

### **Program Director**

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### **Mission Statement**

The mission of the Master of Science (MS) degree in Clinical Exercise Physiology is to develop and train graduate students to understand the disease processes in selected chronic diseases and the proper use of exercise assessment, prescription and training for persons with these chronic diseases and other clinical populations.

### **Goals**

The goals of this program in the Department of Exercise Science are to:

- Help students understand the metabolic and physiological aspects of selected disease processes, prevention, and rehabilitation
- Provide students with an in-depth understanding of exercise physiology, clinical exercise assessment, and exercise prescription for disease prevention and rehabilitation
- Provide students with the laboratory and clinical skills necessary for assessing, educating, and treating persons in preventive and rehabilitative exercise programs
- Help students apply principles of exercise testing and prescription in a way that will enhance the quality of life of individuals with chronic disease and/or other special medical considerations
- Facilitate students becoming certified as Clinical Exercise Specialist<sup>®</sup> with the American College of Sports Medicine

### **Course Requirements**

All GW Department of Exercise Science Master Degree students who select the Clinical Exercise Physiology Program must successfully complete all requirements of the School of Public Health and Health Services, the Department of Exercise Science, and the Clinical Exercise Physiology Program. The required 36 credit total includes the culminating experience of passing the American College of Sports Medicine Clinical Exercise Specialist<sup>®</sup> certification examination. This certification examination is typically taken in the last semester of the program.

## **Competencies**

Upon completion of the MS Clinical Exercise Physiology program, professionals will possess the following functional competencies:

- Skills necessary for the clinical assessment of individuals. Relevant Courses: EXSC 210, EXSC 211, EXSC 230, EXSC 231, EXSC 232, EXSC 233, EXSC 234, EXSC 235.
- Skills necessary for conducting exercise tests and other evaluations of individuals with special clinical needs. Relevant Courses: EXSC 210, EXSC 211, EXSC 230, EXSC 231, EXSC 232, EXSC 233, EXSC 234, EXSC 235.
- Skills for prescribing preventive and rehabilitative exercise for individuals with special medical needs. Relevant Courses: PUBH 204, EXSC 212, EXSC 210, EXSC 211, EXSC 230, EXSC 231, EXSC 232, EXSC 233, EXSC 234, EXSC 235.
- Administrative and professional skills for working with other health care team members in the clinical setting. Relevant Courses: EXSC 207, EXSC 213, EXSC 230, EXSC 233, EXSC 234, EXSC 235.
- Skills for managing clinical exercise and wellness programs. Relevant Courses: EXSC 210, EXSC 211, EXSC 230, EXSC 231, EXSC 232, EXSC 233, EXSC 234.
- Develop the knowledge, skills, and abilities required to successfully complete the American College of Sports Medicine Clinical Exercise Specialist<sup>®</sup> certification examination. Relevant Courses: PUBH 204, EXSC 205, EXSC 207, EXSC 210, EXSC 211, EXSC 212, EXSC 230, EXSC 231, EXSC 232

**Please see the curriculum sheets that follow.**

THE GEORGE WASHINGTON UNIVERSITY MEDICAL CENTER <hr/> WASHINGTON DC	<b>School of Public Health and Health Services</b>  <b>Master of Science</b> <b>Exercise Science – Clinical Exercise Physiology</b> <b>Program-at-a-Glance</b>  <b>Effective for Academic Year 2010-2011</b>			
<b>Prerequisites</b> Undergraduate course in Exercise Physiology – must be completed before beginning coursework at GW				
		<b>Credits</b>	<b>Semester Offered</b>	<b>Grade</b>
<b>Public Health Core Courses</b>				
EXSC 205	Biostatistics Research and Methods for Exercise Science	2	Fall	
PUBH 204	Environmental and Occupational Health in a Sustainable World	2	Fall, Spring, Summer	
EXSC 207	Epidemiology for Exercise Science	2	Fall	
<b>MSES Core Courses</b>				
EXSC 213	Administration of Physical Activity and Health Programs	3	Spring	
EXSC 212	Psychological Aspects of Sport, Exercise, and Fitness	3	Fall	
EXSC 210	Advanced Exercise Physiology 1	3	Fall	
EXSC 211	Advanced Exercise Physiology 2	3	Spring	
<b>Program Specific Courses</b>				
EXSC 230	Cardiac Rehabilitation	3	Fall	
EXSC 231	Clinical Exercise Testing, Exercise Prescription & Electrocardiogram Fundamentals	3	Spring	
EXSC 232	Exercise in Selected Chronic Diseases	3	Spring	
EXSC 235	Clinical Exercise Physiology Rotations	3	Spring	
<b>Culminating Experience</b>				
EXSC 233	Clinical Internship I	3	Fall, Spring, Summer	
EXSC 234	Clinical Internship II	3	Fall, Spring, Summer	
Certification Exam	Students must take and pass the American College of Sports Medicine Clinical Exercise Specialist® Certification Examination	0	Students may take at any time during final semester at a Pearson Vue Testing Center	

