



| General Information | | | | | | | |
|---------------------|--|---------|-------------|----------------------------------|------------------------|-------------|---------------|
| Course Title: | Cellular & Molecular Neuroscience | | | Course Designation: NEURO 520 | Credits: 3 | | |
| Semester: | Fall | | Year: | 2008 | | | |
| Department: | Neuroscience | | | | | | |
| Director: | Robert Milner | Phone # | 6407 | Email: | rmilner@psu.edu | Office Rm # | C3802C |
| Time : | 8:00 am to 8:50 am | | Days: | Monday, Tuesday, Thursday | | Location: | C3700 |

Course Information

Description and/or Overview:

This course provides an introduction to topics in cellular and molecular neuroscience for first year graduate students in neuroscience and related disciplines. The course is divided into three thematic blocks: Cellular Neuroscience, Neuropharmacology and Developmental Neuroscience.

Goals and/or Objectives:

- By the completion of this course students will be expected to be able to*
- describe the structure and functions of the cells of the central and peripheral nervous systems.
 - describe the properties of the major neurotransmitter systems.
 - describe the origins of neural cells and the mechanisms of development of nervous systems.
 - evaluate published research in cellular, molecular and developmental neuroscience.

Pre-requisites:

None.

Requirements; course-specific policies and expectations:

Students are required to write three papers, one in each of the three thematic blocks in the course. Each paper is a critical analysis of a primary paper, relevant to the topics covered in the block; students will be given a choice of primary papers for each assignment. Students are expected to analyze the paper critically and to provide their own views in a detailed, well-argued paper that uses other references from the primary literature. Papers are expected to be written clearly and have a logical structure, and must be at least 1000 words in length (not including references). The papers will be graded on the basis of content (80%) and use of English (20%); each paper is worth 50 points. The papers are due by 5pm on September 22, October 28 & December 3, 2008, respectively.
No late papers will be accepted.

Required Texts and Resources:

Recommended texts:

- Principles of Neural Science*, Kandel, Schwartz & Jessell, (McGraw-Hill/Appleton & Lange; 4th edition, 2000).
- Fundamental Neuroscience*, Squire et al. (Academic Press; 3rd edition, 2008).
- Development of the Nervous System*, Sanes et al. (Academic Press, 2nd edition, 2006).
- Basic Neurochemistry*, Siegel et al. (Academic Press, 7th edition, 2006).
- Biochemical Basis of Neuropharmacology*, Cooper, Bloom & Roth (Oxford Univ. Press, 8th edition, 2002).

Copies of these texts will be placed on reserve in the library. Handouts and other readings will be posted on the ANGEL course site prior to each lecture: students are expected to download this material & print as they wish.

Electronic Links:

Electronic resources and links will be posted on the ANGEL website for the course.

Attendance Policy:

Students are expected to attend all lectures. Students are held responsible for all material covered in the course and should be aware that irregular attendance may affect their performance.

Examination Policy:

There will be three examinations, each worth 100 points, at the end of each block of the course; these examinations will only test material covered in the corresponding block. Make-up examinations will be arranged in special circumstances (e.g. illness or family emergency). In such cases, please inform the course director prior to the exam; in the case of illness, a note from a physician is required.

Grading Criteria:

Final grades will be based upon three examinations (300 points) and three papers (150 points) for a total of 450 points. The course director is responsible for assigning final letter grades.

Academic Integrity

Academic Integrity at Penn State is defined by Faculty Senate Policy 49-20 as “the pursuit of scholarly activity in an open, honest and responsible manner”. The University's Code of Conduct states that “all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others”. Academic dishonesty (including, but not limited to cheating, plagiarism, or falsification of information) will not be tolerated and can result in academic or disciplinary sanctions such as a failing (F) grade in the course.

Plagiarism

In particular, the papers must be entirely a student’s own work: all sources must be referenced and any verbatim text from another source must be placed in quotations and referenced. Students are also discouraged from lightly paraphrasing text from other sources. In addition to ethical concerns, the papers provide an opportunity for students to improve their writing skills: therefore, it is in a student’s best interests to use his or her own words, particularly for students for whom English is not their native language. Plagiarism in a paper will result in a reduced or zero score for the paper.

[For more information, see: <http://tlt.its.psu.edu/suggestions/cyberplag/cyberplagstudent.html>]

Statement on Remediation

The basis for grades, as stated in [Senate Policy 47-20](#), is "...the instructor's judgment of the student's scholastic achievement..." Occasionally, a disagreement arises in the assignment of a grade. A student who wishes to question or challenge the grade assigned in a course must first discuss grading practices and assignments with the instructor. It is expected that the student and instructor will try to eliminate any misunderstandings and will attempt to work out any disagreements over grades.

