

ACSM Certification Transition Dates

June 1, 2009: Begins the start of updated workshop and webinar content to include the new and revised knowledge, skills and abilities (KSAs) and the significant changes from ACSM's Guidelines for Exercise Testing and Prescription, 7th edition (GETP7) to the newest edition.

July 1, 2009: Begins the updated examinations to reflect the new and revised knowledge, skills and abilities (KSAs) and the significant changes from ACSM's Guidelines for Exercise Testing and Prescription, 7th edition to the newest edition.

Within this document:

- How to use the KSA changes spreadsheet
- Frequently Asked Questions
- Editor Notes on the updated (8th edition) of ACSM's Guidelines for Exercise Testing and Prescription
- KSA changes spreadsheet

How to use the KSA changes spreadsheet:

1. Find the certification you are preparing for: Certified Personal Trainer, Certified Health Fitness Specialist, Certified Clinical Exercise Specialist or Registered Clinical Exercise Physiologist.
2. Identify if the KSA is new (blue), revised (yellow) or was deleted (red). The KSAs listed in column B are from the 7th edition of ACSM's Guidelines for Exercise Testing and Prescription and column C is the new KSA listing which is included in the 8th edition. **Note:** this listing of KSA only includes KSAs that are different from the prior version to the new version. For the full list of new KSAs, please review Appendix D in ACSM's Guidelines for Exercise Testing and Prescription, 8th edition (GETP8).
3. Many revised KSAs provide clarification from the earlier version, however, some do include new information that you will need to learn.
4. Expect to have most, if not all, of the new KSAs tested on examinations from July 1, 2009 and on.

Frequently Asked Questions

When should I take a workshop or webinar if I'm studying the new books?

The content of the workshops and webinars will update June 1, 2009. If you take a workshop in advance of June and test on July 1, 2009 or later, closely review the new and revised KSAs that are included in this document.

Do I need to purchase the new textbooks if I am going to take the examination July 1, 2009 or later?

We recommend purchasing the new textbooks if you know you are going to take the examination on or after July 1, 2009.

Can I use the new editions to take the examination now?

Using the new editions may result in learning newer/updated information that won't be reflected in the exam. Although it doesn't cover all the information, we advise you to review the significant changes to the new edition of ACSM's Guidelines for Exercise Testing and Prescription included below and review the KSAs that were changed so you know which KSAs are in the current edition being tested (use column B).

How are the Knowledge, Skills and Abilities (KSAs) used in the examination?

Each exam item is written to address a KSA, so knowing the KSAs is a very important component for your examination preparation. Additionally, it is important to know the examination blueprint so you understand the percent of questions within each content area that you are tested on. The blueprint can be found at www.pearsonvue.com/acsm.

What if I take the examination in June and fail, do I need to retest the new version of the examination?

The waiting period for retesting is 15 days. If you are eligible to retest later in June, you will take the current version of the examination. If your waiting period overlaps to July, you will have to retest the new version of the examination.

Why have the KSAs changed?

As part of ACSM's commitment to quality examinations, the KSAs are reviewed every three to four years by conducting a job task analysis (JTA). By conducting a JTA according to widely-accepted best practices, the resulting examination stays current, relevant, and valid.

Why were KSAs deleted?

The results of the recent job task analysis (JTA) likely showed lower statistics of these KSAs as they relate to the job. During the JTA, KSAs are rated by professionals working in the field for Frequency (F) and Importance (I) as they relate to the job. This results in a criticality score. $(I \times 2) + F = \text{criticality}$. Another reason a KSA may be deleted is if it was combined with another KSA. In this case, you would see the KSA marked as one that was revised.

How do I purchase the new textbooks?

By Phone: 1-800-486-5643 (in the US and Canada); 410-528-4185

Online: www.acsm.org/studymaterials or www.lww.com

The following editions are new publications.

- ACSM's Guidelines for Exercise Testing and Prescription, 8th edition
- ACSM's Resource Manual for Guidelines for Exercise Testing and Prescription, 6th edition
- ACSM's Certification Review, 3rd edition
- ACSM's Resources for Clinical Exercise Physiology, 2nd edition
 - Bonus: Includes access to on-line practice test

ACSM's Guidelines for Exercise Testing and Prescription, 8th ed. Editor Notes:

1. defined atherosclerotic cardiovascular disease as CVD throughout (eliminated the synonymous use of CVD, CAD, CHD).
2. used the "FITT" (frequency, intensity, time, type) framework throughout
3. Chapter 2 – eliminated Table 2.1 from GETP7 and replaced that information is two easy-to-understand schematics
4. Chapter 2 – returned age as a risk factor and eliminated age as an absolute demarcation for low to moderate risk allowing someone to move from moderate to low risk if there are no other risk factors.
5. Chapter 2 – added a "self-guided" section for screening for physical activity
6. Chapter 2 – listed thresholds for pre-diabetes as a risk factor and eliminated diabetes as a risk factor since it is already defined as a disease, which places that person at high risk
7. Chapter 2 – eliminated waist/hip ratio as a risk factor due to limited evidence
8. Chapter 4 – added assessments of muscular strength and endurance for older adults, coronary prone individuals, children and adolescents
9. Chapter 5 – added "indications" for exercise echocardiography (Table 5.3), exercise nuclear imaging (Table 5.4), dobutamine echocardiography (Table 5.5), and pharmacologic nuclear stress testing (Table 5.6)
10. Chapter 7 – incorporated some discussion about 10,000 steps but because the evidence is somewhat weak there is not much emphasis
11. Chapter 8 – removed the requirement that the "older adult" should have a graded exercise test prior to starting an exercise program
12. Section III - all diseases, conditions and special considerations addressed are based on ACSM and/or other professional organizations' position stands either in preparation, press or recently published when they are available. In addition, more often than not a contributor either is or will be a position stand chair or a writing team member. So if there is a deviation from the past, the deviation is well founded scientifically in these documents, e.g., the new exercise criteria for diabetes mellitus in Ch 10 and the new exercise test criteria for older adults in Ch 8.
13. Appendix A enhanced to include "use or condition" of each class of drugs

14. Appendix D eliminated. Metabolic calculations now appear in Chapter 7
15. Appendix E eliminated. Information on environmental conditions now appears in Chapter 8
16. Appendix F (KSAs) will become Appendix D
17. Included where necessary any additional changes mandated by congruency with the 2008 Physical Activity Guidelines for Americans (US DHHS) – particularly chapter 7 (Exercise Prescription)

| Certified Personal Trainer | | |
|--|--|--|
| EXERCISE PHYSIOLOGY AND RELATED EXERCISE SCIENCE | | |
| 1.1.7 | Knowledge to describe the myotatic stretch reflex. | DELETE |
| 1.1.8 | Knowledge of the biomechanical principles for the performance of the following activities: walking, jogging, running, swimming, cycling, weight lifting, and carrying or moving objects. | Knowledge of the biomechanical principles for the performance of common physical activities (e.g. walking, running, swimming, cycling, resistance training, yoga, pilates, functional training.) |
| 1.1.9 | Ability to define aerobic and anaerobic metabolism. | Ability to distinguish between aerobic and anaerobic metabolism. |
| 1.1.22 | Knowledge of the following terms: progressive resistance, isotonic/isometric, concentric, eccentric, atrophy, hypertrophy, sets, repetitions, plyometrics, Valsalva maneuver. | Knowledge of muscle actions such as isotonic, isometric (static), isokinetic, concentric, eccentric. |
| 1.1.23 | Ability to identify the major bones and muscles. Major muscles include, but are not limited to, the following: trapezius, pectoralis major, latissimus dorsi, biceps, triceps, rectus abdominis, internal and external obliques, erector spinae, gluteus maximus, quadriceps, hamstrings, adductors, abductors, and gastrocnemius. | Ability to identify the major muscles. Major muscles include, but are not limited to, the following: trapezius, pectoralis major, latissimus dorsi, biceps, triceps, rectus abdominis, internal and external obliques, erector spinae, gluteus maximus, quadriceps, hamstrings, adductors, abductors, and gastrocnemius. |
| 1.1.25 | Ability to identify the joints of the body. | Ability to identify the various types of joints of the body (e.g. hinge, ball and socket). |
| 1.1.28 | NEW | Knowledge of the unique physiological considerations of children, older adults, persons with diabetes, pregnant women, & persons who are overweight and/or obese. |
| 1.1.29 | NEW | Knowledge of the following related terms: hypertrophy, atrophy, hyperplasia. |
| HEALTH APPRAISAL, FITNESS AND CLINICAL EXERCISE TESTING | | |
| 1.3.2 | Knowledge of the importance of a health/medical history. | Knowledge of the components of a health/medical history. |
| 1.3.6 | Knowledge of the limitations of informed consent and medical clearance prior to exercise testing. | Knowledge of the limitations of informed consent and medical clearance. |
| 1.3.7 | Knowledge of the advantages/disadvantages and limitations of the various body composition techniques including, but not limited to: air displacement, plethysmography, hydrostatic weighing, Bod Pod, bioelectrical impedance. | Knowledge of the advantages/disadvantages and limitations of the various body composition techniques including, but not limited to: skinfolds, plethysmography (Bod Pod), bioelectrical impedance, infrared, dual x-ray absorptiometry (DXA) and circumference measurements. |
| 1.3.9 | Ability to locate common sites for measurement of skinfold thicknesses and circumferences (for determination of body composition and waist-hip ratio). | Ability to locate common sites for body circumferences. |
| 1.3.12 | Ability to instruct participants in the use of equipment and test procedures. | DELETE |
| 1.3.13 | Knowledge of the purpose and implementation of pre-activity fitness testing, including assessments of cardiovascular fitness, muscular strength, muscular endurance, and flexibility, and body composition. | Knowledge of pre-activity fitness testing, including assessments of cardiovascular fitness, muscular strength, muscular endurance, and flexibility, and body composition. |
| 1.3.14 | Ability to identify appropriate criteria for terminating a fitness evaluation and demonstrate proper procedures to be followed after discontinuing such a test. | Knowledge of criteria for terminating a fitness evaluation and proper procedures to be followed after discontinuing such a test. |
| 1.3.15 | NEW | Knowledge of and ability to prepare for the initial client consultation. |

