

EXERCISE AND SPORT SCIENCE (ESS)

The Exercise and Sport Science (ESS) program is designed to prepare a diverse student population for professional careers across the allied health, sport, fitness, wellness, and educational domains. Students are able to pursue comprehensive degrees in Clinical Exercise Science, Clinical Exercise Physiology with Applied Exercise Science and Performance (AESP 3+2), Health & Fitness, K-12 Physical Education, and Sport & Fitness Management. In addition, the program offers a standard Exercise & Sport Science emphasis as well as minors in Exercise & Sport Science, Sport Psychology, and K-12 Physical Education. The program also provides students with the requisite foundational knowledge required to complete professional certifications and/or pursue graduate degrees in diverse fields such as: physical therapy, exercise physiology, athletic training, cardiac rehabilitation, chiropractic medicine, sport and exercise psychology, physical education, and sport management. Members of the ESS faculty are dedicated to the provision of high-quality instruction, impactful and unique experiential learning opportunities, and the development of meaningful faculty-student relationships.

Program Goals

As a result of completing the Exercise & Sport Science Program, students will be able to:

- Understand and appreciate the roles, duties, and responsibilities of professionals in the exercise science field, sport and fitness industry, and allied health occupations.
- Demonstrate pedagogical, theoretical, and practical skills necessary to excel as educators and professionals in physical education, physical activity, health, wellness, and community health.
- Develop intellectual and practical skills, including written and oral communication, critical thinking, teamwork, and quantitative and information literacy.
- Leverage hands-on learning experiences - including field observation and internships, teaching and coaching, and community-based projects for career preparedness in clinical exercise science, physical education, health and fitness, and sport settings.
- Understand the importance of exercise and physical activity to prevent and treat disease and disability, and promote mental health.
- Acquire foundational knowledge and skills to pursue careers in sport administration, sport marketing and communications, facility management, event/program planning, and ethical decision-making and risk management.
- Apply principles of justice, equity, diversity, inclusion, and belonging to evidence-based practice.
- Advanced Coaching Certificate (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/advanced-coaching-certificate/>)
- Exercise and Sport Science Comprehensive Major: Clinical Exercise Physiology Emphasis (with AESP 3+2) (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/exercise-sport-science-comprehensive-clinical-exercise-physiology/>)
- Exercise and Sport Science Comprehensive Major: Clinical Exercise Science Emphasis (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/exercise-sport-science-comprehensive-clinical-exercise-science/>)
- Exercise and Sport Science Comprehensive Major: Health and Fitness Emphasis (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/exercise-sport-science-comprehensive-health-fitness/>)
- Exercise and Sport Science Comprehensive Major: K-12 Physical Education Emphasis (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/exercise-sport-science-comprehensive-k-12-physical-education/>)
- Exercise and Sport Science Comprehensive Major: K-12 Physical Education Emphasis (with a 3+2 Master of Arts) (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/exercise-sport-science-comprehensive-k-12-physical-education-3-2/>)
- Exercise and Sport Science Comprehensive Major: Sport and Fitness Management Emphasis (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/exercise-sport-science-comprehensive-sport-fitness-management/>)
- Exercise and Sport Science Major: Standard Program (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/exercise-sport-science-standard-program/>)
- Exercise and Sport Science Minor (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/exercise-sport-science-minor/>)
- Exercise and Sport Science Minor: Coaching (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/coaching-minor/>)
- Exercise and Sport Science Minor: Sport Psychology Concentration (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/exercise-sport-science-minor-sport-psychology/>)
- Foundations of Coaching Certificate (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/foundations-coaching-certificate/>)
- K-12 Physical Education Minor (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/k-12-p-e-minor/>)
- Sport Management Certificate (<https://catalog.western.edu/undergraduate/programs/exercise-sport-science/sport-management-certificate/>)

Capstone Course Requirement

The following course in the Exercise and Sport Science Major fulfills the capstone course requirement: ESS 495 Senior Seminar in Exercise and Sport Science. Students completing the K-12 Physical Education Emphasis may use EDUC 410 K-12 Student Teaching to fulfill this requirement. Students completing the ESS Standard or the Sport and Fitness Management Standard Emphasis may use ESS 498 Internship in Exercise and Sport Science to fulfill this requirement. Students completing the ESS Clinical Exercise Physiology Emphasis must use ESS 498 Internship in Exercise and Sport Science to fulfill this requirement.