On the rare occasion that a student and instructor fail to resolve the grade dispute through informal means, the student may request that the head of the academic program offering the course act as a mediator. If this mediation does not resolve the dispute, the student who is a graduate student may request further mediation from the associate dean for graduate studies.

[For more information, see: <http://www.psu.edu/dept/oue/aappm/G-10.html>]

Educator's Code of Conduct

The Penn State Milton S. Hershey Medical Center and Penn State College of Medicine are dedicated to developing and maintaining a strong commitment to ethical teaching practices at all levels of the education process.

The foundation for this Educator's Code of Conduct is provided by the Penn State University Graduate School Statement on Teaching Ethics (1). The development of this Graduate School statement was based on a special issue of the journal, *New Directions for Teaching and Learning*. In this special issue, entitled *Ethical Dimensions of College and University Teaching: Understanding and Honoring the Special Relationship between Teachers and Students* (2), several authors provided theoretical and practical guidelines for honing ethical college teaching skills. Some of the authors' recommendations have been used to formulate the Educator's Code of Conduct provided herein. Some of these recommendations were modified to specifically fit the needs of both educators and students at the Hershey Medical Center and the Penn State College of Medicine. Both the Unified Campus Commitment to Excellence of the Hershey Medical Center and Penn State College of Medicine (3) and the Code of Ethical Behavior of the Hershey Medical Center, Policy A-20 HAM (4) were also consulted in preparing this Educator's Code of Conduct.

Four Norms to Govern Teaching

Honesty

Honesty and integrity must be practiced during all aspects of the education process.

Promise-Keeping

Promise keeping requires the educator to fulfill the "promises" made at the beginning of the semester or any other learning activity. Syllabi, assignments, grading principles, and class and office hour schedules each involve promises that are made to students and that must be adhered to under normal circumstances.

Respect for Persons

The educator must approach the learner with personal respect. In addition, the educator ought to encourage mutual respect among students. In particular, respect for race, religion, sexual orientation, disability gender, age, marital status, cultural differences, and political conviction should be supported and encouraged in all aspects of the educational process. Additionally, educators ought to show respect and common courtesy for students both during interpersonal interactions and in responding promptly to students' need for guidance and feedback. An environment free from harassment and discrimination, verbal abuse, physical violence, and intimidation in any form must also be provided for all learning activities.

Fairness

Recognizing the inherent subjectivity involved in grading, an educator ought to ensure that their grading practices are as objective as possible by creating and adhering to unambiguous criteria.

Principles of Ethical College and University Teaching

Content Competence

An educator maintains a high level of subject matter knowledge and ensures that the content of the educational experience is current, accurate, representative, and appropriate to the position of the learning experience within the students' program of study. The educator must be capable of approaching each learner with a commitment to meeting his or her educational needs.

Pedagogical Competence

A pedagogically competent educator communicates the objectives of the educational experience to students, is aware of alternative instructional methods or strategies, and selects methods of instruction that are effective in helping students to achieve the course objectives.

Dealing with Sensitive Topics

Topics that students are likely to find sensitive or discomfiting are dealt with in an open, honest, and positive way.

Student Development

The overriding responsibility of the educator is to contribute to the intellectual development of the student, at least in the context of the educator's own area of expertise, and to avoid actions such as exploitation and discrimination that detract from student development.

Dual Relationship with Students

To avoid conflict of interest, an educator does not enter into dual-role relationships with students that are likely to detract from student development or lead to actual or perceived favoritism on the part of the educator. The establishment of a romantic/sexual relationship between an educator and a student should be reported to the immediate supervisor of the educator. Such relationships should be dealt with consistent with Penn State Administrative Policy AD41 — Sexual Harassment (5).

Student Confidentiality

Student grades, letters of evaluation, attendance records, and private communications are treated as confidential materials and are released only with student consent, for legitimate academic purposes, or if there are reasonable grounds for believing that releasing such information will be beneficial to the student or will prevent harm to the student or to others.

Patient Privacy and Confidentiality

Educators who utilize patient information as part of any educational experience must follow patient privacy and confidentiality guidelines as outlined by the Health Insurance Portability and Accountability Act of 1996 (HIPAA).

Respect for Colleagues

An educator respects the dignity of his or her colleagues and works cooperatively with colleagues in the interest of fostering student development.

Valid Assessment of Students

An educator is responsible for taking adequate steps to ensure that the assessment of a student's performance is valid, open, fair, and congruent with the course/educational experience objectives. An educator must be aware that such assessments are important in students' lives and in the development of their careers.

Respect for Institution and Profession

In the interest of student development, an educator is aware of and respects the educational goals, policies, and standards of the institution in which he or she teaches and the profession which he or she represents.

