

THE ARTS AND THE BRAIN

PSYCH 3H03
Term 2, 2012

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Office Hours: By appointment
Meeting Time/Place: Tuesday 11:30-13:20 am and Friday 11:30-12:20 am, HSC 1A4
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Prerequisite: Sensory Processes (PSYCH 2E03)

Please email me through Univmail and NOT the email function within Avenue.

Course Description

The Arts and the Brain is a course in **functional neuroanatomy** that makes reference to the neurocognitive bases of artistic production and perception. The course discusses a broad range of topics related to motor control, perception, emotion, language, learning, memory, and social cognition.

The arts provide a framework for learning **functional neuroanatomy**. After a detailed introduction to the nervous system and neuroimaging methods, the course is organized into 5 modules: music (audition, vocalization); dance (the motor systems, vestibular sense, proprioception, somatosensation, spatial cognition); the literary arts (language, speech, declarative memory, perspective taking, emotional expression); the visual arts (vision, eye movement, drawing, writing); and the chemical arts (olfaction, gustation).

By the end of the semester, you should (a) be highly familiar with the structure and function of the human nervous system, i.e., **functional neuroanatomy**, (b) be conversant about the **neuroimaging methods** used to study human brain function and cognition, (c) have an understanding of the neural and cognitive processes underlying artistic production and perception, and (d) understand how the four major branches of the arts are related to one another.

Required Text

Purves et al.'s *Neuroscience*, 4th Edition (2008). Associated with the book is a downloadable program called "Sylvius" showing images of the human brain.

Avenue to Learn

This course uses *Avenue to Learn* to post the syllabus, lecture slideshows, and other materials.

Course Evaluation

Exams

A **neuroanatomy exam**, comprised of 30 multiple-choice questions, will occur during Week 3 of the course (**January 20**), accounting for 10% of the final grade. The idea behind this exam is that *if you haven't developed an understanding of the basic structure of the human nervous system by Week 3, you will have great difficulty succeeding in the course as a whole, as the remainder of the course builds on this material.*

In addition, there will be two **exams** (midterms), each one comprised of a combination of true/false, fill-in, multiple-choice, and short-answer (writing) questions. *Exam 2 will constitute one part of the final exam.*

Finally, there will be a separate **comprehensive final** (25 fill-in questions) that will constitute the second part of the final exam and that will cover material from the entire course.

Exams will cover the textbook, readings, and handouts. In addition to concepts, you will be tested extensively on *graphical* material, such as neuroanatomy and schematic figures from the textbook.

Online Quizzes

There will be 4 online quizzes, comprised of 10 multiple-choice questions, each one worth 3.75% of the final grade. Each one will be based on a particular module of the course. The deadline for each quiz will be the Friday after the last lecture of a module at 11:59 pm.

Note that the quizzes are based on the textbook readings rather than the lecture notes.

Term Paper

You will be asked to write a 4-5-page (double-spaced) paper on a topic of relevance to the course. It should be typed and submitted to your TA as a hard copy. The paper will count for 15% of the final grade, and must be turned in by the beginning of week 12 (Tuesday **March 27 at 9:30 am** is the due date), although it can of course be turned in earlier.

The paper should be based on at least 3 *primary research articles* (i.e., not review articles, book chapters, or web sites) that involve the use of **neuroimaging** methods (fMRI, PET, EEG, MEG, TMS, etc.) to analyze functions of relevance to the arts. An analysis of the imaging methods beyond what is taught in the course is not expected of students. What is important is to discuss the tasks, experimental design, results, and interpretation of the studies. The research articles that are chosen should be related enough to one another that a comparison of their findings can be discussed.

The topic and a list of 3 references should be presented to your TA by week 10 (Friday **March 16** is the final date).

NOTE: Citations and references should be written according to APA style. Be meticulous when creating your reference list. If you are not familiar with how to create citations or references, please consult your TA.

Contribution of Assessments to the Final Grade

| | |
|---|------------------|
| Neuroanatomy exam | 10% of the grade |
| 2 exams (each one 20% of the grade) | 40% of the grade |
| Comprehensive final | 20% of the grade |
| 4 quizzes (each one 3.75% of the grade) | 15% of the grade |
| Term paper | 15% of the grade |

An Important Note about Missed Exams

If you are too sick to write the midterm, you are required to inform the instructor of this by email or phone, preferably *before* the midterm but no more than 48 hours after the midterm. In addition, you must schedule a time with a TA to take a make-up midterm no more than one week after the midterm date. **Please understand that presenting a doctor's note to the Dean's office does NOT exempt you from writing the midterm.**

Failure to take the midterm by one week after the midterm date will result in a **total loss of credit for the exam**, unless you have certification from a doctor that you have a chronic condition and are unable to write the exam at that time.

Laptop Courtesy Rule

Students who come to class simply to surf the web and write emails are a nuisance to those who sit behind or next to them. In addition, their behaviour is disrespectful of the instructor.