**Graduation Requirements**

1. **Graduate Credit Requirement:** 36 graduate credits are required.
2. **Course Requirements.** Successful completion of core courses and the program specific courses are required.
3. **Examination Requirement:** Pass the American College of Sports Medicine Clinical Exercise Specialist<sup>®</sup> certification examination.
4. **Grade Point Requirement.** A 3.0 (B average) overall grade point average is required.
5. **Time Limit Requirement.** The degree must be completed within four years.
6. **Transfer Credit Policy.** Up to 12 graduate credits that have not been applied to a previous graduate degree may be transferred to the MSES. Courses need to have been taken within the past three years from an accredited institution with a grade of B or better.

**Prerequisite**

Exercise Physiology – must be completed before beginning coursework at GW

**MSES**

**MSES Core Course Requirements**

EXSC	205	Biostatistics for Exercise Science	2	Study of research methods, experimental design, sampling techniques, and data analysis for the exercise sciences. Specific areas of focus are basic vs. applied research, experimental vs. non-experimental studies, biased and unbiased sampling, measures of reliability and validity, shapes of distributions, descriptive and inferential statistics and meta-analytical techniques. Prerequisite: STAT 53 statistics/measurement/evaluation or equivalent undergraduate statistic course. Fall
EXSC	207	Epidemiology for Exercise Science	2	An introduction to the discipline of epidemiology and its application to health issues and practices. Emphasis is placed on basic concepts, measures of disease frequency, data sources, study designs, results and interpretations, public health screening, infectious disease, chronic disease, nutritional, and physical activity epidemiology. Fall
PUBH	204	Environmental and Occupational Health in a Sustainable World	2	Examines the connection between population health and exposures to chemical, physical, and biological agents in the environment. Through the use of problem-solving frameworks, students will become familiar with data sources, methodologies and policy approaches being used to address the public health impacts of environmental and occupational health hazards, including the consequences of climate change, natural resource degradation, and industrial chemicals. The course will integrate key concepts of environmental health with principles of sustainability to illustrate how public policies and practices on the local, national and global level affect population health. Sum, Fall, Spring

EXSC	210	Advanced Exercise Physiology I	3	Examines the acute and chronic cardiovascular and pulmonary adaptations to exercise training. Special attention is given to the mechanisms that affect oxygen delivery and utilization during aerobic exercise. The responses to exercise in extreme environmental conditions are also explored. Topics are addressed in both lecture and laboratory experiences. Prerequisites: EXSC 152 Fall \$30.00 lab fee
EXSC	211	Advanced Exercise Physiology II	3	Examines the metabolic and neuromuscular adaptations that occur in response to acute and chronic exercise. Special attention is given to the biochemical pathways responsible for energy production during rest and exercise, and how these pathways adapt with chronic training. The neural, hormonal, and nutritional factors that influence exercise performance are also extensively explored. Topics are addressed in both lecture and laboratory experiences. Prerequisites: EXSC 210 or permission of instructor. Spring \$30.00 lab fee
EXSC	212	Psychological Aspects of Sport, Exercise, and Fitness	3	Focus on selected psychological and social psychological factors related to the physical activity experience. Students will explore the ways in which various psychological components influence behavior and the manner in which these resulting behaviors might be addressed in a variety of situations. Spring
EXSC	213	Administration of Physical Activity and Health Programs	3	Provides an overview of health promotion programs, related research and scientific foundations, national policy review, health management strategies and fitness program integration in the community health care and worksite markets. Emphasis is placed on worksite health promotion needs analysis, budgeting, program design, marketing, implementation and evaluation systems. Spring
<b>MSES</b> <b>Clinical Exercise Physiology</b> <b>Program-Specific Requirements</b>				
EXSC	230	Cardiac Rehabilitation	3	Applied physiology of exercise and psychological stress in relation to coronary artery disease and myocardial infarction; the principles and practice of rehabilitation of patients recovering from a coronary event by exercise therapy and risk factor reduction. Prerequisite EXSC 152 or equivalent. Fall
EXSC	231	Clinical Exercise Assessments, Exercise Prescription & Electrocardiogram Fundamentals	3	Provides the student with information, techniques, and laboratory experiences related to blood pressure determinations, clinical exercise testing, other selected clinical assessments, basic medications for cardiovascular disease, and fundamentals of the electrocardiogram. Prerequisites: EXSC or permission.