Exercise and Sport Science Courses

All Exercise and Sport Science service courses (numbered 100-172) are beginner level unless otherwise designated.

ESS 100. Intercollegiate Athletics, Mountain Sports and Club Sports. (1 Credit)

In-season training for intercollegiate athletes, including NCAA, Mountain Sports and Club Sports Athletes. May be taken one time for credit.

ESS 131. Physical Conditioning. (1 Credit)

Off-season conditioning activities for intercollegiate athletes, including NCAA, Mountain Sports and Club Sports Athletes. Students develop the knowledge of how to improve and maintain fitness relevant to their sport during the off-season. May be taken one time for credit.

ESS 181. Foundations of Exercise and Sport Science. (3 Credits)

An introduction to the field of exercise and sport science. An overview of philosophical, historical, and scientific foundations, current trends and issues, professional opportunities, and skills and competencies required for careers in a wide variety of physical activity settings.

ESS 185. Lifetime Wellness. (3 Credits)

An introduction to the interconnected dimensions of wellness central to developing and maintaining a healthy lifestyle, with a focus on topics such as: holistic wellness, mindfulness, balanced nutrition, body composition, cardiorespiratory endurance, muscular strength & endurance, flexibility, stress management, and managing/developing healthy interpersonal relationships.

ESS 197. Special Topics. (1-6 Credits)

Special Topics Lecture Course

ESS 201. Essentials of Human Anatomy and Physiology (with Lab). (4 Credits)

An introduction to basic anatomy and physiology of all human systems. Lab and lecture are integrated. Prerequisite: Sophomore standing or instructor permission.

ESS 210. Skill Development and Analysis: Net and Wall Games. (1 Credit)

Skill development and analysis in net and wall games, including tennis, volleyball, pickleball, handball, and badminton. Learning and application of content in a developmental model. History, scoring, rules, terminology, equipment, and safety considerations included.

ESS 211. Skill and Development and Analysis: Invasion Games. (1 Credit)

Skill development and analysis for invasion games, including soccer, lacrosse, team handball, speedball, basketball, ultimate Frisbee, and flagball. Learning and application of content in a developmental model. History, scoring, rules, terminology, equipment, and safety considerations included.

ESS 212. Skill Development and Analysis: Target and Fielding Games. (1 Credit)

Skill development and analysis for target and fielding games including bowling, archery, golf (traditional and disc), softball, and bocce. Learning and application of content in a developmental model. History, scoring, rules, terminology, equipment, and safety considerations included.

ESS 213. Skill Development and Analysis: Dance. (1 Credit)

Skill development and analysis for a variety of dance forms including fitness, folk, country, social, and ballroom. Learning and application of content in a developmental model. History, terminology, music choices, and safety considerations included.

ESS 275. Human Motor Development and Learning. (3 Credits)

An examination of the development of movement behavior in humans from infancy to older adulthood; how different motor, cognitive, social, and environmental factors influence movement behavior; as well as how, when, and why humans learn motor skills. This course is designed to apply this knowledge of motor development and learning to physical activity and exercise across the lifespan.

ESS 276. Emergency Response. (3 Credits)

Students are provided essential knowledge and skills needed to develop CPR and advanced first-aid capabilities. For students who might be required to provide first aid frequently and for special interest groups. Exercise and Sports Science majors have first option for this course.

ESS 282. Principles of Sport Management. (3 Credits)

An introduction to the field of sport management through an exploration of the unique, diverse, dynamic and expanding sport industry. Students will be introduced to important foundational knowledge and competencies required to pursue career and internship opportunities in sports, fitness or recreation. Topics include: sport and society, ethical decision-making, legal issues, facility and event management, financial decision-making and sport marketing.

ESS 290. Curriculum Development and the Learning Environment. (3 Credits)

A comprehensive overview of materials, suggested teaching methods, procedures, techniques, well-directed and well-selected activities, and ways of evaluating physical education in K-12 schools.

