Course Syllabus
Neurobiology of Disease NEUR 541
USC Neuroscience Graduate Program

Department of Neurology
Keck School of Medicine at USC

Time and Location
Wednesdays 2:00 to 5:00 pm
Spring Semester, 2012

The class will meet on the HSC campus in Bishop 407. This is the library for the Department of Cell and Neurobiology. The Bishop building is located on the East side of the quad in a complex with McKibben and Mudd Research buildings.

Instructors
The course directors will be Michael Jakowec, PhD, and Giselle Petzinger, MD, from the Department of Neurology. Professors’ hours for discussions can be made by appointment at a time convenient for both parties.

Contact: Michael Jakowec, PhD, mjakowec@surgery.usc.edu (323) 442-1057 MCA-241
Giselle Petzinger , MD, gpetzinger@surgery.usc.edu (323) 442-1057 MCA-243

Teaching Faculty
Valarie Askanas, MD/PhD Neurology
Said Beydoun, MD Neurology
Roberta Brinton, PhD Pharmacy
Helena Chui, MD Neurology
W. King Engel, MD Neurology
Beth Fisher, PhD/PT Biokinesiology
Wendy Gilmore, PhD Neurology
Daniel Holschneider, MD Psychiatry
Michael Jakowec, PhD Neurology
Chieng-Ping Ko, PhD, Neurobiology
Pat Levitt, PhD ZNI
Brett Lund, PhD Neurology
David McKinney Neurobiology
David Millet, MD Neurology
Giselle Petzinger, MD Neurology
Nerses Sanossian, MD Neurology
Elyse Schauwecker, PhD Cell and Neurobiology
Daniel Togasaki, MD Neurology
John Walsh, PhD Andrus Gerontology

Overview
The purpose of this course is to provide a basic introduction to the fundamental aspects of common diseases affecting the brain. These disorders include Parkinson’s disease (PD), Alzheimer’s disease (AD), Multiple Sclerosis (MS), epilepsy, pain, amyotrophic lateral sclerosis (ALS), Huntington’s disease (HD), autism spectrum disorders, pain, neuromuscular disorders, and stroke. During this course students will gain an
appreciation for the utility of animal models of human neurological disorders, gain some understanding of the clinical presentation and current understanding of these disorders, and begin to appreciate important aspects of these disorders including the role of the immune system, the genetic basis of many disorders, and the links between neuronal dysfunction and neuropathology. The instructors will open and close each session with highlights of the disorder, the objectives of the presentation, and what was learned in the session linking our understanding to other neurodegenerative disorders already studied. This will allow central themes to be developed and an understanding of the potential mechanisms that link these different disorders. A major goal is to develop an interest and understanding of the opportunities and challenges to translational medicine, linking basic and clinical research.

Prerequisites
This course will be limited to graduate students in the Neuroscience Graduate Program, senior undergraduates, postdoctoral fellows, clinical residents, clinical fellows, and graduate students from other programs. In some cases advanced undergraduate students will be allowed to take this course. The topics of each class will be circulated to other faculty who may choose to attend and enrich the discussions. Students will be expected to have taken NEUR524 or an equivalent introductory course in the Neuroscience Graduate Program core. While the instructors will cover basic aspects of introduction to each disorder, students should have an elementary understanding of neuroanatomy, neurophysiology, cell biology, and biochemistry as it pertains to the neurosciences.

Course Format
This course will be in the format of a directed seminar/lecture under the guidance of the instructor for the specific session. In many sessions there will be multiple instructors and other faculty with specific interests of the topics under discussion are invited to attend and actively participate and stimulate discussions. During each 3 hour weekly session the instructor will engage the students with questions and draw comments or interpretations primarily based on the assigned reading. Students are expected to ask questions and participate in an interactive fashion.

Course Outline
(1) A lecture and discussion course
(2) Maximum of 24 students.
(3) Suggesting readings will include a combination of one classic paper, one “cutting edge” recent paper and one review article. However, in some sessions such as during the first semester the reading will consists of specific chapters from a recommended (not mandatory) textbook.
(4) Grading is based on class participation, attendance, discussion, and two examinations.

Each lecture will consists of a 3 hour period whose formal presentation and discussion will be led by a faculty member whose expertise is in one or more of the common disorders covered in this course. Some topics will be divided based on either the basic or clinical perspective but this is at the discretion of the teamed instructors. Each faculty member who leads a class will be expected to cover specific aspects of the disorder including anatomical correlates, circuitry, clinical features, etiology, epidemiological issues, genetics, cellular and molecular biology of affected cell groups, imaging, animal and cellular models, treatments, and highlights of ongoing and future research. While this may seem like a vast amount of information for students it is the intention of the instructors to synthesize a large body of information and data, express the opinions of the field and identify critical topics or debates that dominate the field. The instructor may also prepare a handout or make available slide sets via the web consisting of relevant figures and visual aids. The instructor will assemble a reading list consisting of required reading prior to attending the class. The instructor will also suggest specific references to additional topics that may be of interest to students who may want to investigate a subject more thoroughly. This reading list may also serve as a basis for students to gain additional information of topics of interest relevant to each disorder as part of their preparation for a term paper.