Students who are using their laptops to take notes can sit wherever they want.

Students who are coming to class to surf the web and write emails should sit in the LAST ROW of the classroom so as to not distract those people coming here to learn.

A Summary of Important Dates

| | |
|------------|--|
| January 20 | Neuroanatomy exam |
| March 6 | Exam 1 |
| March 16 | Term Paper topic (+ 3 references) is due |
| March 27 | Term Paper is due (11:30 am) |
| April TBA | Exam 2 + Comprehensive Final |

Quiz deadlines (all are Fridays at 11:59 pm)

| | |
|-------------|---|
| February 3 | 1. Auditory system quiz: Chapter 13 |
| February 17 | 2. Motor systems quiz: Chapters 16, 18 and 19 |
| March 16 | 3. Language and memory quiz: Chapters 27 and 31 |
| March 30 | 4. Visual system quiz: Chapters 20, 11 and 12 |

McMaster University Grading Scale

| | |
|----|--------|
| A+ | 90-100 |
| A | 85-89 |
| A- | 80-84 |
| B+ | 77-79 |
| B | 73-76 |
| B- | 70-72 |
| C+ | 67-69 |
| C | 63-66 |
| C- | 60-62 |
| D+ | 57-59 |
| D | 53-56 |
| D- | 50-52 |
| F | 0-49 |

NOTE: The grading scale is fixed. There will be no curving of grades.

Academic Integrity

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. The 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.

Weekly Lecture Schedule

| Week | Topic | Lecture Topic | Reading |
|-----------------------|--|--|---|
| 1 1/3,6 | Introduction to Neuroscience | (a) neuroanatomy | Ch. 1 (pp. 13-16); Appendix (p. 815-833) |
| | | (b) the neuron; action potentials; synaptic transmission | Ch. 1; Ch. 2 (pp. 25-28) |
| 2 1/10,13 | Cognitive Neuroscience and its Methods | (a) neuroimaging methods | Ch. 1 (pp. 19-21); Ch. 28 (pp. 715-717) |
| | | (b) theories of cognition; theories of brain function; the emotion/cognition relationship | |
| 3 1/17,20 | Introduction to the Arts | (a) theories of the arts | |
| | | (b) evolution of the arts | Morriss-Kay, pp. 158-168 |
| | | Neuroanatomy Exam (January 20) | |
| 4 1/24,27 | Brain Mechanisms of Music Production | (a) music theory | |
| | | (b) the vocal system | |
| 5 1/31, 2/3 | Brain Mechanisms of Music Perception | (a) neural control of vocalization | |
| | | (b) the auditory system; music perception; the brains of musicians | Ch. 13 |
| 6 2/7,10 | Brain Mechanisms of Dance Production | (a) cognitive dance theory; spatial patterning: the motor systems of the brain and spinal cord | Ch. 16 (pp. 397-407; 414-420); Ch. 17 |
| | | (b) temporal patterning: neural control of rhythm production and timing | Ch. 18 (pp. 453-465); Ch. 19 (pp. 475-82) |
| 7 2/14, 17 | Brain Mechanisms of Dance Perception | (a) perception from the dancer's perspective: vestibular sense and proprioception | Ch. 9; Ch. 16 (pp. 408-414); Ch. 14 |
| | | (b) perception from the viewer's perspective: spatial cognition and motion perception | |
| 8 2/28, 3/2 | Brain Mechanisms of Literary-Arts Production and Perception | (a) the literary arts | |
| | | (b) the neuroscience of language and narrative memory | Ch. 27; Ch. 31 (pp. 791-794, |

| | | | |
|-----------------------|--|---|---|
| | | | 805-809) |
| 9 3/6,9 | | Exam 1, covering lectures 1a-7b (Tuesday, March 6) | |
| | | NO CLASS on Friday March 9 | |
| 10 3/13-16 | | (a) melody and rhythm in speech, poetry and song; writing systems | |
| | | (b) perspective taking (role playing); emotional expression | Buckner & Carroll (2007) |
| 11 3/20-23 | Brain Mechanisms of Visual-Art Production | (a) the visual arts; neural control of drawing and tool use; eye movement | Ch. 20; Morriss-Kay, pp. 168-173 |
| | Brain Mechanisms of Visual-Art Perception | (b) the retina; form and colour | Ch. 11 |
| 12 3/27-30 | | (a) the central visual pathways; pictoriality (i.e., static spatial cognition and implicit motion) | Ch. 12 |
| | The Chemical Arts | (b) olfaction and gustation | Ch. 15 |
| 13 4/2 | | NO CLASS on Monday April 2 | |
| Final 4/TBA | | Exam 2, covering lectures 8a-12b; Comprehensive Final | |

Assigned Readings

Morriss-Kay, G. M. (2009). The evolution of human artistic creativity. *Journal of Anatomy*, 216, 158-176.

Buckner, R. L., & Carroll, D. C. (2007). Self-projection and the brain. *Trends in Cognitive Sciences*, 11(2), 49-57.