

Exercise Science

The Exercise Science Department is an interdisciplinary program that prepares students for allied health, human movement, and physical education career opportunities. Coursework in the major that contributes to the understanding of human movement includes:

- biomechanics
- exercise physiology
- motor learning and development
- nutrition

The program is augmented by foundational courses in:

- anatomy
- physiology
- psychology
- biology
- chemistry
- physics

Many of the careers associated with a degree in exercise science require additional education, certification, or licensure beyond an undergraduate degree. As such, upon graduation, students are prepared to enter additional educational programs in:

- medicine
- physical therapy
- athletic training/sports medicine
- exercise physiology
- biomechanics
- fitness management
- nutrition
- teaching physical education
- other health and movement related fields

Bachelor of Science in Exercise Science

The Exercise Science Department offers three emphasis areas for the Bachelor of Science degree:

1. Health Professions
2. Human Performance
3. Pedagogy/Teaching Physical Education

The Exercise Science Department emphasizes a “hands on” approach to learning with laboratory experiences for many of its courses. In addition, the Department is committed to undergraduate research as a key element of the academic experience. Students are exposed to research throughout the program, culminating in an independent research project in their terminal experience. Students are encouraged to participate in internships and volunteer throughout the community in venues relating to their particular emphasis and future professional aspirations.

Course Requirements by Emphasis Area

Health Professions

63-66 credits minimum, 23-25 credits upper division.

EXSC 201/201L	Functional Anatomy and Functional Anatomy Lab ¹	4
EXSC 202/202L	Exercise Physiology and Exercise Physiology Lab ¹	4
EXSC 301/301L	Biomechanics and Biomechanics Lab	4
EXSC 302	Motor Development Across a Life Span	3
EXSC 494	Capstone	2
BIOL 120	Introduction to Ecology and Populations	3
BIOL 121	Introduction to Cells and Organisms	3
BIOL 123L	Introduction to Biological Experimentation I	2

BIOL 124L	Introduction to Biological Experimentation II	2
CHEM 151	General Chemistry	4
CHEM 151L	General Chemistry Lab	1
CHEM 152	General Chemistry II	4
CHEM 152L	General Chemistry II Lab	1
Select one of the following:		4-5
PHYS 201/201L	Mechanics and Thermodynamics-Algebra and Mechanics and Thermodynamics-Algebra Lab	
PHYS 211/211L	Mechanics and Thermodynamics-Calculus and Mechanics and Thermodynamics-Calculus Lab	
Select one of the following:		4-5
PHYS 202/202L	Electricity, Magnetism, and Optics - Algebra and Electricity, Magnetism, and Optics - Algebra Lab	
PHYS 212/212L	Electricity, Magnetism, and Optics - Calculus and Electricity, Magnetism, and Optics - Calculus Lab (Select one of the following:)	
PSYC 222	Abnormal Psychology	4
EXSC 300	Exercise Prescription	3
EXSC 325	Statistics and Research Methods in Exercise Science	4
Select two of the following: *		8
BIOL 361/361L	Microbiology and Microbiology Lab	
CHEM 331/341	Organic Chemistry and Organic Chemistry Lab	
CHEM 425/425L	Biochemistry and Biochemistry Lab	
EXSC 340	Motor Learning and Control	
EXSC 401/401L	Advanced Biomechanics and Advanced Biomechanics Lab	
EXSC 470/470L	Advanced Exercise Physiology and Advanced Exercise Physiology Laboratory	
EXSC 487	Clinical Exercise Prescription	
PSYC 304	Child and Adolescent Development	
PSYC 305	Adult Development and Aging	
PSYC 331	Physiological Psychology	
Total Hours		64-66

* Two additional courses chosen in consultation with an adviser.

Required Supporting Courses

Support courses are those courses from outside the department that fulfill foundational knowledge requirements (prerequisites) for students in Exercise Science.

