Commission on Accreditation of Allied Health Education Programs

Standards and Guidelines
for the Accreditation of Educational Programs in Exercise Sciences

Standards initially adopted in 2004; revised in 2006, 2017, 20xx

Adopted by
American College of Sports Medicine
American Council on Exercise
American Kinesiotherapy Association
American Red Cross
National Academy of Sports Medicine
National Council on Strength & Fitness
Committee on Accreditation for the Exercise Sciences and
Commission on Accreditation of Allied Health Education Programs

The Commission on Accreditation of Allied Health Education Programs (CAAHEP) accredits programs upon the recommendation of the Committee on Accreditation for the Exercise Sciences (CoAES).

These accreditation **Standards and Guidelines** are the minimum standards of quality used in accrediting programs that prepare individuals to enter the Exercise Sciences profession. Standards are the minimum requirements to which an accredited program is held accountable. Guidelines are descriptions, examples, or recommendations that elaborate on the Standards. Guidelines are not required but can assist with interpretation of the Standards.

Standards are printed in regular typeface in outline form. *Guidelines* are printed in italic typeface in narrative form.

Preamble

The Commission on Accreditation of Allied Health Education Programs (CAAHEP), the Committee on Accreditation for the Exercise Sciences, and the American College of Sports Medicine, American Council on Exercise, American Kinesiotherapy Association, American Red Cross, National Academy of Sports Medicine, and the National Council on Strength & Fitness cooperate to establish, maintain and promote appropriate standards of quality for educational programs in the Exercise Sciences, and to provide recognition for educational programs that meet or exceed the minimum standards outlined in these accreditation **Standards and Guidelines**. Lists of accredited programs are published for the information of students, employers, educational institutions agencies, and the public.

These **Standards and Guidelines** are to be used for the development, evaluation, and self-analysis of Exercise Science programs. On-site review teams assist in the evaluation of a program's relative compliance with the accreditation Standards.

Description of the Profession
Exercise Science professionals assess, design, and implement individual and group exercise and fitness programs for individuals who are apparently healthy and those with controlled disease. They are skilled in evaluating health behaviors and risk factors, conducting fitness assessments, writing appropriate exercise prescriptions, and motivating individuals to modify negative health habits and maintain positive lifestyle behaviors for health promotion. The Exercise Sciences professional has demonstrated competence as a leader of health and fitness programs in the university, corporate, commercial or community settings in which his/her clients participate in health promotion and fitness-related activities.

I. Sponsorship

A. Sponsoring Educational Institution

A sponsoring institution must be one of the following:

1. A post-secondary academic institution accredited by an institutional accrediting agency that is recognized by the U.S. Department of Education, and authorized under applicable law or other acceptable authority to provide a post-secondary program, which awards a minimum of a bachelor's degree at the completion of the program.

2. A foreign post-secondary academic institution acceptable to CAAHEP, which awards a minimum of a bachelor's degree, or its equivalent, at the completion of the program.

B. Consortium Sponsor

1. A consortium sponsor is an entity consisting of two or more members that exists for the purpose of operating an educational program. In such instances, at least one of the members of the consortium must meet the requirements of a sponsoring educational institution as described in I.A.

2. The responsibilities of each member of the consortium must be clearly documented as a formal affiliation agreement or memorandum of understanding, which includes governance and lines of authority.

C. Responsibilities of Sponsor

The Sponsor must assure that the provisions of these **Standards and Guidelines** are met.

II. Program Goals

A. Program Goals and Outcomes

There must be a written statement of the program's goals and learning domains consistent with and responsive to the demonstrated needs and expectations of the various communities of interest served by the educational program. The communities of interest that are served by the program include, but are not limited to, students, graduates, faculty, sponsor administration, employers, physicians, and the public.

Program-specific statements of goals and learning domains provide the basis for program planning, implementation, and evaluation. Such goals and learning domains must be compatible with both the mission of the sponsoring institution(s), the expectations of the communities of interest, and nationally accepted standards of roles and functions. Goals and learning domains are based upon the substantiated needs of health care providers and employers, and the educational needs of the students served by the educational program.

B. Appropriateness of Goals and Learning Domains

The program must regularly assess its goals and learning domains. Program personnel must identify and respond to changes in the needs and/or expectations of its communities of interest.

An advisory committee, which is representative of at least each of the communities of interest named in these **Standards,** must be designated and charged with the responsibility of meeting at least annually, to assist program and sponsor personnel in formulating and periodically revising appropriate goals and learning domains, monitoring needs and expectations, and ensuring program responsiveness to change.

Advisory committee meetings may include participation by synchronous electronic means.

C. Minimum Expectations

The program must have the following goal defining minimum expectations: "To prepare competent entry-level Exercise Science professionals in the cognitive (knowledge), psychomotor (skills), and affective (behavior) learning domains."

Programs adopting educational goals beyond entry-level competence must clearly delineate this intent and provide evidence that all students have achieved the basic competencies prior to entry into the field.

Nothing in this Standard restricts programs from formulating goals beyond entry-level competence.

III. Resources

A. Type and Amount

Program resources must be sufficient to ensure the achievement of the program's goals and outcomes. Resources must include, but are not limited to: faculty; clerical and support staff; curriculum; finances; offices; classroom, laboratory, and ancillary student facilities; clinical affiliates; equipment; supplies; computer resources; instructional reference materials; and faculty/staff continuing education.

B. Personnel

The sponsor must appoint sufficient faculty and staff with the necessary qualifications to perform the functions identified in documented job descriptions and to achieve the program's stated goals and outcomes.

1. Program Director

a. Responsibilities

The Program Director must:

1) assure achievement of the program's goals and outcomes;
2) be responsible for all aspects of the program, including the organization, administration, continuous review, planning, development and general effectiveness of the program; and
3) provide supervision, administration and coordination of the instructional staff in the academic and clinical phases of the educational program.

Administrative and supervisory responsibilities of the Program Director should be recognized as a department assignment. The amount of time devoted to these responsibilities should be consistent with departmental or institutional policy

b. Qualifications

The Program director must:

1) possess a minimum of a Master's degree in Exercise Sciences;
2) have work-related experience in the Exercise Sciences; and
3) proficiency in educational methodology.

Program directors approved under previous CAAHEP ***Standards*** who do not have a minimum of a Master's Degree in Exercise Sciences will continue to be approved provided they remain continuously employed as the program director with the same program.

A qualified Program Director should be a full-time employee of the sponsoring institution.

Exercise Sciences may include, but are not limited to, Exercise Physiology, Exercise Science, Kinesiology, Biomechanics, Human Performance, Sports or Movement Science.

2. Faculty/Instructional Staff

a. Responsibilities

In each location where students are assigned for didactic or clinical instruction or supervised practice, there must be instructional faculty designated to coordinate supervision and provide frequent assessments of the students' progress in achieving program requirements.

All faculty members, regardless of the extent of their participation, should be familiar with the goals of the program.

b. Qualifications

The faculty must:

1) be knowledgeable in course content and effective in teaching their assigned subjects;
2) capable through academic preparation, training and experience to teach the courses or topics to which they are assigned;
3) possess the ability to develop an organized plan of instruction and evaluation; and
4) possess a minimum of a Master's Degree in Exercise Sciences.