ESS 292. Independent Study. (1-6 Credits)**ESS 297. Special Topics. (1-6 Credits)****ESS 298. Fitness Instruction. (3 Credits)**

Students develop knowledge and skills to plan and implement group fitness classes as well as personal training sessions. Topics include: risk management, exercise plans, group fitness instruction, personal training, fitness pedagogy, training special populations, cardiovascular fitness, resistance training, flexibility training, and core stability. Prerequisite: ESS 201 or BIOL 372; or instructor permission.

ESS 320. Psychology of Sport and Physical Activity. (3 Credits)

A variety of issues and research areas in the psychology of sport and physical activity are addressed. Topics covered include an overview of the development of sport and exercise psychology, personality theories, exercise and mood, exercise adherence, goal setting, motivation, psychological interventions for athletes, and cohesion theories. Prerequisite: minimum junior standing or instructor permission.

ESS 328. Methods of Coaching. (3 Credits)

An introduction to the foundations of Coaching methodology and pedagogy appropriate for all coaches with a focus on understanding how to maximize individual athletes' and team improvement. Topics include: the basic components of practice planning, goal setting for individuals and teams, and exploration of different Coaching styles using the Spectrum of Teaching Styles, and the application of the Game-Based Approach to various Coaching fields. Prerequisite: minimum junior standing or instructor permission.

ESS 330. Exercise Physiology. (3 Credits)

An emphasis on the theory and principles of exercise physiology to health, physical fitness, and athletic performance in diverse populations. Prerequisites: ESS 201 or both BIOL 372 and BIOL 373; minimum Junior standing. Or instructor permission.

ESS 331. Exercise Physiology Lab. (1 Credit)

Basic laboratory techniques of exercise physiology correlating with ESS 330. Laboratory experiences include aerobic and anaerobic exercise, body composition, strength, flexibility, and body composition and other indicators of exercise. Prerequisites: completion of the College Mathematics course requirement; or instructor permission. Corequisite: ESS 330.

ESS 340. Mental Training for Peak Performance. (3 Credits)

An application of theories and concepts of sport psychology. This course focuses on application of specific psychological skills necessary for high level performance and assisting students in teaching others those same skills. Prerequisite: ESS 320 or instructor permission.

ESS 346. Psychology of Coaching. (3 Credits)

Psychological factors involved in coaching and leadership are explored in this course. Relevant theory and research, as well as practical applications, are discussed. Topics include expert coaching characteristics and behaviors, leadership and motivational styles, the coach-athlete relationship, stresses of coaching, reinforcement strategies, ethics in coaching, and issues related to youth sport coaching. This course is designed for current and future coaches, individuals in leadership roles, as well as anyone interested in the coach's experience. Prerequisites: ESS 320, minimum junior standing or instructor permission.

ESS 350. Assessment & Technology in Physical Education. (2 Credits)

Planning, administering, and evaluating standards-based accountability systems in physical education. Multiple assessment strategies for psychomotor, cognitive, and affective learning objectives, using current technologies, are presented. Students evaluate, select and/or construct assessment tools to match specific learning outcomes in the K-12 physical education curriculum. Prerequisites: ESS 181 or ESS 185; and ESS 290 and completion of the University mathematics requirement.

ESS 353. Whole School, Whole Community, Whole Child (WSCC). (2 Credits)

An introduction to the application of the Whole School, Whole Community, Whole Child (WSCC) model and the Comprehensive School Physical Activity Programs (CSPAP) within school and community settings. Through hands-on projects and fieldwork, including wellness events, after-school programs and peer teaching, students will develop practical skills in planning, organizing, and leading health and physical activity initiatives and health education lessons. The course also emphasizes leadership, teaching, and self-reflection, preparing students to design and implement effective programs tailored to the needs of diverse communities. Includes 6-8 hours of required field experience. Prerequisite: minimum junior standing; or instructor permission.

