Functions: Strokes, Aphasias, Amusias 2. Experimental arrest of brain functions: Transcranial magnetic stimulation (TMS), Wada’s test. 3. Hierarchical organization of brain functions, Rasmussen’s encephalitis and hemispherectomy 4. Distributed Systems and the Binding Problem	p. 2-28 (contd.) p. 144-146	p. 2-25 (contd.) p. 155-158
<u>Lecture 4</u> <u>and</u> <u>Lecture 5</u> <b>Gross Neuroanatomy</b> 12 <sup>th</sup> and 15 <sup>th</sup> September	1. Gross Anatomy of Cerebral Cortex, Blood Supply, Meninges and Cerebrospinal fluid 2. Meningitis and Hydrocephalus 3. Case: Phineas Gage and the Frontal-Lobe Syndrome 4. The Limbic System 5. Kluver-Bucy’s Syndrome 6. Hypothalamic and Amygdala-Rage 7. The Case of “HM” and Hippocampus	p. 51-81	p. 46-73

<p><u>Lecture 6</u> <u>and</u> <u>Lecture 7</u></p> <p><b>Organization of Neuron</b> 17<sup>th</sup> and 19<sup>th</sup> September</p> <p><i>Questions for 1<sup>st</sup> Assignment will be provided</i></p>	<ol style="list-style-type: none"> <li>1. Structure of a neuron</li> <li>2. Single-cell recording</li> <li>3. Principles of Voltage-Clamp and Patch-Clamp techniques</li> <li>4. Resting Membrane Potential, Graded potential and Action Potential</li> <li>5. Rate-coding in neurons</li> <li>6. “Signatures” of an Epileptic Neuron</li> <li>7. Channelopathies</li> <li>8. Axon-transport</li> <li>9. Tauopathies, nerve degeneration, Alzheimer’s disease</li> <li>10. Nerve conduction</li> <li>11. Myelin and Multiple Sclerosis</li> </ol>	<p>p. 82-109</p>	<p>p. 74-98</p>
<p><u>Lecture 8</u> <u>and</u> <u>Lecture 9</u></p> <p><b>Communication between Neurons</b> 22<sup>nd</sup> and 24<sup>th</sup> September</p>	<ol style="list-style-type: none"> <li>1. Synapse</li> <li>2. Synaptic mechanism</li> <li>3. Neurotransmitter systems</li> <li>4. Long-term Potentiation and Long-term Depression</li> <li>5. Synaptic plasticity</li> <li>6. Environmental determinants of synaptic plasticity</li> </ol>	<p>p.110-131 p.718-745</p>	<p>p. 99-116 p. 670-696</p>



<p><u>Lecture 10</u>  <b>Neuroimaging</b>  26<sup>th</sup> September  <i>1<sup>st</sup> Assignment is due for submission</i></p>	<ol style="list-style-type: none"> <li>1. Imaging the Brain: Structural and Functional Imaging</li> <li>2. CT-MRI</li> <li>3. fMRI-PET</li> <li>4. Diffusion Tensor Imaging/Tractography (DTI)</li> <li>5. Magnetic Resonance Spectroscopy</li> </ol>	p. 146-162	p.158-172 (DTI has not been discussed in the 5 <sup>th</sup> Edition)
<p><b><u>LECTURE 11</u></b>  29<sup>th</sup> September  (Monday)</p>	<p style="text-align: center;"><b>1<sup>st</sup> Midterm Examination</b>  <b>During the class hour (Venue will be posted)</b>  <b>All material covered till lecture 10 (including lecture 10) will be tested</b></p>		
<p><u>Lecture 12</u>  and  <u>Lecture 13</u>  <b>Levels of Consciousness</b>  1<sup>st</sup> and 3<sup>rd</sup> October</p>	<ol style="list-style-type: none"> <li>1. Coma, Vegetative States, Locked-in syndrome</li> <li>2. Neural Basis of Consciousness: Brain stem, ARAS, Thalamus, Cerebral substrates.</li> <li>3. Electroencepholgrapy (EEG)</li> <li>4. The Glasgow Coma Scale</li> </ol>	p. 138-140 p. 645-653	p. 150-154 p. 602-606
<p><u>Lecture 14</u>  <b>Attention</b>  6<sup>th</sup> October</p>	<ol style="list-style-type: none"> <li>1. Attention “spotlight”</li> <li>2. Pre-attentive search, serial search and conjunction search</li> <li>3. Selective and divided attention</li> </ol>	p. 622-645	p. 577-602  Contd.