EXSC	232	Exercise in Selected Chronic Diseases	3	Explores the basic pathophysiology in selected chronic diseases and the application of clinical exercise testing/assessment in patients with these diseases. The effects of acute and chronic exercise and exercise prescription in these patients will also be studied. Patient groups include those with pulmonary diseases, diabetes mellitus, hypertension, peripheral artery disease, obesity, spinal cord injury and exercise in children and the elderly. Prerequisites: EXSC 152 or equivalent; EXSC 230 or Permission
EXSC	233	Clinical Internship I	3	Provides students with the opportunity to directly work with patients and apply knowledge and skills acquired from coursework in the clinical environment. Internships take place at pre-approved affiliated clinical sites usually in the Washington, DC metropolitan area and students are supervised by an on-site Clinical Instructor. Student performance at the internship site will be evaluated by the on-site Clinical Instructor using a standardized format. Prerequisite EXSC 152, 230; EXSC 231; EXSC 232; Approval of Academic Advisor
EXSC	234	Clinical Internship II	3	Provides students with the opportunity to directly work with patients and apply knowledge and skills acquired from coursework in the clinical environment. Internships take place at pre-approved affiliated clinical sites in the Washington, DC metropolitan area and students are supervised by an on-site Clinical Instructor. Student performance at the internship site will be evaluated by the on-site Clinical Instructor using a standardized format. The same internship site used for Clinical Internship I OR a different internship site may be used for this course. Prerequisite EXSC 230; EXSC 231; EXSC 232; EXSC 233; Approval of Academic Advisor
Certification Examination				As part of the program's culminating experience, students must take and pass the American College of Sports Medicine (ACSM) Clinical Exercise Specialist® certification exam. This examination is taken during the last semester of the program at any Pearson Vue Testing Center. Group study sessions for this examination are scheduled during the first half of the spring semester each year. There is a \$239 fee for this examination that is payable to the ACSM. Spring
EXSC	235	Clinical Exercise Physiology Rotations	3	Provides supervised clinical experiences at affiliated hospitals for students in the Clinical Exercise Physiology Program. Students observe and participate in the assessment, treatment and education of patients with a variety of chronic diseases. Pre/co-requisite: EXSC 254. Fall

## **Suggested Course Sequence**

### **Fall Semester, 1st Year (9 credits)**

EXSC 210	Advanced Exercise Physiology I (3)
EXSC 230	Cardiac Rehabilitation (3)
EXSC 212	Psychological Aspects of Sport, Exercise, and Fitness (3)

### **Spring Semester, 1<sup>st</sup> Year (9 credits)**

EXSC 211	Advanced Exercise Physiology II (3)
EXSC 231	Clinical Exercise Testing, Exercise Prescription & Electrocardiogram Fundamentals (3)
EXSC 232	Exercise in Selected Chronic Diseases (3)

### **Fall Semester, 2<sup>nd</sup> Year (9 credits)**

EXSC 233	Clinical Internship I (3)
PUBH 204	Environmental & Occupational Health in a Sustainable World (2)
EXSC 205	Biostatistics for Exercise Science (2)
EXSC 207	Epidemiology for Exercise Science (2)

### **Spring Semester, 2<sup>nd</sup> Year (9 credits)**

EXSC 213	Administration of Physical Activity & Health Programs (3)
EXSC 234	Clinical Internship II (3)
EXSC 235	Clinical Exercise Physiology Rotations(3)

**Prerequisite:** Exercise Physiology

For additional information about the Clinical Exercise Physiology Concentration, contact Dr. Larry F. Hamm at 202-994-2443 or [lfhamm@gwu.edu](mailto:lfhamm@gwu.edu)