Health Science Career Cluster
Fundamentals of Exercise Physiology
Course Number: 25.45400

Course Description:
As the third course in the Physical Medicine/Exercise Physiology Career Pathway, this course is appropriate for students wishing to pursue a career in personal training or for those who desire an introduction in the field of exercise physiology. The course will enable students to perform fitness assessments, according to current guidelines, and to use data to develop exercise and training routines, fitness plans, and nutritional programs to fit the needs of clients. The concepts of human kinesiology will be evaluated and fundamental skills of goal setting, record keeping, and instruction techniques will be covered in the course. Proficiency in using and teaching others to use various types of exercise equipment and stretching techniques will be developed. Personal, professional, and ethical skills, as well as the guidelines, and safety practices required within the field of personal training, will be learned and practiced. The ability to create routines and programs for fitness to meet the needs of the general population and to meet the special needs of targeted groups of individuals will be developed. The prerequisites for this course are Introduction to Healthcare and Essentials of Healthcare.

Successful completion of this course along with any other requirements may lead to a potential eligibility to take the Personal Trainer Exam through a certifying body.

Mastery of these standards through project-based learning, technical-skills practice, and leadership-development activities of the state supported healthcare career and technical student organization will provide students with a competitive edge for either entry into the healthcare global marketplace and/or the post-secondary institution of their choice to continue their education and training.

Course Standard 1

HS-FEP-1
The following standard is included in all CTAE courses adopted for the Career Cluster/Pathways. Teachers should incorporate the elements of this standard into lesson plans during the course. The topics listed for each element of the standard may be addressed in differentiated instruction matching the content of each course. These elements may also be addressed with specific lessons from a variety of resources. This content is not to be treated as a unit or separate body of knowledge but rather integrated into class activities as applications of the concept.

Standard: Demonstrate employability skills required by business and industry.
The following elements should be integrated throughout the content of this course.

1.1 Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities.

Person-to-Person Etiquette	Telephone and Email Etiquette	Cell Phone and Internet Etiquette	Communicating At Work	Listening
Interacting with Your Boss	Telephone Conversations	Using Blogs	Improving Communication Skills	Reasons, Benefits, and Barriers
Interacting with Subordinates	Barriers to Phone conversations	Using Social Media	Effective Oral Communication	Listening Strategies
Interacting with Co-workers	Making and Returning Calls		Effective Written Communication	Ways We Filter What We Hear
Interacting with Suppliers	Making Cold Calls		Effective Nonverbal Skills	Developing a Listening Attitude
	Handling Conference Calls		Effective Word Use	Show You Are Listening

	Handling Unsolicited Calls		Giving and Receiving Feedback	Asking Questions
				Obtaining Feedback
				Getting Others to Listen

Nonverbal Communication	Written Communication	Speaking	Applications and Effective Résumés
Communicating Nonverbally	Writing Documents	Using Language Carefully	Completing a Job Application
Reading Body Language and mixed Messages	Constructive Criticism in Writing	One-on-One Conversations	Writing a Cover Letter
Matching Verbal and Nonverbal communication		Small Group Communication	Things to Include in a Résumé
Improving Nonverbal Indicators		Large Group Communication	Selling Yourself in a Résumé
Nonverbal Feedback		Making Speeches	Terms to Use in a Résumé
Showing Confidence Nonverbally		Involving the Audience	Describing Your Job Strengths
Showing Assertiveness		Answering Questions	Organizing Your Résumé
		Visual and Media Aids	Writing an Electronic Résumé
		Errors in Presentation	Dressing Up Your Résumé

1.2 Demonstrate creativity by asking challenging questions and applying innovative procedures and methods.

Teamwork and Problem Solving	Meeting Etiquette
Thinking Creatively	Preparation and Participation in Meetings
Taking Risks	Conducting Two-Person or Large Group Meetings
Building Team Communication	Inviting and Introducing Speakers
	Facilitating Discussions and Closing
	Preparing Visual Aids
	Virtual Meetings

1.3 Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.

