

FITNESS INSTRUCTOR (ELECTIVE)

The purpose of the Fitness Instructor elective course is to provide students with the knowledge, skills, and experience needed to become certified in personal training, strength and physical conditioning, group fitness, or in other health fitness specialty areas. Students will learn to develop individualized programs with goals that are based on factors that affect one's overall health, including genetic and chronic health conditions, sports injuries, age and gender, level of fitness, and lifestyle factors. Students will gain knowledge and skills to help improve posture, movement, flexibility, balance, core function, cardiorespiratory fitness, and muscular endurance and strength. Students will learn business skills, including effective communication, leadership skills, marketing strategies, consumer advocacy, résumé writing, and interviewing skills. Students will also earn a certification in CPR and AED.

Motor Skill Development

- FI.1 The student will demonstrate mastery of the movement skills and patterns used to perform strength-training, conditioning, and fitness activities.
- a) Demonstrate correct movement skills and patterns for strength-training, physical conditioning, and fitness activities.
 - b) Analyze movement activities for component skills and movement patterns.
 - c) Describe and demonstrate activities specific to improving the skill-related components of fitness.
 - d) Define and identify *activities of daily living* (ADL) as the tasks of everyday life.
 - e) Apply movement skills and patterns to functional fitness activities that support ADL.
 - f) Identify and describe advanced resistance-training techniques.
 - g) Apply principles of exercise progression to improve fitness.
 - h) Demonstrate correct and safe techniques and form when performing strength-training, physical conditioning, and fitness activities and exercises.
 - i) Demonstrate the proper use of fitness equipment, selectorized weight machines, and free weights.
 - j) Demonstrate safety protocols and procedures for strength-training, physical conditioning, and fitness activities.
 - k) Identify contraindications to advanced resistance-training techniques.
 - l) Identify and describe factors that influence participation in physical activity and adherence to an exercise program.
 - m) Explain principles that result in behavior change.

- n) Describe psychological factors that may influence a person’s adherence to an exercise program.
- o) Identify and apply strategies to increase adherence in an exercise program.
- p) Explain the role of the personal trainer in promoting an individual’s adherence to an exercise program.
- q) Identify and explain considerations for special populations.

Essential Understandings	Essential Knowledge and Skills
<p>Strength training activity skills may include (FI.1.a):</p> <ul style="list-style-type: none"> • Free weight activities • Olympic lifts • Dumbbell/kettlebell activities • Manual resistance activities • Resistance band activities • Resistance machines <p>Physical conditioning and fitness activities may include (FI.1.a):</p> <ul style="list-style-type: none"> • Speed and agility activities • Endurance activities • Flexibility activities • Plyometric activities <p>Component skills and movement patterns may include (FI.1.b):</p> <ul style="list-style-type: none"> • Squat • Lunge • Push • Pull • Bend • Twist 	<p>In order to meet these standards, it is expected that students will</p> <ul style="list-style-type: none"> • demonstrate correct movement skills and patterns for strength-training, physical conditioning, and fitness activities (FI.1.a); • use video to analyze movement activities for component skills and movement patterns (FI.1.b); • describe and demonstrate activities specific to improving skill-related components of fitness (FI.1.c); • define and identify <i>activities of daily living</i> (ADL) (FI.1.d); • apply movement skills and patterns to functional fitness activities that support ADL (FI.1.e); • identify and describe advanced resistance-training techniques (FI.1.f); • apply principles of exercise progression to improve fitness (FI.1.g); • demonstrate correct and safe techniques and

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<p>Skill-related fitness components include (FI.1.c):</p> <ul style="list-style-type: none"> • Agility: the ability to move with quick, easy grace; quick change of direction. • Balance: stability produced by even distribution of weight; muscles tense to keep the body in a balanced position. • Coordination: harmonious functioning of parts for effective results; it takes eye hand coordination to strike an object. • Power: physical might, ability to act or produce an effect; kicking a ball for distance. • Reaction time: the time required for a subject to initiate a prearranged response to a defined stimulus; the time between hearing a whistle and starting to run or time between seeing a ball being thrown to a place out of reach and moving to catch it. • Speed: the rate of motion, ability to move swiftly. <p>Activities of daily living (ADL): basic tasks of everyday life, such as eating, bathing, dressing, and transferring (FI.1.d).</p> <p>Movement skills and patterns used in ADL include (FI.1.e):</p> <ul style="list-style-type: none"> • Bending/raising and lifting/lowering movements (e.g., squatting) • Single-leg movements • Pushing movements in vertical/horizontal planes and resultant movement • Pulling movements in vertical/horizontal planes and resultant movement • Rotational movements 	<p>form when performing strength-training, physical conditioning, and fitness activities and exercises (FI.1.h);</p> <ul style="list-style-type: none"> • demonstrate the proper use of fitness equipment, selectorized weight machines, and free weights (FI.1.i); • demonstrate safety protocols and procedures for strength-training, physical conditioning, and fitness activities (FI.1.j); • identify contraindications to advanced resistance-training techniques (FI.1.k); • identify and describe factors that influence participation in physical activity and adherence to an exercise program (FI.1.l); • explain principles that result in behavior change (FI.1.m); • describe psychological factors that may influence a person’s adherence to an exercise program (FI.1.n); • identify and apply strategies to increase adherence in an exercise program (FI.1.o); • explain the role of the personal trainer in promoting an individual’s adherence to an exercise program (FI.1.p); • select one or more special populations and identify and explain considerations for

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<p>Advanced resistance-training techniques may include (FI.1.f):</p> <ul style="list-style-type: none"> • Olympic lifts: two exercises, the snatch and the clean and jerk, performed in the modern Olympic program • Plyometric exercises: a system of exercise in which the muscles are repeatedly stretched then suddenly contracted; explosive exercise used to develop muscular power, such as chops, throws, push-ups, twists, jumps (depth jumps, multiple jumps, lateral jumps) • Pyramid training: training methodology in which high-repetition, lower-weight sets are paired with high-weight, lower-repetition sets <ul style="list-style-type: none"> ○ Ascending: weight is increased and repetitions decrease each set ○ Descending: weight is decreased and repetitions increase each set ○ Triangle: weight increases as reps decrease, then weight decreases as reps increase each set • Super sets: performing multiple exercises with little to no rest between <ul style="list-style-type: none"> ○ Compound sets: two-plus exercises for the same muscle group performed in succession ○ Isolation sets: exercises for two different muscle groups combined in a superset <p>Principle of progression: to effectively improve fitness, an individual must apply an optimal level of overload within a certain time period. (FI.1.g)</p> <ul style="list-style-type: none"> • Active recovery: low-intensity activities completed during recovery periods to speed up the recovery process. • Passive recovery: completely resting during scheduled recovery periods. • Ten percent rule: To meet optimal levels of overload, it is recommended to increase the frequency, intensity, or duration by no more than 10% per 	<p>exercise/physical activity. (FI.1.q)</p> <p>Additional resources: SHAPE America National Standards and Grade-Level Outcomes OpenPhySED Health Smart Virginia PE Central Dynamic PE ASAP</p>

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<p>week.</p> <p>Correct and safe techniques and form when performing strength-training, physical conditioning, and fitness activities and exercises should include consistent, correct performance of all critical elements and safety practices for skills and activities. (FI.1.h)</p> <p>Proper use of fitness equipment, selectorized weight machines, and free weights may include following manufacturer guidelines, classroom procedures and protocols (for use and cleaning), and using equipment for intended purposes only. (FI.1.i)</p> <p>Safety protocols and procedures for strength-training, physical conditioning, and fitness activities include proper form, technique, and use, and following classroom procedures. (FI.1.j)</p> <p>Contraindication is any condition that renders some particular movement, activity, or treatment improper or undesirable. Contraindications for participation in advanced resistance training may include (FI.1.k):</p> <ul style="list-style-type: none"> • Pain • Inflammation • Severe cardiac diseases • Cardiac symptoms such as chest pain (angina) or arrhythmias • Hypertension > 160/105 • Inability to perform basic resistance-training techniques • Lack of muscular strength (Squat 1RM of less than 1.5 times body 	

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<p>weight; Bench press 1RM of less than 1-1.5 times body weight)</p> <ul style="list-style-type: none"> • Low levels of skill-related fitness • Deconditioned <p>Factors that may influence participation in physical activity and adherence to an exercise program may include (FI.1.1):</p> <ul style="list-style-type: none"> • Personal attributes: <ul style="list-style-type: none"> ○ Activity history: past program participation is the most reliable predictor of current participation. ○ Demographic variables: adherence is related to education, income, age, and gender; lower activity levels are seen in individuals with older age, lower education, and lower income; men demonstrate more adherence to exercise programs than women. ○ Health perception: An individual’s perception of their own health is a factor in exercise adherence because individuals that perceive themselves to be healthier tend to demonstrate more adherence. ○ Health status: individuals with chronic illness are less likely to adhere to an exercise program. ○ Knowledge, attitudes, and beliefs: The more knowledge an individual has, the more likely they will adhere to an exercise program; individuals with an internal locus of control, or belief that internal or personal factors control events or outcomes, are more likely to adhere to an exercise program. • Environmental factors: <ul style="list-style-type: none"> ○ Access to facilities: An individual is more likely to adhere to an exercise program if the facility is conveniently located near a person’s 	

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<p>home or work.</p> <ul style="list-style-type: none"> ○ Time: Individuals that have the perception that there is not enough time to participate in physical activity are less likely to adhere to an exercise program. ○ Social support: Individuals with support from family and friends are more likely to adhere to an exercise program. • Physical-activity factors: <ul style="list-style-type: none"> ○ Intensity: individuals participating in vigorous-intensity exercises are much more likely to drop out of the physical activity program; individuals participating in moderate-intensity programs are more likely to adhere to the exercise program. ○ Injury: Individuals that experience injury are less likely to adhere to an exercise program. • Feedback: <ul style="list-style-type: none"> ○ Intrinsic: information individuals provide to themselves based on their own sensory systems; adherence to an exercise program is dependent on intrinsic feedback. ○ Extrinsic: feedback provided from outside sources, including coaches or other fitness professionals; early in an exercise program, extrinsic feedback is key to program adherence. <p>Transtheoretical Model of Behavior Change stages of change (FI.1.m):</p> <ul style="list-style-type: none"> • Precontemplation: unaware that a behavior change is needed • Contemplation: considering a behavior change • Preparation: starting behavior change; inconsistent patterns of change • Action: consistent behavior change; <6 months after starting change 	

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<ul style="list-style-type: none"> • Maintenance: regular change in behavior; change becomes part of lifestyle; >6 months after starting change <p>Psychological factors that may influence a person’s adherence to an exercise program may include (FI.1.n):</p> <ul style="list-style-type: none"> • Motivation: an individual’s motivation correlates with their adherence to an exercise program. • Self-motivation: reflective of one’s ability to set goals, monitor progress, and self-reinforce; shows a positive relationship with adherence to an exercise program. • Self-efficacy: an individual’s belief in their capacity to execute behaviors necessary to produce specific performance attainments; individuals with high levels of self-efficacy are more likely to adhere to an exercise program. <p>Processes of change: providing a process to move from one stage to the next; interventions necessary (ACE TTM). (FI.1.n)</p> <ul style="list-style-type: none"> • Self-efficacy: development of the belief that an individual can master the behavior change. • Decisional balance: development of an understanding that the behavior change will benefit the individual. • Operant conditioning: process by which behaviors are influenced by their consequences (positive and negative). • Shaping: process of using reinforcements to gradually achieve a target behavior. • Observational learning: learning which occurs through observing the 	

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<p>behaviors of others.</p> <ul style="list-style-type: none"> • Cognitions and behavior: the influence a person’s beliefs have on their behaviors. <p>Adherence Strategies (FI.1.o)</p> <ul style="list-style-type: none"> • Stimulus control: making adjustments to the environment to increase the likelihood of engagement in a behavior (e.g., changing a schedule to include workout times, laying out exercise clothes before bed, choosing a fitness location between home and school/work) • Written agreements and behavior contracting: specific written agreements outlining the roles and behaviors of all involved in the behavior change. • Individualized goal setting: Goals must be effectively written and tailored to the individual to elicit changes in behavior (e.g., SMART goal). <p>The personal trainer can promote an individual’s adherence to an exercise program through program design; effective communication and role clarity; goal setting; and developing contracts or agreements. (FI.1.p)</p> <p>Considerations for special populations may include the following. Note: All individuals must obtain physician clearance before beginning any exercise program. (FI.1.q)</p> <ul style="list-style-type: none"> • Arthritis: focus on duration rather than intensity, ensure proper body alignment and exercise technique, and put all joints through full range of motion (ROM) at least once daily; avoid exercise during periods of inflammation for rheumatoid arthritis patients. • Asthma: medical clearance required; ensure rescue medication is 	

