

SABA UNIVERSITY SCHOOL OF MEDICINE
Basic Science Program

NEUROSCIENCES
Fall 2008

William J. Keller, Ph.D.
Professor

Description: This course takes an interdisciplinary approach to the study of the human nervous system and provides an opportunity to acquire the essential knowledge base necessary to understand normal and abnormal nervous system function. The course is designed for the second year medical student and provides an opportunity for students to review and integrate knowledge acquired in other courses with new information presented in this course. Attention is focused upon providing students with a clear understanding of the basic sciences underlying the clinical practice of high quality medicine. The course provides instruction along the entire continuum from the molecular bases of normal nervous system functions to the clinical presentation of patients presenting with impaired neurological functions. While the course is a foundational basic sciences course, attention is always directed to the application of correct patient diagnosis, treatment, and management.

This medical neuroscience course includes instruction in neurohistology, neurochemistry, neurophysiology, neuropathology, neuropharmacology, neuroanatomy, neuroimaging, and neurology. In addition to didactic classroom lectures the course includes a gross Brain Lab.

Purpose: The purpose of this course is straightforward. The course will provide you an opportunity to acquire the necessary knowledge essential to understanding and appreciating the exciting complexities of the human nervous system. Emphasis will be placed upon developing a solid foundation in the basic and applied neurosciences, which will permit you to readily understand both normal and abnormal functions of the nervous systems. Particular attention will be directed to ensuring that you develop a clinically useful, conceptual matrix from which to organize your thinking and guide you through a well organized, systematic, hierarchical, clinical analysis of essential functional systems.

Goal: Provide a solid foundation in the basic and applied neurosciences relevant to the general practice of high quality medicine.

Objectives: Upon completion of this course you should be able to:

1. identify clinically important structures of the human nervous system
2. explain the clinical importance of each named structure
3. identify clinically important connections between structures
4. explain the clinical importance of the connection between structures
5. comfortably discuss the human nervous system within the conceptual matrix of functional systems

6. recognize common signs and symptoms of nervous system dysfunction
7. readily provide a reasonable, defensible, explanation to account for the dysfunction
8. provide a reasonable, defensible explanation as to the location and suspected neuropathophysiology of common lesions of the human nervous system, likely to present in the general practice medical setting
9. understand and conduct a reasonable neurological examination
10. understand the methodologies and interpret common neurodiagnostic procedures, e.g. CT, MRI, MRA, EEG, ERP, PET, SPECT
11. recognize and understand the mechanisms of actions and associated underlying molecular, chemical, and behavioral pathologies underlying commonly occurring neurological conditions, e.g. head trauma, epilepsy, cerebrovascular diseases, Alzheimer's disease, Parkinson's disease, dementia, delirium, coma, immune disorders, headaches, pain syndromes, brain and spinal cord neoplasms
12. understand the mechanisms of actions underlying the medical treatments of commonly occurring neurological conditions, e.g. neuropharmacological basis of the treatment of epilepsy
13. be well prepared to benefit significantly from instruction in subsequent courses, e.g. Physical Diagnosis, Clinical Medicine, Pharmacology, Pathology, as you continue your Basic Sciences medical education

Format: A traditional lecture/discussion format will be used to present course materials. Additionally, students will be provided with the opportunity to participate in regularly scheduled laboratory sessions designed to permit first hand experience in the examination of the nervous system tissues. Numerous photographic slides, CT and MRI films of normal and abnormal human nervous system structures, as well as video of patients suffering from specific neurological diseases and disorders will complement lecture presentations.

Text Books: Required:

1. Snell, Richard S. Clinical Neuroanatomy, 6th Edition, Lippincott, Williams, and Wilkins, 2008. ISBN:0-7817-5993-5.
2. Haines, Duane E. Neuroanatomy: An Atlas of Structures, Sections, and Systems, 7th Edition. Lippincott, Williams, and Wilkins, 2008. ISBN: 10:0-7817-6328-2.
3. Fix, James D. High Yield Neuroanatomy, 3rd Edition. Lippincott, Williams, and Wilkins, 2008. ISBN:0-7817-5899-8.