ESS 355. Psychology of Injury. (3 Credits)

Psychological factors involved in sport-related injuries and the rehabilitation process. Course content includes relevant theory and research as well as practical applications. Topics include: stress, responses to injury, mental skills used to manage injury (i.e., goal setting, motivation, and confidence), social support, potential psychological problems faced during rehabilitation, and returning to sport after injury. Prerequisites: ESS 320, minimum junior standing or instructor permission.

ESS 360. Nutrition for Wellness and Performance. (3 Credits)

A focus on concepts geared to promote peak performance based upon nutritional intake. An understanding of macronutrient ingestion along with other essential nutrients is gained and applied in detail to the healthy and chronically diseased populations. This includes an understanding of the metabolic effect of food. The pros and cons of select supplements are discussed and applied to real-life scenarios. Prerequisites or co-requisites: ESS 330 and ESS 331; or instructor permission.

ESS 363. Inclusive Physical Activity. (3 Credits)

Students develop knowledge and skills necessary to work with diverse populations in physical activity settings. Content includes planning, instructional design & delivery, assessment, coordination of resources, and advocacy for inclusive physical activity programming. Prerequisites: ESS 185 or ESS 275; and minimum junior standing.

ESS 365. Topics in Physical Activity. (3 Credits)

Interdisciplinary study of the role of physical activity under a variety of conditions and settings, and for a variety of populations. Content focuses on current research and practice as it relates to the topic under consideration. Topics will rotate annually. Can be repeated up to three times for credit if a different topic is selected. Prerequisites: ESS 181, ESS 185; ESS 201 or BIOL 372; junior/senior standing. Or instructor permission.

ESS 370. Essentials of Strength Training and Conditioning. (3 Credits)

Exercise prescription and conditioning in the form of resistance training, including the use of free weights, machines, Olympic lifts, and plyometrics. Muscular adaptations to anaerobic and aerobic training, testing and evaluation, exercise techniques, and resistance training program design. Design, implementation, and demonstration of appropriate resistance training routines and proper lifting technique for a variety of populations. Content knowledge aligns with requirements for completion of certification as a Certified Strength and Conditioning Specialist (CSCS) from the National Strength and Conditioning Association (NSCA). Prerequisite: ESS 330 or instructor permission.

ESS 380. Biomechanics. (3 Credits)

Investigation and analysis of human movement. Basic mechanical principles of force, motion, and aerodynamics as related to fundamental physical skills and their application to exercise, sport, and physical activity. Prerequisites: ESS 185; ESS 201 or BIOL 372; completion of the University Mathematics course requirement. Or instructor permission.

ESS 382. Management of Sport and Fitness Facilities. (3 Credits)

A study of principles, guidelines and recommendations for planning, construction, and the use and maintenance of indoor and outdoor sports, physical education, recreation, and fitness facilities. Prerequisite: Junior Standing or instructor permission.

ESS 385. Physical Activity Programming. (3 Credits)

Topics include an overview of physical activity epidemiology, evidence-based physical activity interventions, behavior change theories, best practices, including use of technology, to increase physical activity among specific populations, and principles in program design, implementation, and evaluation. Students will design and administer a physical activity awareness or educational campaign for a target population. Prerequisite: ESS 185 or instructor permission.

ESS 392. Methods of Secondary Activities. (3 Credits)

For students planning to obtain licensure in physical education. A variety of curriculum models (e.g., tactical, sport education, social responsibility) are used to present individual, dual and team sport activities. Lesson and unit plans are developed, implemented and assessed in keeping with Colorado and NASPE standards as they relate to secondary physical education. Prerequisites: 2 of the following: ESS 210, 211, 212, 213; ESS 290, minimum junior standing; or instructor permission. Prerequisite or corequisite: ESS 350

ESS 395. Methods of Secondary Activities. (3 Credits)

Units covered may include apparatus and tumbling, dance, and games. Each unit breaks down into sub-units, and progressions are emphasized. Lesson and unit plans are developed, implemented, and assessed in keeping with national standards and as they relate to elementary physical education. Competencies in the basic skills of each unit are also tested. Prerequisites: two of the following: ESS 210, 211, 212, 213; ESS 290; and minimum junior standing; or instructor permission. Prerequisite or corequisite: ESS 350.