	<ol style="list-style-type: none"> <li>4. Higher attentiveness to threatening stimuli, salience; Pulvinar</li> <li>5. Urbach-Weithe's Syndrome</li> <li>6. Sensory inattention and Parietal and Frontal Neglects</li> <li>7. Blind Sight: Conscious and the Unconscious Neural Systems</li> <li>8. Emotional Unconsciousness</li> </ol>		
<p><u>Lecture 15</u>  <b>Perceiving the world</b>  8<sup>th</sup> October</p>	<ol style="list-style-type: none"> <li>1. The sensory maps in the brain</li> <li>2. Dermatomes</li> <li>3. Specialized receptors and sensory nerve pathways</li> <li>4. The thalamic relays</li> <li>5. Sensory deprivation syndrome</li> <li>6. Phantom limb</li> <li>7. Thalamic pain syndrome</li> </ol>	<p>p. 213-216  p. 141-146</p>	<p>p. 188-191  p. 155-158</p>
<p><u>Lecture 16</u>  <b>Vision: 1</b>  <b>Photoreceptors and Visual maps</b>  10<sup>th</sup> October  <i>Questions for</i></p>	<ol style="list-style-type: none"> <li>1. Photoreceptors and visual pathway</li> <li>2. Perimetry and mapping the visual fields</li> <li>3. Pituitary craniopharyngeoma and hemianopia  Cortical strokes and case of cortical blindness</li> </ol> <p><i>2nd Assignment will be provided</i></p>	<p>p. 206-208</p>	<p>p. 182-184</p>

<p><u>Lecture 17</u> and <u>Lecture 18</u> <b>Vision: 2</b> <b>Visual Experience</b> 15<sup>th</sup> and 17<sup>th</sup> October</p>	<ol style="list-style-type: none"> <li>1. Occipital lobe functions</li> <li>2. The “Visual streams” and visual agnosias, colour blindness and colour agnosia, Prosopagnosia, akinetopsia,</li> <li>3. Visual simultagnosias</li> <li>4. Anton-Babinski syndrome</li> </ol>	<p>p. 350-373</p>	<p>p. 318-342</p>
<p><u>Lecture 19</u> <b>Hearing:</b> <b>Hair cells and Auditory maps</b> 20<sup>th</sup> October <i>2<sup>nd</sup> Assignment is</i></p>	<ol style="list-style-type: none"> <li>1. Cochlea and auditory receptors</li> <li>2. Auditory maps</li> <li>3. Brain organization in non-hearing people</li> </ol> <p><i>due for submission</i></p>	<p>p. 209-212 p. 334-335</p>	<p>p. 184-188 p. 304-305</p>
<p><u>Lecture 20</u> and <u>Lecture 21</u> <b>Temporal lobe: Beyond Hearing</b> 22<sup>nd</sup> and 24<sup>th</sup> October</p>	<ol style="list-style-type: none"> <li>1. Temporal lobes beyond sound processing</li> <li>2. Amusia, Amnesia, Pick’s fronto-temporal dementia.</li> <li>3. Temporal lobe epilepsy</li> <li>4. Kluver-Bucy’s syndrome (revisited)</li> <li>5. Spatial maps</li> <li>6. Temporal lobe function tests</li> </ol>	<p>p. 402-426</p>	<p>p. 370-389</p>

<p><b><u>LECTURE 22</u></b>  <b>27<sup>th</sup> October</b>  <b>(Monday)</b></p>	<p align="center"><b>2<sup>nd</sup> Midterm Examination</b></p> <p align="center"><b>During the class hour (Venue will be posted)</b></p> <p align="center"><b>Only material covered after the 1<sup>st</sup> Midterm Examination till lecture 21 (including) will be tested</b></p>		
<p><u>Lecture 23</u>  and  <u>Lecture 24</u>  <b>Somatic Sensations and Parietal lobes</b>  29<sup>th</sup> and 31<sup>st</sup> October</p>	<ol style="list-style-type: none"> <li>1. Parietal lobes beyond touch sensation</li> <li>2. Gerstmann’s syndrome</li> <li>3. Balint’s syndrome</li> <li>4. Spatial neglects</li> <li>5. Somatosensory agnosias</li> <li>6. Place cells, Grid cells and Spatial maps, topographic disorientations</li> </ol>	<p>p. 376-400  p. 590-619</p>	<p>p. 345-367  p. 546-573</p>
<p><u>Lecture 25</u>  and  <u>Lecture 26</u>  <b>The Acting Brain: Organization of the Motor System</b>  3<sup>rd</sup> and 5<sup>th</sup> November</p>	<ol style="list-style-type: none"> <li>1. Pyramidal and Extrapyrmidal system</li> <li>2. Motor tracts; Upper and Lower Motor Neurons</li> <li>3. Muscle Tone</li> <li>4. Stretch Reflex</li> <li>5. Voluntary Movements</li> <li>6. Upper and Lower Motor Neuron Paralysis</li> <li>7. Mirror Neurons</li> <li>8. The “Booba-Kiki Effect”</li> </ol>	<p>p. 223-243   p. 170 &amp; p. 766</p>	<p>p. 197-219   p.123 &amp; p. 715</p>

