**Foundations of Clinical Neurophysiology**

**Fall 2015**

**Neuroscience 1026**

**Jeffrey R. Balzer, Ph.D.: Course Director**

**Office Hours: By Appointment**

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**Tuesday and Thursday, 4:00-5:15 pm**

**1695 BST (Biomedical Science Tower)**

Lecture Topic Lecturer

1. Course Overview Dr. Balzer

* What is Clinical Neurophysiology? (09/01/15)

2 Functional Neuroanatomy Dr. Thirumala

* Brain (09/03/15)
* Brainstem
* Spinal Cord
* Cerebrovasculature
* Cranial Nerves
* Brachial Plexus/Peripheral Nerves

3 Functional Neurophysiology Dr. Balzer

* Cerebral Metabolism (09/08/15)
* Cerebral Blood Flow
* AVD02
* Autoregulation
* CSF Dynamics
* Blood-Brain Barrier

4 Neuropathophysiology Dr. Haybech

* Injury and Neuronal Responses (09/10/15)
* Cellular Homeostasis
* Ischemia
* Excitatory Amino Acids

5 Techniques for Electroencephalographic Recording Dr. Crammond

* Electrodes (09/15/15)
* International “Ten-Twenty” System
* Equipment

6 Cerebrovascular Anatomy and Physiology Dr. Balzer

* Circle of Willis (09/17/15)
* Anterior Circulation
* Posterior Circulation
* Stroke
* Relationship to Evoked Potentials

7 Basic Scalp Electroencephalography Dr. Thirumala

* Origin of EEG (09/22/15)
* Technical Considerations
* EEG and Anesthesia
* EEG and Surgical Procedures
* Computer Processed EEG

8 Electrocorticography Dr. Thirumala

* Use in Epilepsy Surgery (09/24/15)
* Technical Aspects of ECoG and Stimulation
* Awake Craniotomy
* Anesthetic Considerations

9 Intraoperative Evoked Potentials Dr. Balzer

* Neurophysiologic Basis (09/29/15)
* Instrumentation
* Technical Standards

10 Somatosensory Evoked Potentials Dr. Crammond

* Placement of Electrodes (10/01/15)
* Sensory Tracts
* Stimulating Electrodes
* Phase Reversal
* Clinical Indications for SSEP Recording

11 Brainstem Auditory Evoked Potentials Dr. Crammond

* Placement of Electrodes (10/06/15)
* Recording Parameters
* Auditory Pathways/Obligate Waves
* Clinical Indications for BAEP Recording

12 Visual Evoked Potentials Dr. Crammond

* Stimulating and Recording (10/08/15)
* Visual Pathways
* Clinical Indications for VEP Recording
* Electroretinogram (ERG)

13 Motor Evoked Potentials Dr. Balzer

* Stimulating and Recording (10/13/15)
* Neurogenic vs. Myogenic
* Transcranial Electrical Stimulation
* Motor Pathways
* Clinical Indications for MEP Recording
* Anesthetic Considerations

**MIDTERM EXAMINATION 10/15/15**

**October 20, 2015: NO CLASS**

14 Intraoperative Electromyography (EMG) Dr. Balzer

* Basic Principles of EMG (10/22/15)
* Recording EMG
* Free-Running EMG
* Stimulus-Evoked EMG
* Alarm Criteria

15 Intraoperative Facial Nerve Monitoring Dr. Habeych

* Monitoring Methods (10/27/15)
* Electrode Placement
* Discharge Patterns
* Hemifacial Spasm
* Clinical Indications

16 Other Cranial Nerve EMG Dr. Habeych

* Extra-ocular Muscle EMG (10/29/15)
* Trigeminal Nerve EMG
* Lower Cranial Nerve EMG

17 Nerve Root Monitoring in the Spine Dr. Balzer

* Free-Run vs. Stimulus-Evoked EMG (11/03/15)
* Pedicle Screw EMG
* Cervical EMG
* Thoracic EMG
* Lumbosacral EMG

18 Deep Brain Stimulation Dr. Crammond

* Anatomy (11/05/15)
* Physiology
* Micro-Electrode Recording
* Guiding the Surgical Placement

19 Cerebral Oximetry Dr. Balzer

* Principles (11/10/15)
* Techniques and Examination
* Clinical Application

20 Anesthesia and Evoked Potentials Dr. Balzer

* Halogenated Anesthesia (11/12/15)
* Intravenous Anesthetics
* Effects on Evoked Potentials
* Effects on EMG

21 Interpretation of IOM Data Dr. Balzer

* Recognition (11/17/15)
* Alarm Criteria
* Interpretation
* Differential Diagnosis
* Communication

22 Transcranial Doppler Dr. Balzer

* Cerebrovascular Anatomy (11/19/15)
* Anatomical Anomalies
* Techniques and Examination
* Clinical Application

23 Traumatic Brain Injury Dr. Okonkwo

* Principles (11/24/15)
* Pathophysiology
* ICP
* Evoked Potentials and Prediction of Outcome

**Thanksgiving Break: NO CLASS 11/26/15**

24 Brain Mapping Techniques Dr. Balzer

* Phase Reversal (12/01/15)
* Direct Cortical Stimulation
* Awake Craniotomy
* Fourth Ventricle Mapping

25 Surgical Treatment of Epilepsy Dr. Richardson

* Epilepsy (12/03/15)
* Conventional Treatment
* Surgery
* ECOG and Mapping

26 Interventional Radiology, Aneurysms and Stroke Dr. Ducruet

* Endovascular Treatments (12/08/15)
* Angiography
* Aneurysms
* Stroke

27 Intraoperative Monitoring: Case Reviews All Faculty

* Spine (12/10/15)
* Vascular
* Cranial/Tumor
* Awake Craniotomy
* Cranial/Microvascular Decompression
* Brachial Plexus/Peripheral Nerve
* Deep Brain Stimulation/Microelectrode Recording

**December 17, 2015: FINAL PAPER DUE**

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 140 William Pitt Union, 412-648-7890 (412-383-7355 (TTY)), as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Cheating/plagiarism will not be tolerated. Students suspected of violating the University of Pittsburgh Policy on Academic Integrity will be required to participate in the outlined procedural process as initiated by the instructor. A minimum sanction of a zero score for the quiz, exam or paper will be imposed.

Each student is issued a University e-mail address ([username@pitt.edu](mailto:username@pitt.edu)) upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g., Hotmail, AOL, Yahoo). Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address. To forward e-mail sent to your University account, go to <http://accounts.pitt.edu>, log into your account, click on Edit Forwarding Addresses, and follow the instructions on the page. Be sure to log out of your account when you have finished. (For the full E-mail Communication Policy, go to [www.bc.pitt.edu/policies/policy/09/09-10-01.html](http://www.bc.pitt.edu/policies/policy/09/09-10-01.html).)