Citing Sources of Educational Material

An educator acknowledges and documents, as appropriate, the sources of information and other materials used for teaching.

Violations of the Educator's Code of Conduct

Should a learner experience conduct that is inconsistent with the Educator's Code of Conduct, he/she is encouraged to first address the issue with either the educator responsible for the inconsistency or the director of the course in which the educator teaches. Should this attempt to resolve the problem fail, or if the nature of the inconsistency is such that the learner does not feel comfortable addressing the issue with either the educator or the course director, the student may consult other individuals. These individuals may include but are not limited to: faculty advisor, student ombudsman, departmental chair, the Vice Dean for Educational Affairs, and the Vice Dean for Faculty and Administrative Affairs. The decision of who to contact may be dependent on the educational program of the learner and/or type of violation that was encountered.

References:

- (1) <http://www.gradsch.psu.edu/research/ethics.html#teaching>
- (2) <http://cte.uncwil.edu/et/br030697.htm>
- (3) Unified Campus Commitment to Excellence of the Penn State Milton S. Hershey Medical Center and College of Medicine; 05/11/01
- (4) Code of Ethical Behavior of the Hershey Medical Center, Policy A-20 HAM; Effective Date October, 2001
- (5) <http://guru.psu.edu/POLICIES/Ad41.html>

Developed by the Unified Campus Academic Team Endorsed by Teams Council — May 21, 2003

Course Schedule

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|-------------------------|--------------------|--|--|--|-------|
| Course Title: | | Cellular & Molecular Neuroscience | Course Designation: | NEURO 520 | |
| Course Director: | | Robert Milner | | | |
| Time : | 8:00 am to 8:50 am | Days: | Monday, Tuesday, Thursday | Location: | C3700 |
| Date | Lecture # | Instructor Last, first | Instruction Type (Lecture or lab) | Projected Lecture Topic - This list is an approximate guide to lecture topics. Titles and content are subject to change | |
| Aug 25 | 1 | Milner, Robert | Lecture | Introduction to Course | |
| Aug 26 | 2 | Milner, Robert | Lecture | The Vertebrate Nervous System | |
| Aug 28 | 3 | Connor, James | Lecture | Cell Biology of Neurons | |
| Sept 1 | | <i>No class: Labor Day</i> | | | |
| Sept 2 | 4 | Connor, James | Lecture | Cytoskeleton and Axonal Transport | |
| Sept 4 | 5 | Kim, Uhnoh | Lecture | Excitable Membranes I | |
| Sept 8 | 6 | Kim, Uhnoh | Lecture | Excitable Membranes II | |
| Sept 9 | 7 | Connor, James | Lecture | Cell Biology of Astrocytes | |
| Sept 11 | 8 | Milner, Robert | Lecture | Cell Biology of Myelinating Glia | |
| Sept 15 | 9 | Krady, Kyle | Lecture | Cell Biology of Microglia | |
| Sept 16 | 10 | Simpson, Ian | Lecture | Blood-Brain and Blood-CSF Barriers | |
| Sept 18 | 11 | Simpson, Ian | Lecture | Brain-specific Metabolism-I | |
| Sept 22 | 12 | Simpson, Ian | Lecture | Brain-specific Metabolism-II | |
| Sept 23 | 13 | Milner, Robert | Discussion | Review of Classic Papers | |
| Sept 25 | | | REVIEW | | |
| Sept 29 | | | | Exam I (1–4 pm) | |
| Sept 30 | 14 | Milner, Robert | Lecture | Neurotransmitter Receptors | |
| Oct 2 | 15 | Subramanian, Thyagarajan | Lecture | Synapses and Synaptic Transmission I | |
| Oct 6 | 16 | Subramanian, Thyagarajan | Lecture | Synapses and Synaptic Transmission II | |
| Oct 8 | 17 | Hajnal, Andras | Lecture | Monoamines I | |
| Oct 9 | 18 | Hajnal, Andras | Lecture | Monoamines II | |
| Oct 13 | 19 | Hajnal, Andras | Lecture | Monoamines III | |
| Oct 14 | 20 | McLaughlin, Patricia | Lecture | Opiates I | |
| Oct 16 | 21 | McLaughlin, Patricia | Lecture | Opiates II | |
| Oct 20 | 22 | McLaughlin, Patricia | Lecture | Non-opiate peptides | |
| Oct 21 | 23 | Ellis, John | Lecture | Acetylcholine | |
| Oct 23 | 24 | Milner, Robert | Lecture | Amino Acid Transmitters | |
| Oct 27 | 25 | Milner, Robert | Lecture | Amino Acid Transmitters | |
| Oct 28 | 26 | Milner, Robert | Discussion | Review of Classic Papers | |
| Oct 30 | | | REVIEW | | |
| Nov 3 | | | | Exam II (1–4 pm) | |
| Nov 4 | 27 | Milner, Robert | Lecture | Origins of the Nervous System | |
| Nov 6 | 28 | Barnstable, Colin | Lecture | Neural Induction | |
| Nov 10 | 29 | Barnstable, Colin | Lecture | Neural Patterning | |
| Nov 11 | 30 | Milner, Robert | Lecture | Stem Cells & Progenitors | |
| Nov 13 | 31 | Milner, Robert | Lecture | Cell Differentiation | |
| Nov 17 | | <i>No class: SfN mtg</i> | | | |
| Nov 18 | 32 | Milner, Robert | Lecture | Migration & Axon Guidance | |
| Nov 20 | 33 | Connor, James | Lecture | Neurotrophic Factors | |
| Nov 24 | | <i>No class: Thanksgiving</i> | | | |
| Nov 25 | | <i>No class: Thanksgiving</i> | | | |
| Nov 27 | | <i>No class: Thanksgiving</i> | | | |
| Dec 1 | 34 | Connor, James | Lecture | Programmed Cell Death | |
| Dec 2 | 35 | Barber, Alistair | Lecture | Synapse Formation & Remodeling | |
| Dec 4 | 36 | Milner, Robert | Discussion | Review of Classic Papers | |
| Dec 8 | | | | REVIEW | |
| Dec 10 | | <i>No class: study time</i> | | | |
| Dec 11 | | | | Exam III (1–4 pm) | |