Recommended:

If you are interested in the clinical application of neurosciences, consider purchasing any of the many foundation clinical neurology books. For example:

1. Simon, R., Aminoff, M., Greenberg, D. Clinical Neurology (any edition), Appleton and Lange Publishers. ISBN 0-8385-0515-5.

Supplemental Resources:

1. Atlas of Human Anatomy. F. Netters, (any edition).
(Available in the Saba University School of Medicine Library)
2. Signs in Neurology. R. Kingsley and R. Pourmand. Lippincott, William and Wilkins, 2002.
(Available on DVD located at the reference desk, Saba University School of Medicine Library)
3. SUSM Neuroscience course student presentations from previous semesters. A collection of PowerPoint presentations is now available for your review.
(Available in the Saba University School of Medicine Library)
4. The Internet. Numerous web sites are available. Use your search engine of choice to locate areas of interests. For example:
 - a. For some practice and instruction on reading CTs, MRIs, angiograms of the brain and additional procedures try out these web sites:
www.strokecenter.org/pat/diagnosis/ct.htm
<http://chorus.rad.mcw.edu>
 - b. For some practice and instruction on conducting a neurological examination try out these web sites:
http://medlib.med.utah.edu/neurologicexam/html/home_exam.html
<http://medinfo.ufl.edu/year1/bcs/clist/neuro.html>
 - c. For an interactive experience with the assessment of eye movements try out this web site:
<http://cim.ucdavis.edu/eyerelease/interface/topframe.htm>
5. Extended Course Outline. Medical Neurosciences, Saba University School of Medicine. Keller, W.J., 2008. The outline (approximately 100 pages) provides an extended outline of subject material to be covered each day in lecture and lab. Additionally, a succinct description of specific educational objectives for each day's lecture and lab are presented.
(Available from the reference desk, Saba University School of Medicine Library)
6. Saba University School of Medicine Library has recently added approximately twenty new titles to its Neurology collection. New titles focus upon clinical neurology across the lifespan, children through the elderly.
7. Consider participating in the Student Interest Group in Neurology – Saba (SIGN). This is a student driven interest group, open to all Saba students, faculty, staff, and spouses. The group regularly organizes and presents topics

of interest to those of you interested in the basic or applied clinical neurosciences. Past presentations have included such topics as the educational track for students interested in specializing in neurology, available sites for clinical rotations in neurology, residencies in neurology, board certification, licensing issues, traditional clinical neurology grand rounds, and much more.

Guest Lecturers: Periodically and throughout the term of this course, individuals with relevant skills or knowledge, which will contribute to your understanding of the basic neurosciences, including medical school faculty, advanced students, and visiting lecturers will be invited to address the class.

Grades: Final grades will be assigned as a function of five equally weighted computer based examinations (70% of final course grade), a laboratory examination (10% of final course grade), a written SHELF Exam (10% of final course grade), and a group presentation (10% of final course grade).

Exams: Mastery of course materials will be assessed in part by five (5) computer based examinations, a single (1) practical laboratory exam, and one (1) paper and pencil SHELF exam. Exams will be held every third Monday (Black Monday) with the following exceptions. The first examination will be held Monday 09-15-2008, which is the first Monday following only two weeks of classroom instruction. This represents a departure from the usual three week examination schedule. The Lab Exam will be held on the Friday before the third Black Monday, 10-24-2008. The SHELF Exam will be held on Monday, 12-08-2008, during the week of final exams. The Final Exam will be held Wednesday , 12-10-2008, during the last week of the semester.

