Tennessee CTE

Exercise Science

Exercise Science as a Career	**1** Define exercise physiology and link to the careers within the Clinical Exercise Physiology career pathway as a cardiac rehabilitation therapist, certified strength and conditioning coach, personal trainer, lifestyle and weight management coach, athletic trainer, and corporate wellness supervisor/instructor. Explain in detail the education level, credentialing/licensure requirements, and continuing education unit requirements necessary for success in these fields, as well as state and national compliance guidelines. Research professional organizations and codes of ethics associated with these occupations. 1
	2 Compare and contrast the roles and responsibilities of professionals in exercise physiology with those of professionals in other rehabilitation areas. Research and debate in an oral, written, or digital format the differences in client-therapist/trainer relationships, entities of risk management, liability issues, and protocols for working with special populations. 2
	3 Develop an oral, written, or digital presentation explaining the relationship of exercise physiology professionals with other healthcare and community professionals, especially related to concerns over encroachment and role delineation. Provide suggestions to promote a working, team-building environment. 3
	4 Design a detailed written or digital artifact explaining the correlation of the sciences of physics, chemistry, biology, anatomy and physiology, bioenergetics, and kinesiology to the emerging science surrounding exercise physiology. Include in the explanation at minimum the following: current research, new technologies and treatments, governmental initiatives, and injury/illness prevention. 4
	5 Complete a literature review analyzing at least three peer-reviewed articles to answer a research question surrounding the history, development, and future of exercise physiology as a scientific discipline. Document findings in an informational text using appropriate citation conventions, integrating quantitative and graphic information from the articles reviewed. 5
Anatomy and Physiology	**6** Research the theories of the Specific Adaptation to Imposed Demands (S.A.I.D.) principle and the Frequency, Intensity, Type, and Time (F.I.T.T.) principle. Explain the application of these principles to exercise and fitness, then describe the changes that occur within normal anatomy and physiology associated with these theories. 6
	7 Review the Physical Activity Guidelines Advisory Committee Report (latest edition) from the U.S. Department of Health. Explain the scientific evidence

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surrounding participation in regular physical activity and exercise and its association with positive health outcomes, especially involving the cardiovascular, musculoskeletal, and respiratory systems. 7

8 **Review the gross and cellular anatomy and physiology of the musculoskeletal, nervous, and cardiovascular systems. Define the terms neuromuscular integration and central command. Summarize how neuromuscular integration, central command, and training and/or rehabilitation plans are based on the integration of the muscle nerve with the muscles of these systems.** 8

9 **Identify the two types of muscle fibers and their subtypes, slow twitch and fast twitch. Relate the concepts of histochemistry, immunocytochemistry, and physiologic contraction times to the performance of athletes in various sports. Evaluate the role genetics and training play in muscle fiber adaptations. From this research, generate an informational artifact to share with athletes or clients as part of an exercise/training program.** 9

10 **Review the gross and cellular anatomy and physiology of the respiratory system and explain the ventilation process. Develop an exercise program and a rehabilitation plan for a patient/client who has chronic obstructive pulmonary disease (COPD) and one who is training for a marathon, based on their respective respiratory needs. Compare and contrast these plans to justify the components included.** 10

11 **Compare and contrast the functions of the cardiovascular system in response to aerobic exercises. Cite the specific changes that are likely to occur and the part of the anatomy that is involved. Using this information, develop a public service announcement, health education/public health presentation, or community awareness brochure to educate local citizens about the importance of exercise in maintaining positive cardiovascular health.** 11

Adaptations to Exercise

12 **Explain why adaptations must be made to exercise programs to account for different clients' needs. Given a scenario or profile of a client/patient, develop an exercise program with the following adaptations:** 12

- A Immediate effects of exercise 12A
- B Long term effects of exercise (heart/lungs/weight control/disease prevention) 12B
- C Effects of acclimatization (such as changes in temperature, altitude, climate, etc.) 12C
- D Effects of travel on the client and/or athlete 12D
- E Medications 12E

13 **Review the concepts of kinesiology and biomechanics from the Rehabilitation Careers course. Explain how joint and bone movement, body motion, and levers can have positive or negative effects on an athlete's performance and development. In a presentation or speech intended for an audience of young athletes, describe the effects of overtraining on the musculoskeletal system, and**