| | | |
|--------|--|---|
| 1.3.16 | NEW | Ability to recognize postural abnormalities that may impact exercise performance. |
| 1.3.17 | NEW | Skill in assessing body alignment. |
| | | |
| | EXERCISE PRESCRIPTION AND PROGRAMMING | |
| 1.7.1 | Knowledge of the benefits and risks associated with exercise training in prepubescent and postpubescent youth. | Knowledge of the benefits and risks associated with exercise training and recommendations for exercise programming in children and adolescents. |
| 1.7.2 | Knowledge of the benefits and precautions associated with resistance and endurance training in older adults. | Knowledge of the benefits and precautions associated with resistance and endurance training in older adults, and recommendations for exercise programming. |
| 1.7.7 | Knowledge of selecting appropriate testing and training modalities according to the age and functional capacity of the individual. | Knowledge of selecting appropriate training modalities according to the age and functional capacity of the individual. |
| 1.7.11 | Knowledge of the components incorporated into an exercise session and the proper sequence (i.e., preexercise evaluation, warm-up, aerobic stimulus phase, cool-down, muscular strength and/or endurance, and flexibility). | Knowledge of the proper sequence of an exercise session and the ability to teach and demonstrate them (i.e., preexercise evaluation, warm-up, aerobic stimulus phase, cool-down, muscular strength and/or endurance, and flexibility). |
| 1.7.18 | Skill to teach and demonstrate the components of an exercise session (i.e., warm-up, aerobic stimulus phase, cool-down, muscular strength/endurance, flexibility). | DELETE |
| 1.7.19 | Skill to teach and demonstrate appropriate modifications in specific exercises for the following groups: older adults, pregnant and postnatal women, obese persons, and persons with low back pain. | Skill to teach and demonstrate appropriate modifications in specific exercises, and make recommendations for exercise programming for the following groups: children, older adults, persons with diabetes, pregnant women, persons with arthritis, persons who are overweight and/or obese, and persons with chronic back pain. |
| 1.7.23 | Ability to describe modifications in exercise prescriptions for individuals with functional disabilities and musculoskeletal injuries | DELETE |
| 1.7.32 | Ability to design resistive exercise programs to increase or maintain muscular strength and/or endurance. | Ability to design periodized resistive exercise programs to increase or maintain muscular strength, hypertrophy, power, and/or endurance. |
| 1.7.33 | Ability to periodize a resistance training program for continued muscular strength development | DELETE |
| 1.7.37 | NEW | Ability to safely demonstrate a wide variety of conditioning exercises involving equipment such as stability balls, bosu balls, elastic bands, medicine balls & foam rollers. |
| 1.7.38 | NEW | Ability to safely demonstrate a wide range of resistance training modalities including variable resistance devices, dynamic constant external resistance devices, static resistance devices, and other resistance devices. |
| 1.7.39 | NEW | Ability to safely demonstrate a wide variety of conditioning exercises that promote improvements in agility, balance, coordination, reaction time, speed, and power. |
| 1.7.40 | NEW | Knowledge of training principles such as progressive overload, variation, and specificity. |
| 1.7.41 | NEW | Knowledge of the Valsalva maneuver and the associated risks. |

| | | |
|--------|--|--|
| 1.7.42 | NEW | Knowledge of the appropriate repetitions, sets, volume, repetition maximum, & rest periods necessary for desired outcome goals. |
| 1.7.43 | NEW | Ability to safely demonstrate a wide variety of plyometric exercises and be able to determine when such exercises would be inappropriate to perform. |
| 1.7.44 | NEW | Ability to apply training principles so as to distinguish goals between an athlete and an individual exercising for general health. |
| 1.7.45 | NEW | Knowledge of periodization in aerobic and resistive exercise program design. |
| | | |
| | NUTRITION AND WEIGHT MANAGEMENT | |
| 1.8.1 | Knowledge of the role of carbohydrates, fats, and proteins as fuels for aerobic and anaerobic metabolism. | Knowledge of the role of carbohydrates, fats, and proteins as fuels. |
| 1.8.7 | Knowledge of the USDA Food Pyramid. | Knowledge and understanding of the current Dietary Guidelines for Americans including the USDA Food Pyramid. |
| 1.8.13 | Knowledge of common nutritional ergogenic aids, the purported mechanism of action, and any risk and/or benefits (e.g., carbohydrates, protein/amino acids, vitamins, minerals, sodium bicarbonate, creatine, bee pollen, etc.) | Knowledge of common ergogenic aids, the purported mechanism of action, and potential risks and/or benefits (e.g. anabolic steroids, caffeine, amino acids, vitamins, minerals, creatine monohydrate, adrostenedione, DHEA, etc.) |
| 1.8.15 | NEW | Ability to describe the health implications of commonly used herbs (e.g. echinacea, St. John's Wort, ginseng, etc.) |
| | | |
| | HUMAN BEHAVIOR AND COUNSELING | |
| 1.9.1 | Knowledge of at least five behavioral strategies to enhance exercise and health behavior change (e.g., reinforcement, goal setting, social support). | Knowledge of behavioral strategies to enhance exercise and health behavior change (e.g., reinforcement, goal setting, social support). |
| 1.9.2 | Knowledge of the stages of motivational readiness. | Knowledge of the stages of motivational readiness and effective strategies that support and facilitate behavioral change. |
| 1.9.7 | NEW | Knowledge of common obstacles that interfere with adherence to an exercise program, and strategies to overcome these obstacles. |
| 1.9.8 | NEW | Ability to identify, clarify, and set behavioral and realistic goals with the client (i.e. SMART goals) |
| 1.9.9 | NEW | Knowledge of basic communication and coaching techniques that foster and facilitate behavioral changes. |
| 1.9.10 | NEW | Knowledge of various learning theories (e.g. motivation theory, attribution theory, transfer theory, retention theory, & goal theory) |
| 1.9.11 | NEW | Knowledge of attributes or characteristics necessary for effective teaching. |
| | | |
| | SAFETY, INJURY PREVENTION, AND EMERGENCY PROCEDURES | |
| 1.10.1 | Knowledge of and skill in obtaining basic life support and cardiopulmonary resuscitation certification. | Knowledge of and skill in obtaining basic life support, automated external defibrillators, and cardiopulmonary resuscitation certification. |