To assist with the continuity between class sessions and topics the course instructors Drs. Petzinger and Jakowec, as the supervisors of this course, will attend all classes. A highlight of this course is the fact that the faculty who lead the sessions are themselves directly involved in either or both basic and clinical research or clinical care of patients with these important neurodegenerative disorders.
Course Rationale

There is a fundamental need for graduate students in the NGP and other programs, clinical fellows and residents to obtain a basic understanding of human neurodegenerative disorders. The purpose of this course is to provide an introduction to diseases including PD, AD, ALS, MS, stroke, neuromuscular, and others from the prospective of current basic mechanistic understanding, research directions, clinical features and treatment and future research directions. In the most recent UCAR review, as well as a recent Deans and Provost Neuroscience Advisory Group (DPNAG), the review committee highlighted the need for greater emphasis on translational medicine linking basic and clinical research, as well as the need to better integrate the HSC with the UPC neuroscience programs. This proposed lecture course is a direct response to this need as well as a reflection of the enthusiasm of the faculty of Neurology to be involved in teaching at the graduate student level.

Syllabus

The topics to be covered and lead faculty are the following. Some faculty may bring in additional resources including videos, adjunct faculty, or patients. The following syllabus covers the 2012 spring semester but has not yet been finalized.

Spring Semester 2012 (reading list is derived form previous years and will be updated in early 2012)

<table>
<thead>
<tr>
<th>Session Date</th>
<th>Topics and Instructors</th>
<th>Topics to be Covered</th>
<th>Suggested Readings for Each Session</th>
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<tr>
<td>Parkinson’s Disease (2 Class Sessions)</td>
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| Session 2 January 18, 2012 | Giselle Petzinger, MD                   | Clinical features; neuroplasticity in PD and its models; electrophysiological studies; treatment strategies and translational studies; modifying disease progression; neuro-imaging. |                                                                 | |}

Alzheimer’s Disease (2 Class Sessions) Session 1 (Session 2 on March 26)


Stroke (1 Class Session)

Neuromuscular Disorders (2 Class Sessions)

Session 5
February 8, 2012
Valerie Askanas, M.D.
Models, mechanisms, overlap with central disorders

Session 6
February 15, 2012
King Engel, M.D.
Clinical features, diagnosis, current treatments, future therapeutic targets
Valerie Askanas, M.D.
Pittsburgh, PA. - 12, 28, 12.

Epilepsy (2 Class Sessions)

Session 7
February 22, 2012
Elyse Schauwecker, PhD
Animal models; mechanisms of cell death; plasticity; genetics.

Session 8
February 29, 2012
David Millett, M.D.
Animal models; mechanisms of cell death and dysfunction

Take home examination assigned March 5th and due March 9th.

Huntington’s Disease (1 Class Session)

Session 9
March 7, 2012
Dan Yogasaki, M.D., Ph.D.
John Walsh, Ph.D.
Clinical features; history; genetics, therapeutic Animal models; mechanisms of cell death and dysfunction

Alzheimer's Disease (Session 2)

Session 10
March 21, 2012
Roberta Brinton, Ph.D.
Pharmacological approaches for treatment

ALS, SMA, MND (2 Class Sessions)

Session 11
Mar 28, 2012
Michael Jakowec, PhD
Chien-Ping Ko, PhD
Animal models; molecular features; role immune response; novel treatments

Session 12
April 4, 2012
Said Beydoun, MD
Clinical features; current treatments; electrophysiology; motor neuron cell death.
Said Beydoun, MD. - 12, 28, 12.

March 14, 2012
Spring Recess
NO CLASS

Take home examination assigned March 5th and due March 9th.

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<th>Pain (1 Class Session)</th>
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<th>Multiple Sclerosis (2 Class Sessions)</th>
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<td><strong>Session 15</strong>&lt;br&gt;<strong>April 25, 2012</strong></td>
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<tr>
<td><strong>Session 15</strong>&lt;br&gt;<strong>May 2, 2012</strong></td>
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**Evaluation for student grades:**

Students enrolled in this course will be graded. Evaluation of student performance will be based on attendance, participation, and two examinations.

10% **class attendance:** It is expected that students attend all class sessions. If, for reasons judged adequate by the instructors that a student is unable to attend a class session they will still be expected to complete the assigned readings. The instructors will be available to go over the assigned readings with the students due to a missed class.

10% **class participation:** On a scale of 100, 0-indicating no participation, 100-indicating best participation. The participation scores from all of the sessions will be averaged to obtain the aggregate participation score. Participation will include asking and answering questions and being actively involved in the discussion. It is expected that the students read the assigned papers prior to the lecture and be prepared to discuss background, what was not known, what the question of the paper was, what they did experimentally in general (methods), what the results are and what they mean (know the results!), what the weaknesses are, conclusion of the paper.

80% **Two Examinations:** There will be two examinations. The first exam will be in the format of a take home assignment and may be in the form of assigned reading of a primary publication from the literature with a set of specific questions to be answered by the student. This exam will be based on a subject covered in class in the first half of the semester. The second examination will be conducted at the completion of the course. Students will be assigned a series of comprehensive questions (typically 8) and asked to select 4 based on their own personal interests. This assignment will be in the format of an in class written examination and students will have a period of 3 hours to complete the examination. This exam will cover the entire course and questions are open ended with typically asking students to share their opinion or back up a statement in an organized written fashion backed up by points learned in the course of this lecture series.

**Statement for Students with Disabilities**

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible.
DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

**Statement on Academic Integrity**

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own. All students are expected to understand and abide by these principles. *Scampus*, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: [http://www.usc.edu/dept/publications/SCAMPUS/gov/](http://www.usc.edu/dept/publications/SCAMPUS/gov/). Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: [http://www.usc.edu/student-affairs/SJACS/](http://www.usc.edu/student-affairs/SJACS/).