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<p>available at all times; avoid asthma triggers prior to exercise; gradual and prolonged warm-up and cool down; gradually increase intensity.</p> <ul style="list-style-type: none"> • Cancer (“Nutrition and Physical Activity Guidelines for Cancer Survivors,” http://onlinelibrary.wiley.com/doi/10.3322/caac.21142/full): Obtain physician clearance before any exercise program; gradual build-up focusing more on duration than intensity; light to moderate intensity; resistance-training activities using low weights for 10-15 repetitions; proper warm-up and cool down; individuals with low white blood cell counts should avoid exercising in public gyms; encourage proper nutrition and hydration; monitor for swollen ankles, unexplained weight gain, and/or shortness of breath at rest or with limited exertion; people should not exercise within two hours of chemotherapy or radiation. • Cardiovascular disease: All individuals with coronary artery disease (CAD) should have a physician-supervised maximal graded exercise test to determine functional capacity to establish safe exercise levels; heart rates should not exceed training targets, rate of perceived exertion (RPE) should not exceed 11-14 on the Borg scale (6-20 scale). • Chronic Fatigue Syndrome: use a 1:3 exercise-to-rest ratio; limit deconditioned individuals to ADL; develop low-intensity activities. • Diabetes: Monitor blood glucose levels and avoid exercise if fasting glucose levels are ≥ 250 mg/dL and ketosis is present or if blood glucose levels are > 300 mg/dL and no ketosis is present; avoid injecting insulin into the primary muscle groups that will be used during exercise; avoid exercise during peak insulin activity; exercise at the same time daily to establish a consistent routine; ensure that individuals with diabetes exercise with a partner and wear a medical ID; focus on hydration. 	

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<ul style="list-style-type: none"> • Dyslipidemia: Individuals with dyslipidemia may also have other risk factors for cardiovascular diseases; fitness professionals should follow physician recommendations in the development of an exercise plan; individuals that do not exhibit any other risk factors may follow age-specific guidelines. • Fibromyalgia: Discuss exercise goals and obtain medical clearance from physician prior to starting an exercise program; low-impact, low-intensity activities (9-13 RPE on Borg scale) with intensity levels lowered during periods of flare-up; warm-water exercise is especially beneficial. • Hypertension: Participation in 30 minutes of regular exercise five times per week; aerobic activities supplemented with low-intensity resistance-training; avoid isometric training and teach proper technique and breathing; monitor blood pressure during and after bouts of exercise. • Low-back pain: Specific low-back exercises supplemented with aerobic activity for cardiorespiratory health; ensure proper form and alignment; focus on good posture. • Metabolic syndrome: medical clearance prior to starting a program; exercise program should be designed around guidelines for treatment of overweight and obese individuals; aerobic modes of activity including walking, elliptical training/ergometers, stationary cycling, and other non-weight bearing activities such as aquatic exercise are recommended. • Older adults: decrease in maximum heart rate, muscle mass, basal metabolic rate, balance, and coordination are common in older adults; older adults should consult a physician prior to starting an exercise program; older adults without other underlying factors can follow age-specific guidelines. 	

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<ul style="list-style-type: none"> • Osteoporosis: weight-bearing and resistance activities with intensities that stimulate bone adaptation; avoid spinal flexion, jumping, high-impact aerobics, abducting or adducting legs against resistance • Peripheral Vascular Disease (PVD): complete medical evaluation with a medical professional; walking that is short in duration and includes multiple opportunities for rest; general, non-impact conditioning activities with an RPE of 9-13 on the Borg scale. • Pre- and postnatal/pregnant women with preeclampsia, vaginal bleeding, premature rupture of membranes, or risk factors for pre-term labor should not exercise. • Pregnant women who have a doctor’s permission to exercise should follow the following guidelines: <ul style="list-style-type: none"> ○ Use light to moderate intensity; avoid activities that require extensive running, hopping, skipping, jumping, or bouncing, deep-knee bends, full sit-ups, double-leg raises, and contact sports; women should obtain medical clearance to begin exercise postpartum and should begin slowly and work to increase duration. • Stroke: Focus on optimizing activities of daily living (ADL) to regain balance, coordination, and functional independence; light to moderate intensity activities focusing on gait, balance, and coordination, such as walking, bicycle ergometer, water, and weight-supported treadmill activities. • Weight management: low to moderate levels of intensity; dose-response relationship states the more exercise done the greater the response; recommended at least 150-200 minutes of physical activity/week. • Youth: obtain medical clearance and parental consent; proper supervision; 	

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<p>ensure facility is safe for children prior to use; avoid single maximal lifts or sudden explosive movements; avoid competition with children; teach children how to breathe properly; allow for appropriate rest (at least two minutes between each exercise); encourage nutrition, hydration, and proper communication</p>	

Anatomical Basis of Movement

- FI.2 The student will apply knowledge of anatomy and movement principles and concepts to skill performance in strength training, conditioning, and fitness activities.
- a) Identify the planes of motion and types of movement that occur in the frontal, sagittal, and transverse planes.
 - b) Define common anatomical terms.
 - c) Identify the major bones of the skeletal system.
 - d) Identify and describe the types of joints, including hinge and multiaxial (ball and socket).
 - e) Explain muscle structure and function, including major muscles of the body, terms related to muscles, and muscle origins and insertions.
 - f) Explain movements that result based on muscle origin and insertion.
 - g) Explain how muscles contract, including agonist and antagonist movements in relation to muscle contraction.
 - h) Identify and explain curvatures of the spine.
 - i) Perform and analyze postural evaluation of another individual.
 - j) Perform and analyze movement evaluation for stability and mobility of the joints of another individual.
 - k) Perform and analyze flexibility evaluation of another individual.
 - l) Perform and analyze balance and core-strength evaluations of another individual.
 - m) Identify contraindications to assessments of movement.
 - n) Perform assessments to evaluate the health-related components of fitness.
 - o) Perform assessments to evaluate the skill-related components of fitness.
 - p) Identify contraindications to health-related and skill-related fitness assessments.
 - q) Identify and explain different methods for determining body composition.
 - r) Explain the benefits and challenges of different methods for determining body composition.
 - s) Differentiate between recommendations for physical activity and training principles to meet goals for general health benefits, weight management, fitness improvements, and athletic performance enhancement.
 - t) Explain the effects of acute and chronic exercise on aerobic and anaerobic energy systems.
 - u) Explain the body's response to cardiorespiratory exercise.
 - v) Explain the body's response to resistance training.

- w) Explain the body’s response to warm-up and cool-down.
- x) Explain blood-pressure response related to acute exercise, chronic exercise, and changes in posture.
- y) Explain reversibility or deconditioning and the effect on fitness and performance.
- z) Define common musculoskeletal injuries.
- aa) Compare and contrast muscle fatigue and delayed onset muscle soreness (DOMS) with musculoskeletal injury/overuse.
- bb) Explain inflammatory response and the healing process.
- cc) Identify and describe upper-extremity injuries.
- dd) Identify and describe lower-extremity injuries.
- ee) Identify and explain exercise modifications appropriate when participant is injured.

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<p>Planes of motion and types of movement that occur in each plane. (FI.2.a)</p> <ul style="list-style-type: none"> • Sagittal plane is a vertical plane passing from the rear (posterior) to the front (anterior) dividing the body into left and right halves. It is also known as the anteroposterior plane. Most sport and exercise movements that are almost two-dimensional, forward and backward movements, such as running and long jumping, take place in this plane. Flexion and extension take place in the sagittal plane. • Frontal plane is also vertical and passes from left to right, dividing the body into posterior and anterior halves. It is also known as the coronal or the mediolateral plane. Abduction and adduction is often in the frontal plane; side-to-side movements. • Transverse/horizontal plane divides the body into top (superior) and bottom (inferior) halves. Twisting movements; any time there is rotation in a joint. <p>Anatomical terms (FI.2.b):</p>	<p>In order to meet these standards, it is expected that students will</p> <ul style="list-style-type: none"> • identify the planes of motion and types of movement that occur in the frontal, sagittal, and transverse planes (FI.2.a); • define common anatomical terms (FI.2.b); • identify the major bones of the skeletal system (FI.2.c); • identify and describe the types of joints, including hinge and multiaxial (ball and socket) (FI.2.d); • explain muscle structure and function, including major muscles of the body, terms related to muscles, and muscle origins and insertions (FI.2.e); • explain movements that result based on

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<ul style="list-style-type: none"> • Abduction: movements away from the midline of the body • Adduction: movements toward the midline of the body • Circumduction: a combination of flexion, extension, abduction, and adduction; circular movement; performed at shoulder, hip, wrist, and ankle (e.g., tennis overhead serve) • Distal: distant from the main mass of the body (e.g., the hands are at the distal end of the arms) • Dorsiflexion: flexion of the ankle joint in an upward direction • Extension: movement which increases the angle between the bones of a joint • External rotation: rotation away from the center of the body • Flexion: movement that decreases the angle between the bones of a joint • Hyperextension: extension that increases the angle between bones of a joint to a point which is greater than normal • Inferior: low, or lower, in body position • Internal rotation: rotation toward the center of the body • Lateral: farthest away from the midline of the body (e.g., the lateral collateral ligament of the knee is on the outside of the knee) • Medial: closest to the midline of the body (e.g., the medial collateral ligaments of the knee are on the inside of the knee) • Plantar flexion: flexion of the ankle joint in a downward direction • Pronation: internal rotation of the forearm or foot; pronation of the forearm/wrist will result in the thumb being medial; pronation of the foot will result in weight being borne on the medial part of the foot • Proximal: closest to the main mass of the body (e.g., the shoulder joint is at the proximal end of the arms) 	<p>muscle origin and insertion (FI.2.f);</p> <ul style="list-style-type: none"> • explain how muscles contract, including agonist and antagonist movements in relation to muscle contraction (FI.2.g); • identify and explain curvatures of the spine (FI.2.h); • perform and analyze postural evaluation of another individual (FI.2.i); • perform and analyze movement evaluation for stability and mobility of the joints of another individual (FI.2.j); • perform and analyze flexibility evaluation of another individual (FI.2.k); • perform and analyze balance and core-strength evaluations of another individual (FI.2.l); • identify contraindications to assessments of movement (FI.2.m); • perform assessments to evaluate the health-related components of fitness (FI.2.n); • perform assessments to evaluate the skill-related components of fitness (FI.2.o); • identify contraindications to health-related and skill-related fitness assessments (FI.2.p); • identify and explain different methods for determining body composition (FI.2.q);

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<ul style="list-style-type: none"> • Rotation: movement around a central axis • Superior: high, or higher, in body position • Supination: external rotation of the forearm or foot; supination of the forearm/wrist will result in the thumb being lateral (carrying a cup of soup); supination of the foot will result in weight being borne on the lateral part of the foot. <p>Major bones of the skeletal system (FI.2.c):</p> <ul style="list-style-type: none"> • Skull: cranium, mandible, maxilla • Shoulder girdle: clavicle, scapula • Arm: humerus, radius, ulna • Hand: carpals, metacarpals, phalanges • Chest: sternum, ribs • Spine: cervical vertebrae (7), thoracic vertebrae (12), lumbar vertebrae (5), sacrum (5 vertebrae fused together), coccyx • Pelvis: ilium, ischium, pubis • Leg: femur, tibia, fibula, patella • Ankle: talus, calcaneus • Foot: tarsals, metatarsals, phalanges <p>Types of joints (FI.2.d):</p> <ul style="list-style-type: none"> • Hinge: joint in which movement is restricted to only one plane; allows for flexion/extension movements (e.g., elbow, knee) • Multiaxial (ball and socket): joint in which a spherical head lies in a socket, allowing for multidirectional movement; allows for flexion/extension, abduction/adduction, and rotation movements (e.g., 	<ul style="list-style-type: none"> • explain the benefits and challenges of different methods for determining body composition (FI.2.r); • differentiate between recommendations for physical activity and training principles to meet goals for general health benefits, weight management, fitness improvements, and athletic performance enhancement (FI.2.s); • explain the effects of acute and chronic exercise on aerobic and anaerobic energy systems (FI.2.t); • explain the body’s response to cardiorespiratory exercise (FI.2.u); • explain the body’s response to resistance training (FI.2.v); • explain the body’s response to warm-up and cool-down (FI.2.w); • explain blood-pressure response related to acute exercise, chronic exercise, and changes in posture (FI.2.x); • explain reversibility or deconditioning and the effect on fitness and performance (FI.2.y); • define common musculoskeletal injuries (FI.2.z);