ESS 396. Methods of Alternative Physical Education. (3 Credits)

Units covered may be: Nordic skiing, rock climbing, orienteering, camping, mountain biking, and adventure activities. Lesson and unit plans are developed, implemented, and assessed in keeping with national standards as they relate to secondary physical education. Prerequisites: ESS 290 and minimum junior standing. Or instructor permission.

ESS 397. Special Topics. (1-6 Credits)**ESS 405. Practicum in Exercise and Sport Science. (1 Credit)**

Pre-professional experience in a physical activity setting. Such experiences include observing and participating in the professional activities associated with the particular setting. Students work with an Exercise and Sport Science faculty member to select an approved practicum experience, and are required to develop an approved learning contract. May be repeated once for credit (in a different setting). Graded satisfactory/unsatisfactory. Prerequisites: ESS 181, ESS 185, and minimum junior standing. Or instructor permission.

ESS 410. Assessment and Exercise Prescription. (3 Credits)

Students work with assessment formats, appraisal techniques, and metabolic calculations to gain information needed to construct exercise prescriptions designed to meet individual needs for different segments of the population. Prerequisites: ESS 331 and ESS 298 or instructor permission.

ESS 411. Wellness Elevated I. (3 Credits)

An opportunity for students to further their knowledge, skills, and abilities in exercise assessment, prescription, programming, implementation and outcome evaluation. Students will develop professional skills of healthcare documentation, communication and program analysis. A commitment of 6 hours per week, clinic time, in addition to weekly class meetings is required. Prerequisite: ESS 410 or instructor permission.

ESS 412. Exercise Biochemistry. (3 Credits)

Essential concepts of biochemistry -- molecular biology, basic chemistry, metabolism, and transcription regulation -- as applied to the human during exercise. Prerequisites: ESS 330 and ESS 331; or instructor permission.

ESS 430. Topics in Clinical Exercise Physiology. (3 Credits)

A study of diseased populations, including, but not limited to, exercise therapy in cardiac and cancer patients. Course content focuses on the etiology and pathophysiology of disease, electrocardiogram and diagnostic stress test interpretation, specialized exercise prescription, and other topics at the discretion of the instructor. Prerequisites: ESS 330 and ESS 331; or instructor permission.

ESS 431. Wellness Elevated II. (3 Credits)

An opportunity for students to further their expertise in clinical exercise physiology. Students will gain direct experience in exercise assessment, prescription, programming, implementation and outcome evaluation in special population groups. Students will need to commit to 6 hours per week of clinical time (i.e., Wellness Elevated) as well as weekly meeting times. Prerequisite or co-requisite: ESS 430 or instructor permission.

ESS 440. Topics in Sport & Fitness Management. (3 Credits)

A focus on various managerial functions within sport and fitness management through the study of various theoretical perspectives, the provisions of pre-professional experiences, and distinct topics at the discretion of the instructor. Topics rotate annually. The course may be repeated up to three times if a different topic is offered. Prerequisite: Junior standing or instructor permission.

ESS 450. Risk Management in Physical Activity Settings. (3 Credits)

A focus on risk assessment and management for physical activity professionals. Topics covered include risk assessment, standard of care, negligence, forms to limit liability, constitutional law as relevant for physical activity professionals, development of a risk management plan, and risk reduction strategies. Prerequisites: junior or senior standing; or instructor permission.

ESS 490. Sociology of Sport and Physical Activity. (3 Credits)

A focus on the social organization of sport and physical activity and their relationship to the institutional structure, cultural patterns, and dynamics of American society. Students use different sociological approaches/theories to analyze sport and physical activity and to analyze current issues and problems in sport and physical activity settings. Prerequisite: minimum junior standing or instructor permission.

ESS 492. Independent Study. (1-4 Credits)

For qualified upper-level students who have specialized interests in a particular area of advanced study in Exercise and Sport Science.

ESS 495. Senior Seminar in Exercise and Sport Science. (3 Credits)

A capstone course required for all ESS majors addressing issues, ethical considerations, problem-solving and decision-making, leadership and communication in the discipline. Students integrate content from their course of study, write and speak in discipline-specific formats, and complete a comprehensive self-assessment in preparation for graduate school, internship, or entry-level job. Prerequisites: ESS 181, ESS 185, senior standing; or instructor permission. Students are encouraged to take this course during their final semester.