BIOL 223/223L	Human Anatomy and Human Anatomy Lab	4
BIOL 224/224L	Human Physiology and Human Physiology Lab	4
PSYC 200	General Psychology	4
Total Hours		12

¹ BIOL 223 and BIOL 224 (Anatomy and Physiology) are prerequisites for EXSC 201 (Functional Anatomy) and EXSC 202 (Exercise Physiology). Students are advised to take Anatomy and Physiology as early as possible in their course sequence.

Human Performance

60 credits minimum, 38 credits upper division.

EXSC 201/201L	Functional Anatomy and Functional Anatomy Lab ¹	4
EXSC 202/202L	Exercise Physiology and Exercise Physiology Lab ¹	4
EXSC 301/301L	Biomechanics and Biomechanics Lab	4
EXSC 302	Motor Development Across a Life Span	3
EXSC 494	Capstone	2
EXSC 300	Exercise Prescription	3
EXSC 303	Nutrition	3
EXSC 325	Statistics and Research Methods in Exercise Science	4
EXSC 340	Motor Learning and Control	4

EXSC 401/401L	Advanced Biomechanics and Advanced Biomechanics Lab	4
EXSC 470/470L	Advanced Exercise Physiology and Advanced Exercise Physiology Laboratory	4
EXSC 480	Social Psychology of Sport	4
EXSC 487	Clinical Exercise Prescription	3
CHEM 151	General Chemistry	4
CHEM 151L	General Chemistry Lab	1
CHEM 152	General Chemistry II	4
CHEM 152L	General Chemistry II Lab	1
Select one of the following:		4-5
PHYS 201/201L	Mechanics and Thermodynamics-Algebra and Mechanics and Thermodynamics-Algebra Lab	
PHYS 211/211L	Mechanics and Thermodynamics-Calculus and Mechanics and Thermodynamics-Calculus Lab	
Total Hours		60-61

Required Supporting Courses

Support courses are those courses from outside the department that fulfill foundational knowledge requirements (prerequisites) for students in Exercise Science.

BIOL 223/223L	Human Anatomy and Human Anatomy Lab	4
BIOL 224/224L	Human Physiology and Human Physiology Lab	4
MATH 151	Precalculus	4
PSYC 200	General Psychology	4
Total Hours		16

¹ BIOL 223 and BIOL 224 (Anatomy and Physiology) are prerequisites for EXSC 201 (Functional Anatomy) and EXSC 202 (Exercise Physiology). Students are advised to take Anatomy and Physiology as early as possible in their course sequence.

Pedagogy/Teaching

59 credits minimum, 38 credits upper division.

EXSC 201/201L	Functional Anatomy and Functional Anatomy Lab ¹	4
EXSC 202/202L	Exercise Physiology and Exercise Physiology Lab ¹	4
EXSC 301/301L	Biomechanics and Biomechanics Lab	4
EXSC 302	Motor Development Across a Life Span	3
EXSC 494	Capstone	2
EXSC 203	Prevention and Care of Athletic Injuries	3
EXSC 251	Individual and Dual Sports and Activities	2
EXSC 252	Team Sports	2
EXSC 253	Aquatic and Rhythmic Activities	2
EXSC 254	Combative and Outdoor Activities	2
EXSC 300	Exercise Prescription	3
EXSC 352	Adaptive Physical Education	3
EXSC 353	Field Observations	2
EXSC 354	Elementary School Physical Education	4
EXSC 355	Secondary School Physical Education	4
EXSC 450	History and Principles of Physical Education	3
EXSC 451	Organization and Administration	3
EXSC 452	Measurement and Evaluation in Physical Education	3
EXSC 480	Social Psychology of Sport	4
Activity Courses *		2
Total Hours		59

* A minimum of two activity courses for this emphasis must be taken.

Required Supporting Courses

Support courses are those courses from outside the department that fulfill foundational knowledge requirements (prerequisites) for students in Exercise Science.