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<p>shoulder, hip)</p> <ul style="list-style-type: none"> • Pivot: cervical vertebrae allows head to move side to side; radius and ulna and humerus allow for twist motion (movement of arm for forehand and backhand swing); movement: rotation of one bone around another <p>Muscles function to produce force and motion; muscles move bones by working in pairs; and muscles provide stability by tensing to keep the body in a balanced position. (FI.2.e)</p> <ul style="list-style-type: none"> • Muscle structure <ul style="list-style-type: none"> ○ Actin: thin protein filament that works with myosin to cause muscles to contract ○ Epimysium: connective tissue surrounding muscle ○ Fasciculi: bundles of muscle fibers ○ Motor neuron: a nerve cell that causes the muscles to produce movement ○ Motor units: one motor neuron and all of the muscle fibers that it innervates ○ Muscle fibers: cylindrical muscle cell that contracts when stimulated ○ Myofibril: contractile unit of a muscle fiber, containing contractile proteins actin and myosin ○ Myosin: thick protein filament that works with actin to cause muscle contraction ○ Sarcomere: functional segment of a myofibril which shortens in a concentric muscle contraction ○ Sliding filament theory: method by which muscles contract; release of energy causes myosin filaments to pull actin filaments 	<ul style="list-style-type: none"> • compare and contrast muscle fatigue and delayed onset muscle soreness (DOMS) with musculoskeletal injury/overuse (FI.2.aa); • explain inflammatory response and the healing process (FI.2.bb); • identify and describe upper-extremity injuries (FI.2.cc); • identify and describe lower-extremity injuries (FI.2.dd); • identify and explain exercise modifications appropriate when participant is injured (FI.2.ee). <p>Additional resources: SHAPE America National Standards and Grade-Level Outcomes OPEN Online Physical Education Network Health Smart Virginia PE Central Dynamic PE ASAP KidsHealth.org</p>

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<p>and the Z line inward toward the H zone of the sarcomere to cause muscle to contract and generate force</p> <ul style="list-style-type: none"> • Major muscles of the body (FI.2.e): <ul style="list-style-type: none"> ○ The muscular system is made up of cardiac (heartbeat), smooth (circulation, digestion, breathing), and striated or skeletal (mobility, stability, posture) muscle. Smooth and cardiac muscles are involuntary, and skeletal muscles are voluntary (can consciously control) (“9 Functions of the Muscular System,” Healthline). There are 600 muscles in the body. ○ Skeletal muscle major groups include <ul style="list-style-type: none"> ▪ Back: erector spinae, latissimus dorsi ▪ Chest: pectoralis major, teres major, diaphragm ▪ Arms and shoulders: biceps brachii, triceps brachii, trapezius, rhomboideus major and minor, pectoralis minor, pectoralis major, deltoid, rotator cuff muscles (subscapularis, supraspinatus, infraspinatus and teres minor) ▪ Abdominals: rectus abdominis, external oblique, internal oblique, transversus abdominus ▪ Legs: quadriceps (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius), hamstrings (long head of the biceps femoris, short head of the biceps femoris, semitendinosus, and semimembranosus), gastrocnemius, tibialis anterior, soleus ▪ Buttocks: gluteus maximus, medius, and minimus • Terms related to muscles (FI.2.e): 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ Agonist muscle: muscle causing the body to move (e.g., biceps brachii in a biceps curl movement) ○ Antagonist muscle: muscle lengthening causing body to move (e.g., triceps brachii in a biceps curl movement) ○ Atrophy: decrease in muscle mass ○ Concentric contraction: contraction in which force causes muscle to shorten and change the angle of a joint ○ Eccentric contraction: muscle elongates while under tension due to an opposing force greater than the muscle generates ○ Hypertrophy: increase in muscle mass ○ Hyperplasia: increase the number of muscle cells present in tissue ○ Insertion: distal attachment point of a muscle; tends to be the more mobile structure of which the muscle is attached ○ Isometric contraction: muscular force precisely matches the load, and no movement results ○ Origin: proximal attachment point of a muscle; tends to be the more stationary structure of which the muscle is attached <p>Movements result based on muscle origin and insertion. When muscle contracts, the attachment points are pulled closer together; when it relaxes, the attachment points move apart. (e.g., the point of origin of the biceps brachii is the scapula, which stays stationary while the biceps contracts, while the point of insertion is the radius, which is moved to reduce the angle of the elbow when the biceps contracts.) (FI.2.f)</p> <p>Muscles can pull bones. They cannot push bones, so muscles work in pairs:</p>	

Essential Understandings	Essential Knowledge and Skills
<p>agonist muscle (muscle causing the body to move [e.g., the biceps brachii in a biceps curl movement]) and antagonist muscle (muscle lengthening causing the body to move [e.g., the triceps brachii in a biceps curl movement]). (FI.2.g)</p> <p>Curvatures of the spine include (FI.2.h):</p> <ul style="list-style-type: none"> • Kyphosis: excessive outward curvature of the spine, which causes a hunching of the back • Lordosis: excessive inward curvature of the spine • Scoliosis: abnormal lateral curvature of the spine <p>Muscle Imbalances:</p> <ul style="list-style-type: none"> • Kyphosis/lordosis: <ul style="list-style-type: none"> ○ Facilitated/hypertonic (shortened): hip flexors, lumbar extensors, anterior chest/shoulders, latissimus dorsi, neck extensors ○ Inhibited (lengthened): hip extensors, external obliques, upper-back extensors, scapular stabilizers, neck flexors • Flat back: <ul style="list-style-type: none"> ○ Facilitated/hypertonic (shortened): rectus abdominus, upper-back extensors, neck extensors, ankle plantarflexors ○ Inhibited (lengthened): iliacus/psoas major, internal oblique, lumbar extensors, neck flexors • Sway back: <ul style="list-style-type: none"> ○ Facilitated/hypertonic (shortened): hamstrings, upper posterior obliques, lumbar extensors, neck extensors ○ Inhibited (lengthened): iliacus/psoas major, rectus femoris, 	

Essential Understandings	Essential Knowledge and Skills
<p>external oblique, upper back extensors, neck flexors</p> <p>Postural evaluations may include the Plumb Line Assessment. (FI.2.i)</p> <p>Plumb Line Assessment: A static assessment in which a fitness professional/observer uses a centered line to look at alignment in the frontal, sagittal, and transverse planes to note asymmetries.</p> <ul style="list-style-type: none"> • Frontal Plane <ul style="list-style-type: none"> ○ Anterior view: Position the plumb line with the feet equidistant from line, using the inside of the heels as a point of reference; an individual with good posture will have the line pass equidistant between the feet and ankles and will intersect the pubis, umbilicus, sternum, chin, maxilla (face), and forehead. ○ Posterior view: Position the plumb line behind the client with the line equidistant from the inside of the heels; an individual with good posture will have the line bisecting the sacrum and overlapping with the spinous processes of the vertebrae. • Sagittal Plane <ul style="list-style-type: none"> ○ Position the individual between the plumb line and a wall with individual facing sideways and line immediately anterior to the lateral malleolus (ankle); with good posture, the plumb line will pass through the anterior third of the knee, the greater trochanter of the femur, and the acromioclavicular joint, and will pass slightly anterior to the 	

Essential Understandings	Essential Knowledge and Skills
<p style="text-align: center;">mastoid process of the temporal bone (in line with, or slightly behind the earlobe).</p> <p>Postural Deviations</p> <ol style="list-style-type: none"> 1. Ankle pronation/supination and the effect on tibial and femoral rotation <ul style="list-style-type: none"> - Pronation with internal rotation: places additional stresses on knee ligaments; eversion of calcaneus; tightens calf muscles and may limit dorsiflexion - Supination with external rotation: tightness of gluteal muscles 2. Hip adduction <ul style="list-style-type: none"> - Progressively lengthens and weakens adductor muscles 3. Pelvic tilting <ul style="list-style-type: none"> - Anterior pelvic tilt: indicative of tight hip flexors and erector spinae muscles; indicative of a sedentary lifestyle - Posterior pelvic tilt: indicative of an overdominant rectus abdominus and tight hamstrings 4. Shoulder positioning and the thoracic spine <ul style="list-style-type: none"> - Non-level shoulders: indicative of tight upper trapezius muscles, levator scapulae, rhomboids - Asymmetry to midline: indicative of tight lateral trunk flexors - Protracted (forward and rounded shoulders): indicates tight serratus anterior, anterior scapulo-humeral muscles, and upper trapezius - Medially rotated humerus: indicates tightness in pectoralis major, latissimus dorsi, and subscapularis - Kyphosis and depressed chest: indicates tightness in shoulder adductors, pectoralis minor, rectus abdominus, and internal obliques 5. Head position 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> - Forward head position (ear forward of acromioclavicular joint or cheekbone anterior to collarbone in sagittal view): indicates tightness in cervical spine extensors, upper trapezius, and levator scapulae <p>Movement evaluation for stability and mobility of various joints may include the following: (FI.2.j).</p> <ul style="list-style-type: none"> • Bend and lift screen: The individual will bend and lift at the ankle, knee, and hip to pick up two dowels/broomsticks from the floor, measuring symmetrical lower-body extremity mobility and stability and upper-body stability <ul style="list-style-type: none"> - Lack of foot stability indicates tight soleus, lateral gastrocnemius, and peroneals; indicates weak medial gastrocnemius, gracilis, Sartorius, and tibialis group. - Inward-moving knees indicate tight hip adductors and tensor fascia latae; indicate weak gluteal muscles. - Lateral shifting to one side indicates a dominance and muscle imbalance due to potential lack of stability in lower extremity during joint loading. - Heels lifting from the floor indicates tight plantar flexors. - Movement being initiated at the knees indicates quadriceps and hip flexor dominance and insufficient activation of gluteal muscles. - Being unable to achieve parallel between tibia and torso indicates poor mechanics and a lack of dorsiflexion due to tight plantar flexors. - Hamstrings contacting calves indicates muscle weakness and poor mechanics. - Excessively arched back indicates tightness in hip flexors, back 	

Essential Understandings	Essential Knowledge and Skills
<p>extensors, and latissimus dorsi; indicates weakness in rectus abdominus, gluteal muscles, and hamstrings.</p> <ul style="list-style-type: none"> - Rounded back indicates tightness in latissimus dorsi, teres major, pectoralis major and minor muscles; indicates weakness in upper back extensors. - Downward-facing head indicates increased hip and trunk flexion. - Upward-facing head indicates compression and tightness in cervical extensor region. <ul style="list-style-type: none"> • Hurdle step screen: The individual will step and raise one heel to and over a string placed at a height of the middle of the tibia to assess the mobility of one limb and the stability of the contralateral limb, while maintain hip and torso stabilization. <ul style="list-style-type: none"> - Lack of foot stability indicates tight soleus, lateral gastrocnemius, and peroneals; indicates weak medial gastrocnemius, gracilis, Sartorius, tibialis group, gluteal group; indicates inability to control internal rotation. - Inward moving knees indicate tight hip adductors and tensor fascia latae; indicate weak gluteal muscles. - Hip adduction indicates tight hip adductors and tensor fascia latae; indicates weak gluteal muscles. - Inward rotation of the hip indicates tight internal rotators and weak external rotators. - A lateral torso tilt indicates a lack of core stability. - A lack of ankle dorsiflexion indicates tight ankle plantarflexors and weak ankle dorsiflexors. - A limb deviating from the sagittal plane indicates tight raised-leg hip 	

