EXERCISE SCIENCE AND NUTRITION

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Program Rationale

The program offers graduate level study in exercise science with consideration of nutritional applications for patients and clients concerned with athletic performance or chronic disease.

The program offers graduate education for students interested in applying the principles of exercise science and nutrition in hospital settings working in cardiac and pulmonary rehabilitation, long term rehabilitation of cancer and immune disease patients, as well as fitness and sports performance settings. Students applying to this program include current University undergraduate students who are seeking graduate education in the area of exercise science and nutrition, and current practitioners who are pursuing graduate education as a matter of professional development and career advancement.

The MS in Exercise Science and Nutrition program is located within the Department of Physical Therapy and Human Movement Science, along with graduate programs in physical therapy and undergraduate programs in exercise science and athletic training.

Program Description

There are three major components of the graduate exercise science and nutrition curriculum: (1) core courses, (2) two major tracks (clinical and performance) of which students will select one, and (3) a graduate project or thesis requirement. Students will complete the core courses and select one of two available tracks depending upon their interest. The full degree program will be 38-39 credits taken over 2 academic years (full-time model).

Program Goals

CORE OBJECTIVES
The MS in Exercise Science and Nutrition program will prepare graduates to:

• Demonstrate advanced knowledge in exercise physiology, human anatomy, performance/health-field specific research methodology, and nutrition as it relates to chronic disease prevention
• Appropriately prescribe post-orthopedic rehabilitation resistance training protocols
• Actively engage the professional literature so as to demonstrate current, best practice in these work settings.
• Contribute to research activities in clinical exercise settings, sport or clinical nutrition, and fitness/sport-related exercise programming
• Continue their education in the acquisition of a terminal degree (e.g., Ph.D., Ed.D.)

TRACK SPECIFIC OBJECTIVES
The MS in Exercise Science and Nutrition Performance Track will also prepare graduates to:

• Demonstrate advanced knowledge in strength and conditioning concepts, nutritional influences on training adaptation and performance, coaching methodology/philosophy, and biomechanics
• Participate in research activities investigating adaptations to training, testing methodologies, sports nutrition, injury reduction strategies, and biomechanics
The MS in Exercise Science and Nutrition Clinical Track will also prepare graduates to:

- Demonstrate advanced knowledge in clinical exercise testing and prescription for cardiac, pulmonary, cancer, diabetic, and osteoporotic rehabilitation settings, nutrition as it relates to weight management, and concepts in health behavior change
- Participate in clinical research activities with opportunities in cardiac and pulmonary rehabilitation, nutrition and fitness

### Curriculum Design

<table>
<thead>
<tr>
<th>MS - EXERCISE AND NUTRITION CURRICULUM MODEL</th>
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<tr>
<td>COURSES</td>
<td>Core</td>
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<td>Research Methods (4 credits)</td>
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<td>Advanced Applied Physiology I &amp; II (1-4 credits each)</td>
<td>Advanced Clinical Testing and Rx I (3 credits)</td>
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<tr>
<td>Nutrition and Chronic Disease Prevention (3 credits)</td>
<td>Advanced Clinical Testing and Rx II (4 credits)</td>
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<tr>
<td>Professional Seminar (2 credits)</td>
<td>Clinical Nutrition (3 credits)</td>
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<tr>
<td>Functional Anatomy (4 credits)</td>
<td>Thesis (6 credits) or Graduate Project (6 credits)</td>
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<td>Healthcare in the U.S. (1 credit)</td>
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<th>Exercise Prescription for Endurance Athletes (1 credit)</th>
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<td>20 Credits</td>
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### Admissions Requirements

Students will apply through the Graduate Admissions office of the University. In addition to application materials, applicants must demonstrate completion of the program pre-requisites which include:

- the completion of a Bachelor’s degree in a related clinical science, such as Exercise Physiology, Exercise Science, Physical Education, Athletic Training or Nutrition.
- undergraduate pre-requisite coursework in the following courses, or their equivalent:
  - Anatomy and Physiology I and II (with labs) (8 CR)
  - Exercise Physiology (3-4 CR)
  - Nutrition (3 CR)
  - Physics (1 semester survey course or Physics I with lab) (4 CR) or
  - Biomechanics (3-4 CR) - Performance Track Only
  - Health/Exercise-specific Research Methods or Statistics (3 CR)

If applying with an unrelated major, student must also take an Exercise Prescription course or enroll in either EX 362 Exercise Testing and Prescription (Clinical track students) or EX 363 Developing Strength and Conditioning Programs (Performance track students) during their first semester.
Course Descriptions

EX 401 Advanced Applied Physiology I
3-4 CR
This course provides an in-depth overview of work physiology, including cellular respiration, ventilation, cardiovascular dynamics, and the anthropometric, histologic, and biochemical adaptive response to physical training. The processes of the gastrointestinal tract will be explored as well.

EX 402 Advanced Applied Physiology II
1 CR
This course, part 2 of an in-depth overview of work physiology, includes muscle physiology, the endocrine system, environmental aspects of exercise, and continued discussion of the anthropometric, histologic, and biochemical adaptive response to physical training.

EX 403 Research Methods
4 CR
This course provides an introduction to the fundamental concepts of research design, measurement, statistical analysis, and scientific inquiry as these concepts apply to understanding and evaluating published research. Upon completion of this course, students should be able to make informed decisions about the relevance of published research to their own practice and research.

