Last updated: 08.27.2015.

GAMECHANGERS: CONCEPTUAL BREAKTHROUGHS IN NEUROSCIENCE

AS.200.163. Fall 2015. Tu/Th 1.30-2.45 pm (Ames 402)

Professor	**Teaching Assistant**
Shreesh P. Mysore	Nagaraj Mahajan
224 Ames Hall	022A Ames Hall
shreesh.mysore@jhu.edu,	nagaraj.mahajan@jhu.edu
Office hours: By appt.	Office hours: TBA.

This introductory class will highlight the evolution in our understanding of the brain over the centuries. We will cover key findings that have revolutionized our thinking of how the brain works. The goal is to convey both the essence of, and the excitement surrounding, neuroscientific breakthroughs that caused paradigm-shifts. Topics covered will include "What is the site of the mind: the brain or the heart?", "Is the brain just one big lump of tissue?", "Telephones in the brain? Neural information transmission", "The frog with upside-down vision", "Changing the brain's wiring diagram", "Monkey see=monkey do neurons", "Do ants have GPS?". For each big question, we will try to examine the thinking that previously existed, and then explore the shift in thinking. If time permits, we will also look at some recent headlines in popular media and unpack them from a neuroscientific perspective: "Implanting false memories into brains", "Scarlett Johansson's super brain?" etc.

Prerequisites: *None.*
Evaluation: *Students will be evaluated based on readings, on the synthesis of ideas and critical thinking (writing pieces), on discussions in class, and on presentations.*
Text: *Minds behind the brain: A history of the pioneers and their discoveries, by Stanley Finger (Oxford U Press).*

LESSON PLAN

DATE	WEEKS	DUE TODAY	IN CLASS	READING ASSIGNMENTS (FRI)
08/27.TH	0		Meet and greet About the class	A. Concept maps/How to read/write/present B. Finger: Preface, Ch 1, Ch 18. (15 big questions in neuroscience)
09.01.TU	1	DQs on Ch.1 and 18	**Group discussions** Chs 1, 18 and soft skills (How to read a paper? What are the elements of a good presentation?)	
09.03.TH	1	Concept map (1,18) + (For non-presenters) + Concept map on Concept maps (For all)	**Student presentations**: 1. Preface, 1, 18 (Intent of this course, what you will learn, how it is different from standard courses in neuroscience, why might such a course be important?) 2. 15 big questions	Ch.2: An ancient Egyptian physician. Ch.3: The brain as the organ of the mind
09.08.TU	2	DQs on Ch.2 and 3	**Group discussions** Chs 2, 3	
09.10.TH	2	Concept maps (2,3) (For non-presenters)	**Student presentations**	Ch.4: The birth of experimentation Ch.5: The new "human" neuroanatomy
09.15.TU	3	DQs on Ch.4 and5	**Group discussions** Chs 4, 5	
09.17.TH	3	Concept map (4,5) (For non-presenters)	**Student presentations** Chs 4,5 *(SPM in Wyoming)*	Ch.6: Mind-body problem Ch.7: The functional organization of the brain
09.22.TU	4	DQs on Ch.6,7	**Group discussions** Chs 6, 7	
09.24.TH	4	Concept map (6,7) (For non-presenters) ***Paper -1 (10)***	**Student presentations**	Ch.8: Electricity and the nerves Ch.9: The cerebral organs of Mind
09.29.TU	5	DQs on Ch.8,9	**Group discussions** Chs 8, 9 SkypeIn / Guest Lecture *(SPM in Switzerland)*	
10.01.TH	5	Concept map (8,9) (For non-presenters)	**Student presentations** SkypeIn *(SPM in Switzerland)*	Ch.10: Cortical localization, cerebral dominance Ch.11: Experimentalists map the cerebral cortex
10.06.TU	6	DQs on Ch.10,11	**Group discussions** Chs 10, 11	
10.08.TH	6	Concept map (10,11) (For non-presenters)	**Student presentations**	Ch.12: Clinical neurology comes of age Ch.13: Nerve nets to the neuron doctrine
10.13.TU	7	DQs on Ch.12,13	**Group discussions** Chs 12, 13	
~~10.15.TH~~	7		**NO CLASS** *(Mon Schedule)*	Ch.14: The integrated nervous system Ch.15: Coding in the nervous system
~~10.20.TU~~	8	Concept map (12,13) ***Paper -2 (10)***	**NO CLASS** *(SPM and NM in Chicago; SFN Meeting)*	