Essential Understandings	Essential Knowledge and Skills
<p>extensors and weak raised-leg hip flexors.</p> <ul style="list-style-type: none"> - A hiking of the raised hip indicates tight stance-leg hip flexors. - An anterior tilt with forward torso lean indicates tight stance-leg hip flexors and weak rectus abdominus and hip extensors. - A posterior tilt with hunched torso indicates tight rectus abdominus and hip extensors and weak stance-leg hip flexors. <ul style="list-style-type: none"> • Shoulder push stabilization screen: The individual will execute several push-ups to full arm extension to examine stabilization of the scapulothoracic joint and core control during closed kinetic chain movements. <ul style="list-style-type: none"> - Winging in the scapula indicates an inability of the serratus anterior, trapezius, levator scapula, and rhomboids to stabilize the scapulae against the rib cage. - Collapsing of the low back indicates a lack of core, abdominal, and low-back strength. • Thoracic spine mobility screen: The individual will sit with a dowel/broomstick across the shoulders and will rotate bilaterally to examine the bilateral mobility of the thoracic spine. <ul style="list-style-type: none"> - A bilateral discrepancy can indicate biomechanical issues, such as a side dominance, differences in paraspinal development, and issues with torso rotation (possibly associated with some hip rotation). <p>Performance of multiple flexibility evaluations of another individual may include: (FI.2.k).</p> <ul style="list-style-type: none"> • Thomas test: Assesses the length of muscles involved in hip flexion (hip flexors/iliopsoas and rectus femoris) through moving from a sitting 	

Essential Understandings	Essential Knowledge and Skills
<p>position to a laying position while pulling one thigh toward the chest.</p> <ul style="list-style-type: none"> - Observations include whether the back of the lowered thigh touches the table, whether the knee of the lowered leg achieves 80 degrees of flexion, and whether the knee remains aligned straight or falls into internal or external rotation. • Passive straight-leg raise (PSL): Assesses the length of the hamstrings by attempting to lift one leg from a lying position to a 90-degree position; inability to reach at least 80 degrees indicates tight hamstrings. • Shoulder flexion/extension assessment: Assesses shoulder flexion and extension through an individual lying flat on the back with elevated knees and moving the arms simultaneously into shoulder flexion and down to the ground (flexion); the individual will lay prone and bring the shoulders into extension while lifting arms off the floor (extension). <ul style="list-style-type: none"> - Inability to flex to 170 degrees or discrepancies in limbs indicates tightness in pectoralis major and minor, latissimus dorsi, teres minor, rhomboids, and subscapularis. - Inability to extend to 50 degrees or discrepancies between limbs indicates tightness in pectoralis major, abdominals, subscapularis, anterior deltoid, coracobrachialis, and biceps brachii. • Internal/external rotation assessments: Assess the internal (medial) and external (lateral) rotation of the humerus at the shoulder joint through rotating the shoulders while laying down and with arms bent at elbow. <ul style="list-style-type: none"> - Inability to externally rotate the forearms to the floor (90 degrees) overhead indicates potential tightness in subscapularis as well as tightness in the joint capsule and ligaments. - Inability to internally rotate the forearms forward to 70 degrees 	

Essential Understandings	Essential Knowledge and Skills
<p>indicates potential tightness in infraspinatus and teres minor, as well as tightness in the joint capsule and ligaments.</p> <ul style="list-style-type: none"> • Apley’s scratch test: Assesses simultaneous movements of the shoulder girdle (scapulothoracic and glenohumeral joints). Shoulder flexion, external rotation, and scapular abduction are measured by the individual raising one arm overhead, bending the elbow, and reaching behind the head with palms inward in an attempt to touch the medial border of the contralateral scapula, or to touch the vertebrae as low as possible. Shoulder extension, internal rotation, and scapular adduction are measured by the individual reaching an arm behind the lat and rotating the arm inward with the palm facing outward in an attempt to touch the inferior angle of the contralateral scapula, or to reach up the spine as far as possible <ul style="list-style-type: none"> - Inability to reach specific landmarks indicates a need for further evaluation to determine the source of the limitation. <p>Balance and core-strength evaluations of another individual may include: (FI.2.1)</p> <ul style="list-style-type: none"> • Sharpened Romberg Test: An assessment in which an individual stands with one foot in front of the other, with arms crossed and eyes closed in order to assess static balance by standing with a reduced base of support while removing visual sensory information; the individual will be timed, and a time of less than 30 seconds is indicative of inadequate static balance and postural control. • Stork-Stand Balance Test: An assessment in which an individual stands in a stork position with the heel elevated; meant to assess static balance. <p>Rating scale:</p>	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> - Excellent: <ul style="list-style-type: none"> o Female: > 30 seconds o Male: > 50 seconds - Good: <ul style="list-style-type: none"> o Female: 25-30 seconds o Male: 41-50 seconds - Average: <ul style="list-style-type: none"> o Female: 16-24 seconds o Male: 31-40 seconds - Fair: <ul style="list-style-type: none"> o Female: 10-15 seconds o Male: 20-30 seconds - Poor: <ul style="list-style-type: none"> o Female: < 10 seconds o Male: < 20 seconds <p>Contraindications to assessments of movement may include movement assessment, such as pain, inability to complete the assessment, and low levels of health-related fitness/deconditioned. (FI.2.m) Also refer to FI.2.j.</p> <p>Assessments to evaluate the health-related components of fitness may include: (FI.2.n)</p> <ul style="list-style-type: none"> • Criterion-referenced fitness assessments, such as the FitnessGram assessments. • Cardiorespiratory assessments, such as the YMCA Submaximal Step Test, YMCA Bike Test, Submaximal Talk Test, VT2 Threshold Test, Rockport Fitness Walking Test, and/or the 1.5 Mile Run Test. 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ YMCA Submaximal Step Test: The individual will step up and down a 12-inch step at a rhythm of 96 beats per minute. At the conclusion, the individual will take their pulse for one minute, indicating relative levels of cardiorespiratory fitness. • Muscular endurance assessments, such as the push-up test, curl-up test, and body-weight squat test. • Muscular strength assessments, such as the 1 repetition max (1RM), 3RM, and estimated 1RM strength assessments. • Body composition assessments (e.g., bioelectrical impedance analysis, BMI, skinfold measures). <p>Assessments to evaluate the skill-related components of fitness may include: (FI.2.o)</p> <ul style="list-style-type: none"> • Agility assessments (e.g., shuttle run, pro agility run, Illinois agility run) • Balance assessments (e.g., Romberg test) • Coordination assessments (e.g., stick test) • Power assessments, (e.g., vertical jump and broad jump) • Reaction time assessments (e.g., ruler drop test) • Speed assessments (e.g., 40-yard dash, 100-meter dash) <p>Contraindications to health-related and skill-related fitness assessments may involve exertion (cardiorespiratory, muscular strength, muscular endurance). (FI.2.p)</p> <ul style="list-style-type: none"> • Onset of angina or chest pain • Significant drop in systolic blood pressure • Significant increase in diastolic blood pressure 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Excess fatigue • Subject requests to stop <p>Different methods for determining body composition may include: (FI.2.q)</p> <ul style="list-style-type: none"> • Bioelectrical impedance analysis (BIA) • Body mass index (BMI) • Dual-energy X-ray absorptiometry (DEXA) • Hydrostatic weighing • Near-infrared interactance • Skinfold measurements • Waist-to-hip ratio (WHR) • Whole-body air displacement plethysmography (Bod Pod) <p>Benefits and challenges of different methods for determining body composition: (FI.2.r)</p> <ul style="list-style-type: none"> • Bioelectrical impedance analysis (BIA): a simple, non-invasive technique that uses electrical conductivity to estimate lean body mass. This test is dependent upon hydration status because muscle holds most of the water in the body; so, the more muscle, the better the conduction. The error of bioelectrical impedance is 3-3.5%. BIA can be done using a device in a fitness setting; however, more accurate whole-body machines are found only in laboratory settings. • Body mass index (BMI): The ratio of height to weight; easy to complete; does not take into account lean mass and fat mass. • Dual-energy X-ray absorptiometry (DEXA): A whole-body scanning system that delivers low-radiation X-ray to determine bone and soft-tissue mass; very accurate, yet found only in laboratory settings. 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Hydrostatic weighing: A measurement that determines body fat through submerging an individual in water and measuring water displacement; seen as the gold standard of body composition measures, yet found primarily in laboratory settings. • Near-infrared interactance: The measurement of tissue composition through use of near-infrared light, usually at the biceps brachii. Easy to use in a fitness setting; however, it is not seen to be as accurate as laboratory techniques. • Skinfold measurements: The use of a caliper to pinch a fold of skin and fat at several sites on the body (see Jackson-Pollock for measurement sites), with measurements plugged in to an equation to calculate body fat percentage; easy to use in a fitness setting and provides accurate measurements as long as the individual taking the measurements has been properly trained in this method. • Waist-to-hip ratio (WHR): The measurement of the difference in body circumference at the waist and hip; ratios indicative of higher circumference in the waist are indicative of greater health risks. <p>To meet goals for general health benefits, weight management, fitness improvements, and athletic performance enhancement, refer to FI.1.q to differentiate between recommendations for physical activity and training principles. (FI.2.s)</p> <p>To explain the effects of acute and chronic exercise on aerobic and anaerobic energy systems, review the previous year’s content and vocabulary as appropriate, including: (FI.2.t)</p>	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • An acute bout of exercise increases cardiac output, blood flow, blood pressure, circulation, respiration. • Long-term adaptive responses include hypertrophy of the cardiac muscle fibers (i.e., increases in the size of each fiber). This hypertrophy increases the muscle mass of the ventricles, permitting greater force to be exerted with each beat of the heart. Increases in the thickness of the posterior and septal walls of the left ventricle can lead to a more forceful contraction of the left ventricle, thus emptying more of the blood from the left ventricle • The musculoskeletal system is to define and move the body. To provide efficient and effective force, muscle adapts to demands. Refer to FI.2.e to review muscle fiber types. • Skeletal muscle is composed of two basic types of muscle fibers distinguished by their speed of contraction—slow-twitch and fast-twitch. <ul style="list-style-type: none"> ○ Slow-twitch muscle fibers contain a large number of capillaries, mitochondria (which transform energy from food into adenosine triphosphate [ATP], or cellular energy), and myoglobin (which allows for improved delivery of oxygen). ○ Fast-twitch muscle fibers generally contain fewer capillaries, mitochondria, and myoglobin—they have a lower capacity to use oxygen and fatigue quickly. • Major metabolic pathways involved in energy production include: <ul style="list-style-type: none"> ○ The ATP-PCr system provides energy from the ATP stored in all of the body’s cells. PCr, also found in all cells, is a high-energy phosphate molecule that stores energy. As ATP concentrations in the cell are reduced by the breakdown of ATP to adenosine diphosphate (ADP) to release energy for muscle contraction, PCr is broken down 	

Essential Understandings	Essential Knowledge and Skills
<p>to release both energy and a phosphate to allow reconstitution of ATP from ADP. This process describes the primary energy system for short, high-intensity exercise, such as a 40- to 200-meter sprint; during such exercise, the system can produce energy at very high rates, and ATP and PCr stores, which are depleted in 10-20 seconds, will last just long enough to complete the exercise. At high rates of work, the active muscle cell’s oxygen demand exceeds its supply. The cell must then rely on the glycolytic energy system to produce ATP in the absence of oxygen (i.e., anaerobically). This system can only use glucose, available in the blood plasma and stored in both muscle and the liver as glycogen.</p> <ul style="list-style-type: none"> ○ The glycolytic energy system is the primary energy system for all-out bouts of exercise lasting from 30 seconds to two minutes, such as an 800-meter run. The major limitation of this energy system is that it produces lactate, which lowers the pH of both the muscle and blood. Once the pH drops below a value of 6.4 to 6.6, enzymes critical for producing energy are no longer able to function, and ATP production stops. ○ The oxidative energy system uses oxygen to produce ATP within the mitochondria, which are special cell organelles within muscle. This process cannot generate ATP at a high enough rate to sustain an all-out sprint, but it is highly effective at lower rates of work (e.g., long distance running). ATP can also be produced from fat and protein metabolism through the oxidative energy system. Typically, carbohydrate and fat provide most of the ATP; under most conditions, protein contributes only 5 to 10 percent at rest and during exercise. 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ Adequate fluid intake during exercise sessions is critical to prevent impairments induced by dehydration from endurance, muscular power, and/or strength exercises. <p>Cardiorespiratory exercise has a profound effect on physical and mental health. The body’s response to cardiorespiratory exercise is predictable to the increased demands of exercise. With few exceptions, the cardiovascular response to exercise is directly proportional to the skeletal muscle oxygen demands for any given rate of work, and oxygen uptake (VO₂) increases linearly with increasing rates of work. (FI.2.u) The body’s physiological, physical, and performance-based response to cardiorespiratory training includes the points below. Also refer to FI.2.t.</p> <ul style="list-style-type: none"> • Stronger and more efficient heart, improved ability to pump blood (enhanced cardiac output) • Reduced risk of heart disease, obesity, or diabetes • Lower resting heart rate • More efficient breathing, stronger respiratory muscles • Improved oxygen transport and ability of muscles to use oxygen • Reduced cholesterol levels and blood pressure • Improved fuel supply (improved ability to use fatty acids, sparing muscle glycogen stores) • Improvement in mental alertness, tolerance to stress, ability to relax and sleep • Reduced tendency for depression and anxiety • Increase in lean body mass and metabolic rate 	

