Fundamentals of Neuroscience
Discussion Section

BIO154/NEU114/PSY135

Section 1: Tuesday, 3:05-3:55 PM Room: Old Chem 101
Section 2: Tuesday, 6:15-7:05 PM Room: Allen 103

Instructor: Jessica Bolton
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Office Hours: Tuesdays, 4:00-5:00 pm,
Bostock Library 1st floor
Wednesdays, 12-1 pm,
GSRB-II, Room 3023
By appointment (via e-mail)

Course Description: The discussion section for Fundamentals of Neuroscience is meant to accompany and to expand upon the lecture portions of the course as taught by Dr. Bilbo. Each session will address empirical research that relates to the topics that Dr. Bilbo has outlined on her syllabus.

Student Objectives: By the end of the semester, students should be able to do the following:

- Read empirical scientific articles without fear
- Identify the hypothesis of a scientific paper
- Identify the components of a data figure (e.g. X-axis, Y-axis) and the data that the figure represents
- Explain (succinctly) the finding(s) shown in a single figure
- Summarize the findings from a paper as a whole and assess if they adequately supported their hypothesis
- Extend the findings from an empirical work with suggestions of follow-up experiments
- Assess validity and strength of findings from empirical studies
- Communicate scientific ideas and results clearly to the class
- Be an integral part of a group, participating in all discussions in a thoughtful and respectful way.
- Acquire self-learning abilities, such that you will be able to prepare on your own for class and contribute meaningfully to discussion.

Teaching Methods: Discussion section will be taught using a **Team-Based Learning** format. Classes will consist of the following:

1. **Readiness Assurance and Feedback Sessions (20 minutes)**. For the first part of class, students will take an individual quiz (5 multiple-choice questions), then students will break into their pre-assigned teams and re-take the same quiz. We will then briefly go over the correct answers as a class.
2. **Student Group "Mini-Presentations" & Discussion (30 minutes)**. For the remainder of the class, students will stay in their teams, and each team will be randomly assigned to discuss and communicate to the class one specific part of the assigned paper (e.g., hypothesis & background, methods, figure, or

conclusions & future directions) to the rest of the class. I will also randomly assign one person from the group to be the speaker for the group that week (everyone will get at least one turn) and communicate the group's part to the rest of the class. You will be allowed approximately 5-10 minutes to discuss your assigned part as a group and prepare a concise summary to present to the class. Each group will then present briefly in the logical order of the paper, and after each part is presented, we will open up to questions and discussion from the whole class, so that I can make sure everyone understands the important concepts. At the very end of each class, you will complete a peer evaluation of your fellow group members' level of participation in that day's group work.

Evaluation Methods: The discussion section grade is 50% of your total grade for the class. The breakdown of your discussion section grade will be as follows:

1. **Individual Readiness Assessment (iRA) Points (20%)-** The iRA will be a 5-question quiz to be taken on a laptop using your individual Blackboard account. After 10 minutes of class have passed, the quiz sessions will automatically close and you will break into your assigned groups. If you do not own a laptop, please inquire at the Perkins library desk about the laptop checkout program, or let me know if this will be a problem at the beginning of the semester and I can provide paper copies of the quiz. Each quiz will be worth 20 points, and you may drop your one lowest grade.
2. **Group Readiness Assessment (gRA) Points (10%)-** The gRA consists of the same 5-question quiz taken in your groups on scratch-off response cards, which will be provided. The gRA should take about 5 minutes. Each quiz will be worth 10 points, and you may drop your one lowest grade.
3. **Discussion Participation Points (10%)-** These points will come from your participation during the group discussion of the papers in the second half of class, as well as from your fellow group members' weekly peer evaluations (scale of 0-5) of your level of participation in both the gRA and the preparation for the discussion for that week's class. I will score your group's mini presentation on a scale of 0-2 (0=you didn't read or understand the paper at all, 1=you show evidence of reading and understanding the paper but your presentation was somewhat unclear or incomplete, and 2=you did an exemplary job of clearly and concisely presenting your assigned part of the paper to the class). This score will then be multiplied by your average peer evaluation score (0= you were physically absent during class, 5=you were fully participating in the group discussion) awarded you by your teammates (for a maximum of 2 x 5 = 10 points). Therefore, everyone in the group may receive a different score, depending on each member's level of participation. You may drop your one lowest grade.
4. **Exam Points (60%)-** Exams will be taken at the same time as Dr. Bilbo's lecture portion of the exam. They may consist of integrative multiple-choice, short answer and/or essay questions about the papers we have discussed in class.

Student Responsibilities and Participation:

1. Students are expected to read and study the assigned papers before coming to class, and your level of preparedness and comprehension will be assessed by the

iRA, gRA, and peer evaluation by the other members of your group. The class period will be used to *discuss* empirical work related to class/lecture topics. There will only be ***one*** empirical work discussed each period; therefore, attention to detail on these works should be a priority.