EX 404 Nutrition and Chronic Disease Prevention
3 CR
This graduate level course will investigate the dietary influences on prominent chronic diseases (e.g., cardiovascular disease, cancer, neurodegenerative diseases, osteoporosis). Additional emphases will be placed on understanding disease mechanisms, developing a wide spectrum of food knowledge in order to not provide rigid diets, functional foods, and analyzing various types and fundamental flaws of nutrition research.

EX 411 Professional Seminar
2 CR
This course addresses professionally oriented activities associated with presentation and publication that is peer reviewed or community oriented such as presenting at conferences and administering health related programming. This course collaborates with the Life and Sport Analysis Clinic/SHU Wellness program.

EX 412 Functional Anatomy
4 CR
This course provides a review of human anatomy and movements. Both computer-based simulations and the Cadaver Lab will be utilized.

EX 413 Healthcare in the U.S.
1 CR
This course provides an introduction to the U.S. healthcare system, orienting the student to its overall structure, functions, and processes. Strengths and weaknesses of the current healthcare environment will be discussed. The U.S. healthcare system will be compared to other health care systems around the world. Students will be encouraged to consider strategies for improving access to quality health care for all Americans.

EX 414 Exercise Prescription for Endurance Athletes
1 CR
This course covers advanced concepts in exercise prescription for endurance athletes. Consideration for special case athletes, such as the diabetic or overweight athlete, will also be explored.

EX 521 Advanced Clinical Testing and Prescription I
3 CR
Clinically and field-based assessment tests of neuromuscular fitness and function used
prior to exercise prescription and for use in outcomes data collection are reviewed. Physical assessment tests such as functional, assessments of activities of daily living, strength, power, and flexibility tests will be examined. Chronic disease-specific assessments involving analog scales and questionnaires will be practiced.

**EX 522 Physical Activity and Behavioral Science**  
3 CR  
Using an ecological approach, theories and studies relative to lifestyle and behavior modification are examined. Best practices for promoting physical activity in communities will be reviewed. Changing physical activity behavior among special populations (e.g., children, older adults, minority populations) will also be examined.

**EX 523 Clinical Nutrition**  
3 CR  
Focus includes theories and mechanisms of obesity as well as the efficacy of dietary treatments. Nutritional challenges related to special populations (e.g., children, elderly, pregnancy) and selected nutrient deficiencies will be addressed, as well as the efficacy and safety of herbal supplements.

**EX 524 Advanced Clinical Testing and Prescription II**  
4 CR  
Clinically and field-based assessment tests of cardiovascular fitness, pulmonary function, and metabolic or immune disorders used prior to exercise prescription and for use in outcomes data collection are reviewed. Clinical diagnostic tests such as EKG’s, blood lipids, and stress tests will be examined as well chronic disease-specific assessments including analog scales and questionnaires.

**EX 531 Nutrition and Performance**  
3 CR  
Acute and chronic exercise’s effects on nutrient requirements and fluid needs are presented. Macronutrient metabolism, the influence of nutrient timing, and the ergogenic efficacy of dietary supplements receive substantial attention.

**EX 532 Coaching Methods**  
3 CR  
This course investigates effective coaching methods from a physiologic, psychological, and administrative framework. Students will be guided through an analysis of contemporary research and critical evaluation of current practices resulting in the development of an applied personal coaching methodology. In the process this course addresses the promotion of interpersonal skills and the understanding of individual differences as they relate to human performance.

**EX 533 Advanced Concepts in Strength and Conditioning**  
4 CR  
This course examines advanced concepts, theory, controversies, and techniques utilized in strength and conditioning program design. Validity and reliability of common performance tests and training techniques will be explored. The laboratory portion of the course will include performance test administration as well as program design and technique instruction.

**EX 534 Applied Biomechanics**  
3 CR  
This course provides a thorough evaluation of the mechanical basis of human movement. Fundamental mechanical principles affecting human movement during locomotion and a variety of daily activities are considered. Techniques and methods of mechanics, quantitative video analysis, isometric and isokinetic muscle force, electromyography, and research evaluation are incorporated into laboratory projects.
**EX 560 Thesis Preparation**
3 CR
Issues in research design and statistical analysis within the context of a proposed thesis are explored. A prospectus including a full review of literature and study design will be the end-product of the course. Receiving a grade in the course will be contingent upon submitting an IRB application.

**EX 561 Thesis Completion**
3 CR
Data collection and analysis will be performed, culminating in the Results and Discussion sections of the thesis.

**EX 562 Clinical Graduate Project I**
3 CR
The graduate project includes initiation or continuation of 500 clinical hours in a clinical exercise setting and preparation for track-specific certification exams. The supporting online course specifically addresses best practice via review of research, position stands, and anecdotal clinical experiences among students and faculty during the semester.

**EX 563 Clinical Graduate Project II**
3 CR
The continuation of the graduate project includes completion of clinical hours and continued preparation for track-specific certification exams. The supporting online course provides an overview of the hospital environment and allied health professions and includes projects associated with attendance at a related professional meeting selected by the student.

**EX 564 Performance Graduate Project I**
3 CR
The graduate project includes initiation or continuation of 500 hours in a performance-oriented setting(s) and preparation for track-specific certification exams. The supporting course focuses on organization and administration issues within the context of an exercise facility. Facility and personnel management, safety issues, and finance will be discussed.

**EX 565 Performance Graduate Project II**
3 CR
The continuation of the graduate project includes completion of internship hours and continued preparation for track-specific certification exams. The supporting online course will provide continued exploration of periodization and strength/power/speed training program design. Students will explore current trends in strength and conditioning and gain experience through internships.