Essential Understandings	Essential Knowledge and Skills
<p>The body’s physiological, physical, and performance-based response to resistance training includes (FI.2.v):</p> <ul style="list-style-type: none"> • Improved cardiovascular efficiency • Beneficial endocrine (hormone) and serum lipid (cholesterol) adaptations • Increased bone density • Increased metabolic efficiency (metabolism) • Increased tissue (muscle, tendons, ligaments) tensile strength • Increased cross-sectional area of muscle fibers • Decreased body fat • Increase neuromuscular control (coordination) • Increased endurance, strength, and power <p>A warm-up is generally described as preparing the body for physical activity while the cool-down is to provide the body with a smooth transition from exercise back to a steady state of rest. It can be general in nature or more specific to the activity. (FI.2.w)</p> <ul style="list-style-type: none"> • The purpose of the warm-up period is to increase heart and respiration rates, increase tissue temperature, and psychologically prepare the individual for higher training intensities. A warm-up should last between five and 10 minutes, depending on the goals and objectives of the participant. • The purpose of the cool-down is to reduce heart and breathing rates, gradually cool body temperature, return muscles to their optimal length-tension relationships, and prevent venous pooling of blood in the lower extremities. A cool-down of five to 10 minutes provides the body with an essential transition from exercise back to rest. 	

Essential Understandings	Essential Knowledge and Skills
<p>Blood-pressure response related to acute exercise, chronic exercise, and changes in posture include systolic blood pressure increasing linearly with increases in exercise intensity. In a healthy person with a “normal” systolic pressure of 120 mmHg, vigorous aerobic fitness training can increase systolic pressure to 180 mmHg and take 10-20 minutes to return to resting levels. The higher the intensity of exercise, the greater the rise in heart rate will be and consequently the larger the increase in systolic blood pressure. With most types of exercise, there is minimal change in diastolic blood pressure. (FI.2.x)</p> <p>Explain reversibility or deconditioning and the effect on fitness and performance. (FI.2.y)</p> <ul style="list-style-type: none"> • Reversibility means that an athlete can lose the effects of training when they stop and can gain the effects when they begin to train again. • Deconditioning, or detraining, occurs once an individual stops exercising and can be affected by age, fitness level, how long the individual has been exercising, and the type of exercise the individual was doing and at what level • Cardiovascular (aerobic) gains made with exercise: notably the heart’s ability to pump blood more efficiently, the muscles’ improved capacity to process oxygen, and the body’s enhanced ability to use carbohydrates for fuel. • Even two weeks of detraining can lead to a significant decline in cardio fitness, according to the American College of Sports Medicine. Not exercising for two to eight months leads to loss of virtually all fitness gains. In general, the loss of aerobic capacity occurs more rapidly than declines in muscle strength. 	

Essential Understandings	Essential Knowledge and Skills
<p>A musculoskeletal injury affects the body’s muscular or skeletal system and interferes with the body’s ability to move freely and without pain. Common musculoskeletal injuries include (FI.2.z):</p> <ul style="list-style-type: none"> • Ankle sprains • Knee injuries involving ligaments • Low-back injuries • Shoulder injuries • Other injuries • Past surgeries <p>Delayed onset muscle soreness (DOMS) is exercise-related muscle pain. It develops after excessive and unaccustomed exercise and can cause tiny, microscopic tears in your muscle fibers. It is particularly prevalent if that exercise has an eccentric component during which the muscle exerts force while lengthening, as can happen when a person runs down a steep hill or lowers a weight from a fully flexed to a fully extended position (e.g., the two-arm curl). Overuse or overtraining is the excessive frequency, volume, or intensity of training, resulting in fatigue (which is also caused by a lack of proper rest and recovery). Overtraining may reduce the response of T-lymphocytes, decrease antibody synthesis, and contribute to adverse effects on the immune system. (FI.2.aa)</p> <p>The inflammatory response is triggered by damage to living tissues. Your body responds to the damage from excessive and unaccustomed exercise by activating the body’s pain receptors and initiates a protective mechanism, increasing</p>	

Essential Understandings	Essential Knowledge and Skills
<p>muscle tension or causing a muscle spasm. The healing process takes time and can include lower-intensity recovery movements, topical analgesics, cold bath, warm bath, anti-inflammatory foods, or massage. (FI.2.bb)</p> <p>Common upper-extremity injuries include muscle strains, ligament sprains, pectoralis major tendon ruptures, distal biceps tendon ruptures, and chronic shoulder pain. While each injury is unique in its specific anatomic location and mechanism, each is preventable with proper exercise technique, safety, and maintenance of muscle balance. (FI.2.cc)</p> <ul style="list-style-type: none"> • Low-back injuries can cause decreased neural control to stabilizing muscles of the core, resulting in poor stabilization of the spine. This can further lead to dysfunction in the upper and lower extremities. • Shoulder injuries cause altered neural control of the rotator cuff muscles, which can lead to instability of the shoulder joint during functional activities. <p>Common lower-extremity injuries that result from human movement imbalances can include repetitive hamstring strains, groin strains, patellar tendonitis (jumper’s knee), plantar fasciitis (pain in the heel and bottom of the foot), and posterior tibialis tendonitis (shin splints). While each injury is unique in its specific anatomic location and mechanism, each is preventable with proper exercise technique, safety, and maintenance of muscle balance. Balance training programs are frequently used to help prevent lower extremity injuries. (FI.2.dd)</p> <ul style="list-style-type: none"> • Ankle sprains have been shown to decrease the neural control to the gluteus medius and gluteus maximus muscles. This, in turn, can lead to poor control of the lower extremities during many functional activities, which can lead to injury. 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Knee injuries involving ligaments can cause a decrease in the neural control to muscles that stabilize the patella (kneecap) and lead to further injury. Knee injuries that are not the result of contact (noncontact injuries) are often the result of ankle or hip dysfunctions, such as the result of an ankle sprain. <p>Appropriate modifications for an injured participant may be based on many factors such as the location of the injury, the movement patterns involved, joint angles, weight bearing or not, and/or the original program structure. (FI.2.ee)</p>	

Fitness Planning

FI.3 The student will plan and describe a personalized fitness and conditioning program for others that includes skill-related and health-related fitness components to achieve and maintain a health-enhancing level of physical fitness for a lifetime.

- a) Identify the components of a health/medical history.
- b) Identify the limitations of a health/medical history.
- c) Identify the common signs and symptoms of cardiovascular, metabolic, or pulmonary diseases.
- d) Conduct a health and exercise history with another individual.
- e) Develop SMART fitness goals with another individual based on fitness assessments and personal desired outcomes.
- f) Apply the FITT (frequency, intensity, time, and type of exercise) principles to improve or maintain cardiovascular and musculoskeletal fitness in healthy adults, seniors, youth, adolescents, and pregnant women.
- g) Develop functional programming for stability, mobility, and movement.
- h) Develop a resistance-training program with appropriate progressions.
- i) Develop a cardiorespiratory training program with appropriate progressions.
- j) Evaluate fitness programming for others to determine effectiveness.
- k) Identify contraindications of cardiorespiratory exercise.

- l) Define and explain exercises to improve range of motion, including dynamic stretching, passive stretching, proprioceptive neuromuscular facilitation (PNF), and partner stretching.
- m) Identify contraindications of range of motion exercises.
- n) Describe different forms of mind-body exercise (e.g., yoga, Pilates, tai chi).
- o) Identify indications for use of mind-body exercise.
- p) Identify contraindications for mind-body exercise.

Essential Understandings	Essential Knowledge and Skills
<p>Obtaining a participant’s medical history is vitally important because it provides information about known or suspected chronic disease, such as coronary heart disease, high blood pressure, or diabetes. A medical history provides information about the client’s past and current health status, as well as any past or recent injuries, surgeries, or other chronic health conditions. Identify components of health/medical history. (FI.3.a)</p> <p>Identify limitations of health/medical history. (FI.3.b)</p> <ul style="list-style-type: none"> • PAR-Q: The Physical Activity Readiness Questionnaire is designed to determine the safety or possible risk of exercising for a client based on the answers to specific health history questions. <p>Identify signs and symptoms common for cardiovascular, metabolic, or pulmonary diseases. (FI.3.c)</p> <ul style="list-style-type: none"> • Cardiovascular disease <ul style="list-style-type: none"> ○ Heart attack: Chest pain or discomfort, upper back or neck pain, indigestion, heartburn, nausea or vomiting, extreme fatigue, upper body discomfort, dizziness, and shortness of breath. 	<p>In order to meet these standards, it is expected that students will</p> <ul style="list-style-type: none"> • identify components of health/medical history (FI.3.a); • identify limitations of health/medical history (FI.3.b); • identify signs and symptoms common for cardiovascular, metabolic, or pulmonary diseases (FI.3.c); • conduct health and exercise history with another individual (FI.3.d); • develop SMART fitness goals with another individual based on fitness assessments and personal desired outcomes (FI.3.e); • apply FITT principle to improve or maintain cardiovascular and musculoskeletal fitness in healthy adults, seniors, youth, adolescents, and pregnant women (FI.3.f);

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ Arrhythmia: Fluttering feelings in the chest (palpitations). ○ Heart failure: Shortness of breath, fatigue, or swelling of the feet, ankles, legs, abdomen, or neck veins. • Metabolic syndrome: defined as the presence of at least three of these components: elevated waist circumference, elevated triglycerides, reduced high-density lipoprotein cholesterol, high blood pressure, and elevated fasting blood glucose. • Pulmonary disease <ul style="list-style-type: none"> ○ Chronic obstructive pulmonary disease (COPD) refers to a group of diseases that cause airflow blockage and breathing-related problems. It includes emphysema and chronic bronchitis. Symptoms of COPD include frequent coughing or wheezing, excess phlegm, mucus, or sputum production, shortness of breath, and trouble taking a deep breath. <p>Refer to FI.3.a and FI.3.b to conduct a health and exercise history with another individual. (FI.3.d)</p> <p>A SMART goal is a best practice framework for setting goals: they are specific, measurable, achievable, realistic/relevant and time-bound to clarify exactly what will be required for achieving success and to be able to share that clarification with others based on individual fitness assessments and personal desired outcomes. (FI.3.e)</p> <p>The FITT principle is a set of rules that dictates the frequency, intensity, type and time of exercise. The FITT principle varies based on different groups and</p>	<ul style="list-style-type: none"> • develop functional programming for stability, mobility, and movement (FI.3.g); • develop a resistance-training program with appropriate progressions (FI.3.h); • develop a cardiorespiratory-training program with appropriate progressions (FI.3.i); • evaluate fitness programming for others to determine effectiveness (FI.3.j); • identify contraindications of cardiorespiratory exercise (FI.3.k); • define and explain exercises to improve range of motion, including dynamic stretching, passive stretching, proprioceptive neuromuscular facilitation (PNF), and partner stretching (FI.3.l); • identify contraindications of range of motion exercises (FI.3.m); • describe different forms of mind-body exercise (e.g., yoga, Pilates, tai chi) (FI.3.n); • identify indications for use of mind-body exercise (FI.3.o); • identify contraindications for mind-body exercise. (FI.3.p) <p>Additional resources: SHAPE America National Standards and Grade-</p>