Faculty/instructional staff approved under previous CAAHEP ***Standards*** who do not have a minimum of a Master's Degree in Exercise Sciences will continue to be approved provided they remain continuously employed as faculty/instructional staff with the same program.

Qualified faculty and/or instructional staff should possess work-related experience in Exercise Science.

Exercise Sciences may include, but are not limited to, Exercise Physiology, Exercise Science, Kinesiology, Biomechanics, Human Performance, Sports or Movement Science.

C. Curriculum

The curriculum must ensure the achievement of program goals and learning domains. Instruction must be an appropriate sequence of classroom, laboratory, and clinical activities. Instruction must be based on clearly written course syllabi that include course description, course objectives, methods of evaluation, topic outline, and competencies required for graduation.

The curriculum must include an internship experience.

The program must demonstrate by comparison that the curriculum offered meets or exceeds the competencies specified in Appendix B of these *Standards and Guidelines*.

D. Resource Assessment

The program must, at least annually, assess the appropriateness and effectiveness of the resources described in these **Standards**. The results of resource assessment must be the basis for ongoing planning and appropriate change. An action plan must be developed when deficiencies are identified in the program resources. Implementation of the action plan must be documented and results measured by ongoing resource assessment.

IV. Student and Graduate Evaluation/Assessment

A. Student Evaluation

1. Frequency and purpose

Evaluation of students must be conducted on a recurrent basis and with sufficient frequency to provide both the students and program faculty with valid and timely indications of the students' progress toward and

achievement of the competencies and learning domains stated in the curriculum.

2. Documentation

Records of student evaluations must be maintained in sufficient detail to document learning progress and achievements.

B. Outcomes Assessment

1. Outcomes Assessment

The program must periodically assess its effectiveness in achieving its stated goals and learning domains. The results of this evaluation must be reflected in the review and timely revision of the program.

Outcomes assessments must include, but are not limited to: national credentialing examination(s) performance, programmatic retention/attrition, graduate satisfaction, employer satisfaction, job (positive) placement, and programmatic summative measures. The program must meet the outcomes assessment thresholds established by the CoA.

"Positive placement" means that the graduate is employed full or part-time in the profession or in a related field; or continuing his/her education; or serving in the military. A related field is one in which the individual is using cognitive, psychomotor, and affective competencies acquired in the educational program.

"National credentialing examinations" are those accredited by the National Commission for Certifying Agencies (NCCA). Participation and pass rates on national credentialing examination(s) performance may be considered in determining whether or not a program meets the designated threshold, provided the credentialing examination or an alternative examination is available to be administered prior to graduation from the program. Results from an alternative examination may be accepted, if designated as equivalent by the organization whose credentialing examination is so accredited.

2. Outcomes Reporting

The program must periodically submit to the CoAES the program goal(s), learning domains, evaluation systems (including type, cut score, and appropriateness), outcomes, its analysis of the outcomes, and an appropriate action plan based on the analysis.

Programs not meeting the established thresholds must begin a dialogue with the CoAES to develop an appropriate plan of action to respond to the identified shortcomings.

V. Fair Practices

A. Publications and Disclosure

1. Announcements, catalogs, publications, and advertising must accurately reflect the program offered.

2. At least the following must be made known to all applicants and students: the sponsor's institutional and programmatic accreditation status as well as the name, mailing address, web site address, and phone number of the accrediting agencies; admissions policies and practices, including technical standards (when used); policies on advanced placement, transfer of credits, and credits for experiential learning; number of credits required for completion of the program; tuition/fees and other costs required to complete the program; and policies and processes for withdrawal and for refunds of tuition/fees.

3. At least the following must be made known to all students: academic calendar; student grievance procedure; criteria for successful completion of each segment of the curriculum and for graduation; and policies and processes by which students may perform clinical work while enrolled in the program.

4. The sponsor must maintain, and make available to the public, current and consistent summary information about student/graduate achievement that includes the results of one or more of the outcomes assessments required in these **Standards**.

The sponsor should develop a suitable means of communicating to the communities of interest the achievement of students/graduates (e.g. through a website or electronic or printed documents).

B. Lawful and Non-discriminatory Practices

All activities associated with the program, including student and faculty recruitment, student admission, and faculty employment practices, must be non-discriminatory and in accord with federal and state statutes, rules, and regulations. There must be a faculty grievance procedure made known to all paid faculty.

C. Safeguards

The health and safety of patients, students, faculty, and other participants associated with the educational activities of the students must be adequately safeguarded.

All activities required in the program must be educational and students must not be substituted for staff.

D. Student Records

Satisfactory records must be maintained for student admission, advisement, counseling, and evaluation. Grades and credits for courses must be recorded on the student transcript and permanently maintained by the sponsor in a safe and accessible location.

E. Substantive Change

The sponsor must report substantive change(s) as described in Appendix A to CAAHEP/CoAES in a timely manner. Additional substantive changes to be reported to CoAES within the time limits prescribed include:

1. the institution's mission or objectives if these will affect the program;
2. the institution's legal status or form of control;
3. the addition or deletion of courses that represent a significant departure in content or in method of delivery;
4. the degree awarded;
5. a substantial increase or decrease in clock or credit hours for successful completion of a program or in the length of a program.

F. Agreements

There must be a formal affiliation agreement or memorandum of understanding between the sponsor and all other entities that participate in the education of the students describing the relationship, role, and responsibilities between the sponsor and that entity.

Appendix B
Curriculum for Educational Programs in Exercise Sciences

1. Performance Domains and Associated Competencies for Educational Programs in Exercise Sciences:

The curriculum for programs in Exercise Sciences must include the performance domains and associated competencies listed below.

Competencies that require attainment of didactic "knowledge" reflect cognitive didactic student learning objectives. Competencies that require demonstration of performance of a "skill" reflect psychomotor learning objectives.