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	relate the importance of adopting safe biomechanical practices when training. 13
Nutrition	**14 Gather relevant information from multiple authoritative print and digital sources related to the importance of a balanced diet in the achievement of optimum nutrition and exercise. Compare and contrast the nutritional needs of a normal healthy diet with the needs of other clients, such as those training for an intensive sporting event, those with cardiac disease, or those being treated for and/or recovering from illness. Prepare an informative artifact to discuss the findings.** 14
	15 Investigate the chemical makeup of various sports drinks. In an argumentative essay, debate the nutritional value of these drinks compared to water as a form of hydration, electrolyte replacement, and vitamin replenishment for athletes. State the advantages and disadvantages of each and the dangers that are likely to occur with inappropriate hydration techniques and/or dehydration. Discuss the importance of hydration before, during, and after a sporting event, as well as the factors that affect the hydration process. 15
	16 Access a variety of sources, such as professional journals and/or websites, textbooks, and news articles, regarding appropriate nutritional intake recommendations for athletes. Develop a pre- and post-sport activity meal plan for adolescent, young adult, middle age, and older adult athletes in contact and non-contact sports. Include in the meal plan carbohydrate loading, carbohydrate maintenance, protein loading, and nutritional needs for anaerobic versus aerobic exercise. Revise the plan as new information and circumstances arise. 16
	17 Cite textual evidence from academic research or nutritional literature to explain how chemical energy contained in glucose, fats, and amino acids is converted to adenosine triphosphate (ATP). In a written, oral, or digital presentation, describe how this process is important in the following areas of practice: health/fitness, medicine, athletic performance, and rehabilitation. 17
	18 Choose a health parameter relevant to weight management disorders, such as the presence of anorexia nervosa in teens. Research local incidence information and investigate the scope of the disease/disorder in vulnerable populations. Compare that data to similar state, regional, and national information. Develop an action plan for addressing the weight management disorder for the identified area, complete with an analysis of the pros and cons associated with popular diets, recommended caloric intake, appropriate exercise, and other healthcare interventions. 18
	19 According to articles in professional journals, ergogenic aids have been theorized to improve athletic performance in a variety of ways. In an informational essay, state the definition of ergogenic aids, identify how they are classified (including those that are banned), and describe documented benefits, dangers, and side effects. 19

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20 **Review the International Olympic Committee's position on banned ergogenic aids and debate the pros and cons of the use of acceptable ergogenic aids, especially related to adolescent athletes.** 20

Assessment and Fitness Measurement

21 **Understand principles of, and successfully perform skills related to, baseline assessment and fitness measurement, incorporating rubrics from National HOSA guidelines, textbooks, or clinical standards of practice for the following:** 21

- A Cardiovascular testing 21A
- B Muscular strength testing 21B
- C Flexibility testing 21C
- D Muscular endurance testing 21D
- E Postural screening 21E
- F Speed testing 21F
- G Balance testing 21G
- H Reaction time testing 21H
- I Coordination testing 21I
- J Agility testing 21J
- K Muscular power testing 21K

22 **Understand principles of, and successfully perform skills related to, biometric measurements, incorporating rubrics from National HOSA guidelines, textbooks, or clinical standards of practice for the following:** 22

- A BMI 22A
  - i How to calculate 22AI
  - ii Importance of knowing 22AII
  - iii Myths and misconceptions 22AIII
- B Body fat percentage calculations 22B
- C Girth 22C
- D Waist and hip ratio 22D
- E Resting Heart rate 22E
- F Resting Blood pressure 22F
- G Resting Respiratory rate 22G

Exercise Program

23 **Identify and explain the components of an exercise plan. Evaluate an exercise plan for a healthy athlete, then compare and contrast the plan with one that has been designed for a patient with cardiac, neurological, or orthopedic difficulties. Note the similarities and differences in a side by side chart.** 23

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24 **Summarize information from professional journals, websites, and organizations that have developed position papers or reports surrounding the training principles listed below. In the summary, identify how each principle can be incorporated into the F.I.T.T. principle covered earlier in the course in order to develop an optimal exercise plan for clients who are currently not involved with exercise.** 24

- A Goal Setting/Reality principle 24A
- B Inherent Ability principle 24B
- C Intrinsic Motivation principle 24C
- D Client Education Model principle 24D
- E Physical Assessment principle 24E
- F Overload/Progressive principle 24F
- G Specificity principle 24G
- H Trainability principle 24H
- I Periodization principle 24I
- J Overtraining principle 24J
- K Detraining principle 24K

25 **Complete a consultation and evaluation of a patient/client who is preparing for an intense athletic event, recovering from a cardiovascular illness/injury, making lifestyle modifications to improve health, or is required to improve health for work/insurance reasons. Ensure that the evaluation covers therapeutic communication and psychology, nutrition, cardiovascular and muscular strength and endurance, acute variables that will affect training/rehabilitation, and training goals. Document findings in an authentic template using appropriate medical terminology.** 25

26 **Utilizing information from the consultation, evaluation, fitness testing, and biometric measurements previously obtained, develop and document using appropriate medical terminology an exercise/rehabilitation program for each of the following:** 26

- A Juvenile athlete 26A
- B Adult athlete 26B
- C Senior adult athlete 26C
- D Cardiovascular rehabilitation 26D
- E Morbid obese with a co-morbidity 26E