

MCB 163L: Mammalian Neuroanatomy Lab

4 units

Course Description:

Development, structure (gross and microscopic), and functional relationships of the mammalian nervous system. (Fall)

Organization:

The course consists of 1 hour of lecture and two 3 hour lab sessions a week. Lectures are on Mondays 2-3pm. Laboratory sections are listed below.

LAB1	TuTh	9 – 12 pm	25 students
LAB2	TuTh	2 – 5 pm	25 students
LAB3	MW	9 – 12 pm	25 students
LAB4	MW	2 – 5 pm	25 students

Pre-requisites:

Prerequisites: Biology 1A/1AL, Molecular and Cell Biology 160 but can be taken concurrently. Molecular and Cell Biology 161 is recommended.

Textbook & Readings:

Kandel Schwartz & Jessel, Principles of Neuroscience. McGraw-Hill, 5th Ed. (2012). Optional
Martin, J.H. Neuroanatomy. Text and Atlas. Fourth edition. McGraw-Hill, (2012.) Optional

Grading

Grades on this class are based on work in lab, 3 reports and 3 exams.

Grade distribution will be as follows:

Lab Section Grade	4 %
3 Lab Reports (6% Each)	18 %
3 Exams (26 % each)	78 %

Instructors:

Henk Roelink
Robin Ball
Stephan Lammel

Schedule: (Labs start on Week 2)

	Lecture Topic	Lab Topics
Week 1 Sep 5	Introduction to Anatomical Terms + Gross Anatomy of the Brain + Introduction to Cranial Nerves	Lab 1: Human Brain Gross Observation Lab 1: Sheep Brain Dissection (Dura, Cranial Nerves) Lab 2: Sheep Brain Dissection (Sagittal and Horizontal Planes)
Week 2 Sep 12	Gross Anatomy focus on subcortical structures + Development	Lab 3: Sheep Brain Dissection (Subcortical Structures) Lab 4: Development of the Nervous System [Models + Slides]
Week 3 Sep 19	History and Current Applications of the Allen Brain Atlas	Lab 5: Introduction to Allen Brain Atlas / Brain Explorer + Initial Exercise Lab 6: Research Project using Allen Brain Atlas
Week 4 Sep 26	Sensory Systems (for the next week)	Lab 7: Research Project using Allen Brain Atlas Lab 8: Presentation of Allen Brain Atlas Projects REPORT IN 1 WEEK: ALLEN BRAIN ATLAS PROJECT
EVENING EXAM 1 ON TOPICS OF WEEKS 1 - 4		
Week 5 Oct 3	Detail Anatomy of spinal cord and brainstem	Lab 9: Sensory Systems Histology (Slices of Retina, Inner Ear, etc) + Cow eye ball dissection. Lab 10: Rat Brain: Spinal Cord to Medulla [Slides + Human Case Study]
Week 6 Oct 10	Detail Anatomy of Subcortical Structures	Lab 11: Rat Brain: Pons to Diencephalon [Slides + Human Case Study] Lab 12: Rat Brain: Basal Ganglia / Hippocampus/ Telencephalon [Slides + Human Case Study]
Week 7 Oct 17	Immunohistochemistry Principles	Lab 13: -Look at slices stained using different non-fluorescent labels. - Using prepared slices students conduct 1 st day of a immunohistochemistry protocol (In wet Chambers, students work on this individually) Lab 14: - Using fluorescent microscopes looking at fluorescent sample slices. - Secondary Antibody staining Possibilities: Class uses different concentrations of Ab
Week 8 Oct 24	Image Data Analysis	Lab 15: Looking at own slices using microscopy and taking pictures. Using IMAGEJ to Analyze the Pictures they take. Lab 16: Introduction to Cortical Mapping Techniques (Lecture). -Journal Club discussion using Jigsaw method REPORT IN 1 WEEK: ON IMMUNOHISTOCHEMISTRY
EVENING EXAM 2 ON TOPICS OF WEEKS 5 - 8		

Week 9 Oct 31	External Expert gives Neurological Exam Lecture Video online to review.	Lab 17: Neurological Exam (conducted by GSIs trained by expert) Student Conduct Neurological Exam on Classmates that were previously assigned specific illnesses to research. Lab 18: EEG Lab
Week 10 Nov 7	fMRI (guest lecturer)	Lab 19: fMRI Project / MRI – Case Studies – Data Lab Cancelled due to Veteran’s Day.
Week 11 Nov 14	Introduction to Electrophysiological Principles	Lab 20: Electrophysiology : Equipment I (160L) Lab 21: Electrophysiology : Equipment II (160L)
Week 12 Nov 28	Nerve Recordings, Nerve Conduction, Compound APs	Lab 22: Electrophysiology: Frog Sciatic Nerve Recordings I (160L) Lab 23: Electrophysiology: FSN Recordings II (160L) REPORT IN 1 WEEK: FROG SCIATIC NERVE
EVENING EXAM 3 ON TOPICS OF WEEKS 9-12		

Classrooms to be used:

- Labs 1-19 will take place in the current room used for MCB 163L → 4048 VLSB (assuming we can bring in the Fluorescent Microscopes if we use them)
- Lab 18 will require bringing in external equipment to room 4048 VLSB (EEG lab)
- Labs 20-23 would be conducted in the MCB 160L space.

Animal Protocol Changes to be Made:

We need to include Frogs into our Animal Protocol.

Biological Materials Used in the lab / year:

- Human Brains (in existence, should also try to procure more.)
- ~ 400 Sheep Brains with Dura (easy to order)
- ~ 100 Cow eyes (easy to order)
- ~70 Frogs
- ~ 5 rats (we only use 3 normally).
- Antibodies for Immunohistochemistry.

Additional Equipment Needed, not currently used in MCB 163L:

- From 160L:
 - EEG electrodes + setup
 - Equipment for Labs 1 and 2 of 160L
- Fluorescent Microscopes + Cameras (if available).
- Neurological Exam Tools.
- Development Slides.
- Development Models.
- Tupperware for wet-chambers.
- Sample fluorescent slides.

NUMBER OF GSIs NEEDED: 4