

**COURSE SYLLABUS
MEDICAL NEUROSCIENCE 2011
060/132: 234**

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060:234; 132:234

Course Director: Dr. Martin Cassell

I. The Course: Medical Neuroscience is a course for medical students, physical therapy students, and graduate students in the basic medical and related sciences, which emphasizes the multidisciplinary study of the human central nervous system. The course consists of lectures and laboratories, and group discussion sessions on patient cases dealing with nervous system disorders. The course material is interrelated throughout these forums, giving students multiple approaches for learning the material and giving faculty multiple approaches for teaching. All lectures, labs, and group discussion cases emphasize integration of basic science concepts with clinical significance and applications. Basic and clinical correlations are further reinforced by a series of lectures highlighting contemporary research and clinical issues in neuroscience, such as developmental and emotional disorders, fetal alcohol syndrome, dementias, and gender-related differences in brain structure and function. The course faculty are drawn from basic and clinical departments in the College of Medicine, including Anatomy and Cell Biology, Physical Therapy and Rehabilitation, Neurology, Psychiatry, Pediatrics, and Neurosurgery.

II. The Objectives: The course objectives described in this section and the lecture, lab, and group discussions meet the following Carver College of Medicine learning objectives: MK01, MK02, MK03, MK04, MK05, MK06, MK07, MK08. (These codes are defined at the end of the syllabus.)

The objectives of the course are: (1) to introduce basic concepts about the organization, structure, and function of the human central nervous system; (2) to enable students to apply these fundamental principles toward understanding nervous system function and dysfunction and toward clinical problem-solving in relation to disorders that affect the nervous system, with emphasis on the central nervous system; (3) to provide the necessary foundation in neuroscience upon which students can build for the rest of their medical training and professional careers. Upon completion of the course, students' will have a working knowledge of the structure and function of the human nervous system necessary for their clinical clerkships, for advanced study of the nervous system, and for monitoring new developments in the basic and clinical neurosciences.

More specifically, students will be able to:

1. Describe and identify the major gross anatomical components of the central and peripheral nervous systems. Students will be able to identify major anatomical structures in brain and spinal cord whole specimens, slices, and dissections; and in media images such as X-rays, CTs, and MRIs.
2. Relate the embryological development of the CNS to the adult brain and spinal cord.
3. Describe and identify the structural components and functional significance of the meninges, CSF, venous sinuses, blood supply, and blood-brain, blood-CSF barriers of the CNS.

4. Describe the general structural and functional organization of different hierarchical levels of the CNS: spinal cord and brainstem segments (spinal and cranial nerves, reflexes, neuromuscular junction); relay and processing sites on the route of ascending and descending pathways.
5. Describe and identify the components and specific functions of the spinal and cranial nerves, and the major sensory and motor pathways.
6. Describe and identify the structures and pathways for the special senses: vision, taste, smell, hearing and balance.
7. Describe and identify the major nuclei of the thalamus and their roles in sensory, motor and cognitive functions.
8. Describe the anatomy and functions of the major components of the basal ganglia.
9. Describe the general structural organization of the hypothalamus and functions associated with major nuclei.
10. Describe and identify the major components of the limbic system, the basal forebrain, and a general overview of their roles and relationships with other parts of the CNS.
11. Describe the structures and mechanisms involved in arousal and sleep, memory, language.
12. Describe localization of cortical functions related to motor and sensory functions, to the special senses, and to higher cognitive functions and behaviors.
13. Analyze the effects of an injury to a specific region of the nervous system.
14. Analyze the clinical manifestations of the various diseases that act upon specific structural and functional systems of the human nervous system.
15. Begin to analyze approaches to diagnosis, treatment, and prognosis in patients with nervous system disorders and diseases.

Note: The structural, physiological, and pharmacological aspects of the neuron and neurotransmission at the cell and molecular level are covered by multiple lectures in other courses, including Medical Cell Biology, Human Organ Systems, and Pharmacology. Therefore, we have not included these as part of our course objectives.