Problem Solving	Customer Service	The Application Process	Interviewing Skills	Finding the Right Job
Transferable Job Skills	Gaining Trust and Interacting with Customers	Providing Information, Accuracy and Double Checking	Preparing for an Interview	Locating Jobs and Networking
Becoming a Problem Solver	Learning and Giving Customers What They Want	Online Application Process	Questions to Ask in an Interview	Job Shopping Online
Identifying a Problem	Keeping Customers Coming Back	Following Up After Submitting an Application	Things to Include in a Career Portfolio	Job Search Websites
Becoming a Critical Thinker	Seeing the Customer's Point	Effective Résumés:	Traits Employers are Seeking	Participation in Job Fairs
Managing	Selling Yourself and the Company	Matching Your Talents to a Job	Considerations Before Taking a Job	Searching the Classified Ads
	Handling Customer Complaints	When a Résumé Should be Used		Using Employment Agencies
	Strategies for Customer Service			Landing an Internship

				Staying Motivated to Search

1.4 Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity.

Workplace Ethics	Personal Characteristics	Employer Expectations	Business Etiquette	Communicating at Work
Demonstrating Good Work Ethic	Demonstrating a Good Attitude	Behaviors Employers Expect	Language and Behavior	Handling Anger
Behaving Appropriately	Gaining and Showing Respect	Objectionable Behaviors	Keeping Information Confidential	Dealing with Difficult Coworkers
Maintaining Honesty	Demonstrating Responsibility	Establishing Credibility	Avoiding Gossip	Dealing with a Difficult Boss
Playing Fair	Showing Dependability	Demonstrating Your Skills	Appropriate Work Email	Dealing with Difficult Customers
Using Ethical Language	Being Courteous	Building Work Relationships	Cell Phone Etiquette	Dealing with Conflict
Showing Responsibility	Gaining Coworkers' Trust		Appropriate Work Texting	
Reducing Harassment	Persevering		Understanding Copyright	
Respecting Diversity	Handling Criticism		Social Networking	
Making Truthfulness a Habit	Showing Professionalism			
Leaving a Job Ethically				

1.5 Apply the appropriate skill sets to be productive in a changing, technological, diverse workplace to be able to work independently and apply team work skills.

Expected Work Traits	Teamwork	Time Management
Demonstrating Responsibility	Teamwork Skills	Managing Time
Dealing with Information Overload	Reasons Companies Use Teams	Putting First Things First
Transferable Job Skills	Decisions Teams Make	Juggling Many Priorities
Managing Change	Team Responsibilities	Overcoming Procrastination
Adopting a New Technology	Problems That Affect Teams	Organizing Workspace and Tasks
	Expressing Yourself on a Team	Staying Organized
	Giving and Receiving Constructive Criticism	Finding More Time
		Managing Projects
		Prioritizing Personal and Work Life

1.6 Present a professional image through appearance, behavior and language.

On-the-Job Etiquette	Person-to-Person Etiquette	Communication Etiquette	Presenting Yourself
Using Professional Manners	Meeting Business Acquaintances	Creating a Good Impression	Looking Professional
Introducing People	Meeting People for the First Time	Keeping Phone Calls Professional	Dressing for Success
Appropriate Dress	Showing Politeness	Proper Use of Work Email	Showing a Professional Attitude
Business Meal Functions		Proper Use of Cell Phone	Using Good Posture
Behavior at Work Parties		Proper Use in Texting	Presenting Yourself to Associates

Behavior at Conventions			Accepting Criticism
International Etiquette			Demonstrating Leadership
Cross-Cultural Etiquette			
Working in a Cubicle			

Support of CTAE Foundation Course Standards and Georgia Standards of Excellence L9-10RST 1-10 and L9-10WHST 1-10:
Georgia Standards of Excellence ELA/Literacy standards have been written specifically for technical subjects and have been adopted as part of the official standards for all CTAE courses.

Course Standard 2

HS-FEP-2 Fundamentals of Human Movement Science
Identify and compare the structures and functions of the major anatomical systems of the human body.

2.1 Identify and compare the structure and function of the muscular system, the skeletal system, the nervous system, the cardiorespiratory system, and the endocrine system.

Course Standard 3

HS-FEP-3 Exercise Physiology
Identify the functions of exercise physiology within the systems of the body.