DOMAIN I: HEALTH AND FITNESS ASSESSMENT
1) Administer and interpret preparticipation health screening procedures to maximize client safety and minimize risk.
a) Knowledge pre-activity screening procedures and tools that provide accurate information about the individual's health/medical history, current medical conditions, risk factors, sign/symptoms of disease, current physical activity habits, and medications.
b) Knowledge of the key components included in informed consent and health/medical history.
c) Knowledge of the limitations of informed consent and health/medical history.
DOMAIN I: HEALTH AND FITNESS ASSESSMENT
1) Determine client's readiness to participate in a health-related physical fitness assessment and exercise program.
a) Knowledge of risk factor thresholds for Industry Standard risk stratification including genetic and lifestyle factors related to the development of CVD.
b) Knowledge of the major signs or symptoms suggestive of cardiovascular, pulmonary and metabolic disease.
c) Knowledge of cardiovascular risk factors or conditions that may require consultation with medical personnel prior to exercise testing or training (e.g., inappropriate changes in resting heart rate and/or blood pressure, new onset discomfort in chest, neck, shoulder, or arm, changes in the pattern of discomfort during rest or exercise, fainting, dizzy spells, claudication).
d) Knowledge of the pulmonary risk factors or conditions than may require consultation with medical personnel prior to exercise testing or training (e.g., asthma, exercise-induced asthma/bronchospasm, and extreme breathlessness at rest or during exercise, chronic bronchitis, emphysema).
e) Knowledge of the metabolic risk factors or conditions than may require consultation with medical personnel prior to exercise testing or training (e.g., obesity, metabolic syndrome, diabetes or glucose intolerance, hypoglycemia).
f) Knowledge of the musculoskeletal risk factors or conditions than may require consultation with medical personnel prior to exercise testing or training (e.g., acute or chronic pain, osteoarthritis, rheumatoid arthritis, osteoporosis, inflammation/pain, low back pain).
g) Knowledge of Industry Standard risk stratification categories and their implications for medical clearance before administration of an exercise test or participation in an exercise program.
h) Knowledge of risk factors that may be favorably modified by physical activity habits.
i) Knowledge of medical terminology including, but not limited to, total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), triglycerides, impaired fasting glucose, impaired glucose tolerance, hypertension, atherosclerosis, myocardial infarction, dyspnea, tachycardia, claudication, syncope and ischemia.
j) Knowledge of recommended plasma cholesterol levels for adults based on National Cholesterol Education Program/ATP Guidelines.

k)	Knowledge of recommended blood pressure levels for adults based on National High Blood Pressure Education Program Guidelines.
l)	Knowledge of recommendations for medical clearance before initiating an exercise program.
m)	Knowledge of the components of a health-history questionnaire (e.g., past and current medical history, family history of cardiac disease, orthopedic limitations, prescribed medications, activity patterns, nutritional habits, stress and anxiety levels, and smoking and alcohol use).
n)	Skill in the risk stratification of participants using CVD risk factor thresholds, major signs or symptoms suggestive of cardiovascular, pulmonary, or metabolic disease, and/or the presence of known cardiovascular, pulmonary, and metabolic disease status.
o)	Skill in reviewing pre-activity screening documents to determine the need for medical clearance prior to exercise and to select appropriate physical fitness assessment protocols.
a.	**DOMAIN I: HEALTH AND FITNESS ASSESSMENT**
2)	**Determine and administer physical fitness assessments for apparently healthy clients and those with controlled disease.**
a)	Knowledge of the physiological basis of the components of health-related physical fitness (cardiorespiratory fitness, muscular strength, muscular endurance, flexibility, body composition).
b)	Knowledge of selecting the most appropriate testing protocols for each participant based on preliminary screening data.
c)	Knowledge of calibration techniques and proper use of fitness testing equipment.
d)	Knowledge of the purpose and procedures of fitness testing protocols for the components of health-related fitness.
e)	Knowledge of test termination criteria and proper procedures to be followed after discontinuing health fitness tests.
f)	Knowledge of fitness assessment sequencing.
g)	Knowledge of the effects of common medications and substances on exercise testing (e.g., antianginals, antihypertensives, antiarrhythmics, bronchodilators, hypoglycemics, psychotropics, alcohol, diet pills, cold tablets, caffeine, nicotine).
h)	Knowledge of the physiologic and metabolic responses to exercise testing associated with chronic diseases and conditions (e.g., heart disease, hypertension, diabetes mellitus, obesity, pulmonary disease).
i)	Skill in analyzing and interpreting information obtained from assessment of the components of health-related fitness.
j)	Skill in modifying protocols and procedures for testing children, adolescents, older adults and individuals with special considerations.
a.	**DOMAIN I: HEALTH AND FITNESS ASSESSMENT**
3)	**Conduct and interpret cardiorespiratory fitness assessments.**
a)	Knowledge of common submaximal and maximal cardiorespiratory fitness assessment protocols.
b)	Knowledge of blood pressure measurement techniques.
c)	Knowledge of Korotkoff sounds for determining systolic and diastolic blood pressure.
d)	Knowledge of the blood pressure response to exercise.
e)	Knowledge of techniques of measuring heart rate and heart rate response to exercise.
f)	Knowledge of the rating of perceived exertion (RPE).
g)	Knowledge of heart rate, blood pressure and RPE monitoring techniques before, during, and after cardiorespiratory fitness testing.
h)	Knowledge of the anatomy and physiology of the cardiovascular and pulmonary systems.

i)	Knowledge of cardiorespiratory terminology including angina pectoris, tachycardia, bradycardia, arrhythmia, and hyperventilation.
j)	Knowledge of the pathophysiology of myocardial ischemia, myocardial infarction, stroke, hypertension, and hyperlipidemia.
k)	Knowledge of the effects of myocardial ischemia, myocardial infarction, hypertension, claudication, and dyspnea on cardiorespiratory responses during exercise.
l)	Knowledge of oxygen consumption dynamics during exercise (e.g., heart rate, stroke volume, cardiac output, ventilation, ventilatory threshold).
m)	Knowledge of methods of calculating VO_{2max}.
n)	Knowledge of cardiorespiratory responses to acute graded exercise of conditioned and unconditioned participants.
o)	Skill in analyzing and documenting cardiorespiratory fitness test results.
p)	Skill in locating anatomic landmarks for palpation of peripheral pulses and blood pressure.
q)	Skill in measuring heart rate, blood pressure, and RPE at rest and during exercise.
r)	Skill in conducting submaximal exercise tests (e.g., cycle ergometer, treadmill, field testing, step test).
s)	Skill in determining cardiorespiratory fitness based on submaximal exercise test results.
a.	**DOMAIN I: HEALTH AND FITNESS ASSESSMENT**
4)	**Conduct and interpret assessments of muscular strength, muscular endurance, and flexibility.**
a)	Knowledge of common muscular strength, muscular endurance, and flexibility assessment protocols.
b)	Knowledge of interpreting muscular strength, muscular endurance, and flexibility assessments.
c)	Knowledge of relative strength, absolute strength, and repetition maximum (1-RM) estimation.
d)	Knowledge of the anatomy of bone, skeletal muscle, and connective tissues.
e)	Knowledge of the definition of the following terms: anterior, posterior, proximal, distal, inferior, superior, medial, lateral, supination, pronation, flexion, extension, adduction, abduction, hyperextension, rotation, circumduction, agonist, antagonist, and stabilizer.
f)	Knowledge of the planes and axes in which each movement action occurs.
g)	Knowledge of the interrelationships among center of gravity, base of support, balance, stability, posture, and proper spinal alignment.
h)	Knowledge of the normal curvatures of the spine and common assessments of postural alignment.
i)	Knowledge of the location and function of the major muscles (e.g., pectoralis major, trapezius, latissimus dorsi, biceps, triceps, rectus abdominus, internal and external obliques, erector spinae, gluteus maximus, quadriceps, hamstrings, adductors, abductors, and gastrocnemius).
j)	Knowledge of the major joints and their associated movement.
k)	Skill in identifying the major bones, muscles, and joints.
l)	Skill in conducting assessments of muscular strength, muscular endurance and flexibility (e.g., 1-RM, hand grip dynamometer, push-ups, curl-ups, sit-and-reach).
m)	Skill in estimating 1-RM using lower resistance (2-10 RM).
n)	Skill in interpreting results of muscular strength, muscular endurance and flexibility assessments.
a.	**DOMAIN I: HEALTH AND FITNESS ASSESSMENT**
5)	**Conduct and interpret anthropometric and body composition assessments.**
a)	Knowledge of the advantages, disadvantages and limitations of body composition techniques (e.g., air displacement plethysmography (BOD POD®), duel-energy x-ray absorptiometry (DEXA), hydrostatic weighing, skinfolds, and bioelectrical impedance.