BIOL 223/223L	Human Anatomy and Human Anatomy Lab	4
BIOL 224/224L	Human Physiology and Human Physiology Lab	4
PSYC 200	General Psychology	4
Total Hours		12

¹ BIOL 223 and BIOL 224 (Anatomy and Physiology) are prerequisites for EXSC 201 (Functional Anatomy) and EXSC 202 (Exercise Physiology). Students are advised to take Anatomy and Physiology as early as possible in their course sequence.

Activity Courses

Lower Division

ACTV 102. Badminton. (1).

ACTV 103. Fundamentals of Basketball. (1).

ACTV 104. Golf. (1).

ACTV 105. Tennis I. (1).

ACTV 107. Volleyball. (1).

ACTV 111. Physical Fitness, Health & Wellness. (1).

ACTV 112. Alexander Technique. (1-2).

Introduces students to the principles of the Alexander Technique and the application of these principles in their major areas. The principles develop increased mind and body coordination and are most commonly applied to acting, singing, public speaking, musical instrument performance and athletic performance. (cross-listed with TA 112).

ACTV 120. Aerobic Dance. (1).

ACTV 121. Folk and Square Dance. (1).

ACTV 122. Modern Dance I. (1).

ACTV 123. Modern Dance II. (1).

ACTV 124. Polynesian Dance. (1).

ACTV 125. Swing Dance. (1).

ACTV 126. Ballroom Dance. (1).

ACTV 127. Ballet. (1).

ACTV 130. Tap Dance. (1).

ACTV 140. Body Conditioning -(women). (1).

ACTV 141. Body Conditioning (men). (1).

ACTV 142. Tai Chi. (1).

ACTV 143. Yoga. (1).

ACTV 144. Outdoor Skills. (1).

Designed to introduce outdoor adventure skills and activities to students. With the knowledge and skills developed through a variety of activities, students will then be able to use these skills outside of the classroom for their own personal leisure. The course includes skills in each activity that promote safety, proper equipment use and knowledge, leadership and specific technical skills for each activity.

ACTV 146. Jogging. (1).

ACTV 148. Tang Soo Do. (1).

ACTV 149. Swimming. (1).

ACTV 150. Self Defense and Assault Prevention. (1).

ACTV 151. Speed Development. (1).

ACTV 152. Advanced Body Conditioning. (1).

ACTV 182. Selected Topics. (1).

Upper Division

ACTV 312. Alexander Technique. (1-2).

Introduces students to the principles of the Alexander Technique and the application of these principles in their major areas. The principles develop increased mind and body coordination and are most commonly applied to acting, singing, public speaking, musical instrument performance and athletic performance. (cross-listed with TA 312 and MUS 312).

Athletic Team Courses

ATHL 160. Intercollegiate Baseball. (1).

ATHL 161. Intercollegiate Basketball. (1).

ATHL 163. Intercollegiate Cross Country. (1).

ATHL 164. Intercollegiate Football. (1).

ATHL 165. Intercollegiate Golf. (1).

ATHL 166. Intercollegiate Soccer. (1).

ATHL 167. Intercollegiate Softball. (1).

ATHL 168. Intercollegiate Tennis. (1).

ATHL 169. Intercollegiate Track & Field. (1).

ATHL 170. Intercollegiate Volleyball. (1).

ATHL 171. Intercollegiate Swimming & Diving. (1).

ATHL 172. Intercollegiate Water Polo-Men. (1).

ATHL 173. Intercollegiate Water Polo-Women. (1).

Exercise Science Courses

Lower Division

EXSC 180. Biophysical Foundations of Human Movement. (4).

This course provides an overview of the biophysical aspects of human movement that make up the knowledge base for the discipline of exercise science. Core anatomical, mechanical, physiological, and neural determinants of human movement and adaptation to human movement will be considered, along with how human physical activity contributes to health and physical performance. Course content will be supported by laboratory experiences that emphasize data collection, analysis and interpretation.

