

BIOLOGY 360 NEUROBIOLOGY

Summer 2007 - SYLLABUS

INSTRUCTOR:

Dr. Jagdeep Kaur-Bala

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OFFICE HOURS:

Tuesday: 11:30 am – 12:30 pm

Thursday: 11:30 am – 12:30 pm

& *by appointment*

GENERAL COURSE DESCRIPTION:

From this course, students will gain an understanding of 1) the basic mechanisms underlying the electrical and chemical activities of nervous system function and 2) how nervous systems integrate sensory and motor information to produce behavior. In addition, my goal is to help students develop self-study skills and critical scientific reasoning. Lectures are informal and emphasize the acquisition of neurobiological information and the development of critical thinking and self-study skills. Each of the non-lecture parts of the course (discussions, texts, papers, presentations, movies) are designed to reinforce ideas and augment concepts presented in lectures. The longer class periods allow for a fun and interactive time and class participation is encouraged. Questions are encouraged in all parts of the course and students are welcome to stop by my office for questions and/or discussions during my office hours or additional appointments. Questions/clarifications via emails are also encouraged at all times.

COURSE FORMAT:

A. Four 100 min lectures (divided into two parts each) each week

B. Two discussion sections each week – Tuesday & Thursday – after lectures will be used to answer your questions and discuss your class presentations and review materials via discussions, videos, and demonstrations.

In addition to the formal classroom periods, you will also be exposed to Neuroscience through:

C. Assigned readings from several textbooks;

D. Reading of a primary scientific paper and writing a short report on its content;

F. Reading and researching a topic in neurobiology, writing a short essay on the topic and sharing the information with your classmates via class presentation and discussions.

H. Visiting one of the neurobiology labs and reporting on techniques used to study neuroscience at the U of O (optional – extra-credit assignment)

REQUIRED TEXT:

1) **Gary G. Mathews (GM), *NEUROBIOLOGY, Molecules, Cells and Systems*, 2nd edition**, Blackwell Science (2001). Easy to read, well illustrated text with emphasis on interdisciplinary approaches to neuroscience. Ideal for the essentials of neurobiology covered in this course. Not as comprehensive as some of the other texts though.

Recommended texts:

1) **Kandel, Schwartz, and Jessell (KSJ), *Principles of Neuroscience***, 4th Edition, Elsevier (2000). Lucidly written, extremely comprehensive neurobiology text with more clinical coverage than other texts, but significantly more expensive. Recommended for those who want a first-rate, wide-ranging neuroscience reference text.

2) **Delcomyn (D), *Foundations of Neurobiology***, WH Freeman (1998). A clearly written, less expensive text. Not as encyclopedic as Kandel et al.

3) **Nicholls, Martin, Wallace & Fuchs (NMWF), *From Neuron to Brain***, 4th edition, Sinauer (2001). Provides deeper coverage of fewer issues than Kandel. Experimental emphasis plus a more historical approach.

(Copies of all texts are on reserve in the Science Library)

Course Website:

The official course website is on Blackboard (<http://blackboard.uoregon.edu>, **BI 360 (Summer 2007; 40354), Neurobiology**) Please notify me if you have difficulty logging into the site. This site will provide supplemental information for the course (lecture notes/copies of slides, announcements, deadlines, course outline, grades, etc.).

READING ASSIGNMENTS

A prerequisite to being a Biologist of any sort (even including a physician) is the ability to read and critically evaluate the primary scientific literature. The goal of this two assignment is to help you develop these essential skills.

- 1) **Term Paper (10% of final grade): Read and report on one *primary scientific paper during the term. Due beginning of first class of week 4*** The key here is "primary" - Be sure to read an ***experimental paper*** written by those who performed the work rather than reviews. Papers can be on any neurobiologically-relevant topic from any primary journal. My suggestion is that you choose a paper from a recent journal such as *Journal of Neuroscience*, *Journal of Experimental Biology*, *Journal of Neurophysiology*, *Neuron*. Other journals can also be used. *Nature* and *Science* are also good sources of interesting neurobiology papers. Review articles are not appropriate. Since you might have inadvertently chosen a paper that is too difficult, check with me first before you get too far into it. You may also find it useful to read other papers related to the one you are reading. The most useful papers are generally those cited in the references. ***Review articles are not appropriate. Copy of front page of the article with your name/ID is due at the beginning of first class of week 2.***

For this assignment you required to ***write a short paper*** (4 – 6 pages; double-spaced, 1 inch margins, 10-12 point font) ***which specifically and fully answers the following questions in order:***

1. What is the title of the paper/lecture, who is the author(s), and where was it published (journal, volume, page numbers, year)?
2. What is the major scientific issue addressed by the paper? What is (are) the specific question(s) asked by the paper/lecture?
3. What work has been done previously on this topic?