Contact Information

| Faculty / Title | Department | Phone # | EMAIL | Office Room # | Mail Code |
|---|--------------------------------|---------|--|---------------|-----------|
| Robert Milner, PhD Course Director | Neural & Behavioral Science | 6407 | rmilner@psu.edu | C3802C | H109 |
| <i>Comments: (i.e. preferred method of contact, contact hrs.)</i> | <i>Contact by email first.</i> | | | | |
| Alistair Barber, PhD | Ophthalmology | 6506 | abarber@psu.edu | H5507B | H166 |
| <i>Comments: (i.e. preferred method of contact, contact hrs.)</i> | <i>Contact by email first.</i> | | | | |
| Colin Barnstable, DPhil | Neural & Behavioral Science | 8650 | cbarnstable@hmc.psu.edu | C3801 | H109 |
| <i>Comments: (i.e. preferred method of contact, contact hrs.)</i> | <i>Contact by email first.</i> | | | | |
| James R. Connor, PhD | Neurosurgery | 4541 | jconnor@psu.edu | C3810 | H110 |
| <i>Comments: (i.e. preferred method of contact, contact hrs.)</i> | <i>Contact by email first.</i> | | | | |
| John Ellis, PhD | Psychiatry | 4241 | JohnEllis@psu.edu | C5649 | H073 |
| <i>Comments: (i.e. preferred method of contact, contact hrs.)</i> | <i>Contact by email first.</i> | | | | |
| Andras Hajnal, MD, PhD | Neural & Behavioral Science | 8262 | ahajnal@psu.edu | C1745A | H181 |
| <i>Comments: (i.e. preferred method of contact, contact hrs.)</i> | <i>Contact by email first.</i> | | | | |
| J. Kyle Krady, PhD | Neural & Behavioral Science | 7749 | jkk7@psu.edu | C3747 | H109 |
| <i>Comments: (i.e. preferred method of contact, contact hrs.)</i> | <i>Contact by email first.</i> | | | | |
| Uhnoh Kim, PhD | Neurosurgery | 3284241 | ukim@hmc.psu.edu | H6515 | H110 |
| <i>Comments: (i.e. preferred method of contact, contact hrs.)</i> | <i>Contact by email first.</i> | | | | |
| Patricia McLaughlin, DEd | Neural & Behavioral Science | 6414 | pxm9@psu.edu | | H109 |
| <i>Comments: (i.e. preferred method of contact, contact hrs.)</i> | <i>Contact by email first.</i> | | | | |
| Ian Simpson, PhD | Neural & Behavioral Science | 4156 | ixs10@psu.edu | C3710 | H109 |
| <i>Comments: (i.e. preferred method of contact, contact hrs.)</i> | <i>Contact by email first.</i> | | | | |
| Thyagarajan Subramanian, MD | Neurology | 1804 | tsubramanian@hmc.psu.edu | H037 | H037 |
| <i>Comments: (i.e. preferred method of contact, contact hrs.)</i> | <i>Contact by email first.</i> | | | | |
| Lori Coover, Course Secretary | Graduate Student Affairs | 1045 | lcoover@psu.edu | 1712 | H170 |