Essential Understandings	Essential Knowledge and Skills
<p>populations. (FI.3.f)</p> <ul style="list-style-type: none"> • Seniors <ul style="list-style-type: none"> ○ F: 3-5 days/week ○ I: 40-85% of VO2 Max ○ T: 30-60 minutes/day with 8-10 minute bouts ○ T: Stationary or recumbent cycling, aquatic exercise, treadmill with hand support ○ Physiological considerations and implications for training include: <ul style="list-style-type: none"> ▪ Maximal oxygen uptake and exercise heart rate decrease with increasing age; initial exercise workloads should be low and progress gradually. ▪ Percentage of body fat will increase, and bone mass and lean body mass will decrease with increasing age; resistance exercise is recommended, with lower initial weights and slower progression. ▪ Balance, gait, and neuromuscular coordination may be impaired; exercise options should be chosen and progressed to safeguard against falls. ▪ There is a higher rate or diagnosed and undetected heart disease in the elderly; knowledge of pulse assessment during exercise is critical. ▪ Pulse irregularity is more frequent: careful analysis of medication use and possible exercise side effects • Youth/Adolescents <ul style="list-style-type: none"> ○ F: 5-7 days/week ○ I: Moderate to vigorous ○ T: 60 minutes/day 	<p>Level Outcomes</p> <p>KidsHealth.gov</p> <p>Health Smart Virginia</p> <p>MyPlate.gov</p> <p>OpenPhyzed</p> <p>Physical Activity Guidelines for Americans, 2nd ed.</p> <p>Healthy Children.org</p>

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ T: walking, jogging, running, games, activities, sports, water activity, resistance training ○ Special considerations: progression should be based on postural control and not on the amount of weight. • Pregnant Women <ul style="list-style-type: none"> ○ F: 3-5 days/week ○ I: Physician’s advice ○ T: 15-30 minutes/day ○ T: low-impact, walking, stationary cycling, water activity ○ Physiologic considerations: <ul style="list-style-type: none"> ▪ Contraindications include persistent bleeding in the second to third trimester, medical documentation of incompetent cervix or intrauterine growth retardation, pregnancy-induced hypertension, preterm rupture of membrane, or preterm labor during current or prior pregnancy. ▪ Decreased oxygen available for aerobic exercise. ▪ Posture can affect blood flow to the uterus during vigorous exercise. ▪ Even in the absence of exercise, pregnancy may increase metabolic demand by 300 kcal per day to maintain energy balance. ▪ High-risk pregnancy considerations include individuals older than 35, a history of miscarriage, diabetes, thyroid disorder, anemia, obesity, and a sedentary lifestyle. <p>Functional programming is an approach to training used a little or a lot to</p>	

Essential Understandings	Essential Knowledge and Skills
<p>increase strength, correct imbalances, improve movement quality, and gain comfort and confidence in positions. (FI.3.g)</p> <p>To develop a resistance-training program with appropriate progressions, the following concepts are key to understanding (FI.3.h):</p> <ul style="list-style-type: none"> • Acute variables: important components that specify how each exercise is to be performed • Repetition (or “rep”): one complete movement of a single exercise; each phase of training has specific goals and requires a specific number of repetitions • Sets: a group of consecutive repetitions • Training intensity: an individual’s level of effort, compared with their maximal effort, which is usually expressed as a percentage • Repetition temp: the speed with which each repetition is performed • Rest interval: the time taken to recuperate between sets • Training volume: amount of physical training performed within a specified period • Training frequency: the number of training sessions performed during a specified (usually one week) • Training duration: the timeframe of a workout or the length of time spent in one phase of training • Exercise selection: the process of choosing appropriate exercises for a client’s program • Training plans: the specific outline, created by a fitness professional to meet a client’s goals, that details the form of training, length or time, future changes, and specific exercises to be performed 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Annual, monthly, weekly plan • Various resistance-training modalities include: <ul style="list-style-type: none"> ○ Strength machines, free weights, cable machines, resistance bands, medicine ball, kettlebell, body weight, suspension body weight, stability ball, BOSU ball, vibration <p>Cardiorespiratory training programs need appropriate progressions through various stages to achieve optimal levels of physiologic, physical, and performance adaptations. Key elements include (FI.3.i):</p> <ul style="list-style-type: none"> • Rate of progression: critical to helping clients achieve personal health and fitness goals in the most efficient and effective use of time and energy without resulting in injury. • Each cardio-respiratory session should include a warm-up phase, conditioning phase, and a cool-down phase. • Methods of prescribing exercise intensity <ul style="list-style-type: none"> ○ Maximal oxygen consumption (VO₂ max): the highest rate of oxygen transport and use achieved at maximal physical exertion. ○ Oxygen uptake reserve (VO₂R): the difference between resting and maximal or peak oxygen consumption. ○ Peak Metabolic Equivalent (MET) Method: METs describe the energy cost of physical activity as multiples of metabolic rate. ○ Peak Maximal Heart Rate (MHR) Method: a formula not meant to design a cardio program (220 minus client’s age). ○ HR Reserve (HRR) Method (Karvonen method): establishing training intensity based on the difference between a client’s predicted maximal heart rate and their resting heart rate. ○ Ratings of Perceived Exertion Method: a subjective rating scale of 	

Essential Understandings	Essential Knowledge and Skills
<p>perceived exertion used to express or validate how hard a client feels they are working during exercise.</p> <ul style="list-style-type: none"> ○ Talk Test Method: the ability to speak during activity can identify exercise intensity and ventilatory threshold. • Enjoyment of the mode or type of cardio activity selected. <p>Evaluation for effectiveness of a fitness program will follow a process similar to one used to create an initial fitness program. (FI.3.j)</p> <ul style="list-style-type: none"> • First revisit the goals or objectives of the workout program. • Next determine whether any goals have been met by the program, and which goals may be outstanding or not attained. • Discussion with the individual/client should focus on their opinion relating to the pros, cons, and personal adherence to the program that is being followed currently. • Evaluation of the individual’s current fitness levels and areas of improvement needed may be obtained by completing testing on cardiovascular fitness, muscular strength and functional strength. • Once all information has been obtained, a new or modified fitness program can be established using a template that will address any weaknesses or areas needing improvement for the individual/client. • Fitness programming may require a Corrective approach, a Performance approach, or a more Generalized approach but must be driven by the needs and compliance of the individual/client. • Regular evaluation and appropriate modification of fitness programming is key to meeting goals. <p>Contraindications of cardiorespiratory exercise can include (FI.3.k):</p>	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Pain • Inflammation • Severe cardiac diseases • Cardiac symptoms such as chest pain (angina) or arrhythmias • Hypertension > 160/105 • Chest pain • Deconditioned • Postural considerations such as: <ul style="list-style-type: none"> ○ Upper Crossed Syndrome ○ Lower Crossed Syndrome ○ Pronation Distortion Syndrome <p>Exercises that improve range of motion, may include (FI.3.1):</p> <ul style="list-style-type: none"> • Dynamic stretching is the use of movement to stretch muscles before exercise and relies on momentum to engage the muscles, rather than holding a stretch at a standstill. • Static stretching is stretching to the farthest point and holding the stretch. • Passive stretching (while also being a static stretch), where an external force is created by an outside force, such as a partner. • Proprioceptive neuromuscular facilitation (PNF) involves stretching and contracting the muscle group to be stretched so muscles are stretched and under tension. Then the individual contracts the stretched muscle group for 5-6 seconds while a partner applies sufficient resistance to inhibit movement. The contracted muscle group is then relaxed and a controlled stretch is applied for 20-30 seconds. 	

Essential Understandings	Essential Knowledge and Skills
<p>Contraindications of range of motion exercises include (FI.3.m):</p> <ul style="list-style-type: none"> • Healing from an injury • Soft tissue trauma • DOMS • Deconditioned <p>Instruction on mind-body exercises that combine body movement, mental focus, and controlled breathing to improve strength, balance, flexibility, and overall health are helpful in reducing stress, creating a sense of calm, decreasing chronic pain, and improving sleep patterns. Experience yoga, Pilates, and martial arts (such as tai chi, tae kwon do, and qi gong) are the most commonly known types of physical activity classified as mind-body exercises. (FI.3.n)</p> <ul style="list-style-type: none"> • Yoga is a type of exercise in which you move your body into various positions to become more fit or flexible, to improve your breathing, and to relax your mind. • Pilates is a system of exercises, using special apparatus, designed to improve physical strength, flexibility, and posture, and enhance mental awareness. • Tai chi is a Chinese martial art and form of stylized, meditative exercise, characterized by methodically slow circular and stretching movements and positions of bodily balance. <p>Identify indications for use of mind-body exercise. (FI.3.o)</p> <ul style="list-style-type: none"> • Chronic diseases and conditions such as Parkinson’s Disease, Cardiovascular Disease, Alzheimer’s Disease, Migraine headaches, epilepsy, stroke, neuropathy, and ADHD have shown positive changes in postural stability, blood pressure, vital capacity, flexibility, pain management and aerobic capacity as a result of regular mind-body 	

Essential Understandings	Essential Knowledge and Skills
<p>exercise. (NIH PUB MED or doi: 10.1212/01.wnl.0000314667.16386.5e)</p> <ul style="list-style-type: none"> • Mind-body exercise often produces a decrease in mental/emotional and physiological symptoms associated with various diseases/conditions. • Mental clarity and emotional resilience has also shown improvement among those with mild mental or emotional disabilities. • In the generally healthy population, mind-body exercise improves overall flexibility, core strength, focus and mood, along with decreased levels of stress and increased capacity to manage stress. <p>Mind-body exercise is generally safe with the exception of a few contraindications that include (FI.3.p):</p> <ul style="list-style-type: none"> • When practiced appropriately, yoga has no known side effects. One should exercise caution when attempting new postures. Certain postures, particularly headstands, should not be attempted during pregnancy or by patients with hypertension or heart disease. Individuals with diabetes, hernias, bone cancer, or a history of eye, ear, or brain problems should consult with their healthcare providers prior to beginning any yoga program. • Individuals with epilepsy or schizophrenia should avoid practicing meditation and exercises requiring altered levels of consciousness because of reports of grand mal seizures in the former and acute psychotic events in the latter. • No known side effects or contraindications have been identified with Qigong or tai chi; however, individuals with bone tumors or those with severe bone osteoporosis should contact their healthcare providers prior to attempting any type of exercise. 	

Social and Emotional Development

FI.4 The student will accept responsibility for taking a leadership role as well as demonstrate the ability to follow, in order to accomplish group goals.

- a) Define and explain *cultural competence* and its importance in developing rapport with another individual.
- b) Demonstrate effective teaching techniques for working with individuals of different learning styles, motivation levels, and physical activity levels.
- c) Explain learning styles and instructional strategies, including visual, auditory, and kinesthetic.
- d) Demonstrate effective and varied teaching techniques for a variety of exercises.
- e) Demonstrate and explain how to respond in an emergency situation.
- f) Identify signs of cardiac emergency.
- g) Demonstrate CPR and AED procedures for adults and children.
- h) Identify emergency situations requiring first aid.
- i) Demonstrate first-aid techniques used in emergency situations.
- j) Identify and describe universal precautions and personal protection used during CPR and first aid.

Essential Understandings	Essential Knowledge and Skills
<p>Cultural competence describes the ability of an individual or organization to interact effectively with people of different cultures. Cultural competence improves sustainability by reinforcing the value of diversity, flexibility, and responsiveness in addressing the current and changing needs of clients, communities, and the personal fitness training environments. (FI.4.a)</p> <p>Individual learning style refers to the preferential way in which a person absorbs, processes, comprehends and retains information.</p>	<p>In order to meet these standards, it is expected that students will</p> <ul style="list-style-type: none"> • define and explain cultural competence and its importance in developing rapport with another individual (FI.4.a); • demonstrate effective teaching techniques for working with individuals of different learning styles, motivation levels, and

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Explore intrinsic motivators that may include fascination with the subject, a sense of its relevance to life and the world, a sense of accomplishment in mastering it, and a sense of calling to it. • Intrinsic motivation can be long-lasting and self-sustaining when compared to extrinsic motivators that may include following doctors’ or family members’ advice. <p>Deep learners respond well to the challenge of mastering a difficult and complex subject and are intrinsically motivated students. Everybody learns differently. (FI.4.b, FI.4.c, FI.4.d)</p> <p>Client safety is a top priority. Develop an emergency action plan (EAP) that includes the identification of an emergency response team (ERT), is specific to each fitness venue, and reflects the following important considerations related to managing emergency situations (FI.4.e):</p> <ul style="list-style-type: none"> • emergency personnel • emergency communication • emergency equipment • medical emergency transportation. <p>Common cardiac emergencies include cardiac arrest and a heart attack. Cardiac arrest is when a person’s heart stops beating. A heart attack, also called a myocardial infarction, happens when a part of the heart muscle doesn’t get enough blood. The more time that passes without treatment to restore blood flow, the greater the damage to the heart muscle. The major symptoms of a heart attack are: (FI.4.f)</p>	<p>physical activity levels (FI.4.b);</p> <ul style="list-style-type: none"> • explain learning styles and instructional strategies, including visual, auditory, and kinesthetic (FI.4.c); • demonstrate effective and varied teaching techniques for a variety of exercises (FI.4.d); • demonstrate and explain how to respond in an emergency situation (FI.4.e); • identify signs of cardiac emergency (FI.4.f); • demonstrate CPR and AED procedures for adults and children (FI.4.g); • identify emergency situations requiring first aid (FI.4.h); • demonstrate first-aid techniques used in emergency situations (FI.4.i); • identify and describe universal precautions and personal protection used during CPR and first aid (FI.4.j); • describe the mental wellness supports available for individuals in the community (FI.4.k); • analyze and explain the benefits of exercise to alleviate stress and support mental wellness of individuals (FI.4.l).

