Course Number and Title: EXS 225 Advanced Exercise Testing

Campus Location:
Wilmington

Effective Date:
2018-51

Prerequisite:
EXS 135, MAT 153

Co-Requisites:
None

Course Credits and Hours:
4.00 credits
3.00 lecture hours/week
2.00 lab hours/week

Course Description:
This course presents techniques for assessing cardiovascular fitness, flexibility, body composition, muscular strength, and pulmonary capacity. Emphasis is on safety guidelines and precautions.

Required Text(s):
Obtain current textbook information by viewing the campus bookstore - https://www.dtcc.edu/bookstores online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:
Exercise Science Program Manual
Allied Health/Science Department Program Student Policy Manual

Schedule Type:
Classroom Course

Disclaimer:
None

Core Course Performance Objectives (CCPOs):

1. Explain the basic theories and concepts of electrocardiogram (EKG) interpretation. (CCC 5, 6; PGC 1, 2, 3, 7)
2. Compare and contrast the various EKG arrhythmias due to conduction disturbances and alterations. (CCC 2, 5, 6; PGC 1, 2)
3. Differentiate the effects of EKG artifacts, cardioversion, defibrillation, and pacemakers on normal EKG tracings. (CCC 2, 5, 6; PGC 1, 2)
4. Analyze how electrolyte imbalances, ischemia, and infarctions are differentiated on an EKG. (CCC 2, 5, 6; PGC 1, 2)
5. Explain the principles of hemodynamic monitoring. (CCC 5, 6; PGC 2, 3)
6. Describe how anti-arrhythmic and thrombolytic drugs affect an EKG. (CCC 5, 6; PGC 1, 2)
7. Differentiate between pediatric and adult EKGs. (CCC 3, 6; PGC 1, 2)
8. Analyze the theories and concepts of pulmonary functions as they apply to persons at rest and during exercise. (CCC 2, 5, 6; PGC 1, 2, 3, 8)
9. Conduct and interpret the data from various protocols used in clinical settings to evaluate fitness performance. (CCC 2, 6; PGC 2, 3, 4, 5, 6, 7, 8, 10)
10. Demonstrate and appropriately assess the components of professional behaviors as applied in the classroom and lab activities. (CCC 3, 4; PGC 1, 5)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):
Upon completion of this course, the student will:

1. Explain the basic theories and concepts of electrocardiogram (EKG) interpretation.
    1. Describe the resting potential, depolarization, and repolarization of cells.
    2. Discuss the standard limb leads, augmented leads, precordial leads, and bedside monitoring.
    3. Describe the leads that examine the lateral surface, inferior surface, anteroseptal surface, apical surface, and posterior regions of the left ventricle.
    4. Describe the electrical conduction system of the heart.
    5. Describe the representation of the P wave, P-R interval, QRS complex, ST segment, and T wave in an EKG tracing.
    6. Describe EKG paper time and the three methods of determining heart rates from EKG tracings.