III. The Course Faculty:

Lecturers:

Dr. Harold Adams	Neurology
Dr. Steven Anderson	Neurology
Dr. Dan Bonthius	Pediatrics
Dr. Martin Cassell	Anatomy and Cell Biology
Dr. Robert Cornell	Anatomy and Cell Biology
Dr. Patricia Davis	Neurology
Dr. Natalie Denburg	Neurology
Dr. Mark Dyken	Neurology
Dr. Mark Granner	Neurology
Dr. Nicholas Pantazis	Anatomy and Cell Biology
Dr. Robert Rodnitzky	Neurology
Dr. Kathleen Sluka	Physical Therapy and Rehabilitation
Dr. Daniel Tranel	Neurology
Dr. Michael Wall	Neurology/Ophthalmology
Dr. John Wemmie	Psychiatry

Laboratory Teaching Staff:

Dr. Martin Cassell	Anatomy and Cell Biology
Dr. Robert Cornell	Anatomy and Cell Biology
Dr. Justin Sipla	Anatomy and Cell Biology

Neuroscience Program Graduate Student Teaching Assistants:

Jeff Plume
Bradley Thomas
Jake Kurczek
Cory Massey

Clinical Case Discussion Faculty :

Dr. William Talman	Neurology
Dr. Harold Adams	Neurology
Dr. Eric Dyken	Neurology
Dr. Daniel Bonthius	Pediatrics

- IV. Schedule:** The Medical Neuroscience course runs from January 11, 2011 through May 10, 2011. Please note that course content is intensive in the early weeks of the course. Moreover, topics that are presented later in the course build on information presented in previous lectures and labs. It is important for you to keep up and not fall behind because the information is cumulative: your performance will depend on a thorough understanding of facts and concepts you have learned from the beginning. It is not unusual for students to feel that examinations get more difficult as the course progresses because of this.

Therefore, please plan your study time accordingly. Regular attendance at scheduled lectures and labs makes it easier to keep up with the material and have access to instructors for questions and assistance.

- A. Lectures** are presented in 1110A MERF, generally on Tuesdays, Thursdays, and Fridays at 9:30 a.m. – 10:20 a.m.

Note that there are a number of exceptions to the general lecture day and time. Please refer to the schedule below.

- B. Laboratories:** Eight laboratory sessions are scheduled and will be held on Tuesdays and Thursday in the Gross Anatomy Lab (1-230 BSB). Students are assigned to attend laboratory sessions in one of the following groups:

Tuesday A from 10:30 a.m. - 11:30 a.m.

Tuesday B from 11:30 a.m. - 12:30 p.m.

Thursday A from 10:30 a.m. - 11:30 a.m.

Thursday B from 11:30 a.m. - 12:30 p.m.

Medical students in Group A and Physical Therapy students attend laboratory on Tuesdays.

Medical students in Group B and Graduate students attend laboratory on Thursdays.

Pre-Lab presentations have been video-recorded and will be posted on e-Neuroscience and the ICON course site prior to each scheduled lab session. In order to make efficient and effective use of the hour allocated for each lab period, students are expected to view the pre-lab presentation prior to coming to class.

Table assignments for each student will be posted prior to the first laboratory session (Tuesday, Jan. 18 for Group A and Physical Therapy students) (Thursday, Jan. 20 for Group B and Graduate students).

For health reasons, food and drink are not permitted in the laboratory. For many of the laboratory sessions, wet CNS specimens will be examined and rubber gloves must be worn. Students at each table may wish to arrange to share the cost of a box of disposable gloves and have them available.

The laboratory practical examinations will be held on Fridays between 12:30 – 5:00 p.m. in 1-230 BSB. Specific times for different groups of students will be announced prior to the examination since facilities do not allow the entire class to be tested at the same time.