b)	Knowledge of the standardized descriptions of circumference and skinfold sites.
c)	Knowledge of procedures for determining BMI and taking skinfold and circumference measurements.
d)	Knowledge of the health implications of variation in body fat distribution patterns and the significance of BMI, waist circumference, and waist-to-hip ratio.
e)	Skill in locating anatomic landmarks for skinfold and circumference measurements.
f)	Skill in analyzing and documenting the results of anthropometric and body composition assessments. .
a.	**DOMAIN II: EXERCISE PRESCRIPTION AND IMPLEMENTATION**
1)	**Determine safe and effective exercise programs to achieve desired outcomes and goals, and translate assessment results into appropriate exercise prescriptions.**
a)	Knowledge of strength-, aerobic-, and flexibility-based exercise.
b)	Knowledge of the benefits and precautions associated with exercise training in apparently healthy participants and those with controlled disease.
c)	Knowledge of program development for specific client needs (e.g., sport specific training, performance, health, lifestyle, functional ability, balance, agility, aerobic, anaerobic).
d)	Knowledge of the six-skill related physical fitness components; agility, balance, coordination, reaction time, speed, and power.
e)	Knowledge of the physiologic changes associated with an acute bout of exercise.
f)	Knowledge of the physiologic adaptations following chronic exercise training.
g)	Knowledge of Industry Standard exercise prescription guidelines for strength, aerobic, and flexibility-based exercise for apparently healthy clients, clients with increased risk, and clients with controlled disease.
h)	Knowledge of the components and sequencing incorporated into an exercise session (e.g., warm-up, stretching, conditioning or sports related exercise, cool-down).
i)	Knowledge of the physiological principles related to warm-up and cool-down.
j)	Knowledge of the principles of reversibility, progressive overload, individual differences and specificity of training, and how they relate to exercise prescription.
k)	Knowledge the role of aerobic and anaerobic energy systems in the performance of various physical activities.
l)	Knowledge of the basic biomechanical principles of human movement.
m)	Knowledge of the psychological and physiological signs and symptoms of overtraining.
n)	Knowledge of the signs and symptoms of common musculoskeletal injuries associated with exercise (e.g., sprain, strain, bursitis, and tendonitis).
o)	Knowledge of the advantages and disadvantages of exercise equipment (e.g., free weights, selectorized machines, aerobic equipment).
p)	Skill in teaching and demonstrating exercises.
q)	Skill in designing safe and effective training programs.
r)	Skill in implementing exercise prescription guidelines for apparently healthy clients, clients with increased risk, and clients with controlled disease.
b.	**DOMAIN II: EXERCISE PRESCRIPTION AND IMPLEMENTATION**
2)	**Implement cardiorespiratory exercise prescriptions for apparently healthy clients and those with controlled disease based on current health status, fitness goals and availability of time**
a)	Knowledge of the recommended Industry Standard exercise prescription framework for the development of cardiorespiratory fitness.
b)	Knowledge of the benefits, risks and contraindications of a wide variety of cardiovascular training exercises based on client experience, skill level, current fitness level and goals.

c)	Knowledge of the minimal threshold of physical activity required for health benefits and/or fitness development.
d)	Knowledge of determining exercise intensity using HRR, VO_2R, peak HR method, peak VO_2 method, peak METs method, and the RPE Scale.
e)	Knowledge of the accuracy of HRR, VO_2R, peak HR method, peak VO_2 method, peak METs method, and the RPE Scale.
f)	Knowledge of abnormal responses to exercise (e.g., hemodynamic, cardiac, ventilatory).
g)	Knowledge of metabolic calculations (e.g., unit conversions, deriving energy cost of exercise, caloric expenditure).
h)	Knowledge of calculating the caloric expenditure of an exercise session ($kcal \cdot session^{1}$).
i)	Knowledge of methods for establishing and monitoring levels of exercise intensity, including heart rate, RPE, and METs.
j)	Knowledge of the applications of anaerobic training principles.
k)	Knowledge of the anatomy and physiology of the cardiovascular and pulmonary systems including the basic properties of cardiac muscle.
l)	Knowledge of the basic principles of gas exchange.
m)	Skill in determining appropriate exercise frequency, intensity, time and type for clients with various fitness levels.
n)	Skill in determining the energy cost, absolute and relative oxygen costs (VO_2), and MET levels of various activities and applying the information to an exercise prescription.
o)	Skill in identifying improper technique in the use of cardiovascular equipment.
p)	Skill in teaching and demonstrating the use of a variety of cardiovascular exercise equipment.
b.	**DOMAIN II: EXERCISE PRESCRIPTION AND IMPLEMENTATION**
3)	**Implement exercise prescriptions for flexibility, muscular strength, muscular endurance, balance, agility, and reaction time for apparently healthy clients and those with controlled disease based on current health status, fitness goals and availability of time.**
a)	Knowledge of the recommended Industry Standard exercise prescription framework for the development of muscular strength, muscular endurance and flexibility.
b)	Knowledge of the minimal threshold of physical activity required for health benefits and/or fitness development.
c)	Knowledge of safe and effective exercises designed to enhance muscular strength and/or endurance of major muscle groups.
d)	Knowledge of safe and effective stretches that enhance flexibility.
e)	Knowledge of indications for water-based exercise (e.g., arthritis, obesity).
f)	Knowledge of the types of resistance training programs (e.g., total body, split routine) and modalities (e.g., free weights, variable resistance equipment, pneumatic machines, bands).
g)	Knowledge of acute (e.g., load, volume, sets, repetitions, rest periods, order of exercises) and chronic training variables (e.g., periodization).
h)	Knowledge of the types of muscle contractions (e.g., eccentric, concentric, isometric).
i)	Knowledge of joint movements (e.g., flexion, extension, adduction, abduction) and the muscles responsible for them.
j)	Knowledge of acute and delayed onset muscle soreness (DOMS).
k)	Knowledge of the anatomy and physiology of skeletal muscle fiber, the characteristics of fast-and slow-twitch muscle fibers, and the sliding filament theory of muscle contraction.
l)	Knowledge of the stretch reflex, proprioceptors, golgi tendon organ (GTO), muscle spindles, and how they relate to flexibility.
m)	Knowledge of muscle-related terminology including atrophy, hyperplasia, hypertrophy.
n)	Knowledge of the Valsalva maneuver and its implications during exercise.