EXSC 180L. Biophysical Foundations of Human Movement Lab. (0).

EXSC 201. Functional Anatomy. (4).

The anatomical basis of human motion. Development of the locomotor system from tissue structure and function to anatomical description of skeletal muscles and their interaction in producing coordinated movement. Mechanical aspects of movement at the skeletal and muscular level. Prerequisites: BIOL 223, BIOL 224; Corequisite: EXSC 201L.

EXSC 201L. Functional Anatomy Lab. (0).

Hands-on activities designed to enhance the understanding and learning of associated lecture topics. Corequisite: EXSC 201.

EXSC 202. Exercise Physiology. (4).

Structure, function and regulation of the physiological systems most important in exercise, physical education and sport settings. Emphasis is placed on muscular, metabolic, cardiovascular, nervous and endocrine systems. Prerequisites: BIOL 223, BIOL 224; Corequisite: EXSC 202L.

EXSC 202L. Exercise Physiology Lab. (0).

Will cover tests of exercise metabolism via oxygen uptake, muscle physiology and performance via electromyography and lactate production, anthropometry and body composition via standard anthropometric methods, resting and exercise respiration via standard spirometry and cardiovascular response to exercise via electrocardiography. Corequisite: EXSC 202.

EXSC 203. Prevention and Care of Athletic Injuries. (3).

Topics covered in this course include medical terminology, emergency medical techniques, basic injury mechanisms and an introduction to recognition and treatment of common athletic injuries. Experience will be gained in basic taping techniques. Prerequisites: BIOL 223 & BIOL 224.

EXSC 204. Introduction to Exercise Science. (2).

This course is designed to introduce students to the field of Exercise Science, including the various disciplines included under the umbrella of exercise science, the professionals related to an exercise science degree, the terminology applied to the field, the interactions between the various disciplines, and how methods of inquiry produce knowledge in exercise science.

EXSC 206. First Aid and C.P.R for the Professional Rescuer. (2).

The theory and practice of first aid and cardio-pulmonary resuscitation for the professional rescuer. Topics in the class include: one and two rescuer CPR, bag valve mask and pocket mask use, oxygen administration and AED administration. American Red Cross First Aid, CPR/AED Certification for the professional rescuer is awarded upon successful completion of the necessary requirements.

EXSC 220. Coaching Baseball/Softball. (2).**EXSC 221. Coaching Basketball. (2).****EXSC 222. Coaching Football. (2).****EXSC 223. Coaching Golf. (2).****EXSC 224. Coaching Gymnastics. (2).****EXSC 225. Coaching Swimming and Diving. (2).****EXSC 226. Coaching Tennis. (2).****EXSC 227. Coaching Track and Field. (2).****EXSC 228. Coaching Volleyball. (2).****EXSC 229. Coaching Soccer. (2).****EXSC 251. Individual and Dual Sports and Activities. (2).**

Studies knowledge and skills involved in playing and teaching individual and dual sports and encouraging participation in individual and dual exercise activities. Emphasis on teaching the skills involved in individual and dual sports and activities and motivating people to engage in a healthy and active lifestyle through exercise. Includes techniques for special populations, cultures and ethnicities.

EXSC 252. Team Sports. (2).

Studies the knowledge and skills required for playing and teaching team sports and games.

EXSC 253. Aquatic and Rhythmic Activities. (2).

This course focuses on teaching methodology for rhythmic activities, social dance, and aquatic activities. Specifically, students will learn the processes of skill development, analysis and evaluation of fundamental movements in dance and aquatics.

EXSC 254. Combative and Outdoor Activities. (2).

This course focuses on skill development, teaching methodology, analysis and evaluation of fundamental cycling, self-defense, and combative and outdoor education skills.