C. Important !! Policies regarding recording and distribution of lectures and other presentations by course faculty:

The following statement comes from OSAC:

“Dear M1 and M2 Students,

Recently there have been discussions and questions about how Noteservice obtains and distributes lecture materials. To clarify the issues and expand on the policy that must be adhered to:

- 1. Noteservice is a not-for-profit organization that serves students and is self-directed. We applaud Noteservice leadership for their advocacy efforts and the professional manner in which they have approached this issue with faculty, administration and their peers.*
- 2. Individual faculty must be contacted before lectures are taped. They have a right to refuse all or partial taping of lectures as they effectively own the copyright to their lectures.*
- 3. When a student takes notes while listening to a lecture, the notes are considered the student's interpretation of what they have heard and the notes are not considered an infringement of the professor's copyright ownership of the lecture and can be posted to a website. However, the analysis is different if a student transcribes an audio lecture word-for-word. In that instance, the professor is the owner of the copyright and must give permission prior to*

- posting the notes on a website. Similarly, permission must be sought from a professor if an audio recording of a lecture is posted directly on a website.*
4. *The majority of faculty members have consented to full or partial taping of lectures and posting of lecture material.*
 5. *If a student has been granted reasonable accommodations that include the audio taping of lectures after a review or pertinent documentation by the Disability Accommodations Committee, then the faculty and the CCOM is responsible for providing this resource in compliance with the Americans with Disability Act.*

We are supportive of a learning environment that allows students access to lecture material in the most effective way possible and anticipate that the majority of faculty will continue to permit taping of their lectures. However, the law is clear that individual faculty members must be contacted and give consent before lectures are taped.”

Policy for this course:

All faculty in this course have given permission re: their lectures as follows:

- (1) Notes for each lecture will be posted electronically on ICON approximately one week before the date of the lecture.
- (2) PowerPoint slides used by each lecturer will be posted electronically on ICON in pdf format the day before the lecture (if possible).
- (3) A videocast of slides and audio from each lecture will be recorded and made available as a stream on the course’s ICON site to all students who are registered in the course. Lecturers have requested that students not download the videocasts of their lectures to be copied or saved to personal computers. Please respect this request.

D. Clinical Case Discussions: These discussion groups will be held in 1110 MERF and meet during regularly scheduled lab times during weeks when a laboratory is not scheduled. Each discussion session will last approximately 2 hours, so both groups of Tuesday students will begin at 10:30; and both groups of Thursday students will begin at 10:30, on the occasions when Discussion Groups are scheduled.

Two cases of patients who present with complaints/problems/symptoms related to nervous system disorders will be discussed during each of these meetings. Students will receive only the case history, and will be responsible for discussing pertinent structures, systems, pathways, mechanisms, etc. in explaining the patient’s signs and symptoms, arriving at a differential diagnosis, treatment, and prognosis. Students are also encouraged to seek applicable examples of evidence-based medicine as appropriate.

Help to make these discussions meaningful by coming prepared, and don’t be shy about asking questions and volunteering your opinions.

Questions for the comprehensive section of the Final Examination will come from material covered in the Clinical Case Discussions.

E. Exams:

Lecture Exam I	Feb. 18	8:00 – 10:00 AM	1110A, 1117, 2189 MERF
Lab Exam I	March 4	12:30 – 5:00 PM	1-230 BSB
Lecture Exam 2	April 1	8:00 – 10:00 AM	1110A, 1117, 2189 MERF
Lab Exam 2	April 22	12:30 – 5:00 PM	1-230 BSB
Final Exam	May 10	9:30 AM – 12:30 PM	Beisner & Watzke Auds

It is the responsibility of all students, including those with accommodations, to be ready to take the exams at the assigned times. Students, including those with accommodations, will not be allowed to sit the lecture examinations if they arrive in the examination room more than 15 minutes after the exam has commenced. Students who are late for laboratory exams will not be allowed to take the exam once it has started.

- V. Attendance and Student Responsibilities:** Students are held responsible for all material presented in lectures, laboratories, and discussion group sessions. Students are also responsible for all announcements or schedule changes that are made in class, whether or not they are in attendance.

Course policy is that attendance is required for all components of the course – lectures, labs, and discussion groups. Attendance is not recorded, but is considered as an aspect of professional responsibility expected for students as well as faculty.

Attendance at examinations is mandatory, except for serious illness, which must be documented by a written statement from the treating physician. All other requests for excused absences must be submitted in advance and permission obtained from the Dean of the Office of Student Affairs and Curriculum, the Director of the DPT Program, or the Dean of the Graduate Program. The Course Director retains the discretion for decisions about making-up missed exams.