| | | |
|---------|---|--|
| 1.10.9 | Knowledge of safety plans, emergency procedures, and first aid techniques needed during fitness evaluations, exercise testing, and exercise training. | DELETE |
| 1.10.13 | Knowledge of the components of an equipment maintenance/repair program and how it may be used to evaluate the condition of exercise equipment to reduce the potential risk of injury. | Knowledge of the components of an equipment service plan/agreement and how it may be used to evaluate the condition of exercise equipment to reduce the potential risk of injury. |
| | | |
| | PROGRAM ADMINISTRATION, QUALITY ASSURANCE, AND OUTCOME ASSESSMENT | |
| 1.11.1 | Knowledge of the cPT's role in administration and program management within a health/fitness facility. | Knowledge of the cPT's scope of practice and role in the administration/program management within a health/fitness facility. |
| 1.11.5 | Knowledge of appropriate professional conduct, practice standards, and ethics in relationships dealing with clients, employers, and other allied health/medical/fitness professionals. | Knowledge of appropriate professional responsibilities, practice standards, and ethics in relationships dealing with clients, employers, and other allied health/medical/fitness professionals. |
| 1.11.8 | NEW | Ability to develop a basic business plan which includes establishing a budget, developing management policies, marketing, sales, and pricing. |
| | | |
| | CLINICAL AND MEDICAL CONSIDERATIONS | |
| 1.12.8 | Knowledge of musculoskeletal risk factors or conditions that may require consultation with medical personnel before testing or training, including acute or chronic back pain, osteoarthritis, rheumatoid arthritis, osteoporosis, tendonitis, and low back pain. | Knowledge of musculoskeletal risk factors or conditions that may require consultation with medical personnel before testing or training, including acute or chronic back pain, arthritis, osteoporosis, & joint inflammation. |
| 1.12.9 | Knowledge of the basic principles of electrical conduction of the heart, it's phases of contraction, and it's implications. | DELETE |
| 1.12.10 | Knowledge of common drugs from each of the following classes of medications and describe their effects on exercise: antianginals; antihypertensives; antiarrhythmics; bronchodilators; hypoglycemics; psychotropics; and vasodilators. | Knowledge of common drugs from each of the following classes of medications and describe their effects on exercise: antianginals; anticoagulants; antihypertensives; antiarrhythmics; bronchodilators; hypoglycemics; psychotropics; vasodilators; and over the counter medications such as pseudoephedrine. |
| | | |
| | | |
| | Certified Health Fitness Specialist | |
| | | |
| | GENERAL POPULATION/CORE: | |
| | EXERCISE PHYSIOLOGY AND RELATED EXERCISE SCIENCE | NEW KSA |
| 1.1.2 | Knowledge of the basic anatomy of the cardiovascular system and respiratory system. | Knowledge of the anatomy and physiology of the cardiovascular system and pulmonary system. |
| 1.1.4 | Knowledge of the plane in which each muscle action occurs. | Knowledge of the plane in which each movement action occurs and the responsible muscles. |
| 1.1.7 | Knowledge to describe the myotatic stretch reflex. | Knowledge of the stretch reflex and how it relates to flexibility. |

| | | |
|--------|--|--|
| 1.1.9 | Ability to define aerobic and anaerobic metabolism. | Ability to describe the systems for the production of energy. |
| 1.1.11 | Knowledge of the following terms: ischemia, angina pectoris, tachycardia, bradycardia, arrhythmia, myocardial infarction, cardiac output, stroke volume, lactic acid, oxygen consumption, hyperventilation, systolic blood pressure, diastolic blood pressure, | Knowledge of the following cardiorespiratory terms: ischemia, angina pectoris, tachycardia, bradycardia, arrhythmia, myocardial infarction, claudication, dyspnea and hyperventilation. |
| 1.1.12 | Knowledge to describe normal cardiorespiratory responses to static and dynamic exercise in terms of heart rate, blood pressure, and oxygen consumption. | Ability to describe normal cardiorespiratory responses to static and dynamic exercise in terms of heart rate, stroke volume, cardiac output blood pressure, and oxygen consumption. |
| 1.1.13 | Knowledge of how heart rate, blood pressure, and oxygen consumption responses change with adaptation to chronic exercise training. | Knowledge of the heart rate, stroke volume, cardiac output, blood pressure, and oxygen consumption responses to exercise. |
| 1.1.14 | Knowledge of the physiological adaptations associated with strength training. | Knowledge of the anatomical and physiological adaptations associated with strength training. |
| 1.1.19 | Knowledge of the structure of the skeletal muscle fiber and the basic mechanism of contraction. | Knowledge of the structure and function of the skeletal muscle fiber.. |
| 1.1.23 | Knowledge of the physiological principles involved in promoting gains in muscular strength and endurance. | Knowledge of the principles involved in promoting gains in muscular strength and endurance. |
| 1.1.29 | Knowledge of and ability to describe the physiological adaptations of the respiratory system that occur at rest and during submaximal and maximal exercise following chronic aerobic and anaerobic training. | Knowledge of and ability to describe the physiological adaptations of the pulmonary system that occur at rest and during submaximal and maximal exercise following chronic aerobic and anaerobic training. |
| 1.1.31 | Knowledge of how the principle of specificity relates to the components of fitness. | Knowledge of how the principles of specificity and progressive overload relate to the components of exercise programming. |
| 1.1.36 | Knowledge of the following terms: progressive resistance, isotonic/isometric, concentric, eccentric, atrophy, hypertrophy, sets, repetitions, plyometrics, Valsalva maneuver. | Knowledge of the following terms: progressive resistance, isotonic/isometric, concentric, eccentric, atrophy, hyperplasia, hypertrophy, sets, repetitions, plyometrics, Valsalva maneuver. |
| 1.1.43 | Ability to locate the anatomic landmarks for palpation of peripheral pulses. | Ability to locate the anatomic landmarks for palpation of peripheral pulses and blood pressure. |
| | | |
| | PATHOPHYSIOLOGY AND RISK FACTORS | |
| 1.2.2 | Knowledge of cardiovascular, respiratory, metabolic, and musculoskeletal risk factors that may require further evaluation by medical or allied health professionals before participation in physical activity. | Knowledge of cardiovascular, pulmonary, metabolic, and musculoskeletal risk factors that may require further evaluation by medical or allied health professionals before participation in physical activity. |
| 1.2.5 | Knowledge of plasma cholesterol levels for adults as recommended by the National Cholesterol Education Program (NCEP III). | Knowledge of plasma cholesterol levels for adults as recommended by the National Cholesterol Education Program. |
| 1.2.6 | Knowledge of the risk factor concept of CAD and the influence of heredity and lifestyle on the development of CAD. | Knowledge of the risk factor thresholds for ACSM risk stratification which includes genetic and lifestyle factors related to the development of CAD. |
| 1.2.8 | Knowledge of how lifestyle factors, including nutrition, physical activity, and heredity, influence lipid and lipoprotein profiles. | Knowledge of how lifestyle factors, including nutrition and physical activity, influence lipid and lipoprotein profiles. |

| | | |
|--------|--|--|
| | | |
| | HEALTH APPRAISAL, FITNESS AND CLINICAL EXERCISE TESTING | |
| 1.3.2 | Knowledge of the importance of a health/medical history. | Knowledge of the value of the health/medical history. |
| 1.3.4 | Knowledge of the categories of participants who should receive medical clearance prior to administration of an exercise test or participation in an exercise program. | Knowledge of and the ability to perform risk stratification and its implications towards medical clearance prior to administration of an exercise test or participation in an exercise program. |
| 1.3.7 | Knowledge of the advantages/disadvantages and limitations of the various body composition techniques including air displacement, plethysmography, hydrostatic weighing, Bod Pod, bioelectrical impedance. | Knowledge of the advantages/disadvantages and limitations of the various body composition techniques including air displacement plethysmography, DEXA, hydrostatic weighing, skinfolds and bioelectrical impedance. |
| 1.3.10 | Skill in techniques for calibration of a cycle ergometer and a motor-driven treadmill. | Knowledge of calibration of a cycle ergometer and a motor-driven treadmill. |
| 1.3.15 | Ability to explain the purpose and procedures for monitoring clients prior to, during, and after cardiorespiratory fitness testing. | Ability to explain the purpose and procedures and perform the monitoring (HR, RPE and BP) of clients prior to, during, and after cardiorespiratory fitness testing. |
| 1.3.17 | Ability to describe the purpose of testing, determine an appropriate submaximal or maximal protocol, and perform an assessment of cardiovascular fitness on the cycle ergometer or the treadmill. | Ability to explain purpose of testing, determine an appropriate submaximal or maximal protocol, and perform an assessment of cardiovascular fitness on the treadmill or the cycle ergometer. |
| 1.3.19 | Accurately perform various techniques of assessing body composition, including the use of skinfold calipers. | Ability to perform various techniques of assessing body composition. |
| 1.3.20 | Ability to analyze and interpret information obtained from the cardiorespiratory fitness test and the muscular strength and endurance, flexibility, and body composition assessments for apparently healthy individuals and those with stable disease. | Ability to analyze and interpret information obtained from the cardiorespiratory fitness test and the muscular strength and endurance, flexibility, and body composition assessments for apparently healthy individuals and those with controlled chronic disease. |
| | | |
| | ELECTROCARDIOGRAPHY AND DIAGNOSTIC TECHNIQUES | |
| 1.4.1 | Knowledge of how each of the following differs from the normal condition: premature atrial contractions and premature ventricular contractions. | Knowledge of how each of the following arrhythmias differs from the normal condition: premature atrial contractions and premature ventricular contractions. |
| 1.4.2 | Ability to locate the appropriate sites for the limb and chest leads for resting, standard, and exercise (Mason Likar) electrocardiograms (ECGs), as well as commonly used bipolar systems (e.g., CM-5). | |
| 1.4.3 | NEW | Knowledge of the basic properties of cardiac muscle and the normal pathways of conduction in the heart. |
| | | |
| | EXERCISE PRESCRIPTION AND PROGRAMMING | |
| 1.7.2 | Knowledge of the benefits and risks associated with exercise training in prepubescent and postpubescent youth. | Knowledge of the benefits and precautions associated with exercise training in apparently healthy and controlled disease. |
| 1.7.3 | Knowledge of the benefits and precautions associated with resistance and endurance training in older adults. | Knowledge of the benefits and precautions associated with exercise training in across the lifespan (from youth to the elderly). |