1. Exam schedule:

Exam I:	09-15-2008	14%
Exam II:	10-06-2008	14%
* Lab Exam:	10-24-2008	10% (Friday)
Exam III:	10-27-2008	14%
Exam IV:	11-17-2008	14%
* Presentation	TBA	10%
* SHELF Exam:	12-08-2008	10% (Monday)
* Final Exam:	12-10-2008	<u>14% (Friday)</u>
		100% of Final Course Grade

2. Exam format will be multiple choice and fill in the blanks. Every attempt will be made to construct questions in a clear and concise manner. Only the most important points of each topic will be included on the exams. Each exam will permit you to evaluate your mastery of essential information. Exams will not be constructed to assess everything you know or should know. The exams will attempt to focus on the essentials. You will know and should know a lot more than

what will be assessed on the exams. The exams will be designed to ensure that you have a good working knowledge of the basics.

3. The four computer based Black Monday Exams (Exams I-IV), which will be written every three weeks with the exception of the first exam which will be written following week number two of instruction, will be equally weighted at 14% each of your final grade ($14\% \times 4 = 56\%$ of the final course grade). These four exams have been scheduled to begin at 10:15 AM and will last approximately 1.5 hours.
4. The Lab Exam will be conducted within the familiar and traditional bell ringer, "...identify the pinned structure..." format. This exam will be weighted 10% of the final course grade. The Lab Exam will be administered according to the two assigned Lab Groups. One Group will begin at 10:15 AM and a second Group will begin approximately 45 minutes later, at approximately 11:00 AM. The Lab Exam will last approximately .75 hours for each group
5. The SHELF exam will be a paper and pencil format exam of approximately 125 questions, covering the basics of medical neurosciences. This exam will be weighted 10% of the final course grade. The SHELF Exam schedule time has not been released as of today but is likely to be at a time different from all of your other exams this semester. The SHELF Exam historically has been administered immediately following the Microbiology Shelf Exam, Monday morning and will last 2.5 hours. You will be provided with exact times for SHELF Exam administration, as they become available to the faculty.
6. The Final Exam will be comprehensive. Yes, comprehensive. It will provide you a final opportunity to demonstrate your command and integration of essential information presented during the course. This exam will be weighted 14% of the final course grade.
7. Performance scores from each Monday exam will be submitted to Administration within 48 hours of completing the examinations. Administration will post earned scores in a confidential manner on the University's Campus website. You will need to your assigned Saba University identification number and password to access your exam scores.
8. Performance scores for the Presentation, SHELF exam, final exam, and overall final performance score (grade) for the entire course will be submitted to Administration and within 48 hours of receiving the SHELF score results. During past semesters, the SHELF scores have oftentimes not been available to faculty, until one week after the administration of the SHELF Exam. Administration will post earned

scores in a confidential manner on the University's Campus website. You will need to your assigned Saba University identification number and password to access your exam scores.

9. A brief review of each exam has been scheduled during normal class times on the first Tuesday following each Black Monday exam.
10. Missed exams and makeup exams: A failing grade will be assigned to each missed exam. Make up exams, if granted, will be much more difficult than the scheduled exams and will be provided to students on an individual basis, only under the most exceptional circumstances. In the unlikely event a makeup exam is necessary, the exam will be administered on a single day, at the end of the semester, and in accordance with written University Policy.

Labs: Ten (10) neuroscience laboratory sessions have been scheduled throughout the semester. All scheduled lab sessions will be conducted during regularly scheduled class time 10:15 AM- 12:15 PM. Additional lab sessions will be scheduled if necessary. Primary purpose of the labs will be to provide opportunities for you to examine nervous system tissues and supplement lecture presentations. Attendance and active participation in all lab sessions are required. One (1) comprehensive practical laboratory examination has been scheduled for Friday, 10-24-2008 and will contribute towards your final course grade.

Presentations: Students will be given an opportunity to investigate a selected area of interest in the medical neurosciences and present a synthesis of the topic material to the class at large. A detailed handout will be made available to students to insure compliance with this requirement for the course. Presentations will be made after Exam IV and Week # 12 and will contribute 10% to the student's final course grade.

Attendance: See the Student Handbook for University policy. University policy will be enforced. The Medical School has promulgated new guidelines and enforcement policies regarding attendance. Please familiarize yourself with the recent changes in policy and procedures. University Policy does not differentiate between Excused and Unexcused absences. You are either present or absent from a daily class.