4. What were the technique(s) used in the paper?
5. What was the experimental design for each experiment? Include all controls and explain why they were necessary?
6. What were the results for each experiment?
7. What did the author(s) conclude from the results? Are their conclusions justified?
8. Based on these results, what experiments should the researchers do next?

Important note: ALWAYS keep a copy of your paper, either on disk, or a hard copy!

2) Class Presentation (10% of final grade): Read, research and share knowledge on one of the following topics:

- a. Visual impairments
- b. Hearing deficits / Cochlear implants
- c. Depth Perception / Face Perception
- d. Attention / Attention Deficits
- e. Visual Neglect / Agnosias
- f. Synaesthesia / Savant syndrome
- g. Alzheimer's / Parkinson's Disease
- h. Any topic in neurobiology that interests you *provided it is pre-approved by the instructor***

You will be required to give a **15-20 minute**, in-class presentation on the topic of your choice. This should be accompanied by a short essay on your topic, as well as copies of any supporting slides/overhead transparencies that accompany your talk.

You are free to choose any of these topics (or any other topic of interest to you – talk to the instructor if this is the case). Of necessity, the class presentations will be spread out through the term; some presentation will have to take place earlier in the term than others. Dates of individual presentations will be decided in class with your participation. In addition, while assessing/grading the presentations, I will be sure to keep in mind the amount of time (into the term) each student got for preparation of this assignment.

DUE DATES: Term paper – Copy of First page of article – July 2nd 2007

Full report – July 19th 2006

Class Presentation – Individual presentation dates to be decided in class. Accompanying write-up and copies of slides, overheads, etc. are **due on the day of your presentation.**

What about extra credit? You can earn **up to 5 points** in extra credit in various ways (see below). These points will be **added to your final grade** at the end of the class. So, if you get an 80% with all of your work, and you do 6 points of extra credit, your final score will be 86%. For this, you may choose to do one or both of the following assignments:

Techniques Assignment (optional): Visit one of the neurobiology laboratories at the U of O. Discuss the techniques used to address the question(s) of interest to the lab with one or more members of the lab and write a short (1 page) report on what you have learnt. **Due Date: July 20th 2007.** Your report should include answers to the following questions: which lab did you visit and which lab member(s) did you talk to? What is their main area of research? What technique(s) do they mainly/currently employ in their

research? Describe one of these techniques briefly and discuss its application(s) to neurobiology research? [2-4 points].

Homework Assignments (optional): In the course of the term, the instructor may assign small homework assignments on topics that prove to be challenging. These assignments are designed to help with conceptualizing of these topics as discussed in class and should take no more than 5-10 minutes. **Due Date: due in next class period.** These are often as simple as visiting a website to look at animations of biological processes and answering one question on the topic. Each assignment if submitted will be graded towards extra-credit. [2-4 points].

Quizzes: (20%)

Short quizzes will be given in the first 10 minutes of class on most, but not all days (see the course schedule). Quizzes will contain 5 multiple choice questions that pertain to the most recently presented lecture material. Questions will occasionally be drawn from readings that have been assigned but may not yet have been discussed in the lectures; however, these questions will be of a more general nature and should be easily answered. Of the twelve quizzes, the four with the lowest scores will be dropped, with the average score of the remaining eight yielding 20% of the final grade. No make-up quizzes will be offered; if you miss a quiz, that grade will be one of the four that will be dropped.

Exams: Midterm (30%) & Final (30%): The midterm and final exams will be part multiple choice, part fill-in-the-blank/match the information and part short answer/short essay. The final exam will contain questions drawn from the entire course, but with a greater focus on material covered after the Midterm. **No make-up exams will be given, and the final cannot be taken earlier or later than the time listed in the University final exam schedule – if you know in advance that you cannot take all exams on the appointed dates (see the course outline), do not take this course!** If unforeseen circumstances during the term prevent you from taking an exam, notify the instructor immediately.

GRADING POLICY

Final grades are based on the quizzes, the midterm and final exams and the two reading assignments. In addition, you may participate in the extra-credit assignment on techniques in neurobiology. Consistent good performance or significant improvement through the term will be taken into account while assigning the final grade. Letter grades will be determined as follows: A (90-105% of total possible points), B (80-89%), C (70-79%), D (60-69%), F (0-60%). However, the instructor reserves the right to relax (but not stiffen) this criterion, depending on the actual distribution of grades.