ESS 496. Field Experiences. (1-6 Credits)

Directed field experiences in teaching, coaching, and laboratory settings. Guidelines for the field experiences are provided and agreed upon at the beginning of the course.

ESS 498. Internship in Exercise and Sport Science. (3-12 Credits)

An opportunity for in-depth work at a professional site in an area of exercise and sport science. The internship must meet standards of the department and the University, including completion of a pre-internship checklist. Prerequisites: Satisfactory grade in ESS 405, overall GPA of 2.750, department advisor permission, and senior standing.

ESS 600. Advanced Statistics. (3 Credits)

Statistical tools for scientific research, including parametric and non-parametric methods for ANOVA and group comparisons, simple linear and multiple linear regression. Emphasis placed on the use of dedicated statistical software.

ESS 601. Quantitative Research Methods. (3 Credits)

Research design and methodology in environmental exercise physiology.

ESS 605. Exercise and Sport Science Testing and Instrumentation-Lab. (3 Credits)

Techniques of in-lab exercise testing and result interpretation in healthy and/or diseased populations.

ESS 606. Exercise and Sport Science Testing and Instrumentation-Field. (3 Credits)

Techniques of field-based exercise testing and result interpretation in healthy and/or diseased populations.

ESS 612. Exercise Biochemistry. (3 Credits)

Provides advanced content on research-based findings of how exercise alters biochemical function in skeletal muscle, the liver and adipose tissue. Prerequisite: AESP graduate standing.

ESS 620. Navigating Post-Graduation. (1 Credit)

Prepare for work attainment post-graduation. Skills include, resume writing, cover letters, performing job searches, networking and interviewing (live, phone and video).

ESS 630. Clinical Exercise Physiology. (3 Credits)

Physiological study of acute and chronic responses to exercise in diseased populations.

ESS 640. Environmental Exercise Physiology I. (3 Credits)

Principles of exercise physiology in extreme environmental conditions including extreme temperatures, hyper- and hypobarometric pressure, air pollution, sleep deprivation, and zero gravity. Healthy and diseased populations are studied.

ESS 641. Environmental Exercise Physiology II. (3 Credits)

Advanced research and principles of exercise physiology in extreme environmental conditions including extreme temperatures, hyper- and hypobarometric pressure, air pollution, sleep deprivation, and zero gravity. Healthy and diseased populations are studied. Prerequisite: ESS 640.

ESS 660. Health Promotion. (3 Credits)

Development of skills in health promotion program design, implementation and evaluation. Specific emphasis may be placed on healthy and diseased populations in extreme environments.

ESS 675. Clinical Exercise Programming-Lab. (3 Credits)

Role of exercise/physical activity in the prevention, pathophysiology and treatment of chronic diseases. Hands on clinical exercising programming experiences.

ESS 685. Cardiopulmonary Physiology. (3 Credits)

A foundation course that covers 1) the structure and function of the cardiopulmonary systems; 2) exercise-related physiological changes of the cardiopulmonary system and their applications to exercise training; and 3) pathophysiological changes secondary to cardiopulmonary dysfunction and their effects on function.

ESS 692. Independent Study. (1-3 Credits)

Advanced study for students with specialized interest in a particular area of environmental exercise physiology. Prerequisite: advisor permission.

ESS 695. Thesis. (1-9 Credits)

Independent research project, supervised by academic advisor. Over two semesters, students take 3-6 credits of thesis each semester to meet the 9 credit minimum requirement. If, at the end of the chosen two semesters the thesis is not defended, the student must continuously enroll in 1 credit until successful thesis defense. Prerequisite: second year standing.

ESS 696. Research. (1-6 Credits)

High Altitude Performance Lab research supervised by AESP faculty that falls outside the purview of Master of Science thesis work.

ESS 699. Practicum/Internship. (1-6 Credits)

An opportunity for in-depth work at a site in the area of academic concentration. The experiences must meet standards of the department and the University. Prerequisite: advisor permission.