MEDICAL NEUROSCIENCE SYLLABUS
Course Director: Kevin S. Lee, ksl3h@virginia.edu

OVERVIEW

What does the discipline of Neuroscience comprise?

As a science, neuroscience (or neurobiology) is composed of about equal parts of:

1. Cellular and molecular neuroscience: How individual nerve cells work. (This will occupy the first two weeks).

2. Systems neuroscience: How nerve cells are connected together into circuits that perform different functions—sensory perception, control of movement, integrative functions. (This will account for almost all of the MedNeuro course).

Why study neuroscience in medical school?

1. Understanding neural systems, particularly functional neuroanatomy, is integral to diagnosing neural disease and understanding the consequences of damage to the nervous system.

2. Understanding cellular and molecular neuroscience is essential to treating neural disease.

   This course will emphasize functional neuroscience, because this is what is presently most important for clinical practice, either as a generalist or in a neurological specialty. However, advances in the treatment of neural disease will only occur as we understand more about basic cellular and molecular neurobiology.

How does this course fit into the curriculum?

MedNeuro concerns the normal function of the human nervous system. We will emphasize the structure and function of the central nervous system; the detailed anatomy of the peripheral nervous system is covered in Gross Anatomy. Some aspects of neurophysiology are also integral to general physiology; the teaching of these topics is integrated with the Medical Physiology course. Study of how drugs modulate neural function is covered in Pharmacology, and a behavioral perspective on nervous system function is covered in An Introduction to Human Behavior. The POM course also provides a neuro-section that complements the information presented in Med Neuro.

   The emphasis of all these basic science courses is on normal function. In MedNeuro we will discuss neural disease to provide a context for understanding normal neural function, and also to illustrate the reasoning process that uses an understanding of functional neuroanatomy to localize neural dysfunction. Systematic study of neural disease will occur in later courses, particularly in the required rotation in Neurology during year 4.
What will you learn?

Beyond understanding specific facts, as covered in the lectures, laboratories, and clinical presentations, you need to integrate material from all of these sources in order to put together a comprehensive picture of how the nervous system works (i.e. functional neuroscience). This picture has two parts. One part involves an understanding of the functional neuroanatomy of each level of the nervous system. At each level you need to be able to identify key structures as seen in anatomical specimens, cross-sections, or MRIs; understand their normal function; and understand the neurological consequences if these structures are damaged. You also need to know functional neuroscience from the standpoint of the sensory, motor, and integrative systems that extend over several levels of the nervous system. Thus each piece of information you learn has to be fitted into these two different views, one a level-by-level view, the other a view of functional systems. We will teach the course primarily from the view of functional systems.

Your goal in putting this comprehensive picture together is, by the end of the course, to be able to answer two sorts of questions. What symptoms could arise from damage to the nervous system at any particular spot? Given a set of symptoms, what spot in the nervous system might be damaged?

How should you study for this course?

In terms of learning the facts about each specific topic (and deciding which facts are important) the textbook, Neuroscience by Purves et al. and the lectures should be your basic study guide.

But this will not be enough. By itself, this will not enable you to put together a comprehensive picture of how the nervous system works. To do this you will need to distill and synthesize the information you learn in these different settings. The best way to do this is to make drawings or outlines that organize the essential facts and help you assimilate them, so you really understand the information and can use it to solve problems. The Sylvius software that comes bundled with the Purves Textbook and the Haines Atlas of Structures, Sections and Systems contain anatomical illustrations essential to learning the functional neuroanatomy of each level of the nervous system (as seen in cross-sections) and diagrams illustrating the functional anatomy of longitudinal systems that will be very helpful in putting the big picture together. We won’t spend much class time going over the sections. This is best learned on one’s own time and at one’s own pace.

COURSE ORGANIZATION

Principal Faculty:

Dr. Thomas Bleck  McKim, Room 2027  924-5984  tpb9k@virginia.edu
Dr. Barry Condron  Gilmer, Room B-071  243-6593  bc4f@virginia.edu
Dr. Jeffrey Corwin  MR4, Room 5148  924-1468  jtc2k@virginia.edu
Dr. Jeffrey Holt  MR4, Room 5122  243-9995  jh5am@virginia.edu
Dr. Kevin Lee  MR4, Room 5152  924-0262  ksl3h@virginia.edu
Dr. Jeh-Ping Liu  MR4, Room 5010  924-8647  jl7nf@virginia.edu
Dr. Heidi Scraible  MR4, Room 6116  982-1416  hs2n@virginia.edu
Dr. Virginia Taylor  Jordan, Room 3-88  982-4299  vlt3g@virginia.edu
Dr. Jeremy Tuttle  MR4, Room 6124  924-5634  jbt6w@virginia.edu
Dr. Mary Kate Worden  MR4, Room 5021  982-1817  mkw3k@virginia.edu
Dr. Brad Worrall  McKim, Room 2117  924-2783  bbw9r@virginia.edu
Dr. Scott Zeitlin  MR4, Rm 5012A  924-5011  soz4n@virginia.edu
Laboratories:

The lectures are supplemented by laboratory study and dissection of preserved human brain specimens. The laboratory will be presented in two blocks. The first block will come in early February and will cover the external anatomy of the brain. The second block will be in March, and will involve dissection of internal brain structures in the context of functional systems.

Clinical correlations:

There will be a number of presentations by clinicians throughout the course. Some of these will involve patients, others will be clinical lectures. These are important learning experiences that highlight how basic science knowledge is essential in neurological diagnosis and treatment. The patients who participate in these sessions donate their time because they wish to contribute to your learning experience. *Your attendance and courteous attention at these sessions is especially important, just as in any interaction with patients.*

Clinical problems:

There will be four clinical problem solving sessions. Active student participation is mandatory in these sessions. The sessions will focus on analysis of a series of clinical cases, which will be distributed before each session. The cases provide the opportunity to apply the basic information derived from readings and lectures to an illustrative clinical context. The recommended text entitled Manter and Gatz’s Essentials of Clinical Neuroanatomy and Neurophysiology is often helpful in preparing for these sessions. The sessions will be led jointly by neuroscience faculty and residents in Neurology. These sessions help develop critical skills for integrating basic and clinical information and attendance is mandatory.

For each Clinical Problem session there will be a quiz covering the major issues discussed in the session. These quizzes will be closed-book exams and will be taken on-line during the day or so following the session. The specific time frame for taking the quiz will be announced at the session. Each quiz will be worth 2.5% of the course grade.

Required and Recommended Textbooks:

There are three required textbooks:

Primary Text:


Brain Atlas:


Clinical Problem Case Studies

Strongly Recommended:


Many students also find a review book helpful, both during the course itself and when it comes time to study for the Boards, part 1.

We recommend:


Web Page:

A class web page has been set up at the following location:
<http://www.med.virginia.edu/medicine/basic-sci/neurosci/educ/>

Notes and miscellaneous course material will be posted on this page. The class web page is also linked via the medical education home page.

Newsgroup and Exam Inquiries:

A web-based medical neuroscience newsgroup has been created to provide a forum for students to ask questions of faculty and other students. We will monitor the newsgroup to the best of our abilities, and endeavor to have your questions answered.

The newsgroup can be accessed through the class webpage or can be found at the following address:

We recognize that exam questions often arise during the week preceding an exam. We will try to answer all questions (newsgroup, email etc.) during this period. However, please note that faculty responses to questions submitted very near the exam dates cannot be guaranteed.

Examinations and Grades:

There will be four quizzes and three exams. The four quizzes relate to the four Clinical Problem sessions and will account for a total of 10% of the final grade (i.e. 2.5% per quiz). The exams will be comprised of two mid-term exams (each worth 25% of the final course grade) and a final exam (worth 40% of the final course grade). Exam questions will be of two general types: 1) those that test your knowledge of information from a specific lecture, lab, or clinical presentation; 2) those that assess your ability to integrate material from different sources in order to develop a comprehensive picture of functional neuroscience and apply it to clinical problems. The first two examinations will consist primarily of questions of the first type, but as the course progresses, greater emphasis will be placed on the comprehensive picture. The exams are compiled by the principal faculty, but will include material from the clinical correlations and clinical problem sessions to the extent that the material overlaps the basic science material.
Please note that the exams will include questions involving the identification of anatomical structures, as covered in the labs and the Sylvius software.

Grades are distributed via electronic mail to ensure confidentiality.

Reserve Books, Audiovisual Materials and Computer Based Learning Aids

A list of books on reserve in the Health Sciences Library for this course is given below. Other reserve materials include a collection of slides illustrating brain sections (with accompanying descriptions), a series of videotapes prepared by Dr. L. Heimer entitled a "Dissection of the Human Brain" (WL17/A881/1982), and a "Slide Atlas of the Human Brain" (WL101/D613/1986). The latter includes labeled slides illustrating surface anatomy, dissected specimens, and sections that are especially helpful for individual review. Also available in the library are computer-based learning aids, which some students find particularly helpful.

TEXTBOOKS ON RESERVE


ATLASES


REVIEW BOOKS


SAMPLE QUESTIONS