10.22.TH	8	DQs on Ch.14,15 Concept map (14,15)	**Group discussions** Chs 14, 15	Ch.16: Neurotransmittters Ch.17: From Neural growth to split brains (frog)
10.27.TU	9	DQs on Ch.16,17	**Group discussions** Chs 16, 17	
10.29.TH	9	Concept map (16,17)	**MIDTERM (in class)**	vonFrisch (Bees) Nicholls et al (Ants)
11.03.TU	10	DQs on Ch.Bees/Ants	**Group discussions** Chs Bees, Ants	
11.05.TH	10	Concept map (Bee/Ant) (For non-presenters) **Abstract+References (4)**	**Student presentations** Chs Bees, Ants	*Kaku: Intro, Ch1* *Kaku: Ch 3,4*
11.10.TU	11	DQs on Ch.	**Group discussions** Chs	
11.12.TH	11	Concept map (For non-presenters) **Outline (3)**	**Student presentations** Chs	*Kaku: Ch 5, 7* *Kaku: Ch 8,9*
11.17.TU	12	DQs on Ch.	**Group discussions** Chs	
11.19.TH	12	Concept map (For non-presenters) **Draft -1 (3)**	**Student presentations** Chs	*Kaku: Ch 10* *Kaku: Ch 11,12*
~~11.24, 26~~		Thanksgiving		
12.01.TU	13	DQs on Ch.	**Group discussions** Chs	
12.03.TH	13	Concept maps (For non-presenters) **Draft -2 (optional)**	**Student presentations** Chs	
12/17		**FINAL PAPER DUE (15)**		

CLASS STRUCTURE

Tuesdays:

Due:

(Before 9AM Monday) Email 2-3 discussion questions to the TA and Instructor.

(In class on Tuesday) Participate in discussions.

Thursdays:

Due:

(Beginning of class) Submit concept map.

OR (In class) Student presentations (2 students per week).

+ (By the end of class) Submit critique of presentations.

GRADING

[20 pts] 13 sets of discussion questions x 2 points

the lowest three scores will be dropped

[25 points] 12 concept maps x 2.5 points

the lowest two scores will be dropped

4-5 hours/week for reading + concept map + discussion questions

[10 pts] 1 individual presentation

3 hours for preparing presentation

[10 pts] 10 critiques of presentations x 1 point

If you are absent, you will lose a point.

[10 pts] 2 papers x 5 points: Each paper approximately 1500 words long.

[5 pts] Midterm (in class)

[10 pts] Term paper pieces

[10 pts] Final term paper: Approximately 4000 words long; details/topic TBA.

Total for the semester: 100 points.

DESCRIPTION OF ASSIGNMENTS

Last updated: 08.27.2015.

I. Discussion questions**:** Short (one to two line) questions that reflect things that you didn't understand in the readings, or found interesting, or would like to discuss with others. When emailing please use the following subject – **[Gamechangers DQ] mm.dd**.

II. In class group discussions**:** Students will be split up into groups of 3- 5. They will discuss assigned questions in *think-pair-share* mode in 6 x 12 minute segments.

III. Concept map: One page map "pictorially" summarizing all the assigned readings for that week.

IV. In-class presentation: 2 assigned students will deliver individual presentations.

Presentation guidelines

1. Each presentation is to be approximately 30 minutes long + 5 minutes for questions. The rule of thumb is that each slide takes, on average, 1 minute to present.
2. Weave a coherent story (**your own point of view)**. Two approaches:
   A. (IF ARTICLE ASSIGNED OR BOOKCHAPTERS ASSIGNED FOR PRESENTATION) Use some point that interested you in the readings, research it (online, books etc) and put together a compelling narrative. This approach will rely almost entirely on outside material, but with the reading as a jumping off point.
   B. (IF BOOKCHAPTERS ASSIGNED FOR PRESENTATION) Use the reading as a basis and cover (a) What was the state of neuroscientific enquiry in the period covered in the chapter (what was known or what did people think)? (b) What was (were) the major advance(s) in our understanding of the brain (what were the major findings)? (c) What were the experimental approaches (if any), that were utilized? (d) Critique the approaches and thinking (editorialize) in a rational unbiased, fashion; elaborate using any examples or experiences; essentially construct a logical argument for your points. DO NOT JUST PRESENT A PLAY-BY-PLAY OF WHAT IS IN THE READING MATERIAL. WE WANT YOUR POINT OF VIEW TO COME THROUGH.
   Even if you choose approach B, you still need to go beyond the material in the readings and present some new pieces of information/viewpoints as well. For instance, (e) What alternate hypotheses about how the brain works (in the context of the chapter) are feasible/plausible? (f) Is our current understanding the same as the "thinking" in this chapter, or different? You would plan for at least 25% of your presentation to be "new" material (outside of what is in the readings); so this translates to about 7 min or about 6-7 slides.
3. **Most important**: Take a stance. Construct your narrative. Weave a story.

