

## Cellular and Molecular Neurobiology (NBIO 722-723) 2009-2010 Course Description

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

The purpose of this course in Cellular and Molecular Neurobiology is to acquaint you with the experimental basis for our current concepts of nervous system function. The course runs as a series of three Blocks in the fall and two Blocks in the spring semesters. 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 information; not to provide a complete textbook picture of the functioning nervous system as we know it in 2009, but to provide you with mental tools 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 engendering good discussion, each Block is limited to 24 students and auditors are not permitted. A student requires the permission of the Course Director to enroll. Because of the BBSP, we do not know how many applicants we will have for the course in fall 2008. Priority is given to (1) students entering the Neurobiology Curriculum, as they are required to take the course, and to (2) students from departments affiliated with the course and who intend to register for all five 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 the third floor conference room of the Neuroscience Building (Room 3118 across from the elevators) from 10:00 AM to 11:50, Mon. Wed. Fri, with a break roughly at 11:00.

### **Course Director:**

Paul B. Manis, Ph.D. - G127 Physician's Office Bldg, 6-8926 [pmanis@med.unc.edu](mailto:pmanis@med.unc.edu)

### **Course Administrative Assistant:**

Denise Kenney - Neuroscience Bldg Rm 3122, 6-1260. [denise\\_kenney@email.unc.edu](mailto:denise_kenney@email.unc.edu)

### **Block Heads:**

Block 1 2 credit hours	Franck Polleux, 8109C NRB <a href="mailto:polleux@med.unc.edu">polleux@med.unc.edu</a>
Block 2 2 credit hours	Clyde Hodge, 1025A Thurston-Bowles <a href="mailto:clyde_hodge@med.unc.edu">clyde_hodge@med.unc.edu</a>
Block 3 2 credit hours	Robert Sealock, 5312A MBRB <a href="mailto:sealock@med.unc.edu">sealock@med.unc.edu</a>
Block 4 3 credit hours	Paul Manis, 1123 Bioinformatics <a href="mailto:paul_manis@med.unc.edu">paul_manis@med.unc.edu</a> Patricia Maness (Tidwell), 505A Mary Ellen Jones <a href="mailto:patricia_maness@med.unc.edu">patricia_maness@med.unc.edu</a>
Block 5 3 credit hours	Aldo Rustioni, 326 Taylor <a href="mailto:aldo_rustioni@med.unc.edu">aldo_rustioni@med.unc.edu</a>

### **Absence from class:**

Please email your Block Head (see above; also, the asterisked faculty member on your schedule is the head of your Block) if you know you will be absent from class. It is particularly important that you do this if you know you will unavoidably miss your group's presentation.

**Course organization and style:**

The course material is organized into five four-to-seven-week Blocks: three Blocks in the fall semester and two Blocks in the spring semester. The student receives a separate grade for each Block. A student may take the Blocks separately; students intending to join the Neurobiology Curriculum are required to take all five Blocks.

Typically, the first hour of each session is an interactive presentation of fundamental material by a faculty member and the second hour is 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.**

The first five sessions of Block 1 cover fundamental aspects of cell biology, a workshop in molecular biology, and a session on neuroanatomy to prepare students for the material of the rest of the course. Students familiar with certain of these concepts, 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.

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*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 them 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 on the expectation of being tested.*

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**Assigned background reading:**

Assignments will be posted under Course Documents at the course site on BlackBoard. Assigned background reading may be from Squire et al ("Fundamental Neuroscience" or "FUN") in the recommended textbook list (see "Recommended Textbooks", below). However, we are not requiring this text this year. *Another similar level text may provide the background that you need, and it is 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 BlackBoard.

**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 and their editors and, as a result, have few errors. The different texts all have different strengths.

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. One author is Anthony LaMantia from the Cell and Molecular Physiology Department here at UNC.)

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, an original research paper 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 paper will either be "short" (a 5-10 page paper from a journal such as Science, PNAS, or Neuron), or, if it is a longer paper, 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 meaty discussion is to ensue and all students are expected to read this paper, whether or not they are presenting it.

For each original paper, you will be given a set of questions to guide your reading. These questions will form a basis for class discussion. Typical questions one should ask oneself in any case in reading a paper are these:

- What is the hypothesis being tested?
- 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. 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. A student receives a separate grade for each Block based on a combination of the exam grade, 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.*

Take-home exams are open book. They will be handed out at the end of each Block (usually a Friday) and will be due three days later (usually "Exam Monday" at 4PM). Class will not be held on the day the exam is due. This information is on the class schedule. You should hand in your exam (and course evaluation—see below) to Denise Kenney in Neurosciences Bldg Rm. 3122 unless instructed otherwise. Faculty will hand the corrected exam back one week and two days later as is noted on the course schedule.

Exams will usually consist of 4 questions; in some larger blocks there may be more questions and you will have the opportunity to select 4. Exam questions typically will ask you to *think*: e.g. to design 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 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 faculty give sentence 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 if you only put your PID number on it. Only the course director and assistant (Denise Kenney) will know the student PID numbers. Faculty will either provide comments on your answers on the exam itself or hand out a sheet in which they discuss the possible answers to their question.

Instructors may assign problem sets. Problem sets give the faculty an idea of what the students know and will give the students a baseline of grades so that the Block exam is not the only determinant of the Block grade.

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

An anonymous evaluation is required for each Block. The evaluation is on-line and will be posted on BlackBoard at the beginning 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. First of all, 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, 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 to be effective. These evaluations go into a faculty member's teaching portfolio, so if you have complaints, please be diplomatic! And if you have praise, it truly helps the faculty member if you spell out what you enjoyed about their teaching.