3.1 Identify the basic structure and function of exercise physiology within the:
- nervous system (e.g., motor units, action potential)
- muscular system (e.g., sliding filament theory, muscle action spectrum)
- skeletal system (e.g., arthrokinematics)
- endocrine system (e.g., feedback mechanisms, responses to exercise)
- cardiorespiratory system (e.g., cardiovascular physiology and cardiorespiratory physiology)
- bioenergetics (e.g., energy systems, anaerobic vs. aerobic metabolism)

3.2 Explain and differentiate between the principles of human movement science.
3.3 Describe the functional biomechanics of human movement (e.g., levers, force, torque, planes of motion, joint motion).

Course Standard 4

HS-FEP-4 Human Kinesiology
Explain and compare the principles of human kinesiology.

4.1 Define the concepts of biomechanics.
4.2 Recognize and use basic biomechanical terminology (e.g., anatomical locations, planes of motion, axes and joint motion.
4.3 Identify and explain the concepts associated with scapular motion.
4.4 Identify and explain how muscle actions and outside forces relate to human movement (e.g., isotonic, isometric and isokinetic motions).
4.5 Identify the concepts associated with the functional anatomy of muscles, including the following:
- Muscular Force
- Length-Tension Relationships
- Force-Velocity Curve
- Force couple relationships
- Reciprocal Inhibition
- Synergistic Dominance

- Kinetic Chain

4.6 Explain the concepts of motor learning and motor control.
- Identify the concept of motor behavior
- Describe motor control, motor learning and motor development and explain their importance in exercise training
- Define and compare the concepts associated with motor control (e.g., muscle synergies, proprioception, and sensorimotor integration)
- Define and compare motor-learning concepts (internal and external feedback)

Course Standard 5

HS-FEP-5 Assessments Associated with Personal Fitness Training
Explain and perform the assessments associated with personal fitness training.

5.1 Explain the regulations and guidelines related to the scope of practice for fitness assessment and personal training.

5.2 Perform a fitness assessment using current guidelines.
- Demonstrate the ability to interpret and record information using the current guidelines for PAR-Q, medical history, medical risk factors (e.g., medications, surgeries, chronic disease, metabolic syndrome), and lifestyle questionnaire (e.g., sleeping habits, occupation, hobbies, stress level)
- Demonstrate the ability to perform subjective assessments for special populations such as seniors, youths, prenatal and postnatal individuals

5.3 Demonstrate performing, interpreting, and recording for the following:
- objective assessments related to the field of personal training
- postural assessments of the lumbo-pelvic-hip complex and the upper and lower extremities
- movement assessments including an Overhead Squat Test, Single-Leg Squat Test, Pushing Test, and Pulling Test

5.4 Demonstrate performing and interpreting the following:
- vital sign examinations including respiration rate, blood pressure, pulse rate, and temperature
- body composition assessments
- strength assessments (e.g., maximal submaximal)
- performance assessments (e.g., stability, balance, power, speed, agility)

5.5 Describe a cardiorespiratory assessment and assess the findings including:
- maximum heart rate
- heart rate training zones
- sub VO2 max test (e.g., step test, Rockport Walk test, heart rate monitoring systems, metabolic testing)

Course Standard 6

HS-FEP-6 Exercise Technique and Training Instruction
Explain the concepts associated with exercise techniques and training instruction.

6.1 Define and assess the components of exercise execution following the Kinetic Chain Checkpoints (e.g., starting position, ending position).

6.2 Demonstrate and describe the usages for integrated flexibility techniques including Active, Dynamic, Static, and SMR (Self myofascial release).
- Define flexibility
- Explain the components of the Human Movement System (HMS).
- Explain the components of Neuromuscular Efficiency and mechanoreceptors.

- Explain the scientific rationale associated with flexibility training.
- Illustrate the three components of the flexibility continuum and describe their importance
- Demonstrate the proper techniques for performing the following:
  a. Stretches associated with myofascial release
  b. Static stretching
  c. Active isolated
  d. Dynamic
- Demonstrate knowledge of safety measures for flexibility training.