Note: Students should organize a Neuroscience Liaison Committee consisting of five or six medical students, one or two PT students, and one graduate student to meet regularly once each month, and on additional occasions as needed, with the course director. The student chairperson is responsible for contacting other members of the Liaison Committee and the Course Director to coordinate meeting dates, times, and locations.

Consultation: Many concepts and terms in the neurosciences may seem difficult or confusing at first exposure. Usually, a session of a few minutes with the instructor will clear up these difficulties. Therefore, when material presented in class or lab is not understood, students are urged to consult with the appropriate lecturer or lab instructor as soon as possible. Don't leave this to the last minute before exams.

Students whose score on an exam is less than the passing grade should make an appointment with the Course Director to seek assistance if needed. Due to the large size of the class, the Course Director cannot follow up failing students and they are expected to call/email for an appointment as soon as possible after the exam. Early remediation can make a major difference to a student's successful completion of the Course.

VI. Background Knowledge:

Medical Neuroscience is a stand-alone course but it is expected that students have a basic understanding of human anatomy and physiology and the basic vocabulary of the anatomical sciences. Of particular importance is an understanding of the basic functions of the twelve cranial nerves. Much of the lecture and laboratory material, as well as clinical cases, pertaining to the brainstem involve various aspects of cranial nerve function, a portion of which is not covered in the course. Two cranial nerve review sessions will be held in the MERF auditorium during the second week of the course.

VII. Required Course Material:

1. Medical Neuroscience 2011 Syllabus (this includes the first weeks lecture notes)
2. Medical Neuroscience 2011 Laboratory Manual

Recommended Textbooks and Laboratory Manuals:

1. Highly Recommended:
Afifi and Bergman, Functional Neuroanatomy, Text and Atlas, McGraw-Hill, 2nd Edition, 2005. This text is an excellent source for additional information or clarification of topics covered in the course, and is the cited reference for assigned readings. Students will find that the Clinical Chapters and the Key Concepts (marked by icons) are especially helpful.
***** Students at the University of Iowa have free access to the electronic copy of this text via the Hardin Library link.**
2. Highly Recommended:
Haines, Neuroanatomy: An Atlas of Structures, Sections and Systems, 7th ed. Ed. Lippincott William and Wilkins, 2007. Note that the Laboratory Manual is keyed to illustrations and images in this atlas.
3. Waxman, Clinical Neuroanatomy (Paperback), McGraw-Hill Medical; 26th edition (2009)
***** Students at the University of Iowa have free access to the electronic copy of this text via the Hardin Library link.**
4. Blumenfeld, Neuroanatomy Through Clinical Cases (Paperback), Sinauer Associates; 1st edition (2002)

VIII. eNeuroscience: Most selected material for the Laboratory section will be available on the eNeuroscience Website. This material will include: (i) brain and spinal cord microscopic sections for the labs on spinal cord, brainstem, and thalamus; (ii) radiographic and relevant pathological material and gross specimens for all Labs; and (iii) two practice practical examinations (available one week before Lab exams). The eNeuroscience Website can be accessed at www.anatomy.uiowa.edu→eNeuroscience. Tutorials for using this material will be presented in the laboratory sessions.

Pre-lab videos will be made available to students prior to each lab. These videos are intended to facilitate your sessions in the lab to learn neuroanatomy – NOT SUBSTITUTE OR REPLACE them. For many students, the practical labs present the only opportunity you will have to study and handle actual brain specimens, normal and with unique pathologies. Please do not deprive yourselves of this valuable learning experience.

IX. Examinations and Grading: There will be 2 midterm lecture exams, 2 midterm laboratory practical exams, and a final examination. The points allocated to each will be as follows:

Exam I (Lecture)	40 points
Exam I (Lab practical)	50 points
Exam II (Lecture)	40 points
Exam II (Lab practical)	50 points
Final Exam	<u>120 points</u>
Total possible points	300 points

Students will be required to earn a total of 210 out of 300 points in order to pass the course.

Generally, the minimum points needed for a particular Grade are as follows:

Medical students:	Honors	270 points
	Near honors	267points
	Pass	210 points
	Fail	Below 210 points

Graduate and Physical Therapy students will receive letter grades usually based on a scale of A \geq 265 points; B \geq 235 points; C \geq 205 points; F < 205 points.