The Medical Neuroscience course has been designed in part, upon an assumption of daily attendance and active participation by the student. Should you fail to meet the attendance and/or active participation requirements of the course, you fail to meet minimal standards for successful completion of the course and will be required to repeat the entire course. These requirements stand independent of exam scores.

Special Note: Should a student be absent from class for more than five days throughout the entire semester, independent of the reason(s), the student, at the discretion of the professor, may be immediately dismissed from the course and required to repeat the course next semester.

Withdrawing from Course: You may voluntarily withdraw from the Course at any time throughout the semester. Please see the Saba University School of Medicine Student Catalogue, Academic Policy section, for new and recently released materials promulgated by the University regarding withdrawing from a course.

Student Misconduct: See the Student Handbook for University policy. University policy will be enforced. (Note: Caps and visors are not to be worn inside the labs, classroom, or computer testing center.).

Recordings: OK with me. You may audiotape lectures and lab sessions. The University prohibits videotaping of lectures and labs.

Things you will need: Listed below are required items you will need in addition to the textbooks.

1. Movable computer memory, e.g. Memory Stick, CD-RW
2. Latex Exam Gloves
3. Reflex hammer
4. Pin Light
5. Rosenbaum Pocket Vision Screener Chart
6. Tuning Forks
 - a. 128 cps
 - b. 256 cps (optional)
 - c. 512 cps (optional)
7. Ophthalmoscope and Otoscope (Optional and highly recommended)

Note: The Saba SIGN (Student Interest Group in Neurology), as a service to other students, occasionally assembles convenient packages of required instruments for the Medical Neurosciences course, including pin light, reflex hammer, vision charts, tuning forks, et cetrea. These SIGN packs are typically available on campus from the SIGN at or close to actual cost. Highly recommended.

Outside Readings Packet: During the course you will be required to complete a small set of outside readings. An entire packet will be made available to you on both hard copy and electronic media. The readings will supplement lecture materials presented during Weeks 9 and 10.

Additional Course Information:

What: Medical Neurosciences.
Credits: 9 academic credits.
When: Monday through Friday, 10:15 AM -12:15 PM.
Where: Third Semester Classroom, main floor, new campus building..
Office: Faculty Offices – main campus building, third floor.

LECTURE/DISCUSSION SCHEDULE

Week # 1

09-01-2008	Monday	No class - University Orientation
09-02-2008	Tuesday	Introduction to the course Organization of the nervous systems Gross normal and pathological structures- the basics
09-03-2008	Wednesday	Neurobiology of the Neuron
09-04-2008	Thursday	Neurobiology of the Neuroglia
09-05-2008	Friday	Nerve Fibers and Peripheral Nerves Receptor and Effector Endings Dermatomes and Muscular Activity

Week # 2

09-08-2008	Monday	Spinal Cord- Introduction; The big four
09-09-2008	Tuesday	The Brainstem- Medulla and Pons
09-10-2008	Wednesday	The Brainstem- Midbrain
09-11-2008	Thursday	Thalamus and cortex - primary somato sensory / somato motor systems – the basics Clinical integration
09-12-2008	Friday	Open

Week # 3

09-15-2008	Monday	Exam # I
09-16-2008	Tuesday	Review
09-17-2008	Wednesday	Cerebrum –Structure, Organization, Connections
09-18-2008	Thursday	Structure and Function of the Cerebral Cortex
09-19-2008	Friday	LAB SESSIONS I – Identification of gross structures

Week # 4

09-22-2008	Monday	Reticular Activating System and Limbic System
09-23-2008	Tuesday	Basal Nuclei and Connections
09-24-2008	Wednesday	Basal Nuclei and Connections
09-25-2008	Thursday	Open
09-26-2008	Friday	LAB SESSIONS II– Identification of gross structures