| | | |
|--------|---|---|
| 1.7.4 | Knowledge of specific leadership techniques appropriate for working with participants of all ages. | Knowledge of specific group exercise leadership techniques appropriate for working with participants of all ages. |
| 1.7.5 | Knowledge of how to modify cardiovascular and resistance exercises based on age and physical condition. | Knowledge of how to select and/or modify appropriate exercise programs according the age, functional capacity and limitations of the individual. |
| 1.7.9 | Knowledge of selecting appropriate testing and training modalities according to the age and functional capacity of the individual. | Delete |
| | Knowledge of the properties of water that affect the design of a water exercise session. | Delete |
| | Skill to teach participants how to monitor intensity of exercise using heart rate and rating of perceived exertion. | |
| 1.7.24 | Skill in the use of various methods for establishing and monitoring levels of exercise intensity, including heart rate, RPE, and METs. | Skill in the use of various methods for establishing and monitoring levels of exercise intensity, including heart rate, RPE, and oxygen cost. |
| 1.7.28 | Ability to determine training heart rates using two methods: percent of age-predicted maximum heart rate and heart rate reserve (Karvonen). | Knowledge of and ability to determine target heart rates using two methods: percent of age-predicted maximum heart rate and heart rate reserve (Karvonen). |
| 1.7.30 | Ability to identify proper and improper technique in the use of cardiovascular conditioning equipment (e.g., stairclimbers, stationary cycles, treadmills, elliptical trainers). | Ability to identify proper and improper technique in the use of cardiovascular conditioning equipment (e.g., stairclimbers, stationary cycles, treadmills, elliptical trainers, rowing machines). |
| 1.7.32 | Ability to communicate effectively with exercise participants. | Ability to communicate appropriately with exercise participants during initial screening and exercise programming. |
| 1.7.34 | Ability to modify exercises based on age and physical condition. | Ability to modify exercises based on age, physical condition and cognitive status. |
| 1.7.35 | Knowledge and ability to determine energy cost, $\dot{V}O_2$, METs, and target heart rates and apply the information to an exercise prescription. | Ability to apply energy cost, $\dot{V}O_2$, METs, and target heart rates to an exercise prescription. |
| 1.7.36 | Ability to determine weights from pounds (lb) to kilograms (kg) and speed from miles per hour (mph) to meters per minute (m.min ⁻¹). | Ability to convert between the U.S. and Metric systems for length/height (inches to centimeters), weight (pounds to kilograms) and speed (miles per hour to meters per minute). |
| 1.7.37 | Ability to determine METs to $\dot{V}O_2$ expressed as mL.kg ⁻¹ .min ⁻¹ , L.min ⁻¹ , and/or mL.kg FFW ⁻¹ .min ⁻¹ . | Ability to convert between absolute (mL.min ⁻¹ or L.min ⁻¹) and relative oxygen costs (mL.kg ⁻¹ .min ⁻¹ , and/or METs). |
| 1.7.38 | Ability to determine the energy cost in METs and kilocalories for given exercise intensities in stepping exercise, cycle ergometry, and during horizontal and graded walking and running. | Ability to determine the energy cost for given exercise intensities during horizontal and graded walking and running stepping exercise, cycle ergometry, arm ergometry and stepping. |
| 1.7.47 | NEW | Ability to assess postural alignment and recommend appropriate exercise to meet individual needs and refer as necessary. |
| | | |
| | NUTRITION AND WEIGHT MANAGEMENT | |
| 1.8.2 | Knowledge to define the following terms: obesity, overweight, percent fat, lean body mass, anorexia nervosa, bulimia, and body fat distribution. | Knowledge of the following terms: obesity, overweight, percent fat, BMI, lean body mass, anorexia nervosa, bulimia, metabolic syndrome and body fat distribution. |

| | | |
|--------|---|--|
| 1.8.4 | Knowledge of the effects of diet plus exercise, diet alone, and exercise alone as methods for modifying body composition. | Knowledge of the effects of diet, exercise and behavior modification as methods for modifying body composition. |
| 1.8.8 | Knowledge of the USDA Food Pyramid. | Knowledge of the USDA MyPyramid and Dietary Guidelines for Americans. |
| 1.8.10 | Knowledge of the myths and consequences associated with inappropriate weight loss methods (e.g., saunas, vibrating belts, body wraps, electric simulators, sweat suits, fad diets). | Knowledge of the myths and consequences associated with inappropriate weight loss methods (e.g., fad diets, dietary supplements, over-exercising, starvation diets). |
| 1.8.12 | Knowledge of the number of kilocalories equivalent to losing 1 pound of body fat. | Knowledge of the number of kilocalories equivalent to losing 1 pound of body fat and the ability to prescribe appropriate amount of exercise to achieve weight loss goals. |
| 1.8.14 | Knowledge of common nutritional ergogenic aids, the purported mechanism of action, and any risk and/or benefits (e.g., carbohydrates, protein/amino acids, vitamins, minerals, sodium bicarbonate, creatine, bee pollen). | Knowledge of common nutritional ergogenic aids, the purported mechanism of action, and any risk and/or benefits (e.g., carbohydrates, protein/amino acids, vitamins, minerals, herbal products, creatine, steroids, caffeine). |
| 1.8.18 | NEW | Knowledge of the nutrition and exercise effects on blood glucose levels in diabetes. |
| | HUMAN BEHAVIOR AND COUNSELING | |
| 1.9.1 | Knowledge of at least five behavioral strategies to enhance exercise and health behavior change (e.g., reinforcement, goal setting, social support). | Knowledge of behavioral strategies to enhance exercise and health behavior change (e.g., reinforcement, goal setting, social support). |
| 1.9.2 | Knowledge of the five important elements that should be included in each counseling session. | Knowledge of the important elements that should be included in each behavior modification session. |
| 1.9.3 | Knowledge of specific techniques to enhance motivation (e.g., posters, recognition, bulletin boards, games, competitions). Define extrinsic and intrinsic reinforcement and give examples of each. | Knowledge of specific techniques to enhance motivation (e.g., posters, recognition, bulletin boards, games, competitions). |
| 1.9.6 | Knowledge of three counseling approaches that may assist less motivated clients to increase their physical activity. | Knowledge of approaches that may assist less motivated clients to increase their physical activity. |
| 1.9.7 | Knowledge of symptoms of anxiety and depression that may necessitate referral to a medical or mental health professional. | Knowledge of signs and symptoms of mental health states (e.g., anxiety, depression, eating disorders) that may necessitate referral to a medical or mental health professional. |
| 1.9.9 | NEW | Ability to coach clients to set achievable goals and overcome obstacles through a variety of methods (e.g., in person, phone, and internet). |
| | SAFETY, INJURY PREVENTION, AND EMERGENCY PROCEDURES | |
| 1.10.1 | Knowledge of and skill in obtaining basic life support and cardiopulmonary resuscitation certification. | Knowledge of and skill in obtaining basic life support, first aid, cardiopulmonary resuscitation, and automated external defibrillator certifications. |
| 1.10.3 | Knowledge of basic first aid procedures for exercise-related injuries, such as bleeding, strains/sprains, fractures, and exercise intolerance (dizziness, syncope, heat injury). | Knowledge of and skill in performing basic first aid procedures for exercise-related injuries, such as bleeding, strains/sprains, fractures, and exercise intolerance (dizziness, syncope, heat and cold injuries). |