EXSC 282. Selected Topics. (1-4).**EXSC 282C. ST: Select Topic (core). (1-4).**

Select Topic approved for core.

EXSC 282L. Selected Topic Lab. (1-4).**Upper Division****EXSC 300. Exercise Prescription. (3).**

Design, implementation and evaluation of exercise and physical activity programs for all populations. Covers the scientific basis for exercise prescription, gender issues, ethnicity issues, children and older adult issues, and exercise prescription for sports. Emphasis involves the scientific application of training principles and safety to improve both health and physical fitness. Prerequisite: EXSC 201, EXSC 202.

EXSC 301. Biomechanics. (4).

Studies the mechanical basis of human motion based on Newtonian mechanics. Emphasis involves applying the laws of physics to sports and exercise. Corequisite: EXSC 301L. Prerequisite: EXSC 201.

EXSC 301L. Biomechanics Lab. (0).

Covers the physics of human movement. Study will be augmented by laboratory experiences using high speed video, electromyography, kinematic analysis via computer digitized skills, kinetic analysis via load cells and a force platform. Corequisite: EXSC 301.

EXSC 302. Motor Development Across a Life Span. (3).

Motor skills or movement skills provide much of the means of human interaction with the environment. Studies the interaction of motor skills and the environment through birth, infancy, childhood, adolescence, adulthood, middle adulthood and old age. Emphasis involves recognition and analysis of the sequence of skill landmarks throughout the life span.

EXSC 303. Nutrition. (3).

Studies the role of food in metabolism for enhancing exercise performance and the interaction of food types with energy production, growth, development and weight control. The course integrates data from chemistry, exercise physiology, biochemistry, medicine, and physiology. Cultural issues of food and the social implications of diet and nutrient intake are emphasized. Prerequisite: EXSC 202.

EXSC 325. Statistics and Research Methods in Exercise Science. (4).

The course will provide a strong basic knowledge of statistics commonly used in research in the exercise sciences. Understanding of appropriate research design will be covered. A strong emphasis on reading current literature and the application of statistics will be made. Prerequisite: MATH 151.

EXSC 340. Motor Learning and Control. (4).

This course will provide an introduction to clinical assessment of exercise, with particular focus on modalities. This course will examine the theoretical and clinical basis for the use of therapeutic modalities in clinical assessment. This course will provide knowledge regarding the scientific basis and physiological effects of various modalities, as well as knowledge of safe and appropriate use of modalities in clinical assessment. Prerequisite: EXSC 201, EXSC 202, EXSC 302.

EXSC 352. Adaptive Physical Education. (3).

Covers the theory and techniques of providing physical activity for special populations. Emphasis is on the interaction of physical/mental challenges and physical activity. Prerequisite: EXSC 251.

EXSC 353. Field Observations. (2).

Students will observe community teachers and students in real physical education settings. The students will perform systematic observation of student and teacher conduct and meet once each week to discuss their observations.

EXSC 354. Elementary School Physical Education. (4).

Covers the development of knowledge, skills and attitudes in traditional and nontraditional activities and methods at the elementary school level.

EXSC 355. Secondary School Physical Education. (4).

Covers the development of knowledge, skills and attitudes in traditional and nontraditional activities and methods at the secondary school level.

EXSC 400. Scientific Literature in Exercise Science. (2).

This course provides an overview of literature in the various subdisciplines in Exercise Science. Students will learn to choose appropriate journal articles and to read peer-reviewed literature carefully and critically. Written summaries and critiques will be submitted throughout the semester. Each student will also make oral presentations.

EXSC 401. Advanced Biomechanics. (4).

Studies the three-dimensional mechanical aspects of human movement. Topics include gait analysis, mechanical properties of biological tissues, work-energy approach to movement analysis, inverse dynamics, ergonomics and postural sway. Prerequisite: EXSC 301.

EXSC 401L. Advanced Biomechanics Lab. (0).