o)	Knowledge of the physiology underlying plyometric training and common plyometric exercises (e.g., box jumps, leaps, bounds).
p)	Knowledge of the contraindications and potential risks associated with muscular conditioning activities (e.g., straight-leg sit-ups, double leg raises, squats, hurdler's stretch, yoga plough, forceful back hyperextension, and standing bent-over toe touch, behind neck press/lat pull-down).
q)	Knowledge of spotting positions and techniques for injury prevention and exercise assistance.
r)	Knowledge of periodization (e.g., macro, micro, mesocycles) and associated theories.
s)	Knowledge of safe and effective Olympic weight lifting exercises.
t)	Knowledge of safe and effective core stability exercises (e.g., planks, crunches, bridges, cable twists).
u)	Skill in identifying and correcting improper technique in the use of resistive equipment (e.g., stability balls, weights, bands, resistance bars, water exercise equipment).
v)	Skill in teaching and demonstrating appropriate exercises for enhancing musculoskeletal flexibility.
w)	Skill in teaching and demonstrating safe and effective muscular strength and endurance exercises (e.g., free weights, weight machines, resistive bands, Swiss balls, body weight and all other major fitness equipment).
x)	Skill in prescribing exercise using the calculated % 1-RM.
b.	**DOMAIN II: EXERCISE PRESCRIPTION AND IMPLEMENTATION**
4)	**Establish exercise progression guidelines for flexibility, muscular strength, muscular endurance, balance, agility, and reaction time for apparently healthy clients and those with controlled disease based on current health status, fitness goals and availability of time.**
a)	Knowledge of the basic principles of exercise progression.
b)	Knowledge of adjusting the exercise prescription framework in response to individual changes in conditioning.
c)	Knowledge of the importance of performing periodic reevaluations to assess changes in fitness status.
d)	Knowledge of the training principles that promote improvements in muscular strength, muscular endurance, cardiorespiratory fitness, and flexibility.
e)	Skill in recognizing the need for progression and communicating updates to exercise prescriptions.
b.	**DOMAIN II: EXERCISE PRESCRIPTION AND IMPLEMENTATION**
5)	**Implement a general weight management program as indicated by personal goals, as needed.**
a)	Knowledge of exercise prescriptions for achieving weight related goals, including weight gain, weight loss and weight maintenance.
b)	Knowledge of energy balance and basic nutritional guidelines (e.g., MyPyramid, USDA Dietary Guidelines for Americans).
c)	Knowledge of weight management terminology including, but not limited to, obesity, overweight, percent fat, BMI, lean body mass (LBM), anorexia nervosa, bulimia, binge eating, metabolic syndrome, body fat distribution, adipocyte, bariatrics, ergogenic aid, fat-free mass (FFM), resting metabolic rate (RMR) and thermogenesis**.**
d)	Knowledge of the relationship between body composition and health.
e)	Knowledge of the unique dietary needs of participant populations (e.g., women, children, older adults, pregnant women).
f)	Knowledge of common nutritional ergogenic aids, their purported mechanisms of action, and associated risks and benefits (e.g., protein/amino acids, vitamins, minerals, herbal products, creatine, steroids, caffeine).
g)	Knowledge of methods for modifying body composition including diet, exercise, and behavior modification.
h)	Knowledge of fuel sources for aerobic and anaerobic metabolism including carbohydrates, fats and proteins.
i)	Knowledge of the effects of overall dietary composition on healthy weight management.
j)	Knowledge of the importance of maintaining normal hydration before, during and after exercise.

k)	Knowledge of the consequences of inappropriate weight loss methods (e.g., saunas, dietary supplements, vibrating belts, body wraps, over exercising, very low-calorie diets, electric stimulators, sweat suits, fad diets).
l)	Knowledge of the kilocalorie levels of carbohydrate, fat, protein, and alcohol.
m)	Knowledge of the relationship between kilocalorie expenditures and weight loss.
n)	Knowledge of published position statements on obesity and the risks associated with it (e.g., National Institutes of Health, American Dietetic Association, ACSM).
o)	Knowledge of the relationship between body fat distribution patterns and health.
p)	Knowledge of the physiology and pathophysiology of overweight and obese clients.
q)	Knowledge of the recommended exercise prescription framework for participants who are overweight or obese.
r)	Knowledge of comorbidities and musculoskeletal conditions associated with overweight and obesity that may require medical clearance and/or modifications to exercise testing and prescription.
s)	Skill in applying behavioral strategies (e.g., exercise, diet, behavioral modification strategies) for weight management.
t)	Skill in modifying exercises for individuals limited by body size.
u)	Skill in calculating the volume of exercise in terms of $kcal \cdot session^{-1}$.
b.	**DOMAIN II: EXERCISE PRESCRIPTION AND IMPLEMENTATION**
6)	**Prescribe and implement exercise programs for clients with controlled cardiovascular, pulmonary, and metabolic diseases and other clinical populations and work closely with clients' healthcare providers, as needed.**
a)	Knowledge of Industry Standard risk stratification and exercise prescription guidelines for participants with cardiovascular, pulmonary, and metabolic diseases and other clinical populations.
b)	Knowledge of Industry Standard relative and absolute contraindications for initiating exercise sessions or exercise testing, and indications for terminating exercise sessions and exercise testing.
c)	Knowledge of the physiology and pathophysiology of diseases and conditions (e.g., cardiac disease, arthritis, diabetes mellitus, dyslipidemia, hypertension, metabolic syndrome, musculoskeletal injuries, overweight and obesity, osteoporosis, peripheral artery disease, pulmonary disease).
d)	Knowledge of the effects of diet and exercise on blood glucose levels in diabetics.
e)	Knowledge of the recommended exercise prescription principles for the development of cardiorespiratory fitness, muscular fitness and flexibility for participants with cardiac disease, arthritis, diabetes mellitus, dyslipidemia, hypertension, metabolic syndrome, musculoskeletal injuries, overweight and obesity, osteoporosis, peripheral artery disease, and pulmonary disease.
f)	Skill in progressing exercise programs, according to exercise prescription principles, in a safe and effective manner.
g)	Skill in modifying the exercise prescription and/or exercise choice for clients with diseases and conditions (e.g., cardiac disease, arthritis, diabetes mellitus, dyslipidemia, hypertension, metabolic syndrome, musculoskeletal injuries, overweight and obesity, osteoporosis, peripheral artery disease, pulmonary disease).
h)	Skill in identifying improper exercise techniques and modifying exercise programs for participants with low back, neck, shoulder, elbow, wrist, hip, knee and/or ankle pain.
b.	**DOMAIN II: EXERCISE PRESCRIPTION AND IMPLEMENTATION**
7)	**Prescribe and implement exercise programs for healthy special populations (i.e., older adults, youth, and pregnant women).**
a)	Knowledge of normal maturational changes across the lifespan and their effects (e.g., skeletal muscle, bone, reaction time, coordination, posture, heat and cold tolerance, maximal oxygen consumption, strength, flexibility, body composition, resting and maximal heart rate, resting and maximal blood pressure).