6.3 Demonstrate and describe the fundamentals of cardiorespiratory fitness training (e.g., base, anaerobic threshold, submaximal).

- Describe the phases (e.g. warm up cardiorespiratory, and cool down).
- Develop a cardiorespiratory program using the FITTE guidelines and explain the importance of each component – (FITTE - frequency, intensity, time, type, and enjoyment).
- Demonstrate the training methods.
- Compare and contrast the two types cardiorespiratory training methods (Stage training and Circuit training).
- Describe postural considerations involved in cardiorespiratory training.

6.4 Demonstrate and describe the components of integrated training (e.g., stabilization, strength, and power), including the following:

- core training
- balance training
- reactive (plyometric) training
- speed, agility, and quickness training
- resistance training

6.5 Describe select Exercise Modification (pro-/regression), including the following:

- neurological continuum (e.g., modality selection, extremity symmetry)
- mechanical/movement patterns
- bioenergetics

6.6 Demonstrate the ability to follow and implement safe training methods, including:

- Demonstrating spotting techniques.
- Explaining environmental considerations.
- Comparing exercise risk vs. benefit (e.g., behind the neck pulls/presses, dips, upright rows).
- Monitoring exercise intensity.
- Identifying medical signs and symptoms that require training modifications.
- Describing overtraining and the effects on the body.

6.7 Perform effective Kinesthetic, Auditor, and Visual Cueing Techniques to direct the client.

Course Standard 7

HS-FEP-7 Program Design

Apply the following principles of program design.

7.1 Explain the principle of specificity (SAID), including mechanical specificity, neuromuscular specificity, and metabolic specificity.

7.2 Define the principle of overload and variation.

7.3 Illustrate the components of periodization in the OPT (optimum performance training) model (e.g., linear, undulating).

7.4 Describe the components of stabilization within the OPT model (e.g., stabilization endurance training).
7.5 Illustrate the aspects of strength within the OPT model (e.g., strength endurance training, hypertrophy, maximal strength).
7.6 Describe the concept of power within the OPT model.
7.7 Distinguish between the stages of general adaptation syndrome relating to physical training, including alarm reaction, resistance development, and exhaustion.
7.8 Investigate the acute variables of training when designing an exercise program using each of the following:
- exercise selection
- sets
- repetitions
- training intensity
- tempo
- rest interval
- exercise order
- training volume
- training duration
- training frequency
- reputation tempo

7.9 Define, compare and use the components of the integrated training continuum to design an exercise program including each of the following components within a series of exercise routines within the framework of the OPT model:
- warm up
- core training
- balance training
- reactive training
- SAQ (speed, agility, and quickness) training
- resistance training
- cardiorespiratory Training
- cool down

7.10 Demonstrate and compare the styles of resistance training systems:
- single set
- multiple set
- super set
- pyramid set
- circuit training
- peripheral heart action
- metabolic density training
- split routines
- horizontal loading
- vertical loading

7.11 Demonstrate using the principles of FITTE to create a client-specific cardiorespiratory program.
7.12 Demonstrate utilizing physiological considerations and exercise guidelines for the following special populations:
- diabetes
- hypertension
- arthritis

- coronary heart disease
- cancer
- PAD (peripheral artery disease)
- obesity
- lung disease (e.g., asthma, COPD)
- osteoporosis
- fibromyalgia
- youth
- seniors
- prenatal and postnatal

7.13 Define the following program modifications based on training setting and identify the proper use of each modification:
- small group personal training
- boot camps
- 30-minute sessions
- high altitude acclimatization
- temperature acclimatization

7.14 Define and describe the safe and effective use of selected exercise training modalities within the OPT model. (e.g., free weights, tubing, and kettlebells).
- strength training machines
- free weights
- cable machines
- elastic resistance
- medicine balls
- kettlebells
- body weight
- suspension body weight
- stability balls
- bosu ball
- vibration training

7.15 Research the Physical Activity Guidelines for Americans.

7.16 Design a client-specific program based upon assessment results.

Course Standard 8

HS-FEP-8 Considerations in Nutrition

Research the concepts related to nutrition and wellness.