| | | |
|--|---|---|
| 1.10.5 | Knowledge of the physical and physiological signs and symptoms of overtraining. | Knowledge of the physical and physiological signs and symptoms of overtraining and the ability to modify a program to accommodate this condition. |
| 1.10.6 | Knowledge of the effects of temperature, humidity, altitude, and pollution on the physiological response to exercise. | Knowledge of the effects of temperature, humidity, altitude, and pollution on the physiological response to exercise and the ability to modify the exercise prescription to accommodate for these environmental conditions. |
| 1.10.7 | Knowledge of the following terms: shin splints, sprain, strain, tennis elbow, bursitis, stress fracture, tendonitis, patellar femoral pain syndrome, low back pain, plantar fasciitis, and rotator cuff tendonitis. | Knowledge of the signs and symptoms of the following conditions: shin splints, sprain, strain, tennis elbow, bursitis, stress fracture, tendonitis, patellar femoral pain syndrome, low back pain, plantar fasciitis, and rotator cuff tendonitis and the ability to recommend exercises to prevent these injuries. |
| 1.10.14 | Knowledge of the legal implications of documented safety procedures, the use of incident documents, and ongoing safety training. | Knowledge of the legal implications of documented safety procedures, the use of incident documents, and ongoing safety training documentation for the purposes of safety and risk management. |
| 1.10.15 | Skill to demonstrate exercises used for people with low back pain. | Skill to demonstrate exercises used for people with low back pain, neck, shoulder, elbow, wrist, hip, knee and/or ankle pain; and the ability to modify a program for people with these conditions. |
| 1.10.17 | Ability to identify the components that contribute to the maintenance of a safe environment. | Ability to identify the components that contribute to the maintenance of a safe environment including equipment operation and maintenance, proper sanitation, safety and maintenance of exercise areas, and overall facility maintenance. |
| 1.10.18 | NEW | Knowledge of basic ergonomics to address daily activities that may cause musculoskeletal problems in the workplace, and the ability to recommend exercises to alleviate symptoms caused by repetitive movements. |
| PROGRAM ADMINISTRATION, QUALITY ASSURANCE, AND OUTCOME ASSESSMENT | | |
| 1.11.3 | Knowledge of how to manage of a fitness department (e.g., working within a budget, training exercise leaders, scheduling, running staff meetings). | Knowledge of how to manage of a fitness department (e.g., working within a budget, interviewing and training staff, scheduling, running staff meetings, staff development). |
| 1.11.10 | NEW | Knowledge of basic sales techniques to promote health, fitness, and wellness services. |
| 1.11.11 | NEW | Knowledge of networking techniques with other health care professionals for referral purposes. |
| 1.11.12 | NEW | Ability to provide and administer appropriate customer service. |
| 1.11.13 | NEW | Knowledge of the importance of tracking and evaluating health promotion program results. |
| CARDIOVASCULAR: PATHOPHYSIOLOGY AND RISK FACTORS | | |
| 2.2.2 | Knowledge of the causes of myocardial ischemia and infarction. | Knowledge of the pathophysiology of myocardial ischemia and infarction. |
| 2.2.3 | Knowledge the pathophysiology of hypertension, obesity, hyperlipidemia, diabetes, chronic obstructive pulmonary diseases, arthritis, osteoporosis, chronic diseases, and immunosuppressive disease. | Knowledge the pathophysiology of stroke, hypertension, and hyperlipidemia. |

| | | |
|---|---|---|
| 2.2.4 | Knowledge the effects of the above diseases and conditions on cardiorespiratory and metabolic function at rest and during exercise. | Knowledge the effects of the above diseases and conditions on the cardiorespiratory responses at rest and during exercise. |
| METABOLIC: PATHOPHYSIOLOGY AND RISK FACTORS | | |
| 4.2.1 | Knowledge of metabolic risk factors or conditions that may require consultation with medical personnel before testing or training, including body weight more than 20% above optimal, BMI> 30, thyroid disease, diabetes or glucose intolerance, and hypoglycem | Knowledge of metabolic risk factors or conditions that may require consultation with medical personnel before testing or training, including obesity, metabolic syndrome, thyroid disease, kidney disease, diabetes or glucose intolerance, and hypoglycemia. |
| NEUROMUSCULAR: PATHOPHYSIOLOGY AND RISK FACTORS | | |
| | NEW | 6.2.1 Knowledge of neuromuscular risk factors or conditions that may require consultation with medical personnel before testing or training, including spinal cord injuries and multiple sclerosis. |
| IMMUNOLOGIC: PATHOPHYSIOLOGY AND RISK FACTORS | | |
| | NEW | 7.2.1 Knowledge of immunologic risk factors or conditions that may require consultation with medical personnel before testing or training, including AIDS and cancer. |
| Certified Clinical Exercise Specialist | | |
| EXERCISE PHYSIOLOGY AND RELATED EXERCISE SCIENCE | | |
| 1.1.4 | Describe activities that are primarily aerobic and anaerobic. | Delete |
| 1.1.6 | Knowledge of the unique hemodynamic responses of arm versus leg exercise and of static versus dynamic exercise. | Knowledge of the unique hemodynamic responses of arm versus leg exercise, combined arm and leg exercise, and of static versus dynamic exercise. |
| 1.1.7 | Define the determinants of myocardial oxygen consumption and the effects of exercise training on those determinants. | Define the determinants of myocardial oxygen consumption (i.e., heart rate x systolic blood pressure = double product OR rate-pressure product) and the effects of acute exercise and exercise training on those determinants. |
| 1.1.8 | Determine maximal oxygen ($\dot{V}O_{2max}$) consumption and describe the methodology for measuring it. | Describe the methodology for measuring peak oxygen consumption ($\dot{V}O_{2peak}$) |

| | | |
|--------|--|---|
| 1.1.9 | Plot the normal resting and exercise values associated with increasing exercise intensity (and how they may differ for diseased populations) for the following: heart rate, stroke volume, cardiac output, double product, arteriovenous O_2 difference, O_2 consumption, systolic and diastolic blood pressure, minute ventilation, tidal volume, breathing frequency, V_d/V_t , $V_{E/V.O_2}$, and $V_{E/V.CO_2}$. | Plot the normal resting and exercise values associated with increasing exercise intensity (and how they may differ for cardiac, pulmonary and metabolic diseased populations) for the following: heart rate, stroke volume, cardiac output, double product, arteriovenous O_2 difference, O_2 consumption, systolic and diastolic blood pressure, minute ventilation, tidal volume, breathing frequency, V_d/V_t , $V_{E/V.O_2}$, and $V_{E/V.CO_2}$, FEV1.0, SaO ₂ , blood glucose. |
| 1.1.10 | Discuss the effects of isometric exercise in individuals with cardiovascular, pulmonary, and/or metabolic diseases or with low functional capacity. | Discuss the effects of isometric exercise in individuals with cardiovascular, pulmonary, and/or metabolic diseases. |
| 1.1.11 | Knowledge of acute and chronic adaptations to exercise for apparently healthy individuals (low risk) and for those with cardiovascular, pulmonary, and metabolic diseases. | Knowledge of acute and chronic adaptations to exercise for those with cardiovascular, pulmonary, and metabolic diseases. |
| 1.1.13 | NEW | Understand the hormonal (i.e., insulin, glucagon, epinephrine, norepinephrine, angiotensin, aldosterone, renin, erythropoietin) responses to acute and chronic exercise. |
| 1.1.14 | NEW | Identify normal and abnormal respiratory responses during rest and exercise as assessed during a pulmonary function test [i.e., FVC, MVV, FEV1.0, flow volume loop]. |
| | | |
| | PATHOPHYSIOLOGY AND RISK FACTORS | |
| 1.2.2 | Compare and contrast the differences between typical, atypical, and vasospastic angina. | Compare and contrast the differences between typical, atypical, and vasospastic angina and how these may differ in specific subgroups (i.e., males, females, diabetes). |
| 1.2.3 | Describe the pathophysiology of the healing myocardium and the potential complications after acute myocardial infarction (MI) (extension, expansion, rupture) | Describe the pathophysiology of the healing myocardium and the potential complications after acute myocardial infarction (MI) (remodeling, rupture) |
| 1.2.4 | Describe silent ischemia and its implications for exercise testing and training. | |
| 1.2.5 | Examine the role of diet on cardiovascular risk factors such as hypertension, blood lipids and body weight. | Examine the role of lifestyle on cardiovascular risk factors such as hypertension, blood lipids, glucose tolerance, and body weight. |
| 1.2.6 | Describe the lipoprotein classifications and define their relationship to atherosclerosis or other diseases. | Describe the lipoprotein classifications and define their relationship to atherosclerosis. |
| 1.2.7 | Describe the cardiorespiratory and metabolic responses that accompany or result from pulmonary diseases at rest and during exercise. | Describe the resting and exercise cardiorespiratory and metabolic responses in those with pulmonary disease. |
| 1.2.8 | Describe the influence of exercise on cardiovascular risk factors. | Describe the influence of exercise on cardiovascular, pulmonary and metabolic risk factors |
| 1.2.9 | Describe the normal and abnormal cardiorespiratory responses at rest and exercise. | |