b)	Knowledge of techniques for the modification of cardiovascular, flexibility, and resistance exercises based on age, functional capacity and physical condition.
c)	Knowledge of techniques for the development of exercise prescriptions for children, adolescents and older adults with regard to strength, functional capacity, and motor skills.
d)	Knowledge of the unique adaptations to exercise training in children, adolescents, and older participants with regard to strength, functional capacity, and motor skills.
e)	Knowledge of the benefits and precautions associated with exercise training across the lifespan.
f)	Knowledge of the recommended exercise prescription framework for the development of cardiorespiratory fitness, muscular fitness and flexibility in apparently healthy children and adolescents.
g)	Knowledge of the effects of the aging process on the musculoskeletal and cardiovascular structures and functions during rest, exercise, and recovery.
h)	Knowledge of the recommended exercise prescription framework necessary for the development of cardiorespiratory fitness, muscular fitness, balance, and flexibility in apparently healthy, older adults.
i)	Knowledge of common orthopedic and cardiovascular exercise considerations for older adults.
j)	Knowledge of the relationship between regular physical activity and the successful performance of activities of daily living (ADLs) for older adults.
k)	Knowledge of the recommended frequency, intensity, type, and duration of physical activity necessary for the development of cardiorespiratory fitness, muscular fitness and flexibility in apparently healthy pregnant women.
l)	Skill in teaching and demonstrating appropriate exercises for healthy populations with special considerations.
m)	Skill in modifying exercises based on age, physical condition, and current health status.
b.	**DOMAIN II: EXERCISE PRESCRIPTION AND IMPLEMENTATION**
8)	**Modify exercise prescriptions based on various environmental conditions.**
a)	Knowledge of the effects of various environmental conditions on the physiologic response to exercise (e.g., altitude, variable ambient temperatures, humidity, environmental pollution).
b)	Knowledge of special precautions and program modifications for exercise in various environmental conditions (e.g., altitude, variable ambient temperatures, humidity, environmental pollution).
c)	Knowledge of the role of acclimatization when exercising in various environmental conditions (e.g., altitude, variable ambient temperatures, humidity, environmental pollution).
d)	Knowledge of appropriate fluid intake during exercise in various environmental conditions (e.g., altitude, variable ambient temperatures, humidity, environmental pollution).
b.	**DOMAIN III: EXERCISE COUNSELING AND BEHAVIOR MODIFICATION**
1)	**Optimize adoption and adherence of exercise and other healthy behaviors by applying effective communication techniques.**
a)	Knowledge of verbal and non-verbal behaviors that communicate positive reinforcement and encouragement (e.g., eye contact, targeted praise, empathy).
b)	Knowledge of group leadership techniques for working with clients of all ages.
c)	Knowledge of learning preferences (auditory, visual, kinesthetic) and how to apply teaching and training techniques to optimize training session.
d)	Skill in applying active listening techniques.
e)	Skill in using feedback to optimize a client's training sessions.
f)	Skill in effective use of a variety of communication modes (e.g., telephone, newsletters, email, social media).

c. DOMAIN III: EXERCISE COUNSELING AND BEHAVIOR MODIFICATION **2) Optimize adoption and adherence of exercise and other healthy behaviors by applying effective behavioral strategies and motivational techniques.**	
a)	Knowledge of behavior change models and theories (e.g., transtheoretical model, social cognitive theory, social ecological model, health belief model, theory of planned behavior, self-determination theory, cognitive evaluation theory).
b)	Knowledge of the basic principles involved in motivational interviewing (MI).
c)	Knowledge of intervention strategies and stress management techniques.
d)	Knowledge of behavioral strategies to enhance exercise and health behavior change (e.g., reinforcement, S.M.A.R.T. goal setting, social support).
e)	Knowledge of behavior modification terminology (e.g. self-esteem, self-efficacy, antecedents, cues to action, behavioral beliefs, behavioral intentions, and reinforcing factors).
f)	Knowledge of behavioral strategies (e.g., exercise, diet, behavioral modification strategies) for weight management.
g)	Knowledge of the role that affect, mood and emotion play in exercise adherence.
h)	Knowledge of barriers to exercise adherence and compliance (e.g., time management, injury, fear, lack of knowledge, weather).
i)	Knowledge of techniques that facilitate intrinsic and extrinsic motivation (e.g., goal setting, incentive programs, achievement recognition, social support).
j)	Knowledge of the role extrinsic and intrinsic motivation plays in the adoption and maintenance of behavior change.
k)	Knowledge of health coaching principles and lifestyle management techniques related to behavior change.
l)	Knowledge of strategies that increase non-structured physical activity levels (e.g., stair walking, parking farther away, bike to work).
m)	Skill in explaining the purpose and value of understanding perceived exertion.
n)	Skill in using imagery as a motivational tool.
o)	Skill in evaluating behavioral readiness to optimize exercise adherence.
p)	Skill in applying the theories related to behavior change to diverse populations.
q)	Skill in developing intervention strategies to increase self-efficacy and self-confidence.
r)	Skill in developing reward systems that support and maintain program adherence.
s)	Skill in setting effective behavioral goals.
c. DOMAIN III: EXERCISE COUNSELING AND BEHAVIOR MODIFICATION **3) Provide educational resources to support clients in the adoption and maintenance of healthy lifestyle behaviors.**	
a)	Knowledge of the relationship between physical inactivity and common chronic diseases (e.g., Atherosclerosis, type II diabetes, obesity, dyslipidemia, arthritis, low back pain, hypertension).
b)	Knowledge of the dynamic inter-relationship between fitness level, body composition, stress and overall health.
c)	Knowledge of modifications necessary to promote healthy lifestyle behaviors for diverse populations.
d)	Knowledge of stress management techniques and relaxation techniques (e.g., progressive relaxation, guided imagery, massage therapy).
e)	Knowledge of the activities of daily living (ADLs) and how they relate to overall health.
f)	Knowledge of specific, age-appropriate leadership techniques and educational methods to increase client engagement.
g)	Knowledge of community-based exercise programs that provide social support and structured activities (e.g., walking clubs, intramural sports, golf leagues, cycling clubs).