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Chest pain or discomfort. Most heart attacks involve discomfort in the center or left side of the chest that lasts for more than a few minutes or that goes away and comes back. The discomfort can feel like uncomfortable pressure, squeezing, fullness, or pain. • Feeling weak, light-headed, or faint. You may also break out into a cold sweat. • Pain or discomfort in the jaw, neck, or back. • Pain or discomfort in one or both arms or shoulders. • Shortness of breath. This often comes along with chest discomfort, but shortness of breath also can happen before chest discomfort. <p>Adult and child cardiopulmonary resuscitation (CPR) and the use of an automated external defibrillator (AED): CPR should follow current guidelines as set by the International Liaison Committee on Resuscitation/American Heart Association (guidelines are reviewed and revised every five years). (FI.4.g)</p> <p>Emergency situations requiring first aid may include choking, bleeding, contusions, fractures, or anaphylactic shock. (FI.4.h)</p> <p>Demonstrate first-aid techniques used in emergency situations. (FI.4.i)</p> <ul style="list-style-type: none"> • Choking can occur at any time and requires immediate action. <ul style="list-style-type: none"> ○ Conscious choking victims require the responder to perform five back blows, then five abdominal thrusts repeatedly to the victim until the object is forced out, the person can cough forcefully or breathe, or the person becomes unconscious. (American Red Cross Choking Guidelines) 	<p>Additional resources: OPEN Online Physical Education Network Health Smart Virginia PE Central EverFi KidsHealth.org</p>

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ Once the person becomes unconscious, ensure that 911 has been called and follow the procedures for CPR. (FI.4.g) • Bleeding is a common situation requiring first aid. <ul style="list-style-type: none"> ○ Non-life-threatening bleeding is characterized as a minor wound with slowly trickling or oozing blood. This type of bleeding is controlled with direct pressure over the wound using a sterile or clean gauze/cloth. Once the bleeding is controlled, clean the area with sterile water and apply a bandage to the wound. ○ Potentially life-threatening bleeding is characterized as a significant wound with steady, dark-colored blood flow. This type of bleeding is controlled with direct pressure over the wound and additional pressure applied to a pulse point above or proximal to the wound. The wound will likely require a pressure dressing which applies continuous pressure over the bleeding site and may require sutures or closure by a physician. All large wounds should be evaluated by medical personnel and be monitored for infection. ○ Life-threatening bleeding is characterized by a large, full-thickness wound which has injured or severed a major vein or an artery. This wound results in a spurting or pulsating bright red bleeding. This wound will require the use of a tourniquet to slow or stop the bleeding. A tourniquet is any straplike material that can be tightly applied proximal to or above the wound to slow blood flow to the area. This type of wound requires calling 911. Monitor the victim for signs of shock. ○ Do not apply direct pressure to any wound that could be superficial to an associated bone injury/fracture. 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ Nosebleeds are commonly seen during physical activity due to direct blows to the nose/face or simply from changes in temperature or pressure in the environment. Treatment for a nosebleed is similar to any other wound. Pressure is applied to the nostrils using clean/sterile cloth or gauze. Keep the person sitting upright and leaning slightly forward. Do not lean the head back or lay the victim down. If the bleeding is more difficult to stop, application of ice to the nose can sometimes help. If the nosebleed is not controlled within 15 minutes, seek medical assistance. • Contusions are bruises to bone and soft tissue caused by a direct blow to the area. <ul style="list-style-type: none"> ○ Characterized by pain, discoloration, and swelling in the area of the direct blow; bruises are easy to assess. ○ Application of an ice pack or cold compress to the area within the first 24-36 hours of the injury will help reduce the pain and inflammation. ○ Ice should be applied to an area for 10-15 minutes every one to two hours. Continuous application of ice is not necessary. ○ If the discoloration or pain is immediate or excessive, damage to underlying tissue/bone may be significant, seek medical assistance. • Fracture is the medical term used to diagnose a broken bone. A fracture and a break are the same injury. <ul style="list-style-type: none"> ○ Injury to a bone that produces a “crack, snap, or pop” sound could potentially result in a fracture. ○ If there is significant pain over a bone or inability to bear weight or pressure to a body part, a fracture should be suspected. ○ Immobilize the body part by applying a rigid material (splint) to the 	

Essential Understandings	Essential Knowledge and Skills
<p>injury and cover the joints above and below the suspected injured bone.</p> <ul style="list-style-type: none"> ○ Apply a sling, use crutches, or help the person in any movement so that further injury to the area is avoided. ○ Monitor for signs of shock. ○ If the injury is to a major bone such as the femur, humerus, pelvis, or if the victim is in excessive pain, call 911. ○ If the injury is to a smaller bone, such as a finger, toe, foot, or hand bone and the victim is stable, transport by private vehicle can be initiated. <ul style="list-style-type: none"> • Anaphylaxis is a severe, potentially life-threatening allergic reaction causing shock, which is when blood pressure suddenly drops and the airways narrow, causing breathing restrictions. <ul style="list-style-type: none"> ○ Causes of anaphylaxis include foods (nuts, eggs, wheat), insect venom (bee sting), latex, and some medications. ○ The only effective treatment for anaphylaxis is epinephrine injection and follow-up care in the emergency department. This requires calling 911. ○ An Epi-Pen is a single-dose of epinephrine used to treat anaphylaxis and can be used easily by any layperson, including self-injection. <p>Universal precautions refer to the practice, in medicine, of avoiding contact with patients’ bodily fluids by means of the wearing of nonporous articles such as medical gloves and face shields during CPR and first aid. (FI.4.j)</p> <p>Social and emotional networks can strongly influence behaviors and beliefs. People who are trying to change their exercise behavior and who have strong</p>	

Essential Understandings	Essential Knowledge and Skills
<p>social support fare better. The following are various supports available for individuals (FI.4.k):</p> <ul style="list-style-type: none"> • Instrumental support: tangible, practical factors (i.e., transportation, babysitter, spotter, etc.) • Emotional support: expressed through encouragement, caring, empathy, and concern; enhances self-esteem and reduces anxiety. • Information support: directions, advice, suggestions, feedback regarding progress. • Companionship support: availability of family, friends, co-worker(s), other group(s). <p>Stress is the outcome of challenging situations that can cause physical symptoms, such as headaches and stomachaches. Exercise has been shown to be effective at reducing stress and can lead to immediate and long-term results. Other well-documented mental wellness benefits include promoting a positive mood, improving sleep, and reducing depression and anxiety. (FI.4.l)</p>	

Energy Balance

FI.5 The student will explain energy balance.

- a) Identify and explain dietary guidelines based on USDA recommendations.
- b) Identify macronutrients used by the body for energy.
- c) Identify the number of kilocalories found in macronutrients that provide energy.
- d) Explain energy balance and relationship to weight gain, weight loss, or weight maintenance.
- e) Explain lipid and lipoprotein profiles.
- f) Explain the influences of nutrition and physical activity on lipid and lipoprotein profiles.
- g) Explain the importance of hydration.
- h) Explain how to maintain hydration in a physically active individual, including effective methods to rehydrate after exercise.
- i) Identify and describe common supplements and ergogenic aids used by individuals in training programs.
- j) Explain potential risks, benefits, and contraindications associated with use of supplements and ergogenic aids.
- k) Explain the relationship between body composition and health.
- l) Define terms related to body composition, including *body mass index (BMI)*, *lean body mass*, and *fat mass*.
- m) Explain influences on body composition, including diet, exercise, and behavior modification.
- n) Identify and explain inappropriate weight-loss methods.
- o) Identify and explain eating disorders including anorexia nervosa and bulimia nervosa.
- p) Explain the female athlete triad.

Essential Understandings	Essential Knowledge and Skills
Dietary guidelines reflect the current body of nutrition science, help health professionals and policymakers guide Americans to make healthy food and beverage choices, and serve as the science-based foundation for vital nutrition policies and programs across the United States. (FI.5.a) (https://www.dietaryguidelines.gov/)	In order to meet these standards, it is expected that students will <ul style="list-style-type: none"> • identify and explain dietary guidelines based on USDA recommendations (FI.5.a); • identify macronutrients used by the body for energy (FI.5.b);

Essential Understandings	Essential Knowledge and Skills
<p>A macronutrient is an essential nutrient used by the body for energy that has a large minimal daily requirement, including proteins, fats, carbohydrates, and water. (FI.5.b)</p> <p>A calorie (or thermochemical calorie) is a unit of energy. There are 1,000 calories in a kilocalorie. The number of calories a person needs depends on their age, height, weight, gender, and activity level. People who consume more calories than they burn off in normal daily activity or during exercise are more likely to be overweight. One gram of fat contains nine calories. Protein and carbohydrates contain four calories per gram. (FI.5.c)</p> <p>Instruction includes an explanation that energy balance is the relationship between “energy in” (food calories taken into the body through food and drink) and “energy out” (calories being used in the body for our daily energy requirements). (FI.5.d)</p> <p>This relationship, which is defined by the laws of thermodynamics, dictates whether weight is lost, gained, or remains the same. According to these laws, energy is never really created, and it’s never really destroyed. Rather, energy is transferred between entities. We convert potential energy that’s stored within our food (measured in calories, or kcals) into three major “destinations”: work, heat and storage. (FI.5.d)</p> <p>Resting metabolic rate refers to the minimal amount of caloric energy required to maintain basic physiological needs, such as breathing, heart rate, thinking, and sleeping. (FI.5.d)</p>	<ul style="list-style-type: none"> • identify the number of kilocalories found in macronutrients that provide energy (FI.5.c); • explain energy balance and relationship to weight gain, weight loss, or weight maintenance (FI.5.d); • explain lipid and lipoprotein profiles (FI.5.e); • explain the influences of nutrition and physical activity on lipid and lipoprotein profiles (FI.5.f); • explain the importance of hydration (FI.5.g); • explain how to maintain hydration in a physically active individual, including effective methods to rehydrate after exercise (FI.5.h); • identify and describe common supplements and ergogenic aids used by individuals in training programs (FI.5.i); • explain potential risks, benefits, and contraindications associated with use of supplements and ergogenic aids (FI.5.j); • explain the relationship between body composition and health (FI.5.k); • define terms related to body composition, including <i>body mass index</i> (BMI), <i>lean body mass</i>, and <i>fat mass</i> (FI.5.l) • explain influences on body composition,

Essential Understandings	Essential Knowledge and Skills
<p>Lipid profile is a pattern of lipids in the blood. A lipid profile usually includes the levels of total cholesterol, high-density lipoprotein (HDL) cholesterol, triglycerides, and the calculated low-density lipoprotein (LDL) cholesterol. (FI.5.e)</p> <p>Lipoproteins are molecules that have a globular shape and are a combination of lipid and protein. (FI.5.e)</p> <p>Total blood cholesterol as a measure of the cholesterol components LDL (low-density lipoprotein) cholesterol, HDL (high-density lipoprotein) cholesterol, and VLDL (very low-density lipoprotein, which is the triglyceride-carrying component of lipids). Explain that triglycerides are the chemical form in which most fat exists in food and the body. Triglycerides are mostly carried in VLDL and chylomicrons. VLDL comes from the liver and also has cholesterol. Chylomicrons come from dietary fat. (FI.5.e)</p> <p>Along with cholesterol, triglycerides form plasma lipids. Excess triglycerides in plasma have been linked to the occurrence of coronary artery disease in some people. Like cholesterol, increases in triglyceride levels can be detected by plasma measurements. These measurements should be made after an overnight food and alcohol fast. (FI.5.e)</p> <p>The standard clinical approach for reducing cardiovascular disease risk due to dyslipidemia is to prescribe changes in diet and physical activity and individualized physical activity programs to enhance lipid lipoprotein profiles by reducing triglycerides (TG), increasing HDL, and lowering LDL/HDL for clients. (FI.5.f)</p>	<p>including diet, exercise, and behavior modification (FI.5.m);</p> <ul style="list-style-type: none"> • identify and explain inappropriate weight-loss methods (FI.5.n); • identify and explain eating disorders, including anorexia nervosa and bulimia nervosa (FI.5.o); • explain the female athlete triad. (FI.5.p) <p>Additional resources: SHAPE America National Standards and Grade-Level Outcomes OpenPhySED Health Smart Virginia PE Central KidsHealth.gov MyPlate.gov Physical Activity Guidelines for Americans, 2nd ed. American Heart Association</p>