| | | |
|--------|--|--|
| 1.2.10 | Identify the mechanisms by which functional capacity and cardiovascular, pulmonary, metabolic, and neuromuscular adaptations occur in response to exercise testing and training in healthy and disease states. | |
| 1.2.12 | NEW | Recognize and describe the pathophysiology of the differing severities (e.g., NYHA classification) of heart failure including: cardiac output, heart rate, blood pressure, cardiac dimensions, and basic echocardiography parameters (ejection fraction, wall motion, left ventricular dimension). |
| 1.2.13 | NEW | Recognize and describe the pathophysiology of diabetes mellitus (pre-diabetes, type I and II, gestational) including blood glucose, HbA1c, insulin sensitivity, and the risk and affect on co-morbid conditions. |
| 1.2.14 | NEW | Identify the contributing factors to 'metabolic syndrome', their pathologic sequelae and their affect on the primary or secondary risk of cardiovascular disease. |
| 1.2.15 | NEW | Recognize the pathologic process that various risk factors contribute for the development of cardiac, pulmonary and metabolic diseases (e.g., smoking, hypertension, abnormal blood lipid values, obesity, inactivity, sex, genetics, diabetes). |
| | | |
| | HEALTH APPRAISAL, FITNESS AND CLINICAL EXERCISE TESTING | |
| 1.3.1 | Describe common procedures and apply knowledge of results from radionuclide imaging (e.g., thallium, technetium, sestamibi, single photon emission computed tomography (SPECT)). | Describe common procedures and apply knowledge of results from radionuclide imaging (e.g., thallium, technetium, sestamibi, tetrafosmin, single photon emission computed tomography (SPECT)), stress echocardiography, and pharmacological testing (e.g., dobutamine, adenosine, persantine). |
| 1.3.3 | Describe anatomical landmarks as they relate to exercise testing and programming. | Describe anatomical landmarks as they relate to exercise testing and programming (e.g., electrode placement, blood pressure). |
| 1.3.5 | Select an appropriate test protocol according to the age and functional capacity of the individual. | Select an appropriate test protocol according to the age, functional capacity, physical ability and health status of the individual. |
| 1.3.9 | Instruct the test participant in the use of the RPE scale and other appropriate subjective rating scales, such as the dyspnea and angina scales. | Instruct the test participant in the use of the RPE scale and other appropriate subjective rating scales, such as the dyspnea, pain, claudication, and angina scales. |
| 1.3.10 | Obtain informed consent and describe its purpose. | |
| 1.3.11 | Describe the importance of accurate and calibrated testing equipment (e.g., treadmill, ergometers, electrocardiograph, and sphygmomanometers). | Describe the importance of accurate and calibrated testing equipment (e.g., treadmill, ergometers, electrocardiograph, gas analysis systems, and sphygmomanometers) and ability to recognize and remediate equipment that is no longer properly calibrated. |

| | | |
|--------|---|---|
| 1.3.12 | Measure physiological and subjective responses (e.g., symptoms, ECG, blood pressure, heart rate, RPE and other scales, oxygen saturation, and oxygen consumption) at appropriate intervals during the test. | Obtain and recognize normal and abnormal physiological and subjective responses (e.g., symptoms, ECG, blood pressure, heart rate, RPE and other scales, oxygen saturation, and oxygen consumption) at appropriate intervals during the test. |
| 1.3.13 | Describe the effects of age, weight, level of fitness, and health status on the selection of an exercise test protocol. | |
| 1.3.14 | Ability to measure oxygen consumption during an exercise test. | |
| 1.3.16 | Obtain and interpret medical history and physical examination findings as they relate to health appraisal and exercise testing. | Evaluate medical history and physical examination findings as they relate to health appraisal and exercise testing. |
| 1.3.18 | Describe and analyze the importance of the absolute and relative contraindications of an exercise test. | Describe and analyze the importance of the absolute and relative contraindications and test termination indicators of an exercise test. |
| 1.3.20 | Describe and conduct immediate postexercise procedures and various approaches to cool-down. | Describe and conduct immediate postexercise procedures and various approaches to cool-down and recognize normal and abnormal responses. |
| 1.3.24 | Describe and apply Baye's theorem as it relates to pretest likelihood of CAD and the predictive value of positive or negative diagnostic exercise ECG results. | Understand and apply pretest likelihood of CAD, the positive and negative predictive values of various types of stress tests (e.g., ECG only, stress echo, radionuclide), and the potential of false positive/negative and true positive/negative results. |
| 1.3.26 | Identify orthopedic limitations (e.g., gout, foot drop, specific joint problems) as they relate to modifications of exercise testing and programming. | Identify orthopedic limitations (e.g., gout, foot drop, specific joint problems, amputation, prosthesis) as they relate to modifications of exercise testing and programming. |
| 1.3.27 | Identify neuromuscular disorders (e.g., Parkinson's disease, multiple sclerosis) as they relate to modifications of exercise testing and programming. | Identify basic neuromuscular disorders (e.g., Parkinson's disease, multiple sclerosis) as they relate to modifications of exercise testing and programming. |
| 1.3.30 | Discuss the appropriate use of static and dynamic exercise for individuals with cardiovascular, pulmonary, and metabolic disease. | Discuss the appropriate use of static and dynamic resistance exercise for individuals with cardiovascular, pulmonary, and metabolic disease. |
| 1.3.31 | NEW | Understand the basic principle and methods of coronary calcium scoring using computed-tomography (CT) methods. |
| 1.3.32 | NEW | Recognize the emergence of new imaging techniques for the assessment of heart disease (e.g., CT angiography). |
| 1.3.33 | NEW | Recognition of the value of heart and lung sounds in the assessment of patients with cardiovascular and/or pulmonary disease. |
| 1.3.34 | NEW | Ability to perform a 6-minute walk test and appropriately utilize the results to assess prognosis, fitness, and/or improvement. |
| | | |
| | ELECTROCARDIOGRAPHY AND DIAGNOSTIC TECHNIQUES | |
| 1.4.3 | Describe the differences between Q-wave and non-Q-wave infarction. | Describe the differences between Q-wave and non-Q-wave infarction; and ST elevation (STEMI) and non-ST elevation myocardial infarction (non-STEMI). |

| | | |
|--------|---|---|
| 1.4.4 | Identify the ECG patterns at rest and responses to exercise in patients with pacemakers and ICDs. | Identify the ECG patterns at rest and responses to exercise in patients with pacemakers and ICDs. In addition, recognize the ability of bi-ventricular pacing and possibility of pacemaker malfunction (e.g., failure to sense and failure to pace). |
| 1.4.8 | Describe potential causes of various cardiac arrhythmias. | Describe potential causes and pathophysiology of various cardiac arrhythmias. |
| 1.4.20 | Explain indications and procedures for combining exercise testing with radionuclide or echocardiographic imaging. | |
| | | |
| | PATIENT MANAGEMENT AND MEDICATIONS | |
| 1.5.1 | List indications for use of streptokinase, tissue plasminogen activase, and other thrombolytic agents. | |
| 1.5.2 | Describe mechanisms and actions of medications that may affect exercise testing and prescription. | Describe mechanisms and actions of medications that may affect exercise testing and prescription (i.e., beta-blockers, nitrates, calcium channel blockers, digitalis, diuretics, vasodilators, anitarrhythmic agents, bronchodilators, antilipemics, psychotropics, nicotine, antihistamines, OTC cold medications, thyroid medications, alcohol, hypoglycemic agents, blood modifiers, pentoxifylline, <u>antigout medications, and anorexiant/diet pills</u>). |
| 1.5.3 | Recognize medications associated in the clinical setting, their indications for care, and their effects at rest and during exercise (e.g., antianginals, antihypertensives, antiarrhythmics, bronchodilators, hypoglycemics, psychotropics, vasodilators, anticoagulant and antiplatelet drugs, and lipid-lowering agents). | Recognize medications associated in the clinical setting, their indications for care, and their effects at rest and during exercise (i.e., beta-blockers, nitrates, calcium channel blockers, digitalis, diuretics, vasodilators, anitarrhythmic agents, bronchodilators, antilipemics, psychotropics, nicotine, antihistamines, over-the-counter (OTC) cold medications, thyroid medications, alcohol, hypoglycemic agents, blood modifiers, pentoxifylline, antigout medications, and anorexiant/diet pills). |
| 1.5.4 | NEW | Recognize the use of herbal and nutritional supplements, over-the-counter medications, homeopathic remedies and other alternative therapies often used by patients with chronic diseases |
| 1.5.5 | NEW | Practice disease/case management responsibilities including daily follow-up concerning patient needs, signs and symptoms, physician appointments, medication changes, etc. for patients with chronic diseases including cardiovascular, pulmonary, metabolic diseases, co-morbid conditions, arthritis, <u>osteoporosis, and renal dysfunction/transplant/dialysis</u>. |
| 1.5.6 | NEW | Direct patients actively attempting to lose weight in a formal or informal setting using behavioral, diet, exercise or surgical methods. |
| 1.5.7 | NEW | Manage patients on oxygen therapy as needed during exercise testing or training. |