8.1 Evaluate basic nutritional concepts.
- Research why the body needs carbohydrates, proteins, and fats and evaluate their role in digestion, absorption, and elimination.
- Investigate the role of water in the regular diet and hydration needs within exercise.
- Explain the dietary requirements for vitamins and minerals and how it relates to general health and performance enhancement.
- Explain what a calorie is and how it relates to diet and, general health, weight gain/loss, and performance enhancement.
- Describe the current Dietary Guidelines for Americans (e.g., myPlate).
- Explain meal timing and frequency (e.g., pre/post/during workout).

8.2 Research the risks and benefits of nutritional supplements and ergogenic aids.

- Explain the effects of nutritional supplements on general health (e.g., multi-vitamin, calcium supplement).
- Evaluate how nutritional supplements and ergogenic aids can alter body composition (e.g., fat loss, mass gain).
- Describe the effects of performance enhancement aids on the body (e.g., anabolic steroids, caffeine, and creatine).

8.3 Describe weight management concepts.

- Compare the effects of different types of diets on the body related to healthy menu composition and crash/fad/myth diets.
- Describe the law of thermodynamics related to diet
- Explain metabolic rates (e.g., basal, resting)
- Explain how endocrine abnormalities can affect metabolism and dietary needs.
- Describe how nutritional guidelines can be used to create a plan for body composition alteration

8.4 Outline the protocols for special dietary considerations.

- Outline the components for a balanced vegetarian meal plan
- Explain the dietary modifications necessary for someone who is lactose intolerant
- Compare dietary considerations and protocols for people with chronic diseases

8.5 Examine the nutritional guidelines for enhancing athletic performance (e.g., anaerobic, aerobic).

Course Standard 9

HS-FEP-9 Client Relations and Behavioral Coaching
Research the concepts related to client relations and behavioral coaching.

9.1 Demonstrate the components of effective communication.

- Describe the use of verbal and nonverbal communication and demonstrate effective use of each
- Compare and contrast open-ended and closed-ended questions and explain when and how each should be used
- Describe techniques for effective listening (e.g., paraphrasing, active listening).
- Explain how to build client/personal trainer rapport through use of supportive techniques (e.g., showing empathy, validating)

9.2 Facilitate client goal setting strategies and procedures.

- Explain the stages of the Change Model
- Demonstrate the ability to facilitate the client in developing effective SMART (Specific Measurable Attainable Realistic Timely) goals as he or she works toward physical fitness and a healthy lifestyle

9.3 Demonstrate implementing lifestyle and behavioral coaching strategies.

- Demonstrate how to motivate a client's behavior and actions (e.g., cognitive, affective, and physiological) to improve exercise adherence and to maintain a healthy and physically active lifestyle
- Explain how to assist a client in developing coping strategies (stress management, time management, interpersonal influences,& external influences)

Course Standard 10

HS-FEP-10 Professional Development, Practice, and Responsibility
Research the concepts and requirements associated with professional development, practice and responsibility.

10.1 Describe and demonstrate the ability to uphold the NASM-BOC Code of Professional Conduct.
- Describe ways to maintain competencies through continuing education
- Explain ways to adhere to safe and ethical training practices (e.g., OSHA)
- Outline the components of proper facility maintenance (e.g., equipment, safety, layout, and disinfection)
- Understand protocols with respect for special considerations for training diverse clientele (e.g., age, gender, cultural background, and ability)
- Clearly define the role and professional limitations of a personal trainer (e.g., referral to registered dietitians, allied health care professionals)
- Explain the importance of adhering to the following standards of professionalism and ethical business practices:
  a. liability insurance
  b. record keeping
  c. medical clearance
  d. physical appearance and attire
  e. timeliness
  f. sexual harassment awareness
  g. client confidentiality (e.g., HIPAA)

10.2 Demonstrate the ability to follow proper procedures in an emergency situation, including:
- Renewing CPR and First Aid certifications
- Developing an effective emergency action plan for various fitness settings (e.g. commercial fitness facilities, in home personal training, and privately owned facilities)

10.3 Demonstrate implementing personal and professional goal setting strategies and procedures related to the career of personal training.