Week # 5

09-29-2008	Monday	Ascending Tracts of the Spinal Cord and Brain- revisited
09-30-2008	Tuesday	Descending Tracts of the Spinal Cord and Brain- revisited
10-01-2008	Wednesday	Cerebellum - revisited
10-02-2008	Thursday	LAB SESSIONS III- Review of Functional Anatomy
10-03-2008	Friday	Clinical Integration

Week # 6

10-06-2008	Monday	EXAM # II
10-07-2008	Tuesday	Review
10-08-2008	Wednesday	Cranial Nerves and Nuclei
10-09-2008	Thursday	Cranial Nerves and Nuclei
10-10-2008	Friday	LAB SESSIONS IV- Cranial Nerve Systems

Week # 7

10-13-2008	Monday	Cranial Nerves and Nuclei
10-14-2008	Tuesday	Clinical Integration
10-15-2008	Wednesday	Thalamus and Hypothalamus
10-16-2008	Thursday	Ventricular System, Cerebrospinal Fluid, Meninges of Brain and Spinal Cord Blood Brain Barrier, Development of the Nervous System
10-17-2008	Friday	Blood Supply to Brain and Spinal Cord- Normal

Week # 8

10-20-2008	Monday	Blood Supply to Brain and Spinal Cord- Pathology
10-21-2008	Tuesday	LAB SESSIONS V-Blood Supply
10-22-2008	Wednesday	Autonomic Nervous Systems
10-23-2008	Thursday	Autonomic Nervous Systems
10-24-2008	Friday	LAB EXAM

Week # 9

10-27-2008	Monday	EXAM # III
10-28-2008	Tuesday	Review
10-29-2008	Wednesday	Neuroimaging, CT and MRI
10-30-2008	Thursday	Cerebral Angiography, MRA, Carotid Doppler PET, SPECT, fMRI. rCBF
10-31-2008	Friday	Clinical Neuroelectrophysiology, EEG, ERP, BAEP

Week # 10

11-03-2008	Monday	Neurobehavioral assessment (introduction) LAB SESSION VI
11-04-2008	Tuesday	Sensory systems - lecture and demonstration LAB SESSION VII
11-05-2008	Wednesday	Motor systems – lecture and demonstration LAB SESSION VIII
11-06-2008	Thursday	Ophthalmoscopic examination – The Basics LAB SESSION IX
11-07-2008	Friday	Clinical integration of Neurobehavioral Examination LAB SESSION X

Week # 11

11-10-2008	Monday	The Mental Status Exam from a neurological perspective
11-11-2008	Tuesday	Motor and Sensory Systems Revisited
11-12-2008	Wednesday	Clinical Integration
11-13-2008	Thursday	Clinical Integration
11-14-2008	Friday	Open

Week # 12

11-17-2008	Monday	EXAM IV
11-18-2008	Tuesday	Review
11-19-2008	Wednesday	Neurotransmitters and Neuropharmacology
11-20-2008	Thursday	Neurotransmitters and Neuropharmacology
11-21-2008	Friday	Open

Week # 13

11-24-2008	Monday	Head Trauma Seizures and Epilepsy
11-25-2008	Tuesday	Movement Disorders Immune Disorders and Demyelinating Diseases
11-26-2008	Wednesday	History of Medicine Coma
11-27-2008	Thursday	Headaches Neurological Complications of Systemic Diseases
11-28-2008	Friday	Open- Reading Day

Week # 14

12-01-2008	Monday	Disorders of the Autonomic Nervous Systems Pain Syndromes
12-02-2008	Tuesday	Neurological Disorders presenting as Psychiatric Disorders Pediatric Neurology
12-03-2008	Wednesday	Dementia and Delirium Medical Trivia
12-04-2008	Thursday	Cerebrovascular Disorders Neuro-Oncology
12-05-2008	Friday	Saba Day - Island Holiday – No Class

Week # 15

12-08-2008	Monday	SHELF EXAM
12-09-2008	Tuesday	Reading Day
12-10-2008	Wednesday	FINAL EXAM