| | | |
|--------|---|--|
| 1.5.8 | NEW | Recognize patient clinical need for referral to other (non-ES) allied health professionals (e.g., behavioralist, physical therapist, diabetes educator, nurse, etc.) |
| 1.5.9 | NEW | Recognize patients with chronic pain who may be in a chronic pain management treatment program and who may require special adaptations during exercise testing and training. |
| 1.5.10 | NEW | Recognize exercise testing and training needs of patients with joint replacement or prosthesis. |
| 1.5.11 | NEW | Address exercise testing and training needs of elderly and young patients. |
| 1.5.12 | NEW | Recognize treatment goals and guidelines for hypertension using the most recent JNC report and other relevant evidence-based guidelines. |
| 1.5.13 | NEW | Recognized treatment goals and guideline for dyslipidemia using the most recent NCEP report and other relevant evidence-based guidelines. |
| 1.5.14 | NEW | Ability to perform pulse-oximetry and blood glucose evaluations and appropriately interpret the data in a given clinical situation. |
| 1.5.15 | NEW | Ability to assess for peripheral edema and other indicators of fluid retention and respond appropriately in a given clinical setting. |
| | | |
| | MEDICAL AND SURGICAL MANAGEMENT | |
| 1.6.3 | NEW | Identify risk, benefit and unique management issues of patients with mechanical, prosthetic valve replacement and valve repair. |
| 1.6.4 | NEW | Describe and recognize bariatric surgery as a therapy for obesity |
| 1.6.5 | NEW | Recognize external counter-pulsation (ECP) as a method of treating severe, difficult to treat chest pain (i.e., angina). |
| | | |
| | EXERCISE PRESCRIPTION AND PROGRAMMING | |
| 1.7.1 | Describe basic joint movements, muscle actions, and points of insertions as it relates to exercise programming. | |
| 1.7.2 | Compare and contrast benefits and risks of exercise for individuals with CAD risk factors and for individuals with cardiovascular, pulmonary, and/or metabolic diseases. | Compare and contrast benefits and risks of exercise for individuals with risk factors for, or established cardiovascular, pulmonary, and/or metabolic diseases. |
| 1.7.3 | Design appropriate exercise prescription in environmental extremes for normal individuals and those with cardiovascular, pulmonary, and metabolic diseases. | Design appropriate exercise prescription in environmental extremes for those with cardiovascular, pulmonary, and metabolic diseases. |
| 1.7.4 | Design, implement and supervise individualized exercise prescriptions for people with chronic disease and disabling conditions. | Design, implement and supervise individualized exercise prescriptions for people with chronic disease and disabling conditions, or who are young or elderly. |

| | | |
|--------|---|--|
| 1.7.5 | Design a supervised exercise program beginning at hospital discharge and continuing for up to six months for the following conditions: MI; angina; LVAD; congestive heart failure; PCI; CABG; medical management of CAD; chronic pulmonary disease; weight management; diabetes; and cardiac transplants. | Design a supervised exercise program beginning at hospital discharge and continuing for up to six months for the following conditions: MI; angina; left ventricular assist device (LVAD); congestive heart failure; percutaneous coronary intervention (PCI); CABG(S); medical management of CAD; chronic pulmonary disease; weight management; diabetes; metabolic syndrome; and cardiac transplants. |
| 1.7.7 | Prescribe exercise using nontraditional modalities (e.g., bench stepping, elastic bands, isodynamic exercise, water aerobics) for individuals with cardiovascular, pulmonary, or metabolic diseases. | Prescribe exercise using nontraditional modalities (e.g., bench stepping, elastic bands, isodynamic exercise, water aerobics, Yoga, Tai Chi, etc.) for individuals with cardiovascular, pulmonary, or metabolic diseases. |
| 1.7.8 | Discuss equipment adaptations necessary for different age groups. | Demonstrate exercise equipment adaptations necessary for different age groups, physical abilities, and other potential contributing factors. |
| 1.7.9 | Identify individuals who require exercise testing prior to exercise training. | Identify patients who require a symptom-limited exercise test prior to exercise training. |
| 1.7.14 | Identify and explain the mechanisms by which exercise may contribute to preventing or rehabilitating individuals with cardiovascular, pulmonary, and metabolic diseases. | Identify and explain the mechanisms by which exercise may contribute to reducing disease risk or rehabilitating individuals with cardiovascular, pulmonary, and metabolic diseases. |
| 1.7.15 | Describe common gait abnormalities as they relate to exercise testing and programming. | Describe common gait, movement and coordination abnormalities as they relate to exercise testing and programming. |
| 1.7.18 | Determine appropriate testing and training modalities according to the age and functional capacity of the individual. | Determine appropriate testing and training modalities according to the age, functional capacity, physical ability and health status of the individual. |
| 1.7.20 | Describe the importance of and appropriate methods for resistance training in older individuals. | Discuss the appropriate use of static and dynamic resistance exercise for individuals with cardiovascular, pulmonary, and metabolic disease. |
| 1.7.22 | NEW | Design, describe and demonstrate specific resistance exercises for major muscle groups for patients with cardiovascular, pulmonary and metabolic diseases and conditions. |
| 1.7.23 | NEW | Identify procedures for pre-exercise assessment of blood glucose, determining safety for exercise, and avoidance of exercise induced hypoglycemia in patients with diabetes. Also the management of post-exercise hypoglycemia when it occurs. |
| | | |
| | NUTRITION AND WEIGHT MANAGEMENT | |
| 1.8.4 | NEW | Describe the hypotheses related to diet, weight gain and weight loss. |
| 1.8.5 | NEW | Ability to differentiate and educate patients between nutritionally sound diets versus fad diets and scientifically supported supplements and anecdotally supported supplements. |
| 1.8.6 | NEW | Differentiate among and understand the value of the various vegetarian diets [i.e. Ovo-lacto, vegan] |

| | | |
|--------|---|---|
| | | |
| | HUMAN BEHAVIOR AND COUNSELING | |
| 1.9.1 | List and apply five behavioral strategies as they apply to lifestyle modifications, such as exercise, diet, stress, and medication management. | List and apply behavioral strategies which apply to lifestyle modifications, such as exercise, diet, stress, and medication management. |
| 1.9.6 | Describe the psychological issues to be confronted by the patient and by family members of patients who have cardiovascular disease and/or who have had an acute MI or cardiac surgery. | Describe the psychological issues to be confronted by the patient and by family members of patients who have cardiovascular or pulmonary disease or diseases of the metabolic syndrome. |
| 1.9.8 | NEW | Recognize and implement methods of stress management for patients with chronic disease. |
| 1.9.9 | NEW | Implement tools for assessment of behavioral change such as the Transtheoretical Model (i.e., readiness for change), quality of life questionnaires (e.g., Short Form 8, 12 or 36, Kansas City Cardiomyopathy questionnaire, etc.) |
| 1.9.10 | NEW | Facilitation of effective and contemporary motivational and behavior modification techniques to promote behavioral change. |
| 1.9.11 | NEW | Ability to conduct effective and informative group and individual education sessions directed at primary or secondary prevention of chronic disease. |
| | | |
| | SAFETY, INJURY PREVENTION, AND EMERGENCY PROCEDURES | |
| 1.10.1 | Respond appropriately to emergency situations (e.g. cardiac arrest, hypoglycemia and hyperglycemia; bronchospasm; sudden onset hypotension; serious cardiac arrhythmias; implantable cardiac defibrillator (ICD) discharge; transient ischemic attack (TIA) or stroke; MI) which might arise before, during, and after administration of an exercise test and/or exercise session. | Respond appropriately to emergency situations (e.g. cardiac arrest, hypoglycemia and hyperglycemia; bronchospasm; sudden onset hypotension; severe hypertensive response; angina; serious cardiac arrhythmias; implantable cardiac defibrillator (ICD) discharge; transient ischemic attack (TIA) or stroke; MI) which might arise before, during, and after administration of an exercise test and/or exercise session. |
| 1.10.5 | Describe the effects of cardiovascular, pulmonary, and metabolic diseases on performance and safety during exercise testing and training. | Describe the effects of cardiovascular and pulmonary disease, and the diseases of the metabolic syndrome on performance of, and safety during exercise testing and training. |
| 1.10.6 | Risk stratify individuals with cardiovascular, pulmonary, and metabolic diseases, using appropriate materials and understanding the prognostic indicators for high-risk individuals. | Risk stratify individuals with cardiovascular, pulmonary, and metabolic diseases, using appropriate risk stratification methods and understanding the prognostic indicators for high-risk individuals. |
| 1.10.7 | NEW | Describe the process for developing and updating emergency policies and procedures (e.g., call 911, call code team, call medical director, transport and use defibrillator, etc.). |
| 1.10.8 | NEW | Be aware of the current CPR, AED, and ACLS standards to be able to assist with emergency situations. |