2. As the class is based on a Team-Based Learning format, students play a vital role in the success and excitement of this course. Therefore, students are expected to attend class each week and participate meaningfully in both group and class discussions. Attendance is also mandatory to receive points on the iRA, gRA, and group mini-presentations—if you miss class, you will not be able to receive these points. *Importantly, if you are not in class on time, you will lose time to take your iRA, and if you leave class early, you will lose points on the group mini-presentations*. If you miss class for any reason, you must notify me by email BEFORE class. As an allowance for unforeseen crises, you are allowed to drop your lowest grade from each of the participation point categories.
3. PLEASE do not play on your laptops after taking the quiz—close the lid when you are done so I can see how many people are done. Be respectful to me and to the rest of the class—turn off your cell phone before coming to class!

Readings: Empirical articles will come from a variety of sources. All articles will be available as PDFs on Blackboard in folders labeled for each week. There may occasionally be a review paper or some background notes posted as well for increased depth and breadth to better understand the empirical paper.

Schedule and Readings:

Week 2 (1/17/12) **Introduction to Discussion Section**

- **Before Class Read** "How to read, discuss, and present a primary research paper" and **syllabus**
- Introducing ourselves
- Questions about syllabus?
- Practice iRA
- Practice gRA

Week 3 (1/24/12) **Ion Channels**

- **Before Class Read** Cannon & Strittmatter, 1993 (*Neuron*) "Functional expression of sodium channel mutations identified in families with periodic paralysis"
- **1st Graded iRA (20 points) and gRA (10 points)**
- Group mini-presentations of paper **(10 points)**

Week 4 (1/31/12) **Neurotransmitters and Receptors**

- **Before Class Read** Saal, *et al*. 2003 (*Neuron*) "Drugs of abuse and stress trigger a common synaptic adaptation in dopamine neurons"
- iRA **(20 points)** and gRA **(10 points)**
- Group mini-presentations of paper **(10 points)**

Week 5 (2/07/12) **Exam Review**

- Please come prepared with questions
- Neuroanatomy Review

EXAM 1 (2/09/12)

Week 6 (2/14/12) **Pain & Microglia**
- **Before Class Read** Hains, *et al*., 2010 (*J Pain*) "Pain intensity and duration can be enhanced by prior challenge: initial evidence suggestive of a role of microglial priming"
- iRA **(20 points)** and gRA **(10 points)**
- Group mini-presentations of paper **(10 points)**

Week 7 (2/21/12) **Visual Development and Sensitive Periods**
- **Before Class Read** Daw, *et al*., 1992 (*J Neurophys*) "Critical period for monocular deprivation in the cat visual cortex"
- iRA **(20 points)** and gRA **(10 points)**
- Group mini-presentations of paper **(10 points)**

Week 8 (2/28/12) **The Olfactory System & Neurogenesis**
- **Before Class Read** Gheusi, *et al*., 1999 (*PNAS*) "Importance of newly generated neurons in the adult olfactory bulb for odor discrimination"
- iRA **(20 points)** and gRA **(10 points)**
- Group mini-presentations of paper **(10 points)**

Week 9 (3/06/12) **Spring Break!**

Week 10 (3/13/12) **The Basal Ganglia & Optogenetics**
- **Before Class Read** Gradinaru, *et al*., 2009 (*Science*) "Optical deconstruction of Parkinsonian neural circuitry"
- iRA **(20 points)** and gRA **(10 points)**
- Group mini-presentations of paper **(10 points)**

Week 11 (3/20/12) **Exam Review**
- Please come prepared with questions

EXAM 2 (3/22/12)

Week 12 (3/27/12) **Perinatal Programming**
- **Before Class Read** Liu, *et al*., 1997 (*Science*) "Maternal care, hippocampal glucocorticoid receptors and hypothalamic-pituitary-adrenal responses to stress"
- iRA **(20 points)** and gRA **(10 points)**
- Group mini-presentations of paper **(10 points)**

Week 13 (4/3/12) **Sleep**
- **Before Class Read** Mirescu *et al*., 2006 (*PNAS*) "Sleep deprivation inhibits adult neurogenesis in the hippocampus by elevating glucocorticoids"

- iRA **(20 points)** and gRA **(10 points)**
- Group mini-presentations of paper **(10 points)**

Week 14 (4/12/12) **Sex & the Brain**
- **Before Class Read** Waldherr & Neumann, 2007 (*PNAS*) "Centrally released oxytocin mediates mating-induced anxiolysis in male rats"
- iRA **(20 points)** and gRA **(10 points)**
- Group mini-presentations of paper **(10 points)**

Week 15 (4/17/12) **Learning, Memory & the Hippocampus**
- **Before Class Read** Ramirez-Amaya *et al*., 2005 (*J. Neurosci.)* "Spatial exploration-induced Arc mRNA and protein expression: Evidence for selective, network-specific reactivation"
- iRA **(20 points)** and gRA **(10 points)**
- Group mini-presentations of paper **(10 points)**

(4/19/12, 10:05-11:20 am) **Exam Review**
- Please come prepared with questions
- We will review for the discussion section during Dr. Bilbo's regularly scheduled exam review for the lecture portion of the course, as well as complete course evaluations

EXAM 3 (4/24/12)