Use cutting-edge technologies to understand and analyze human movement. Technologies include high-speed motion analysis, electromyography, and force plates. Students will complete a semester-long research project in a topic of their choice. Pre-requisite: EXSC 301 & EXSC 301L.

EXSC 450. History and Principles of Physical Education. (3).

Studies the historical roots of physical education and sport. Emphasis on the history of physical education and sport in the development of societies from antiquity to current times.

EXSC 451. Organization and Administration. (3).

Covers the principles and methods of organizing and administering physical education, recreation and sports.

EXSC 452. Measurement and Evaluation in Physical Education. (3).

Covers the use of statistics to collect data, analyze the data and make decisions based on the data. Also covers the use of tests in exercise science. Emphasis on the reliability and validity of tests and appropriate methods for interpretation of test scores. Discussion of test issues that relate to gender, ethnicity, culture and others.

EXSC 460. Mechanics of Biosystems - Calculus. (4).

Covers basic concepts of beam theory applied to biological systems. Topics covered include tension, compression, torsion, shear, moments, flexure, moments of inertia, dynamics, conservation of momentum, angular velocity, momentum, Conservation laws, constitutive relationships and yield criteria. Students will engage in simple design exercises.

EXSC 461. Exercise Psychology. (4).

This course will examine applied and theoretical issues related to the psychology of physical activity. Theories of motivation and exercise behavior will be examined in relation to the increasing problems of exercise adherence and physical inactivity. Other topics that will be discussed include: the psychological benefits of exercise, personality and exercise, body image, and the psychology of injury. Various techniques will be discussed in relation to motivating exercise behaviors and how to deal with special populations.

EXSC 470. Advanced Exercise Physiology. (4).

Builds on the concepts developed in EXSC 201. Emphasis covers physiological demands of exercise at terrestrial extremes (e.g., altitude, temperature, pressure, etc.). Also covers the special physiology involved in high performance exercise and sport. Pre-requisite: EXSC 202.

EXSC 470L. Advanced Exercise Physiology Laboratory. (0).

Will cover physiological processes in more depth particularly exploring physiology at terrestrial extremes and sport and exercise high performance.

EXSC 480. Social Psychology of Sport. (4).

Studies the social significance of sports and how sport factors interrelate with the structures, relations and problems of society. Covers contemporary theories and methods of the social sciences as applied to sport.

EXSC 482. Selected Topic. (1-4).**EXSC 482C. ST; Select Topic (core). (1-3).**

Select Topic approved for core requirement.

EXSC 482L. Selected Topic Lab. (1-4).

EXSC 483. Seminar. (2-4).

EXSC 487. Clinical Exercise Prescription. (3).

This course will teach principles to manage exercise in persons with chronic disease or disability. Students will learn how to decrease physiologic limitations and improve physical capacity through specific exercise therapies. Students will learn how to define specific goals and choose appropriate training intensity, duration and frequency for persons with chronic disease or disability. Prerequisite: EXSC 300.

EXSC 490. Independent Study. (1-4).

EXSC 492. Internship. (1-4).

EXSC 493. Capstone Preparation. (2).

This course covers the development, organization, conduct and presentation of a major research question which demonstrates mastery of a subject from the discipline of Exercise Science. The course involves preparation for completing a major research paper covering a student-selected (with faculty approval) topic. Prerequisites: Successful completion of EXSC 201 & EXSC 201L, EXSC 202 & EXSC 202L, and EXSC 400. Completion of or concurrently taking either EXSC 325 or EXSC 452.

EXSC 494. Capstone. (2).

Covers the development organization, conduct and presentation of a major research question based on all the previous work involved in course work and personal experiences. The course involves a major research paper covering a student-selected topic (with faculty approval). Prerequisite: Senior Standing and EXSC Core completion or concurrent enrollment, and completion of or concurrent enrollment in EXSC 325 or EXSC 452.

EXSC 496. Directed Research. (1-3).