7. Describe a sinus rhythm, its components, and its normal range of values.

2. Compare and contrast various EKG arrhythmias due to conduction disturbances and alterations.
    1. List and describe the basic steps used to accurately interpret dysrhythmias.
    2. Identify and describe the following sinus and atrial dysrhythmias:
        1. Sinus arrhythmia, bradycardia, and tachycardia
        2. Premature atrial contractions
        3. Atrial tachycardia
        4. Wandering atrial pacemaker
        5. Sick sinus syndrome (brady-tachy syndrome)
        6. Atrial flutter
        7. Atrial fibrillation
    3. Identify and describe junctional escape rhythms, junctional escape beats, premature junctional beats, and junctional tachycardia.
    4. Identify and describe fusion beats.
    5. Identify and describe premature ventricular contractions, ventricular tachycardia, flutter, fibrillation, and escape rhythms.
    6. Compare and contrast sinus arrest and sinus block.
    7. Discuss bundle of His electrogram studies.
    8. Compare and contrast first degree atrioventricular block (AV block), Mobitz Type I (Wenckebach) second degree AV block, Mobitz Type II second degree AV block, and third degree heart block.
    9. Compare and contrast right bundle branch block, rate dependent bundle branch block, and left bundle branch block.
3. Differentiate the effects of EKG artifacts, cardioversion, defibrillation, and pacemakers on normal EKG tracings.
    1. Describe various appearances and sources of artifacts on EKG readings.
    2. Discuss the cause of artifacts, how they are recognized, and the steps used to eliminate them.
    3. Identify refractory and vulnerable periods in the cardiac cycle.
    4. Explain synchronized and non-synchronized precordial shock or cardioversion.
    5. Describe temporary and permanent pacemakers.
    6. Discuss how pacemakers affect EKG readings.
4. Analyze how electrolyte imbalances, ischemia, and infarctions are differentiated on an EKG.
    1. Identify and describe the EKG manifestations associated with hypokalemia, hyperkalemia, hypocalcemia, and hypercalcemia.
    2. Compare and contrast the EKG changes associated with myocardial ischemia and infarction.
    3. Compare and contrast anteroseptal, inferior, lateral, and posterior wall myocardial infarctions.
    4. Describe how EKG lead changes are associated with specific coronary arteries.
    5. Discuss the changes seen in cardiac enzymes with myocardial infarction.
5. Explain the principles of hemodynamic monitoring.
    1. Describe normal right atrial, right ventricular, pulmonary artery, and pulmonary capillary wedge pressure valves.
    2. Describe the typical pressure waveforms associated with right heart chambers and the pulmonary artery.
    3. Discuss the relationships among pulmonary artery diastolic pressure, pulmonary capillary wedge pressure, and left ventricular end diastolic pressure.
    4. Discuss the causes for abnormal hemodynamic pressures.
6. Describe how anti-arrhythmic and thrombolytic drugs affect an EKG.
    1. Describe the autonomic nervous system control of heart rate.
    2. Discuss drug actions in terms of agonists, antagonists, and receptors.
    3. Describe the four categories of antiarrhythmic drugs and their effects on the heart, including subsequent EKG changes.
    4. Describe thrombolytic drug therapy for acute myocardial infarction.
7. Differentiate between pediatric and adult EKGs.
    1. Compare heart rate norms for children and adults.
    2. Compare the normal duration of P, P-R, QRS, and QT intervals in children to adults.
    3. Identify and describe common cardiac dysrhythmias in children.
    4. Describe drug and electrolyte manifestations in children.
8. Analyze the theories and concepts of pulmonary function as they apply to persons at rest and during exercise.
    1. Define *maximum oxygen uptake* (VO2max).
    2. Calculate VO2max from field tests for cardiovascular fitness.
    3. Define a metabolic equivalent of task (MET) and its relationship to VO2max.
    4. Describe the use of open-circuit spirometry to determine VO2max and the anaerobic threshold.
    5. Discuss how VO2max and the anaerobic threshold can be used in writing exercise prescriptions.
9. Conduct and interpret data from various protocols used in clinical settings to evaluate fitness performance.
    1. Conduct and interpret a pre-exercise test/program health questionnaire.
    2. Collect a systolic and diastolic blood pressure reading on a resting patient within a 5 mm range of the instructor’s reading.
    3. Collect a systolic and diastolic blood pressure reading on an exercising patient within a 5 mm range of the instructor’s reading.
    4. Collect heart rates by auscultation with a stethoscope, palpitation, and EKG readings.
    5. Use the American College of Sports Medicine (ACSM) equation for VO2max, kcal, and METs.
    6. Collect body compositions using the following methods: BMI, skin folds, waist to hip ratio, bioelectric impedance, and anthropometric measurements.
    7. Conduct and interpret an EKG using 12-lead placement.
    8. Interpret normal and abnormal EKG rhythm strips.
    9. Prepare an exercise prescription plan appropriate for the client given the EKG data.
    10. Prepare and perform a complete metabolic (VO2) assessment.
    11. Prepare an exercise prescription plan appropriate for the client given VO2max and the anaerobic threshold.

10. Demonstrate and appropriately assess the components of professional behaviors as applied in the classroom and lab activities.
    1. Demonstrate professional behaviors and attributes of the professional behaviors tool.
    2. Self-assess professional behaviors and modify accordingly.
    3. Comply with the Health Insurance Portability and Accountability Act (HIPAA) regulations.
    4. Demonstrate the ability to maintain the order of equipment, supplies, and testing area.

Evaluation Criteria/Policies:
Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	–	100	=	A
83	–	91	=	B
75	–	82	=	C
0	–	74	=	F

Students should refer to the Student Handbook - https://www.dtcc.edu/handbook for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):

1. Integrate professional behaviors in an ethical, legal, safe, and effective manner within the exercise science delivery system.
2. Perform appropriate measurement and assessment techniques to assist in evaluating a client's status for proper exercise prescription plans.
3. Prescribe and implement a comprehensive exercise prescription plan based upon pre- exercise screenings.
4. Communicate effectively with clients about their progress.
5. Modify existing exercise prescription plans based upon routinely scheduled re- evaluations of clients.
6. Document relevant aspects of client treatment.
7. Demonstrate effective written, oral, and nonverbal communication skills with clients, their families, colleagues, health care providers, and the public.
8. Communicate knowledge by participating in the teaching and explaining of exercise science concepts to clients, colleagues and the public.
9. Recognize the importance of continued development of knowledge and skills through the practice of reading professional literature and attending continuing education activities.
10. Demonstrate the ability to apply their knowledge to aspects of clinical practice, as required of an entry-level Certified Exercise Science technologist.

Disabilities Support Statement:
The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the disabilities services - https://www.dtcc.edu/disabilitysupport web page or visit the campus Advising Center.