<p><u>Lecture 27</u> and <u>Lecture 28</u> <b>Extrapyramidal System</b> 7<sup>th</sup> and 10<sup>th</sup> November</p>	<ol style="list-style-type: none"> <li>1. Basal ganglia; Motor and Cognitive Functions</li> <li>2. Parkinson's disease</li> <li>3. Huntington's dementia</li> <li>4. Tourette's syndrome</li> </ol>	<p>p. 223-243 (continued) p. 786-796</p>	<p>p. 197-219 (continued) p. 732-741</p>
<p><u>Lecture 29</u> <b>The Open Loop-Motor Mechanisms</b> 12<sup>th</sup> November</p>	<ol style="list-style-type: none"> <li>1. Apraxia</li> <li>2. Alien Hand and Anarchic Hand syndromes</li> <li>3. Tests for apraxias</li> </ol>	<p>p. 376-400 (contd.)</p>	<p>p. 345-367 (contd.)</p>
<p><u>Lecture 30</u> and <u>Lecture 31</u> <b>Servo- Mechanism of Cerebellum</b> 14<sup>th</sup> and 17<sup>th</sup> Nov.</p>	<ol style="list-style-type: none"> <li>1. Functional and anatomical divisions of cerebellum</li> <li>2. Ataxia</li> <li>3. Cerebellar Affective Syndrome</li> <li>4. Cerebellar Functions Tests</li> </ol>	<p>p. 223-243</p>	<p>p. 197-219</p>
			<p style="text-align: right;">Contd.</p>

<p><u>Lecture 32</u> and <u>Lecture 33</u> <b>The</b> <b>“Moral/Emotional</b> <b>Social” Brain</b> 19<sup>th</sup> and 21<sup>st</sup> November</p>	<ol style="list-style-type: none"> <li>1. Frontal lobe, Limbic, Autonomic system</li> <li>2. Korsakoff’s Syndrome</li> <li>3. The Hypothalamo-Pituitary-Adrenal axis</li> <li>4. Hypothalamus and “Sham Rage”, Kluver-Bucy’s syndrome, “Sham Mirth”.</li> <li>5. Hippocampus and Posttraumatic Stress Disorder (PTSD)</li> <li>6. Autism Spectrum Disorder, William’s Syndrome</li> <li>7. Psychopathy</li> </ol>	<p>p. 429-461 PTSD: p.194</p> <p>Kluver-Bucy Syndrome: p. 561-562</p> <p>Sham rage: p. 251-252</p> <p>p. 704-707</p>	<p>p. 391-422</p> <p>Kluver-Bucy Syndrome: p. 520-522</p> <p>Sham rage: p. 227-228</p> <p>p. 657-659</p>
<p><u>Lecture 34-</u> <u>Lecture 36</u> 24<sup>th</sup>, 26<sup>th</sup> and 28<sup>th</sup> November</p>	<p>Leftover topics; Special topics; Review. (Subject to time constraints)</p>		

**NOTE ABOUT THE FINAL EXAMINATION**

- Dates for the final examination will be announced by the University.
- The final examination is **cumulative**. It will cover the **entire material** covered in the lectures.
- Final examination follows similar pattern as the midterm examinations. There will be both **multiple choice questions** as well as **short answer** type questions on the final examination.

### **A Note on Academic Dishonesty**

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at <http://www.mcmaster.ca/academicintegrity>

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
2. Improper collaboration in group-work.
3. Copying or using unauthorized aids in tests and examinations.

### **Message from the Chair of Psychology**

The Instructor cannot be responsible for returning long distance calls from students. Any student wishing to reach an Instructor is invited to e-mail the instructor.