

## **Cellular and Molecular Neurobiology (NBIO 722-723) 2014-2015**

### **Course Description**

#### **Purpose of the course:**

The purpose of this course in Cellular and Molecular Neurobiology is to explore the experimental and theoretical basis for our current concepts of nervous system function. The course runs as a series of three Blocks in the fall semester and three Blocks in the spring semester. This is NOT a survey course in neurobiology. The goals of the course are not so much to inform as to foster an understanding of how we accumulate our knowledge and hypotheses; not to provide a complete textbook picture of the functioning nervous system as we know it in 2011, but to provide the intellectual tools and skills to evaluate current and future hypotheses; not so much to provide answers to questions as to attempt to define the unanswered questions.

#### **Limit on Enrollment and Priority for Registration:**

In order to create a climate for active discussion and exploration of ideas, each Block is limited to 24 students. All students are required to obtain permission from the Course Director to enroll. Because of the BBSP, we do not know how many applicants we will have for the course in Fall 2012. Priority is given to (1) students entering the Neurobiology Curriculum, as they are required to take the entire course, and to (2) students from departments affiliated with the course and who intend to register for all six Blocks of the course. Students should acquaint themselves with the course description and schedule and, if they are willing to take on the responsibilities of the course, email Denise Kenney for permission to enroll; Denise will contact the Course Director. The email should state for how many Blocks the student intends to register and why he or she wants to take the course.

#### **Time, place, and course administration:**

All sessions will take place in Taylor Hall room 124 for Fall 2014 from 10:10 AM to 12:05pm, Mon. Wed. Fri, with a break roughly at 11:00.

#### **Course Director:**

Garret D. Stuber, Ph.D. – 4109E Neuroscience Research Building, 843-7140: [gstuber@med.unc.edu](mailto:gstuber@med.unc.edu)

#### **Course Administrative Assistant:**

Denise Kenney – 3122 Neuroscience Research Building, 966-1260: [denise\\_kenney@med.unc.edu](mailto:denise_kenney@med.unc.edu)

#### **Block Heads:**

Block 1a	Garret Stuber, 4109E NRB
Block 1b	<a href="mailto:gstuber@med.unc.edu">gstuber@med.unc.edu</a>
2 credit hours	

	Paul Manis, G127 POB  Paul_manis@med.unc.edu
Block 2  2 credit hours	Thomas Kash, 5023 Thurston-Bowles Bldg  tkash@med.unc.edu
Block 3  2 credit hours	Ben Philpot, 5109E NRB  bphilpot@med.unc.edu
Block 4  2 credit hours	Eva Anton, 7109B NRB  eva_anton@med.unc.edu
Block 5  2 credit hours	Mark Zylka, 5109A NRB  zylka@med.unc.edu
Block 6  2 credit hours	William Snider, 8109 NRB  wsnider@med.unc.edu

#### **Absence from class:**

Please email the appropriate Block Head (see above or look for the asterisked faculty member for each Block on the schedule) if you will be absent from class. It is particularly important to do this if you will unavoidably miss your group's presentation.

#### **Course organization and style:**

The course material is organized into six four-to-seven-week Blocks: three Blocks in the fall semester and three Blocks in the spring semester. The student receives a separate grade for each Block. A student may take the Blocks separately but this is not encouraged as each block builds on concepts discussed in the previous blocks. Students intending to join the Neurobiology Curriculum are required to take all six Blocks.

Typically, the first hour of each session is an interactive presentation of fundamental material by a faculty member. The second hour may be a continuation of the first presentation, may be a different topic, or may be a presentation and discussion of an original paper led by the students. Faculty "lectures," while presenting major concepts, are in general interactive rather than didactic. **Student participation during "lectures" and discussion sessions is essential in order that this course be effective. Participation during a Block can "bump up" a borderline grade (see next page).**

The first sessions of Block 1 cover fundamental aspects of cell biology, electrical signaling, microscopic imaging, along with workshops in molecular biology and neuroanatomy. These sessions are designed to prepare students for the material in the rest of the course. Students familiar with the concepts covered in these sessions, especially in the molecular biology sessions, are expected to help others who are less

knowledgeable. Because the course draws students from a wide variety of backgrounds, these sessions are crucial in establishing a level of expected background knowledge.

*Students: It is crucial in undertaking this course that you view yourself as a beginning professional developing the skills of the profession – the ability to design and judge the quality of experiments, to talk about your experiments and hypotheses with colleagues, to express ideas in writing, and to master material well enough to be confident in discussing it – and not as an undergraduate cramming in information with the expectation of being tested in a rote manner.*

### **Assigned background reading:**

Assignments will be posted under Course Documents at the course site on Sakai.

Assigned background reading are typically articles that will be assigned me each instructor. **While we do not require a specific text, it is strongly suggested that you obtain a copy of at least one of the recommended neuroscience texts for your reference.** Instructors are also likely to assign required or optional reviews, or chapters from additional specialized texts, and post them as PDFs on Sakai.

