END-1350: INTRODUCTION TO ELECTROENCEPHALOGRAPHY (EEG)

Cuyahoga Community College

Introduction to Electroencephalography (EEG)

Board of Trustees:
2002-04-04

Academic Term:
2003-08-21

Subject Code
END - Electroneurodiagnostic

Course Number:
1350

Title:
Introduction to Electroencephalography (EEG)

Catalog Description:
Provides basic knowledge of electroencephalography, understanding EEG concepts utilized for diagnosis of various cerebral disorders. Includes history, development, basic neurophysiology concepts of EEG, normal and abnormal brain wave patterns in adult and children, with emphasis on instrumentation and recording techniques.

Credit Hour(s):
3

Lecture Hour(s):
2

Lab Hour(s):
2

Requisites
Prerequisite and Corequisite
BIO-2331 Anatomy and Physiology I or concurrent enrollment, and concurrent enrollment in END-1300 Introduction to Electroneurodiagnostic Technology, and departmental approval: admission to program.

I. ACADEMIC CREDIT

Academic Credit According to the Ohio Department of Higher Education, one (1) semester hour of college credit will be awarded for each lecture hour. Students will be expected to work on out-of-class assignments on a regular basis which, over the length of the course, would normally average two hours of out-of-class study for each hour of formal class activity. For laboratory hours, one (1) credit shall be awarded for a minimum of three laboratory hours in a standard week for which little or no out-of-class study is required since three hours will be in the lab (i.e. Laboratory 03 hours). Whereas, one (1) credit shall be awarded for a minimum of two laboratory hours in a standard week, if supplemented by out-of-class assignments which would normally average one hour of out-of-class study preparing for or following up the laboratory experience (i.e. Laboratory 02 hours). Credit is also awarded for other hours such as directed practice, practicum, cooperative work experience, and field experience. The number of hours required to receive credit is listed under Other Hours on the syllabus. The number of credit hours for lecture, lab and other hours are listed at the beginning of the syllabus. Make sure you can prioritize your time accordingly. Proper planning, prioritization and dedication will enhance your success in this course. The standard expectation for an online course is that you will spend 3 hours per week for each credit hour.

II. ACCESSIBILITY STATEMENT

If you need any special course adaptations or accommodations because of a documented disability, please notify your instructor within a reasonable length of time, preferably the first week of the term with formal notice of that need (i.e. an official letter from the Student Accessibility Services (SAS) office). Accommodations will not be made retroactively.
For specific information pertaining to ADA accommodation, please contact your campus SAS office or visit online at http://www.tri-c.edu/accessprograms. Blackboard accessibility information is available at http://access.blackboard.com.

III. ATTENDANCE TRACKING

Regular class attendance is expected. Tri-C is required by law to verify the enrollment of students who participate in federal Title IV student aid programs and/or who receive educational benefits through other funding sources. Eligibility for federal student financial aid is based in part on enrollment status.

Students who do not attend classes for the entire term are required to withdraw from the course(s). Additionally, students who withdraw from a course or stop attending class without officially withdrawing may be required to return all or a portion of their financial aid based on the date of last attendance. Students who do not attend the full session are responsible for withdrawing from the course(s).

Tri-C is responsible for identifying students who have not attended a course before financial aid funds can be applied to students’ accounts.

Therefore, attendance is recorded in the following ways:

- For in-person and blended-learning courses, students are required to attend the course by the 15th day of the semester (or equivalent for terms shorter than five weeks) to be considered attending. Students who have not met all attendance requirements for in-person and blended courses, as described herein, within the first two weeks or equivalent, will be considered not attending.
- For online courses, students are required to login at least two times per week and submit one assignment per week for the first two weeks of the semester, or equivalent to the 15th day of the term. Students who have not met all attendance requirements for online courses, as described herein, within the first two weeks or equivalent, will be considered not attending.

At the conclusion of the first two weeks of a semester or equivalent, instructors report any registered students who have “Never Attended” a course. Those students will be administratively withdrawn from that course. However, after the time period in the previous paragraphs, if a student stops attending a class or wants or needs to withdraw, for any reason, it is the student’s responsibility to take action to withdraw from the course. Students must complete and submit the appropriate Tri-C form by the established withdrawal deadline.

Tri-C is required to ensure that students receive financial aid only for courses that they attend and complete. Students reported for not attending at least one of their registered courses will have all financial aid funds held until confirmation of attendance in registered courses has been verified. Students who fail to complete at least one course may be required to repay all or a portion of their federal financial aid funds and may be ineligible to receive future federal financial aid awards. Students who withdraw from classes prior to completing more than 60 percent of their enrolled class time may be subject to the required federal refund policy.

If illness or emergency should necessitate a brief absence from class, students should confer with instructors upon their return. Students having problems with coursework due to a prolonged absence should confer with the instructor or a counselor.

IV. LEARNING OUTCOMES ASSESSMENT

Occasionally, in addition to submitting assignments to their instructors for evaluation and a grade, students will also be asked to submit completed assignments, called ‘artifacts,’ for assessment of course and program outcomes and the College’s Essential Learning Outcomes (ELOs). The artifacts will be submitted in Blackboard or a similar technology. The level of mastery of the outcome demonstrated by the artifact DOES NOT affect the student’s grade or academic record in any way. However, some instructors require that students submit their artifact before receiving their final grade. Some artifacts will be randomly selected for assessment, which will help determine improvements and support needed to further student success. If you have any questions, please feel free to speak with your instructor or contact the Learning Outcomes Assessment office.

