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
   The Health Profession emphasis is best suited for students who want to go on to a graduate program in a health-related field such as medical school, physician assistant programs, physical therapy, occupational therapy, and nursing programs. The curriculum enables students to meet the course pre-requisites for any of these programs as part of their degree in exercise science. The emphasis course requirements are a combination of courses outside of EXSC which are required for those programs and courses focused specifically on exercise science.

2. Human Performance
   The Human Performance emphasis is best suited for students who want to dig deep into exercise science. It prepares students to go immediately into the workforce in exercise-related positions (e.g. personal training, exercise programming for a company or hospital, medical sales) or to go to graduate school within exercise science (e.g. nutrition, biomechanics, clinical exercise physiology) or some allied health fields such as athletic training.

3. Pedagogy/Teaching Physical Education
   The Pedagogy/Teaching emphasis is best suited for students who want to go into a credential program for teaching physical education in K-12. The curriculum in this emphasis is approved by the state to meet the single subject matter in physical education. This emphasis is often pursued by students who are interested in teaching and coaching in middle or high school.

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
66-69 credits minimum (26-28 credits upper division); 12 supporting = 78-81 total credits.

<table>
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<tbody>
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<td>EXSC 302</td>
<td>Motor Development Across a Life Span</td>
<td>4</td>
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<tr>
<td>EXSC 494</td>
<td>Capstone</td>
<td>2</td>
</tr>
<tr>
<td>BIOL 120</td>
<td>Introduction to Ecology and Populations</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 121</td>
<td>Introduction to Cells and Organisms</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 123L</td>
<td>Intro Biol Experimentation I</td>
<td>2</td>
</tr>
<tr>
<td>BIOL 124L</td>
<td>Intro Biol Experimentation II</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 151</td>
<td>General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 151L</td>
<td>General Chemistry Lab</td>
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<tr>
<td>CHEM 152</td>
<td>General Chemistry II</td>
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<tr>
<td>CHEM 152L</td>
<td>General Chemistry II Lab</td>
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Select one of the following: 4-5

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<td>PHYS 211/211L</td>
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<tr>
<td>PHYS 202/202L</td>
<td>General Physics II and General Physics Lab II</td>
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</tr>
<tr>
<td>PHYS 212/212L</td>
<td>Physics - Scientists and Engineers II and Physics for Scientists Engineers II Lab (Select one of the following:)</td>
<td>4</td>
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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>PSYC 222</td>
<td>Abnormal Psychology</td>
<td>4</td>
</tr>
<tr>
<td>EXSC 300</td>
<td>Exercise Prescription</td>
<td>4</td>
</tr>
<tr>
<td>EXSC 325</td>
<td>Stats &amp; Research Methods Exsc Science</td>
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Take 7 to 8 Credits *

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<tr>
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<tbody>
<tr>
<td>BIOL 361/361L</td>
<td>Microbiology and Microbiology Lab</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 331/341</td>
<td>Organic Chemistry and Organic Chemistry Lab</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 425/425L</td>
<td>Biochemistry and Biochemistry Lab</td>
<td>4</td>
</tr>
<tr>
<td>EXSC 340</td>
<td>Motor Learning and Control</td>
<td>4</td>
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<tr>
<td>EXSC 401/401L</td>
<td>Advanced Biomechanics and Advanced Biomechanics Lab</td>
<td>4</td>
</tr>
<tr>
<td>EXSC 470/470L</td>
<td>Advanced Exercise Physiology and Advanced Exercise Physiology Lab</td>
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</tr>
<tr>
<td>EXSC 487</td>
<td>Clinical Exercise Physiology</td>
<td>4</td>
</tr>
<tr>
<td>PSYC 304</td>
<td>Child and Adolescent Development</td>
<td>4</td>
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<tr>
<td>PSYC 305</td>
<td>Adult Development and Aging</td>
<td>4</td>
</tr>
<tr>
<td>PSYC 331</td>
<td>Physiological Psychology</td>
<td>4</td>
</tr>
<tr>
<td>EXSC 303</td>
<td>Nutrition,</td>
<td>4</td>
</tr>
<tr>
<td>EXSC 461</td>
<td>Exercise Psychology</td>
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**Total Hours** 74-76

*Two additional courses chosen in consultation with an adviser.

### Required Supporting Courses
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**Total Hours** 12
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); 16 supporting = 76 total credits.

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Total Hours 64-61

**Required Supporting Courses**

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</tr>
<tr>
<td>MATH 151</td>
<td>Precalculus</td>
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<tr>
<td>PSYC 200</td>
<td>General Psychology</td>
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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); 12 supporting = 71 total credits.

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<td>Team Sports</td>
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<td>EXSC 253</td>
<td>Aquatic and Rhythmic Activities</td>
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EXSC 254  Combative and Outdoor Activities  2
EXSC 300  Exercise Prescription  4
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 & Principles Physical Education  3
EXSC 451  Organization and Administration  3
EXSC 325  Stats & Research Methods Exsc Science  4
EXSC 461  Exercise Psychology  4

Activity Courses  2

Total Hours  62

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

**Required Supporting Courses**

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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.

**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 142. Tai Chi. (1).

ACTV 143. Yoga. (1).

ACTV 144/144. Outdoor Skills. (1,1).

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).

ACTV 1ST/2ST. Selected Topic. (1,1).

ACTV 3ST. Selected Topics. (1).

Upper Division

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

ACTV 312. 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).
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).
ATHL 1ST. Selected Topics. (1.00).

Exercise Science Courses
Lower Division
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 Foundtn Human Movemt Lab. (0).

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.

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).

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 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 251. Individual & Dual Sports & 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).
Select Topic approved for core.
EXSC 282L. Selected Topic Lab. (1-4).
EXSC 2ST. Selected Topics. (2).
EXSC 4ST. Selected Topic. (3).

Upper Division

EXSC 300. Exercise Prescription. (4).
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.

Motor skills or movement skills provide much of the means of human interaction with the environment. This course studies the interaction of motor skills and the environment through birth, infancy, childhood, adolescence, adulthood, middle adulthood and old age within the context of health disparities, especially among racial/ethnic populations. The emphasis of this course will be on recognition and analysis of the sequence of skill landmarks throughout the life span.

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.

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.

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.

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

EXSC 400. Scientific Literature 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.

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 an 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 & Principles 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. Measuremnt & Eval in Physical Educ. (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.

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 Lab. (0).
Will cover physiological processes in more depth particularly exploring physiology at terrestrial extremes and sport and exercise high performance.

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 483. Seminar. (2-4).

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).