END-1311: CARDIOPULMONARY ANATOMY AND PHYSIOLOGY

Cuyahoga Community College

Viewing: END-1311: Cardiopulmonary Anatomy and Physiology
Board of Trustees:
2018-01-25

Academic Term:
Fall 2018

Subject Code
END - Electroneurodiagnostic

Course Number:
1311

Title:
Cardiopulmonary Anatomy and Physiology

Catalog Description:
Anatomy and physiology of cardiovascular and pulmonary systems. Cardiovascular system anatomy and electrophysiology of the heart, electrocardiography (ECG) interpretation, blood flow characteristics and hemodynamics. Pulmonary system anatomy and physiology overview, principles of ventilatory control, diffusion, gas transport, and oxygenation.

Credit Hour(s):
2

Lecture Hour(s):
2

Requisites

Prerequisite and Corequisite
BIO-2331 Anatomy and Physiology I, 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 https://www.tri-c.edu/student-accessibility-services. Blackboard accessibility information is available at http://access.blackboard.com.

Eastern (216) 987-2052 - Voice. (216) 987-2423 - Fax
Metropolitan (216) 987-4344 – Voice.
(216) 987-3257 - Fax.
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/3354-1-20-10-zero-tolerance-for-violence-policy.pdf

VI. CORONAVIRUS/COVID-19 STATEMENT

Students are responsible for adhering to all College health and safety guidance, including that which relates to the COVID-19 pandemic.

Public health requirements and standards are changing rapidly, and the College is adapting its guidance accordingly. Please check your Tri-C email and visit tri-c.edu/coronavirus regularly for updates.

All students must adhere to the following general guidelines, until further notice:

• Remain at home if you are ill or experiencing symptoms of illness. Do not attend any in-person class or gathering.
• Notify your instructor(s) if you are ill, have tested positive for COVID-19, or were exposed to an individual who has tested positive for COVID-19 and they will report the information to the Tri-C Compliance & Risk Management team and you may be contacted for follow-up information.
• Wear a mask or face covering at all times, including, but not limited to: upon entering and exiting any Tri-C facility, in class, and in all common areas.
• Maintain a distance of at least six feet between yourself and others at all times and if you must pass near an individual do it quickly and do not linger.
• Provide the College with relevant information about your current health status and participate in any required on-site checks (e.g., temperature checks, current contact information, symptom profile, etc.).
• Use only designated areas of Tri-C facilities, including entrances and exits. Sign in and out of Tri-C facilities as directed.
The general guidelines listed above do not encompass all coronavirus-related guidance. These guidelines are subject to change at the discretion of the College and under the direction of public health authorities. Students who fail to adhere to this guidance may be subject to disciplinary action under the College’s Student Code of Conduct and the Student Judicial Code.

Outcomes
Course Outcome(s):
Apply basic knowledge of cardiac and pulmonary functions while performing Electroencephalography (EEG) and Polysomnography (PSG) under supervision.

Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):
1. Relate the anatomic structures of the cardiovascular system to their respective physiologic function.
2. Compare normal and abnormal conduction (arrhythmias) to heart function.
3. Relate the phases of the action potential to the conduction of a normal heart beat.
4. Compare the effects of repolarization and depolarization of the heart chambers to the waveforms seen on the electrocardiogram (ECG).
5. Calculate the heart rate given an ECG strip.
6. Analyze ECG rhythm strips.
7. Predict the physiologic events that are occurring given an electrocardiogram (normal or abnormal).
8. Relate the anatomic structure of the respiratory system to the respective physiologic function.
9. Associate principles of gas flow, resistance and compliance to the anatomical structures regulating the dynamic principles of ventilation.
10. Discuss the principles of gas diffusion and its limiting factors within the pulmonary circulation.
11. Differentiate the processes of ventilation, gas distribution, gas flow, diffusion and respiration and identify the structures that accommodate these functions.
12. Diagram and label the mechanical and electrical structures of the heart.
13. Compare the stimulus of ventilation between the central and peripheral chemoreceptors.
14. Integrate the structural and physiologic effects of spinal injuries on the process of ventilation.
15. Associate principles of gas flow, resistance and compliance to the anatomical structures regulating the principles of ventilation.
16. Evaluate the clinical changes seen with changes in lung compliance.
17. Classify clinical scenarios as presenting normal, shunting, deadspace relationships.
18. Predict how changes in surfactant levels could alter alveolar distending pressures and lung compliance in newborns and adults.
19. Categorize how changes in gas flow, volume, pressure, and/or resistance could alter work of breathing.
20. Illustrate the relationship of gas diffusion and gas transport to cellular respiration.
22. Categorize clinical factors that could shift the position of the oxygen and carbon dioxide dissociation curves.
23. Relate the terms depolarization and repolarization to the electrical and mechanical actions of the heart.
24. Differentiate the gas volume of the lung to pulmonary circulation and the physical characteristics, which regulate ventilation to perfusion matching.
25. Compare perfusion and diffusion limited gases and relate to pulmonary blood flow.
26. Discuss concepts of ventilation-perfusion in an upright position and compare to variations occurring with changes in body position, and in the presence of shunting and/or deadspace.
27. Differentiate the results of sympathetic and parasympathetic innervation on the heart and blood vessels.
28. Compare and contrast factors that affect blood pressure and blood flow through the cardiovascular system.
29. Predict the effect on blood pressure when any of the following factors are changed: blood volume, venous return, ventricular end-diastolic pressure (VEDP), ventricular end-diastolic volume (VEDV), stroke volume (SV), cardiac output (CO), heart rate, contractility, peripheral resistance, and vessel constriction and/or dilation. Differentiate the types of pressures affecting blood vessels.
30. Compare the systemic and pulmonary vascular systems.
31. Relate the effect of gravity on blood flow to various regions of the lung
32. Compare the relationship of preload, afterload and contractility on stroke volume and cardiac output.
Methods of Evaluation:
1. Examinations
2. Quizzes
3. Assignments: EKG strip analysis
4. Participation in small group learning activities (EKG strip reading)
5. Class participation

Course Content Outline:
1. Cardiovascular system
   1. anatomy and physiology
      i. heart
   2. vessels heart Cardiac cycle
      i. blood flow through the heart chambers
      ii. cardiovascular pressures and volumes
      iii. cardiovascular control
   3. Electrophysiology of the heart
      i. action potential
      ii. conduction system of the heart
      iii. sequence of electrical activity of the cardiac cycle
      iv. interrelationship of electrical system and mechanical action of heart
      v. action potential related to conduction
   4. Hemodynamics of cardiovascular system
      i. interrelationships between flow, volume, resistance, and pressure
      ii. variables that determine/modify blood pressure
      iii. variables that determine/modify cardiac output
      iv. variables the determine/modify resistance to blood flow
      v. clinical measurements related to flow, volume, resistance, and pressure
   5. Normal and abnormal electrocardiogram
      i. waveform components of electrocardiogram and corresponding electrical and mechanical actions of the heart
      ii. calculate rate of electrocardiogram rhythms
      iii. interpret normal and abnormal electrocardiogram rhythms
      iv. abnormal cardiac rhythm impact on cardiac output
2. Respiratory system
   1. anatomy and physiology
      i. upper and lower airways
      ii. respiratory exchange zone
      iii. lung divisions
      iv. thorax
   2. control of ventilation
      i. normal ventilatory drive
      ii. abnormal ventilatory drive
      iii. ventilation mechanics
      iv. interrelationships between pressure, flow, volume, and resistance
      v. pulmonary pressure changes that result in inspiration and expiration
      vi. normal and abnormal lung compliance
      vii. variables affecting distending pressure of alveolus
      viii. variables effecting airway resistance
   3. diffusion of pulmonary gases and transport of gases
      i. normal movement of gases across alveolar-capillary membrane
      ii. methods of gas transport for oxygen and carbon dioxide
      iii. oxygen and carbon dioxide dissociation curves
   4. ventilation-perfusion matching
      i. perfusion-limited and diffusion limited gases
      ii. normal and abnormal ventilation-perfusion matching in the lung
      iii. pulmonary shunting and deadspace

Resources


**Resources Other**

5. *American Journal of Electroneurodiagnostic Technology (AJET)* by the ASET; 4 issues annually; which reflects most recent changes and updates in the field.

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