V. CONCEALED CARRY STATEMENT

College policy prohibits the possession of weapons on college property by students, faculty and staff, unless specifically approved in advance as a job-related requirement (i.e., Tri-C campus police officers) or, in accordance with Ohio law, secured in a parked vehicle in a designated parking area only by an individual in possession of a valid conceal carry permit.

As a Tri-C student, your behavior on campus must comply with the student code of conduct which is available on page 29 within the Tri-C student handbook, available at http://www.tri-c.edu/student-resources/documents/studenthandbook.pdf. You must also comply with the College’s Zero Tolerance for Violence on College Property available at http://www.tri-c.edu/policies-and-procedures/documents/3354-2-10-10-zero-tolerance-for-violence-policy.pdf
Outcomes

Objective(s):
1. Relate landmarks in the history of EEG.
2. Describe the neurophysiological basis of EEG.
3. Identify normal awake rhythms in an EEG, and to relate criteria specific to certain age groups.
4. Identify normal sleep rhythms in the EEG and to relate these patterns and age related criteria specific to certain age groups.
5. Explain the various activation procedures used in routine EEG including the advantages and disadvantages of each.
6. Discuss abnormal EEG patterns through a classification of abnormalities, which will be related to all age groups.
7. Identify various benign variants commonly seen in the EEG and to differentiate them form abnormal patterns.
8. Identify EEG and clinical seizures and to describe these using specific seizure classifications.
9. Discuss all aspects of electrodes: type, metals, conductivity; electrolytes and impedance measurement.
10. Perform head measurement for placement of electrodes according to the International 10-20 electrode placement. Adjust the electrode placement for anatomical defects or anomalies.
11. Demonstrate the different techniques of applying electrodes using collodion, paste, electrode caps.
12. Discuss the importance of inter-electrode impedance measurement and resistance measurements.
13. Recognize, identify, and monitor physiological artifacts which may become a part of any routine EEG recording.
14. Recognize, identify and monitor a variety of non-physiological artifacts which may contaminate a EEG recording.
15. Differentiate artifact from cerebral waveforms.
16. Discuss the characteristics of the EEG input board and recording system.
17. Demonstrate how waveforms displays are affected by variations in instrumentation.
18. Define the descriptors of EEG activity: wave form, repetition, frequency, amplitude, distribution,
19. phase, timing, persistence, reactivity.
20. Describe the EEG report: description of the record, EEG diagnosis, clinical interpretation.

Methods of Evaluation:
1. Quizzes
2. Exams
3. Comprehensive final
4. Laboratory worksheets
5. Laboratory quizzes
6. Laboratory competencies
7. Laboratory comprehensive final

Course Content Outline:
1. Origins of the electroencephalogram
   a. Historical introduction
   b. The generator of the EEG
   c. Rhythmical EEG activity
   d. Recording of electrical potentials with scalp electrodes
2. Overview of the neurophysiological basis of EEG
   a. Neurophysiological basis--regulation of cortical rhythm
   b. Neurophysiological basis--generator of cortical rhythm
3. Recording electrodes
   a. Electrical properties of recording electrodes
      i. electrode potential
      ii. polarization
      iii. reversible electrodes
   b. Electrode shapes and application methods
   c. Types of electrodes
   d. Measuring of electrode resistance
   e. Electrode placement
      i. 10-20 International System
   f. Connecting electrodes to amplifiers
      i. bipolar derivation
      ii. common reference derivation
iii. average reference derivation
iv. source derivation
4. EEG recording system instrumentation
   a. Characteristics of the input board
   b. Characteristics of recording system
      i. sensitivity
      ii. linearity
      iii. frequency response
      iv. phase response
      v. noise
      vi. frequency response controls
         1. low-frequency and its time constant
         2. high frequency filter
         3. notch filter
      vii. paper speed
5. Operational techniques
   a. Design of montages
   b. Recording procedures
   c. Evocative techniques
      i. hyperventilation
      ii. photic stimulation
      iii. sleep
   iv. intravenous administration of drugs
6. Artifacts
   a. Physiological
   b. Nonphysiological
   c. Troubleshooting of artifacts
7. The normal EEG
   a. The definition of normal EEG
   b. The normal EEG from premature age to age of 19 years
   c. The normal EEG of wakeful resting adults of 20 to 50 years of age
   d. The normal EEG of adults over 20 years
   e. The normal EEG of adults over 60 years of age
8. The abnormal EEG
   a. The definition of abnormal EEG
   b. Correlation between abnormal EEG patterns, general cerebral pathology and specific neurological diseases
9. Deviation from normal patterns
   a. Abnormal frequency of alpha rhythm
   b. Abnormal reactivity of alpha rhythm
   c. Activity of alpha frequency in coma and seizures
   d. Immature patterns
10. Classification of seizures
    a. Definitions
    b. Classification of seizures—general
    c. Classification of seizures—specific
11. The EEG report
    a. Description of the record
    b. EEG diagnosis
    c. Clinical Interpretation

Resources


