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 High Altitude Exercise Physiology (HAEP 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

- Students will engage with issues, challenges, ethical considerations, problem-solving techniques, methods of deliberating and making decisions, proofs, and methods of communicating characteristics (Western Capstone Outcome)
- Students will demonstrate the ability to write in discipline-specific formats
- Students will demonstrate the ability to deliver oral presentations (Western Capstone Outcome)
- Students will demonstrate General Education Essential Skills as they pertain to the discipline
- Students will demonstrate advocacy skills
- Students will demonstrate professionalism

Exercise and Sport Science Comprehensive Major: Clinical Exercise Physiology Emphasis (with HAEP 3+2) (https://catalog.western.edu/undergraduate/programs/exercise-sport-science/exercise-sport-science-comprehensive-clinical-exercise-physiology/)


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 Minor (https://catalog.western.edu/undergraduate/programs/exercise-sport-science/exercise-sport-science-minor/)


K-12 Physical Education Minor (https://catalog.western.edu/undergraduate/programs/exercise-sport-science/k-12-p-e-minor/)

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: Basketball. (1 Credit)
Basketball open to members of the intercollegiate basketball team. May be taken one time for credit. Prequisite: Coach/instructor permission

ESS 101. Intercollegiate Athletics: Cross Country. (1 Credit)
Intercollegiate Athletics: Cross Country Open to members of the intercollegiate cross country team. May be taken one time for credit. Prequisite: Coach/ instructor permission

ESS 102. Intercollegiate Athletics: Football. (1 Credit)
Football Open to members of the intercollegiate Football team. May be taken one time for credit. Prequisite: Coach/ instructor permission

ESS 103. Intercollegiate Athletics: Indoor Track. (1 Credit)
Indoor Track Open to members of the intercollegiate Indoor Track team. May be taken one time for credit. Prequisite: Coach/ instructor permission

ESS 104. Intercollegiate Athletics: Outdoor Track. (1 Credit)
Open to members of the intercollegiate Outdoor Track team. May be taken one time for credit. Prequisite: Coach/ instructor permission

ESS 105. Intercollegiate Athletics: Volleyball. (1 Credit)
Open to members of the intercollegiate Volleyball team. May be taken one time for credit. Prequisite: Coach/ instructor permission

ESS 106. Intercollegiate Athletics: Wrestling. (1 Credit)
Open to members of the intercollegiate athletic wrestling team. May be taken one time for credit. Prerequisite: Coach/instructor permission

ESS 107. Intercollegiate Athletics: Soccer. (1 Credit)
Open to members of the intercollegiate athletic soccer team. May be taken one time for credit. Prerequisite: coach/instructor permission
ESS 108. Intercollegiate Athletics: Swimming. (1 Credit)
Open to members of the intercollegiate athletic swimming team. May be taken one time for credit. Prerequisite: coach/instructor permission.

ESS 112. Select Activities in Recreation, Exercise, and Sport Science. (1 Credit)
A specific activity is offered as student interest, facilities, faculty, and equipment are available.

ESS 131. Physical Conditioning. (1 Credit)
Off-season conditioning activities for intercollegiate athletes. Students develop the knowledge of how to improve and maintain fitness relevant to their sport during the off-season. Prerequisite: Instructor Permission.

ESS 132. Weight Training. (1 Credit)
The theory and practice of weight training. Information is presented concerning physiological and bio-mechanical adaptations accompanying resistive training, reasonable methods of improving athletic performance, and methods of resistance training that can lead to improved quality of life.

ESS 135. Mountain Bike Riding. (1 Credit)
Students develop general knowledge of and proficiency in the activity, equipment, safety procedures, and terminology of the fundamental skills of mountain bike riding.

ESS 160. Swimming (Beginning). (1 Credit)
An introduction to swimming designed to equip the students with the basic watersafety skills and knowledge needed to be reasonably safe while in, on, or about the water.

ESS 161. Swimming (Intermediate). (1 Credit)
Satisfactory completion of these skills leads to the Red Cross Intermediate and Swimmer’s Certificate.

ESS 170. Lifeguard Training. (2 Credits)
Provides the individual with the knowledge and skills designed to save one's own life or the life of another in the event of an emergency, with certification by the American Red Cross.

ESS 172. Water Safety Instruction. (3 Credits)
Satisfactory completion of these skills leads to the Red Cross WSI Certificate.

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)
Provides conceptual and experiential components designed as a basis for developing a healthier lifestyle.

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

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.

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 field 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 221. Methods of Coaching Football. (2 Credits)
The fundamental principles and play of football, including a basic defensive and offensive game plan, the fundamentals and techniques involved in coaching football, a basic outline of coaching the quarterback, the moral and ethical responsibilities of the coach to game participants, administration, etc., as well as coaching philosophy and interpretation of the rules.

ESS 223. Methods of Coaching Basketball. (2 Credits)
A study of individual fundamentals and techniques, as well as team offensive and defensive patterns and strategies involved in coaching basketball.

ESS 225. Methods of Coaching Wrestling. (2 Credits)
An introduction to all phases of wrestling. Fundamental movements and techniques, rule interpretations, and approved coaching ethics are covered.

ESS 227. Methods of Coaching Track and Field. (2 Credits)
The techniques and fundamentals of each track and field event. The course also includes the important phase of practical track meet management.

ESS 229. Methods of Coaching Volleyball. (2 Credits)
Lecture and discussion with research assignments and practicum work. An understanding of basic offenses (6-0 and 4-2), basic defensive coverage and rotations, service reception, and serving sets are presented.

ESS 275. Motor Development and Learning. (3 Credits)
An application of the knowledge of motor development and learning to physical activity across the lifespan. This class introduces the physiological, perceptual, and cognitive, as well as the affective changes that occur in motor development and learning across the lifespan. Prerequisite: ENG 102 with a grade of C- or above.

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 and Fitness Management. (3 Credits)
A focus on the administration of programs within the sport and fitness industries. Topics include administrative theories and concepts, personnel, communication and problem solving, fiscal management, budgeting, ethical considerations, and program evaluation. Prerequisite: ENG 102 with a grade of C- or above, ESS 181, or instructor permission.
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.

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.

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.

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; 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. Coordinated School Health and Physical Activity Programs. (2 Credits)
Overview of coordinated school health programs with a heavy focus on local wellness policy, comprehensive school health education and the role of physical activity and physical education in schools. Includes 6-8 hours of required field experience. Prerequisites: EDUC 000 and junior standing.

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.

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.

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.

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.
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.

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; Prerequisite or corequisite: ESS 350

ESS 395. Methods of Elementary 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; 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.

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). Prerequisites: ESS 181, ESS 185, junior or senior standing.

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.

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.

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.

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, and 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.

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.

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.

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. 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: HAEP graduate standing.

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. Prerequisites: second year graduate standing, ESS 650.

ESS 696. Research. (1-6 Credits)
High Altitude Performance Lab research supervised by HAEP 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.