Evaluation: Will be based on clarity, content, and overall quality. How well you are able to do #5 (above) will form an important part of your presentation grade.

V. Critique of peer presentations: Short, legibly written paragraphs (written in class) evaluating each presentation's clarity, content, overall quality, and what you thought about information they presented that was outside of the readings (was it sufficient, was it interesting and informative?). I expect an approximately 5-6 sentence-long critique of each presentation.

VI. Paper:

Paper guidelines

1. Each paper is to be written combining ***BOTH*** the assigned chapters.
2. Papers 1 and 2: 1500 words long (including summary and title); Final term paper: 4000 words long.
3. Use Times New Roman, 11 pt font, use 0.75" margins. Use double spaced lines.
4. Include name and page number in header.
5. Structure: Title + a summary paragraph (150 words or less) that describes briefly what your paper is about + the body of your paper + conclusion/discussion.
6. Body of the paper: Weave a coherent story (**in your own words)** from the material in the readings. Start with an intro and then go on to cover: (a) – (d) as in #2B above.
7. Conclusion/discussion: Summarize and place in broader context.
8. References.
9. Use sub-headings in the paper (and within the body, as needed).
10. For the paper, you don't need to go beyond what is covered in the readings (for instance, you don't need to do (e) and (f) described in the presentation guideline #2B above).

11. Make sure to adopt a professional style in writing your papers, not a colloquial one. Your papers should, in theory, be publishable. For instance, in Scientific American, The New York Times, etc.

Evaluation: Will be based on clarity, content, and overall quality of the paper.

COURSE POLICIES

1. The order in which students will deliver in-class presentations will be determined by a randomized drawing by students in the first class. In the event that there are extenuating circumstances that make it difficult for you to present on your assigned day, please come talk to me. Having to submit a homework assignment for another class, for instance, is not an extenuating circumstance. Note that your presentation date can be rescheduled only if we can find another student willing to swap dates with you. (So be nice to your fellow students!).
2. Students must abide by the JHU code of academic ethics: The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Discussion of the homework assignments among students is allowed; however, each student must turn in their own work. Report any violations you witness to the instructor. You may consult the associate dean of students and/or the chair of the Ethics Board beforehand. See the guide on "Academic Ethics for Undergraduates" and the Ethics Board Website (http://ethics.jhu.edu) for more information.
3. Participation in in-class discussions is a key component of this class (and forms part of your grade). No more than one absence is allowed for the entire semester for each student (please email me and the TA letting us know that you plan to be absent). If there are extenuating circumstances preventing you from attending class on a second occasion, please contact me (SPM), and I will consider your situation on a case-by-case basis.
4. Assignments are due on the date (and time) specified. Not working on them or not turning them in on time will adversely affect what you get out of class. For this reason, late submissions are not allowed. Please contact me if there are extenuating circumstances preventing you from turning in assignments on time.
5. You may email me or the TA with questions. Typically, I will pool questions related to class material and discuss them in class. Any emails on administrative or other personal concerns, I will respond to individually.

GENERAL COMMENTS

- This syllabus is meant to serve as a guideline for various aspects of this course. However, it is not the "final word" and is subject to change by the instructor during the course of the semester. If there are changes, students will be informed in advance and given time to adapt to them. If you find any errors or inconsistencies in this syllabus, please let me (SPM) know.
- The topics listed for Week 10 onwards are tentative and will be finalized in the coming weeks.
- If you have questions about any aspect of the course, please feel free to get in touch with the TA or me for clarification.