Essential Understandings	Essential Knowledge and Skills
<p>Good hydration means getting the right amount of water before, during, and after exercise. Water regulates your body temperature and lubricates your joints. It helps transport nutrients to give you energy and keep you healthy. Your body cannot perform at its highest level if you are not hydrated. Dehydration happens when your body does not have as much water as it needs to function properly. (FI.5.g)</p> <p>Hydration: Fluids help prevent dehydration. When we are physically active, our bodies sweat to help cool us down. Electrolytes such as sodium are also lost in our sweat. For this reason, many sports drinks contain a mix of water and electrolytes. The presence of these electrolytes also helps the water to diffuse through the small intestine and back into the body. (FI.5.h)</p> <p>The DSHEA defines dietary supplements as a substance that completes or makes an addition to daily dietary intake. Dietary supplements are an umbrella for a wide range of products, including weight loss pills and substances that promise to increase physical performance. (FI.5.i)</p> <p>Ergogenic aids are classified as nutritional, pharmacologic, physiologic, or psychological. Methods to enhance athletic performance range from use of accepted techniques, such as carbohydrate loading, to illegal and unsafe approaches, such as use of anabolic/androgenic steroids. (FI.5.i)</p> <p>Dietary supplements used to prevent or treat a specific health problem or enhance exercise and athletic performance come in a variety of forms, including tablets, capsules, liquids, powders, and bars. Many of these products contain numerous</p>	

Essential Understandings	Essential Knowledge and Skills
<p>ingredients in varied combinations and amounts. Among the more common ingredients are amino acids, protein, creatine, and caffeine. (FI.5.j)</p> <p>Because the Food and Drug Administration (FDA) does not need to approve dietary supplements before being sold, the sole responsibility for determining the safety and effectiveness of a dietary supplement falls on the company that manufactures and markets the supplement. (FI.5.j)</p> <p>There is no substitute for an appropriate training regimen and attitude, nor is there a magic pill that creates a world-class athlete out of anyone. If deciding to explore the possible use of supplements or ergogenic aid, ask three simple questions: Does it work? Is it safe? Is it ethical and legal? (FI.5.j)</p> <p>Benefits of having a healthy body composition: (FI.5.k)</p> <ul style="list-style-type: none"> • Normal blood pressure level • Improved quality of sleep • Improved mood and self-confidence • Increased energy and endurance throughout the day • Reduced pain in joints, hips, and lower back • Improved blood circulation, leading to lower risk for heart disease • Higher fertility rates and lower risk for pregnancy-related complications • Improved breathing, respiration, and lung function • Improved glucose tolerance and insulin sensitivity <p>Review factors that can lead to altered body composition: (FI.5.k)</p> <ul style="list-style-type: none"> • Lack of exercise and physical activity 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Eating large portion sizes and overeating in general • High-fat, high-sugar diet • Lack of whole foods in the diet, such as fruits, vegetables, nuts, seeds, legumes • Excessive alcohol intake. <p>Body mass index (BMI) is a measure of body fat based on height and weight. (FI.5.l)</p> <ul style="list-style-type: none"> • Lean body mass refers to all of your body components except fat. It includes your body’s water, bone, organs, and muscle content. However, when it comes to weight management and body composition, fat-free mass refers primarily to muscle mass. • Fat mass is total body fat and can be measured with dual energy absorptiometry or bioelectrical impedance techniques. <p>Influences on body composition include gender, age, diet, activity level, and genes. (FI.5.l)</p> <ul style="list-style-type: none"> • Men tend to have more muscle mass than women, and women tend to have more fat mass than men. • As people age, lean muscle mass decreases, making it somewhat more difficult to maintain optimal body composition. <p>There are barrier(s) to making positive behavior changes. These may include but are not limited to: (FI.5.m)</p> <ul style="list-style-type: none"> • Lack of self-motivation • Busy schedule 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Lack of time • Lack of support from others (family, friends, spouse, colleagues) • Home environment • Physical barriers such as a disability or injury <p>Starvation, fasting, or very-low-calorie diets are inappropriate weight-loss methods that can include the following risks (FI.5.n):</p> <ul style="list-style-type: none"> • Increased risk of malnutrition • Poor energy and inability to complete the essential fitness program • A behavioral “pendulum” swing; an inability to reintroduce “forbidden foods” in a moderate manner • Other side effects: fatigue, constipation, nausea, diarrhea, gallstones. <p>Anorexia nervosa is a psychological and possibly life-threatening eating disorder defined by an extremely low body weight relative to stature, extreme and needless weight loss, illogical fear of weight gain, and distorted perception of self-image and body. (FI.5.o)</p> <p>Bulimia nervosa is a psychological and possibly life-threatening eating disorder in which people (bulimics) consume large amounts of food (binge) and then trying to rid themselves of the food and calories (purge) by fasting, excessive exercise, vomiting, or using laxatives. (FI.5.o)</p> <p>The female athlete triad is an interrelationship of menstrual dysfunction, low energy availability (with or without an eating disorder), and decreased bone mineral density. (FI.5.p)</p>	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • It is relatively common among young women participating in sports. • Diagnosis and treatment of this potentially serious condition is complicated (https://dx.doi.org/10.1177%2F1941738112439685). 	

Professional Responsibilities

- FI.6 The student will identify and explain professional and legal responsibilities to manage a personal business and be employed as a personal fitness instructor.
- a) Identify and explain requirements to become a certified personal fitness instructor and maintain certification, including certification requirements, requirements to maintain certification, and resources for professional development to increase knowledge and skill and maintain certification.
 - b) Identify and explain the role, scope of practice, and code of ethics of a personal fitness instructor.
 - c) Identify and describe the professional responsibilities of a personal fitness instructor.
 - d) Identify and describe necessary facility maintenance.
 - e) Explain and describe appropriate inspection and care of equipment to maintain safety and maximize use.
 - f) Identify and describe appropriate facility supervision to maintain safety of users.
 - g) Identify and describe legal considerations of working as a personal fitness instructor.

Essential Understandings	Essential Knowledge and Skills
<p>There are various credentialing bodies in the health and fitness industry. One example is National Academy of Sports Medicine (NASM). To be an NASM-certified personal trainer (CPT), an individual must take a course and pass an exam on personal training topics, including anatomy, physiology, and fitness basics. NASM CPTs are required to recertify every two years by earning 1.9 continuing education units (CEUs). (FI.6.a)</p> <p>The role, scope of practice, and code of ethics of a personal fitness instructor may vary based on the credentialing body. NASM’s Code of Professional Conduct includes (FI.6.b):</p> <ul style="list-style-type: none"> • Maintain competencies through continuing education • Adhere to safe and ethical training practices 	<p>In order to meet these standards, it is expected that students will</p> <ul style="list-style-type: none"> • identify and explain requirements to become a certified personal fitness instructor and maintain certification, including certification requirements, requirements to maintain certification, and resources for professional development to increase knowledge and skill and maintain certification (FI.6.a); • identify and explain the role, scope of practice, and code of ethics of a personal

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Adhere to strict facility maintenance • Understand scope of practice of the role and professional limitations of a personal trainer (i.e., referral to registered dietitians, shall not diagnose or treat an injury or illness etc.) • Adhere to professionalism and ethical business practices <ul style="list-style-type: none"> ○ Liability insurance ○ Record keeping ○ Medical clearance ○ Physical appearance and attire ○ Timeliness ○ Sexual harassment awareness ○ Client confidentiality <p>Professional responsibilities of a personal fitness instructor with NASM are to uphold the highest level of professional and ethical conduct, which includes information from FI.6.a-b. NASM-CPTs are health and fitness professionals who are responsible for performing individualized assessments and design safe, effective, and individualized exercise and conditioning programs that are scientifically valid and based on clinical evidence for clients who have no medical or special needs. They provide guidance to help clients achieve their personal health, fitness, and performance goals via the implementation of exercise programs, nutritional recommendations, and suggestions for lifestyle modification. (FI.6.c)</p> <p>Identify and describe necessary facility maintenance. (FI.6.d)</p> <ul style="list-style-type: none"> • Maintaining a clean and orderly facility is necessary to encourage regular 	<p>fitness instructor (FI.6.b);</p> <ul style="list-style-type: none"> • identify and describe the professional responsibilities of a personal fitness instructor (FI.6.c); • identify and describe necessary facility maintenance (FI.6.d); • explain and describe appropriate inspection and care of equipment to maintain safety and maximize use (FI.6.e); • identify and describe appropriate facility supervision to maintain safety of users (FI.6.f); • identify and describe the legal considerations of working as a personal fitness instructor. (FI.6.g) <p>Additional resources: Health Smart Virginia</p>

Essential Understandings	Essential Knowledge and Skills
<p>use of the facility and to reduce liability.</p> <ul style="list-style-type: none"> • Ensure that all pathways are clear of debris and equipment is properly stored to prevent injury. • Specific areas for designated activities, such as powerlifting heavy weights or swinging kettlebells, are well-marked. • Proper floor coverings are present to prevent falls, damage to the floor from weights, or injury to individuals exercising. • Materials used in the facility should meet local health code for fitness facility requirements and be easy to clean. • All surfaces and floors must be cleaned daily at minimum and more frequently based upon higher use. <p>Explain and describe appropriate inspection and care of equipment to maintain safety and maximize use. (FI.6.e)</p> <ul style="list-style-type: none"> • Ability to inspect and maintain fitness equipment and physical activity surroundings to ensure safety is necessary to reduce injury and reduce liability. • All equipment should be inspected daily for proper function and cleanliness. Equipment should always work optimally and never partially. • The following areas should be inspected daily: <ul style="list-style-type: none"> ○ Electrical equipment (e.g., treadmills, bikes, audio/video equipment) should have cords free of damage and be plugged into appropriately loaded outlets. ○ Cables, pulleys, straps, and bands should be solid, with no fraying, and properly seated in machines where applicable. ○ Metal weights, plates, and bars should be free from cracks and rust. 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> ○ All benches and racks must be properly installed, properly bolted together, and have proper padding to protect the user. • Equipment manufacturers will provide recommendations for proper solutions and materials used to clean the equipment used. • Users should be instructed on how to wipe down or clean equipment after each use. Facility managers should ensure that the equipment is thoroughly cleaned/disinfected several times per day, depending upon use. <p>Appropriate facility supervision to maintain safety of users includes the following (FI.6.f):</p> <ul style="list-style-type: none"> • Educating clients and enforcing policies regarding the safe and proper use of equipment and facilities • Instructing clients on basic exercise physiology and informing them as to proper lifting and exercise technique • Ability to teach and demonstrate the use of resistance training equipment (e.g., weight machines, free weights, small apparatuses, resistance tubing, others) using proper exercise form and technique. <p>There are many legal considerations of working as a personal fitness instructor, which may include the following (FI.6.g):</p> <ul style="list-style-type: none"> • Act of omission: Failing to act responsibly. Example: A trainer who fails to spot a client who is lifting a considerable amount of weight. • Act of commission: Performing an act or allowing an individual to perform an act that causes harm. Example: A trainer who asks a client to perform a squat jump, knowing that the client has a knee injury. 	

Essential Understandings	Essential Knowledge and Skills
<ul style="list-style-type: none"> • Liability waivers potentially provide protection for trainers, in the event a client suffers an injury, preventing the client from recovering for damages. <p>General liability insurance is specific to the industry and protects in the case of injury due to slips and falls in fitness facilities.</p>	