| | | |
|--------|--|---|
| | | |
| | PROGRAM ADMINISTRATION, QUALITY ASSURANCE, AND OUTCOME ASSESSMENT | |
| 1.11.2 | Identify and discuss various outcome measurements that could be used in a cardiac or pulmonary rehabilitation program. | Identify and discuss various outcome measurements used in a cardiac or pulmonary rehabilitation program. |
| 1.11.4 | NEW | Understand the most recent cardiac and pulmonary rehabilitation CMS (Centers for Medicare Services) rules for patient enrollment and reimbursement (e.g., diagnostic CPT codes, DRG's) |
| | | |
| | | |
| | ACSM Registered Clinical Exercise Physiologist | |
| | | |
| | CORE: | |
| | PATHOPHYSIOLOGY AND RISK FACTORS | |
| | NEW | Describe the epidemiology, pathophysiology, risk factors, and key clinical findings of cardiovascular, pulmonary, metabolic, orthopedic/musculoskeletal, neuromuscular, and NIH diseases |
| | | |
| | CORE: | |
| | SAFETY, INJURY PREVENTION, AND EMERGENCY PROCEDURES | |
| | NEW | Knowledge of advanced cardiac life support procedures |
| | | |
| | CARDIOVASCULAR: | |
| | EXERCISE PHYSIOLOGY AND RELATED EXERCISE SCIENCE | |
| | NEW | Explain how cardiovascular diseases may affect the physiologic responses to aerobic and resistance training. |
| | NEW | Describe the immediate and long-term influence of medical therapies for cardiovascular diseases on the responses to aerobic and resistance training. |
| | | |
| | CARDIOVASCULAR: | |
| | PATHOPHYSIOLOGY AND RISK FACTORS | |
| | NEW | Explain methods of reducing risk in patients with cardiovascular diseases |
| | | |
| | CARDIOVASCULAR: | |
| | HEALTH APPRAISAL, FITNESS AND CLINICAL EXERCISE TESTING | |
| | NEW | Conduct and interpret appropriate exercise testing methods for patients with cardiovascular diseases. |

| | | |
|--|--|---|
| | | |
| | CARDIOVASCULAR: | |
| | EXERCISE PRESCRIPTION AND PROGRAMMING | |
| | NEW | Counsel individuals with cardiovascular disease on the proper uses of sublingual nitroglycerin. |
| | | |
| | PULMONARY: (e.g. Obstructive and Restrictive Lung Diseases) | |
| | EXERCISE PHYSIOLOGY AND RELATED EXERCISE SCIENCE | |
| | NEW | Describe the immediate and long-term influence of medical therapies for pulmonary diseases on the responses to aerobic, resistance, and flexibility training. |
| | | |
| | PULMONARY: | |
| | PATHOPHYSIOLOGY AND RISK FACTORS | |
| | NEW | Explain methods of reducing risk in patients with pulmonary diseases |
| | | |
| | PULMONARY: | |
| | HEALTH APPRAISAL, FITNESS AND CLINICAL EXERCISE TESTING | |
| | NEW | Describe common techniques and tests used to diagnose pulmonary diseases, and explain the indications, limitations, risks and normal and abnormal results for each. |
| | NEW | Conduct and interpret appropriate exercise testing methods for patients with pulmonary diseases. |
| | | |
| | PULMONARY: | |
| | MEDICAL AND SURGICAL MANAGEMENT | |
| | NEW | Explain the common medical and surgical treatments of pulmonary diseases. |
| | NEW | Apply key recommendations of current U.S. clinical practice guidelines (e.g. ALA, NIH, NHLBI) for the prevention, treatment and management of pulmonary diseases |
| | | |
| | PULMONARY: | |
| | EXERCISE PRESCRIPTION AND PROGRAMMING | |
| | NEW | Knowledge of the use of supplemental oxygen during exercise and its influences on exercise tolerance |
| | | |
| | METABOLIC: (e.g. Diabetes, Hyperlipidemia, Obesity, Frailty, Chronic Renal Failure, Metabolic Syndrome) | |
| | EXERCISE PHYSIOLOGY AND RELATED EXERCISE SCIENCE | |

| | |
|---|--|
| NEW | Explain how metabolic diseases may affect aerobic endurance, muscular strength and endurance, flexibility, and balance. |
| NEW | Describe the immediate and long-term influence of medical therapies for metabolic diseases on the responses to aerobic, resistance, and flexibility training. |
| NEW | Describe the potential benefits and hazards of aerobic, resistance, and flexibility training in individuals with metabolic diseases. |
| | |
| PATHOPHYSIOLOGY AND RISK FACTORS | |
| NEW | Explain methods of reducing risk in patients with metabolic diseases |
| | |
| METABOLIC: HEALTH APPRAISAL, FITNESS AND CLINICAL EXERCISE TESTING | |
| NEW | Conduct and interpret appropriate exercise testing methods for patients with metabolic diseases. |
| | |
| | |
| METABOLIC: EXERCISE PRESCRIPTION AND PROGRAMMING | |
| NEW | Adapt the Exercise Prescription based on the functional limits and benefits of assistive devices (e.g. wheelchairs, crutches, and canes). |
| | |
| ORTHOPEDIC/MUSCULOSKELETAL: (e.g. low back pain, osteoarthritis, rheumatoid arthritis, osteoporosis, amputations, vertebral disorders) | |
| EXERCISE PHYSIOLOGY AND RELATED EXERCISE SCIENCE | |
| NEW | Describe the immediate and long-term influence of medical therapies for orthopedic/musculoskeletal diseases on the responses to aerobic, resistance, and flexibility training. |
| | |
| ORTHOPEDIC/MUSCULOSKELETAL: HEALTH APPRAISAL, FITNESS AND CLINICAL EXERCISE TESTING | |
| NEW | Describe common techniques and tests used to diagnose orthopedic/musculoskeletal diseases |
| | |
| ORTHOPEDIC/MUSCULOSKELETAL: MEDICAL AND SURGICAL MANAGEMENT | |

| | |
|---|---|
| NEW | Apply key recommendations of current U.S. clinical practice guidelines (e.g. NIH) for the prevention, treatment and management of orthopedic/musculoskeletal diseases |
| NEW | Explain how treatments for orthopedic/musculoskeletal disease may affect the rate of progression of disease. |
| | |
| ORTHOPEDIC/MUSCULOSKELETAL: | |
| EXERCISE PRESCRIPTION AND PROGRAMMING | |
| NEW | Adapt the Exercise Prescription based on the functional limits and benefits of assistive devices (e.g. wheelchairs, crutches, and canes). |
| | |
| NEUROMUSCULAR: (e.g. Multiple Sclerosis, Muscular Dystrophy and other myopathies, Alzheimer's, Parkinson's Disease, Polio and Post Polio Syndrome, Stroke and Brain Injury, Cerebral Palsy, Peripheral Neuropathies) | |
| EXERCISE PHYSIOLOGY AND RELATED EXERCISE SCIENCE | |
| NEW | Describe the immediate and long-term influence of medical therapies for Neuromuscular diseases on the responses to aerobic, resistance, and flexibility training. |
| | |
| NEUROMUSCULAR: | |
| PATHOPHYSIOLOGY AND RISK FACTORS | |
| NEW | Describe the epidemiology, pathophysiology, risk factors, and key clinical findings of neuromuscular diseases |
| NEUROMUSCULAR: | |
| HEALTH APPRAISAL, FITNESS AND CLINICAL EXERCISE TESTING | |
| NEW | Conduct and interpret appropriate exercise testing methods for patients with neuromuscular diseases. |
| | |
| NEUROMUSCULAR: | |
| MEDICAL & SURGICAL MANAGEMENT | |
| NEW | List the commonly used drugs (generic and brand names) in the treatment of patients with neuromuscular disease, and explain the indications, mechanisms of actions, major side effects, and the effects on the exercising individual. |
| NEW | Apply key recommendations of current U.S. clinical practice guidelines (e.g. NIH) for the prevention, treatment and management of neuromuscular diseases |
| NEW | Explain the common medical and surgical treatments of neuromuscular diseases. |

| | | |
|--|--|---|
| | NEW | Explain how treatments for neuromuscular disease may affect the rate of progression of disease. |
| | | |
| | NEOPLASTIC, IMMUNOLOGIC, & HEMATOLOGIC: | |
| | HEALTH APPRAISAL, FITNESS AND CLINICAL EXERCISE TESTING | |
| | NEW | Describe common techniques and tests used to diagnose NIH diseases |
| | | |
| | NEOPLASTIC, IMMUNOLOGIC, & HEMATOLOGIC: | |
| | MEDICAL AND SURGICAL MANAGEMENT | |
| | NEW | Explain how treatments for NIH disease may affect the rate of progression of disease. |
| | | |