These grade policies are intended to cover the students from different programs in the course, but the Course Director reserves the right to make minor adjustments in the cut-offs for all or any grades.

The final examination will cover lectures after Lecture Exam II and a comprehensive component consisting of basic science and clinical material from or relating to Clinical Discussion cases. For the comprehensive component, major concepts and problem-solving skills will be stressed.

An Exam Comment book is available in MERF for all course participants to comment on exam questions shortly after the exam. These comments will be viewed by the Course Director and in most cases the student's query will be answered by email. Responses to recurring themes will be posted on ICON. The Course Director wishes it made clear that while individual student comments about exam questions are very welcome, the comments are primarily used to reword questions in future exams. Only when there is an absolutely clear error in one or more of the question foils which results in obvious ambiguity as indicated by a preponderance of students answering a question incorrectly will the question be scratched. *Individual* student interpretations of questions or foils will not be considered grounds for double-keying or eliminating a question.

- X. Students with Disabilities:** Any student with the need for a disability accommodation should contact Christine Cork in OSAC and the Course Director, Dr. Martin Cassell, at the beginning of the Course.

CCOM Learning Objectives Codes

Medical Knowledge MK01

Demonstrate and integrate knowledge of the structure and function of the healthy human body from conception to death, including the molecular, cellular, biophysical, genetic, organ system, biostatistical, behavioral and psychological bases for these processes.

Medical Knowledge MK02

Demonstrate knowledge of the causes, epidemiology, risk factors, mechanisms, morphology, pathophysiology, major clinical features, and natural history of various diseases and conditions of the body and its major organ systems, and demonstrate the ability to correlate this knowledge with clinical, laboratory, radiologic, and epidemiologic data in a patient case scenario.

Medical Knowledge MK03

Demonstrate knowledge of the mechanism of action, kinetics, side effects, toxicity, interactions, clinical and non-clinical uses of medications.

Medical Knowledge MK04

Demonstrate knowledge of complementary and alternative medicine.

Medical Knowledge MK05

Demonstrate knowledge of the diagnosis, treatment and prognosis of the diseases and conditions most likely to be encountered in both outpatient and inpatient settings.

Medical Knowledge MK06

Expand understanding of therapeutic modalities, including medications, radiation and alternative therapies.

Medical Knowledge MK07

Demonstrate the skill of critical appraisal of the literature and use of biostatistical concepts, and applications of these to evolving medical understanding.

Medical Knowledge MK08

Demonstrate knowledge of the diagnosis, treatment, and prognosis of the most common diseases and conditions encountered in specialized areas of medicine.

**Medical Neuroscience 2011
Lecture, Lab, Small Group, and Exam Schedule**

Month/Date	Day/Time	Modules	Lect #	Topic	Lecturer	Lab/ Clinical Case
Jan-11	Tues/1:30 PM	CNS Overview	1	Introduction to the Brain	Cassell	
	Tues/2:30 PM		2	Nervous System Organization and Terminology	Cassell	
13	Thurs/9:30 AM		3	Neuroembryology and CNS Topography	Cornell	
18	Tues/9:30 AM		4	Metabolism, Cerebral Blood Flow, CSF	Cornell	Lab 1: Brain, meninges, ventricles
	Tues/3:30 PM			Optional Cranial Nerves Review I 1110A	Cassell	
20	Thurs/3:30 PM			Optional Cranial Nerves Review II 1110A	Cassell	Lab 1
21	Fri/9:30 AM		5	Blood Supply	Cassell	
25	Tues/9:30 AM		6	Stroke	Davis	Lab 2: Blood supply & stroke
27	Thurs/9:30 AM	Spinal Cord	7	Concept of CNS Pathways	Cassell	Lab 2
Feb-1	Tues/9:30 AM		8	Viscerosomatic Sensation I	Sluka	Lab 3: Spinal Cord
3	Thurs/9:30 AM		9	Viscerosomatic Sensation II	Sluka	Lab 3
4	Fri/9:30 AM		10	Spinal Cord I: Segmental Organization	Cassell	
8	Tues/9:30 AM		11	Spinal Cord II: Pathways	Cassell	Clinical Cases 1 1110A 1030-1230
10	Thurs/9:30 AM		12	Spinal Cord III : Review of Syndromes	Cassell	Clinical Cases 1 1110A 1030-1230
11	Fri/9:30 AM	Brainstem	13	Brainstem Overview	Cassell	
15	Tues/9:30 AM		14	Medulla	Cassell	Lab 4: Brainstem
	Tues/2:30-4:30 PM			Optional Review: Room 1110A	Course Faculty	
17	Thurs/9:30 AM		15	Pons	Cassell	Lab 4
18	Fri/8-10AM			Lecture Exam I		Rooms 1110A, 1117, 2189 MERF
22	Tues/930		16	Midbrain	Cassell	Clinical Cases 2 1110A 1030-1230
24	Thurs/930		17	Auditory-Vestibular	Cornell	Clinical Cases 2 1110A 1030-1230