### **Recommended textbooks:**

These texts will be on reserve at the Health Sciences Library. Do not rely on Wikipedia or other general Internet resources, many of which are neither always accurate nor complete. The texts below have been slaved over lovingly by the authors, reviewers, and editors and, as a result, have few errors. The different texts all have different strengths.

Kandel et al., (2012) Principles of Neural Science (5<sup>th</sup> Ed.) McGraw-Hill Companies Inc.

Squire, L.R. et al (2008) Fundamental Neuroscience (3<sup>rd</sup> Ed.) Academic Press (most likely to be assigned – available online; see the Course Description Link for NBIO722A ).

Alberts B. et al (2002) Molecular Biology of the Cell (4th Ed.) Garland Publications. (Used mostly in Block 1)

Purves D. et al (2007) Neuroscience (4th Ed.) Sinauer (Most of the authors are from Duke Neurobiology.

Bear, Connors, Paradiso (2007) Neuroscience: Exploring the Brain. Lippincott, Williams & Wilkins

Nicholls et al (2001) From Neuron to Brain. Sinauer (Although it is “old”, the basic material is still relevant and well explained.)

### **Assigned original research papers:**

For most sessions, original research papers will be assigned. A group of students will be assigned to present this paper and lead the discussion of it in the second hour of the class session. The papers will either be "short" (a 5-10 page paper from a journal such as Science, PNAS, or Neuron), or, if longer, the faculty member will assign particular sections or figures within the paper to present. Clearly the reading

must be done **before** the class session if a lively and informative discussion is to ensue. **All students are expected to read the papers, whether or not they are presenting.**

A set of questions will be provided for each original paper to guide your reading. These questions will form a basis for class discussion. Typical questions that should be asked while reading any paper are:

- What is the hypothesis being tested?
- Is the hypothesis good, and how does it fit with the existing literature?
- How strong is the evidence in support of the hypothesis?
- What is the point of each of the figures?
- Is there a central, most important figure?
- Are the experiments direct or indirect?
- Did the authors do the proper controls?
- Does the text of the paper deal completely with the data presented in the figures or are points overlooked?

#### **Problem sets and Quizzes:**

Some sessions will include assigned problem sets or brief in-class quizzes. Problem sets give the faculty an idea of what the students know, and where there are weaknesses. When assigned, problem sets are required to be handed in, and will be included in your grade. Some sessions may also include short quizzes given at the beginning of class at the discretion of the instructor.

#### **Exams and grading:**

Blocks traditionally end in a take-home exam. A student receives a separate grade for each Block based on a combination of the exam grade (usually the major component), problem set or quiz grades, and on class participation. *Active participation in the discussions, as well as clear and well-organized presentations during the Block, can tip a marginal Block grade in the favorable direction (see previous page).*

Take-home exams are open book. They will be handed out at the end of each Block (usually a Friday). Exams are due either two or three days later (usually “Exam Monday” at 4PM). Class will not be held between the time the exam is handed out and the day the exam is due. This information is posted on the class schedule; plan your life and your experiments around the exams. You should hand in your exam (and course evaluation—see below) to Denise Kenney (NRB 3122) unless instructed otherwise. Faculty will hand the corrected exam back ~7-10 days later as noted on the course schedule.

Exams will usually consist of multiple questions; in some larger blocks there may be more questions and you may have the opportunity to select a subset. Exam questions often will ask you to *think*: e.g. to de-

sign an experiment or set of experiments to address a particular hypothesis, complete with controls and a discussion of feasibility (as one must do in preparing a grant application). Notes, papers, and texts may be consulted, but you may not confer with other students, colleagues, or instructors. Any questions regarding an exam question should be directed to the Block Head. Instructors will try to design questions, based on the discussions of the material of the Block, that provoke the thought processes we all must go through in planning or evaluating a series of experiments.

EXAMS ANSWERS MUST BE TYPED. Neat hand lettering of figures or hand-written math is acceptable. Usually a satisfactory answer can be written in several direct, succinct paragraphs; some questions give sentence or word limits. These exams provide exercise for the brain and the chance to experiment with elegance and clarity in writing style, which will be critical for future activities such as writing papers or grants.

Exams are graded blind by the instructors--that is, they will not know whose exam it is only your PID number appears on it. Only the course director and assistant (Denise Kenney) have the key to connect the PID numbers to students. Faculty will either provide comments to the answers on the exam itself or they may hand out a sheet in which they discuss the possible answers to their question.

### **Course evaluations--important!**

An anonymous evaluation is required for each Block. The evaluation is on-line and will be posted on Sakai at the end of each Block.

You may feel that filling out an evaluation for every Block is a burden and return a casually filled-in evaluation. We ask you please not to do this but to take the evaluation process very seriously for three reasons:

- First, we faculty take your comments seriously, incorporating your constructive suggestions into our future iterations of the course or even making changes within the current course year if warranted.
- Secondly, the faculty need feedback on how they are perceived. This is particularly true for younger faculty who may not yet have had a lot of experience and are trying to figure out how best to be effective teachers.
- Third, these evaluations go into a faculty member's teaching portfolio, so if you have complaints, please be diplomatic and constructive! If you have praise, it truly helps the faculty member if you spell out what you enjoyed about their teaching and why.