h)	Skill in accessing and disseminating scientifically-based, relevant fitness-, nutrition-, and wellness-related resources and information.
i)	Skill in educating clients about benefits and risks of exercise and the risks of sedentary behavior.
c.	**DOMAIN III: EXERCISE COUNSELING AND BEHAVIOR MODIFICATION**
4)	**Provide support within the scope of practice of a fitness professional and refer to other health professionals as indicated.**
a)	Knowledge of the side effects of common over-the-counter and prescription drugs that may impact a client's ability to exercise.
b)	Knowledge of signs and symptoms of mental health states (e.g., anxiety, depression, eating disorders) that may necessitate referral to a medical or mental health professional.
c)	Knowledge of symptoms and causal factors of test anxiety (i.e., performance, appraisal threat during exercise testing) and how they may affect physiological responses to testing.
d)	Knowledge of client needs and learning styles that my impact exercise sessions and exercise testing procedures.
e)	Knowledge of conflict resolution techniques that facilitate communication among exercise cohorts.
f)	Skill in communicating the need for medical, nutritional, or mental health intervention.
c.	**DOMAIN IV: RISK MANAGEMENT AND PROFESSIONAL RESPONSIBILITIES**
1)	**Develop and disseminate risk management guidelines for a health/fitness facility to reduce member, employee, and business risk**
a)	Knowledge of employee criminal background checks, child abuse clearances and drug and alcohol screenings.
b)	Knowledge of employment verification requirements mandated by state and federal laws.
c)	Knowledge of safe handling and disposal of body fluids and employee safety (OSHA guidelines).
d)	Knowledge of insurance coverage common to the health/fitness industry including general liability, professional liability, workers' compensation, property, and business interruption.
e)	Knowledge of sexual harassment policies and procedures.
f)	Knowledge of interviewing techniques.
g)	Knowledge of basic precautions taken in an exercise setting to ensure client safety.
h)	Knowledge of pre-activity screening, medical release and waiver of liability for normal and at-risk participants.
i)	Knowledge of emergency action plan (EAP); response systems and procedures.
j)	Knowledge of the legal implications of documented safety procedures, the use of incident report documents, and ongoing safety training documentation.
k)	Knowledge of maintaining employee records/documents (CPR/AED certification, certifications for maintaining job position).
l)	Knowledge of the components for ethical standards and scope of practice in the health/fitness industry.
m)	Skill in developing and/or modifying a policies and procedures manual.
n)	Skill in enforcing confidentiality policies.
o)	Skill in maintaining a safe exercise environment (e.g., equipment operation and regular maintenance schedules, safety and scheduled maintenance of exercise areas, overall facility maintenance, proper sanitation, proper signage).
p)	Skill in clearly communicating human resource risk management policies and procedures.
q)	Skill in training employees to identify and limit/reduce high risk situations.
d.	**DOMAIN IV: RISK MANAGEMENT AND PROFESSIONAL RESPONSIBILITIES**
2)	**Ensure that emergency policies and procedures are in place.**

a)	Knowledge of emergency procedures (i.e., telephone procedures, written emergency procedures (EAP), personnel responsibilities) in a health and fitness setting
b)	Knowledge of the initial management and first-aid procedures for exercise-related injuries (e.g., bleeding, strains/sprains, fractures, shortness of breath, palpitations, hypoglycemia, allergic reactions, fainting/syncope).
c)	Knowledge of the responsibilities, limitations, and legal implications for the fitness professional of carrying out emergency procedures.
d)	Knowledge of safety plans, emergency procedures and first-aid techniques needed during fitness evaluations, exercise testing, and exercise training
e)	Knowledge of potential musculoskeletal injuries (e.g., contusions, sprains, strains, fractures), cardiovascular/pulmonary complications (e.g., tachycardia, bradycardia, hypotension/hypertension, dyspnea) and metabolic abnormalities (e.g., fainting/syncope, hypoglycemia/hyperglycemia, hypothermia/hyperthermia).
f)	Knowledge of appropriate documentation of emergencies.
g)	Skill in applying first-aid procedures for exercise-related injuries (e.g. bleeding, strains/sprains, fractures, shortness of breath, palpitations, hypoglycemia, allergic reactions, fainting/syncope).
h)	Skill in applying basic life support, first aid, cardiopulmonary resuscitation, and automated external defibrillator techniques.
i)	Skill in developing and/or modifying an evacuation plan.
j)	Skill in demonstrating emergency procedures during exercise testing and/or training.

2. Performance Domains and Associated Competencies for Strength and Conditioning Add-on

For programs offering the Strength and Conditioning Add-on, the curriculum must include the following performance domains and associated competencies in addition to those listed above for programs in Exercise Sciences.

Competencies that require attainment of didactic "knowledge" reflect cognitive didactic student learning objectives. Competencies that require demonstration of performance of a "skill" reflect psychomotor learning objectives.

a.	**DOMAIN I: Functional Anatomy and Biomechanics**
1)	Knowledge of the anatomy and physiology of muscle cells
2)	Knowledge of the anatomy and function of motor units (i.e., fast and slow twitch characteristics)
3)	Knowledge of the skeletal system and connective tissue structures and how they interact for form and force closure (e.g., muscle, tendons, ligaments)
4)	Knowledge of muscles involved in movement (e.g., local/global stabilizers and global movers of the arms, legs, hips, trunk, and shoulder girdle)
5)	Knowledge of the interrelationship of prime movers, stabilizers, neutralizers, supportive tissue structures and proprioception as it relates to gross movement, balance, speed, agility and dynamic stabilization
6)	Knowledge of the factors that affect joint movement and ROM (e.g., joint structures, joint types, agonist/antagonist neural relationships, muscle strength balance, and acute and chronic factors that affect movement efficiency)
7)	Knowledge of the role of muscle actions in performance development (e.g., eccentric, concentric, isometric).
8)	Knowledge of the stretch reflex, proprioceptors, Golgi tendon organ (GTO), muscle spindles, and their function.
9)	Knowledge of the biomechanics of sport and exercise (e.g., joint movements, planes and axes of motion, movement and spatial terminology)
10)	Knowledge of proper joint function, common distortions and mechanical errors in movement (e.g., dysfunctional postures and movement patterns)
b.	**DOMAIN II: Sports Metabolism**
1)	Knowledge of acute factors that affect a muscle contraction (e.g., hydrogen, glycogen, fluid, electrolytes)

2)	Knowledge in muscle contraction response to stress (e.g., work/rest ratio, time under tension, workload)
3)	Knowledge of energy system employment in response to intensity and duration (i.e., phosphagen system, glycolytic system, aerobic system)
4)	Knowledge of acute and chronic cellular response to intensity and duration (e.g., energy system interaction, consequential byproducts of the energy system, the effect of rest intervals on substrate replenishment and byproduct removal)
5)	Knowledge of causes of fatigue (i.e., acute peripheral, peripheral, chronic)
6)	Knowledge of physiology of different types of warm-ups, cooldown and recovery methods
7)	Knowledge of acute responses and chronic adaptations to exercise and training (e.g., cardiovascular, metabolic, endocrine, neuromuscular, musculoskeletal)
8)	Knowledge of the force-velocity relationship for adaptational response in sport
9)	Knowledge of muscle fiber characteristics, recruitment patterns and training adaptations to aerobic and anaerobic training (e.g., structural, neural, metabolic)
10)	Knowledge of the effects of detraining (e.g., structural, neural, metabolic)
c.	**DOMAIN III: Performance Assessment and Evaluation**
1)	Knowledge of analysis of sports and athletes (e.g., movement analysis, metabolic demands and common injury sites)
2)	Knowledge of sport-specific evaluation criteria (e.g., anthropometrics, body fat, strength, power speed)
3)	Knowledge of tests and testing procedures for components of fitness
4)	Knowledge of tests and the testing procedure for sport
5)	Knowledge of the factors that would prevent an athlete from being tested.
6)	Skills in administering performance related fitness tests for sport
7)	Knowledge of factors that affect assessments (e.g. pre-test considerations, test proficiency, test readiness, specificity, test sequencing)
8)	Skill in administering and monitoring testing techniques
9)	Knowledge test validity, reliability and predictability
10)	Skill in analyzing, interpreting and documenting test results
11)	Skill in implementing and interpreting data collected during assessments for program design
12)	Skill in setting effective goals
13)	Knowledge of program tracking and re-evaluation (timing, selection and implementation of re-assessments)
14)	Skill in record keeping (e.g., program and risk factor tracking)
d.	**DOMAIN IV: Nutrition and Ergogenic Aids**
1)	Knowledge of the sources, roles, caloric value and physiological implications of macronutrients for sport training and competition (e.g. types of carbohydrates/fats/proteins)
2)	Skill in evaluating energy sufficiency based on sports demands
3)	Knowledge of energy timing, balance and nutrition-based recovery strategies
4)	Knowledge of the sources, roles, and physiological implications of select micronutrients (e.g. fat vs. water soluble vitamins, mineral interaction, electrolytes)
5)	Knowledge in the role of hydration at rest, during exercise, recovery, pre/post competition (e.g., interaction with electrolytes and signs and symptoms of dehydration and heat-related illnesses)
6)	Knowledge of conditions associated with nutrient deficiency (i.e., premature fatigue, osteopenia and anemia)
7)	Knowledge of the guidelines for daily caloric intake of nutrients based on activity and performance needs
8)	Knowledge of the impact of drugs and alcohol on health and performance
9)	Knowledge of the roles and effects of ergogenic aids on health and performance (e.g., creatine, protein, meal replacement, dietary supplements, PEDs)
10)	Knowledge of the factors that affect body composition (e.g., food timing, types of food/drink, lean mass, stress)