Mar-1	Tues/9:30 AM	Movement	18	Motor System Overview	Cornell	Lab Review
3	Thurs/9:30 AM		19	Basal Ganglia I	Cassell	Lab Review
4	Fri/12:30-5:00 PM			Lab Exam I		
8	Tues/ 930		20	Basal Ganglia II	Cassell	Lab 5: Diencephalon, basal ganglia, int. capsule
10	Thurs/8:30 AM		21	Cerebellum	Cornell	Lab 5
	Thurs/9:30 AM		22	Movement Disorders	Rodnitzky	
March 14 - 18	SPRING BREAK					
22	Tues/9:30 AM		23	Thalamus	Cassell	Lab 6: Cerebral cortex
24	Thurs/9:30 AM			NO LECTURE		Lab 6
25	Fri/9:30 AM	Autonomic and Limbic	24	Hypothalamus I	Cassell	
	Fri/10:30 AM		25	Hypothalamus II	Cassell	
28	Mon/1:30-2:30 PM			<i>Optional Review</i>	Cassell	
29	Tues/9:30 AM		26	Limbic System	Cassell	Clinical Cases 3 1110A 1030-12130
	Tues/1:30 PM		27	Basal Forebrain	Cassell	
31	Thurs/9:30 AM		28	Behavior and Pharmacology of Monoaminergic Systems	Wemmie	Clinical cases 3 1110A 1030-1230
Apr-1	Fri/8-10AM			Lecture Exam II	Rooms 1110A, 1117, 2189 MERF	
5	Tues/9:30 AM	Cerebral Cortex	29	Cortex	Cornell	Lab 7: Assoc. path, limbic, lat. ventricle
7	Thurs/9:30 AM		30	Cortical Localization of Function	Tranel	Lab 7
8	Fri/9:30 AM		31	Frontal Lobe Syndromes	Tranel	
12	Tues/9:30 AM		32	Memory	Anderson	Lab 8: Brain sections, MRIs
	Tues/1:30 PM		33	Language	Anderson	
14	Thurs/9:30 AM		34	Epilepsy	Granner	Lab 8

19	Tues/9:30 AM		35	Sleep and Wakefulness	Dyken	Lab Review
21	Thurs/9:30 AM		36	Dementia	Denburg	Lab Review
22	Fri/9:30 AM		37	Ocular Movements	Thurtell	
	Fri/12:30-5:00 PM			Lab Exam II		
26	Tues/9:30 AM		38	Visual Pathways	Wall	Clinical Cases 4 1110A 1030-1230
28	Thurs/9:30 AM	Trauma and Disease	39	Fetal Alcohol Syndrome	Pantazis	Clinical Cases 4 1110A 1030-1230
29	Fri/10:30 AM		40	Vascular Syndromes	Adams	
May-2	Mon/1:30-3:20 PM			<i>Optional Review</i>	Course Faculty	Beisner Auditorium
3	Tues/9:30 AM		41	Sensory and Motor Syndromes	Adams	
	Tues/10:30 AM		42	Disorders of Development	Bonthius	
10	Tues/9:30-12:30			Final Exam	Beisner, Watzke in BSB	