- **Quizzes** – Off the 12 quizzes (5 MCQs each), scores from the your highest-scoring 8 quizzes form 25% of final grade
- **Midterm exam** – 25% of final grade
- **Final exam** – 30% of final grade
- **Term Paper** – 10% of final grade
- **Class presentation** – 10% of final grade
- **Extra-credit assignment** - +5 points towards final grade

Students with Disabilities: If you have a documented disability and anticipate needing accommodations in this course, please make arrangements to meet with the instructor as soon as possible. Also, please request that the Counselor for Students with Disabilities (Hillary Gerdes, hgerdes@oregon.uoregon.edu, tel. 346-3211, TTY 346-1083) send a

letter verifying your disability.

Students for whom English is a Second Language: If you are a non-native English speaker and think you may have trouble in this course due of language difficulties, please see the instructor as soon as possible to make special arrangements.

Academic Honesty: All work submitted in this course must be your own. For the consequences of academic dishonesty, refer to the Schedule of Classes published quarterly. Violations will be taken seriously and are noted on student disciplinary records. If you are in doubt regarding any aspect of these issues as they pertain to this course, please consult with the instructor before you complete any relevant requirements of the course. (For more information, see the UO web site regarding academic honesty at: <http://darkwing.uoregon.edu/~conduct/>).

COURSE OUTLINE:

This is only a working draft of the course outline; it will be revised (with input from the class and as necessitated by the discussions) as the term progresses. **Dates on which particular topics are to be presented in lecture are subject to change, as are reading assignment dates; however, I will not change the dates of quizzes, exams or term paper deadlines unless absolutely necessary.** The official updated version of the outline will reside on the Blackboard web site. Updated print versions can also be obtained from me during regular office hours.

COURSE OUTLINE:

Date	Class Time			Recommended Reading
	1:00 - 1:10	1:10 - 2:50	3:00-3:50	
25-Jun	Syllabus, Introduction to the Nervous System – structure, function & Development of NS			GM-Ch. 1-2, 19; KSJ-Ch. 1-2; D-Ch. 1-3; NMWF-Ch. 1
26-Jun	Quiz 1	Neurons at rest and in action	Movie/ Discussion	GM-Ch.3-4; KSJ-Ch. 4-9; D-Ch. 4-5; NMWF-Ch. 2-7
27-Jun	Quiz 2	Synaptic transmission & Neurotransmitters	--	GM-Ch. 5; KSJ-Ch. 10,13-14; D-Ch. 6; NMWF-Ch. 9-11
28-Jun	Quiz 3	Integration of neural signals	Movie/ Discussion	GM- Ch. 6; KSJ-Ch. 15; D-Ch. 7; NMWF-Ch.13-14
2-Jul	Quiz 4	Sensory systems	--	GM-Ch. 13; KSJ-Ch. 12; D-Ch. 8; NMWF-Ch. 15
3-Jul	Quiz 5	The visual system	Class Presentations	GM-Ch.15; KSJ-Ch. 21, 25-26; D-Ch. 9, 11; NMWF-Ch. 19-20
4-Jul	No class (Independence Day)			
5-Jul	Quiz 6	Visual processing	--	GM-Ch.16 KSJ-Ch. 27,29; D-Ch. 10; NMWF-Ch. 21
9-Jul	Midterm Exam			
10-Jul	Quiz 7	Visual Perception	Class Presentations	GM- - -; KSJ-Ch. 28-29; D-Ch. 10; NMWF-Ch. - - -
11-Jul	Quiz 8	Other sensory systems	--	GM-Ch. 14, 17-18; KSJ-Ch. 22-24,30-32; D-Ch. 12-14; NMWF-Ch. 17-18
12-Jul	Quiz 9	Motor control	Class Presentations	GM-Ch. 7-9; KSJ-Ch. 33-37; D-Ch. 15-16; NMWF-Ch. 22
16-Jul	Quiz 10	Sensorimotor integration	--	GM-Ch. 10; KSJ-Ch. 39-42; D-Ch. 17-18; NMWF- - -
17-Jul	Quiz 11	Neural control of behavior	Class Presentations	GM-Ch. 20-21; KSJ-Ch. 62-63; D-Ch. 20-21,24; NMWF-Ch. - - -
18-Jul	Quiz 12	Neural control Of behavior II; Open Questions	--	GM- - - ; KSJ-Ch. App D; D-Ch. 1; NMWF-Ch. 26
19-Jul	Final Exam			