11)	Knowledge of the guidelines for safe weight loss and weight gain
12)	Knowledge of the signs and symptoms of disordered eating and body image disorders
13)	Knowledge of the relationship between body composition and performance
e.	**DOMAIN V: Advanced Programming for Sport**
1)	Knowledge of exercise prescription across the periodization phases
2)	Knowledge of the principles of training (e.g., overload, specificity, progression, reversibility, individualization, priority, tapering, recovery, concurrent)
3)	Knowledge of the principles of programming (e.g., mode, frequency, intensity, duration, rest intervals, recovery periods, sets, reps, volume, time under tension)
4)	Knowledge of safe and effective exercises designed to reduce the risk of NFO and overtraining
5)	Knowledge of the anaerobic training methods (e.g., pyramids, eccentric training, supersets, strip-sets, contrast, complex, circuit, interval).
6)	Knowledge of aerobic training systems (e.g., steady-state, interval, tempo, LSD, lactate threshold, cross-training)
7)	Knowledge of exercises for specific muscular adaptations using open and closed kinetic chains
8)	Knowledge of contraindications and potential risks associated with muscular conditioning activities
9)	Knowledge of the types of resistance training modes (e.g., free weights, variable resistance equipment, pneumatic machines, bands)
10)	Knowledge of spotting techniques and exercise assistance with different training modalities
11)	Knowledge of interplay of specific program factors (e.g., mode, frequency, intensity, duration, rest intervals, recovery periods, sets, repetitions, volume, time under tension, exercise selection, order)
12)	Knowledge of recovery and physiological factors that affect performance, adherence and program decisions (e.g., types of fatigue and delayed onset muscle soreness)
13)	Knowledge of the effects of concurrent anaerobic and aerobic training to enhance sport specific conditioning
14)	Knowledge of strategies to minimize the effects of detraining (i.e., associated with competition, seasonal transition, injury, illness)
15)	Knowledge of physiological adaptations associated with phasic goals of periodization
16)	Knowledge of components of proper athletic development (e.g., skill acquisition, movement mastery, load/resistance, training volume, variation, complexity)
17)	Knowledge of types of training and factors that affect progression or regression
18)	Knowledge of the types of training and factors that affect mode and how each is implemented in an exercise prescription (e.g., reduce injury risk, movement proficiency, fitness, speed, performance with on-field conditioning)
19)	Knowledge in the role of exercise programming in reducing injury risk (e.g., movement compensation muscle balance, joint stability/range of motion)
20)	Knowledge of the importance of performing periodic evaluations of changes in fitness status
21)	Skill in progressing and regressing an exercise prescription and modifications necessary for safe participation including acclimation
22)	Knowledge of the effects of environmental conditions on the physiologic response to exercise (e.g., altitude, variable ambient temperatures, humidity, environmental pollution).
23)	Skill in adjustments for training/recovery (e.g., signs and symptoms of overreaching, overtraining and exercise-induced acute trauma)
f.	**DOMAIN VI: Training Techniques for Athletic Performance.**
1)	Knowledge of strategies and instruction techniques for skill/performance, development and enhancement exercises (e.g., power, speed/acceleration, strength, agility, balance, coordination, conditioning)
2)	Skill in instructing athletes how to use exercise equipment (e.g., free weights, stability equipment aerobic/anaerobic machines for training)

3)	Skill in instructing and monitoring proper biomechanics of exercise to ensure safety and effectiveness
4)	Skill in progressing and regressing exercises safely and effectively based on athlete age and ability
5)	Skill in providing exercise modifications for athletes returning from injury
6)	Knowledge of strategies for improved stabilization and energy transfer
7)	Skill in instructional strategies for cueing (e.g., form adjustment, spinal position/posture-during lifting and conditioning, proper spotting techniques)
8)	Knowledge and skill in techniques for flexibility/mobility training (e.g. static, dynamic, active-assisted)
9)	Knowledge and skill in techniques for improvements in conditioning, speed, agility and quickness of adolescents
10)	Skill in teaching and demonstrating appropriate exercises for strength and conditioning in athletic environments
11)	Skill in modifying exercises instruction based on age, physical condition, or ability.
g.	**DOMAIN VII: Injury prevention and Return to play**
1)	Knowledge of the benefits, risks and modifications of training for injured athletes or those with special conditions/considerations (e.g., age, detrained individual, pregnancy)
2)	Knowledge of high-risk athletes and emergency response (e.g., sickle cell, diabetes, heart conditions)
3)	Knowledge of the common injuries for each sport and protocols for return to play following medical clearance
h.	**DOMAIN VIII: Professionalism and Risk Management**
1)	Knowledge of pre-activity screening, medical release and waiver of liability for normal and at-risk participants
2)	Knowledge of response systems and procedures of an emergency action plan (EAP)
3)	Knowledge of the components for ethical standards and scope of practice in strength and conditioning
4)	Knowledge of continued education requirements and professional development
5)	Skill in maintaining a safe exercise environment (e.g., equipment operation and regular maintenance schedules, safety and scheduled maintenance of exercise areas, overall facility maintenance, proper sanitation, proper signage).
6)	Knowledge of the laws that apply to the scope of the profession
7)	Knowledge of risks associated with supplements and ergogenic aids
8)	Skill in identifying signs and symptoms of an emergency event (i.e., over heating)
9)	Knowledge of potential health issues and injuries that would prevent an athlete from participating in acute exercise.
10)	Skill in applying basic life support, first aid, cardiopulmonary resuscitation, and automated external defibrillator techniques

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