Program Director

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Mission Statement

The mission of this program is to provide formal graduate level academic instruction in the science and theory of resistance training, as well as to promote student production of research that directly relates to the neuromuscular adaptations involved with resistance training.

Goals

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

- Establish scientific basis for the value of anaerobic exercise, and to provide internal and external programs that promote health behaviors across the lifespan.
- Meet an increasing demand for well-educated professional capable of delivering a broad range of exercise-based preventive, technical, educational, and rehabilitative services.
- Gain insight into strategies for the prevention and treatment of sarcopenia, osteoporosis and childhood obesity.
- Provide advanced training in exercise physiology as it relates specifically to resistance training for the purpose of increasing athletic performance and the prevention or treatment of inactivity-related health disorders.
- Prepare students with knowledge and skills to take the Certified Strength and Conditioning Specialist (CSCS) exam offered through the NSCA, and the Level One Weightlifting Coaching Course offered through United States Weightlifting (USAW)

Course Requirements

All GW Department of Exercise Science Master Degree students who select the Strength and Conditioning Program enroll in both Core Courses (18 credits) and Program-Specific Courses (18 credits). The 36 total credit requirement includes a culminating experience consisting of either successful completion of an Oral Research Defense or the Comprehensive Exam.
Competencies

Upon completion of the MS Strength and Conditioning program, professionals will possess the following functional competencies:

- Skills necessary for the evaluation and development of resistance training programs that develop and improve neuromuscular function. Relevant Courses: EXSC 270, EXSC 271, EXSC 272, EXSC 273.

- Skills necessary for the assessment of muscular strength and endurance in athletic and non-athletic populations. Relevant Courses: EXSC 210, EXSC 211, EXSC 270, EXSC 272.

- Skills for prescribing therapeutic exercise activities. Relevant Courses: EXSC 210, EXSC 211, EXSC 212, EXSC 283, EXSC 298, EXSC 299.

- Administrative and professional skills for working with other health and fitness professionals. Relevant Courses: PUBH 204, EXSC 207, EXSC 212, EXSC 213, EXSC 283, EXSC 299.

- Skills of conducting exercise science research. Relevant Courses: EXSC 205, EXSC 210, EXSC 211, EXSC 272, EXSC 299.

Please see the curriculum sheets that follow.
### Additional Course Requirements – Prerequisites
Take only if required by the Admissions Committee

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Semester Offered</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXSC 151</td>
<td>Kinesiology or Biomechanics</td>
<td>3</td>
<td></td>
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<tr>
<td>EXSC 152</td>
<td>Exercise Physiology</td>
<td>3</td>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>EXSC 154</td>
<td>Applied Anatomy Physiology I (or equiv, with lab)</td>
<td>4</td>
<td>Fall</td>
<td></td>
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<tr>
<td>STAT 053</td>
<td>Statistics for Social Sciences</td>
<td>3</td>
<td>Fall, Spring, Summer</td>
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### Public Health Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Semester Offered</th>
<th>Grade</th>
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</thead>
<tbody>
<tr>
<td>EXSC 205</td>
<td>Biostatistics for Exercise Science</td>
<td>2</td>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>PubH 204</td>
<td>Environmental and Occupational Health in a Sustainable World</td>
<td>2</td>
<td>Fall, Spring, Summer</td>
<td></td>
</tr>
<tr>
<td>EXSC 207</td>
<td>Epidemiology for Exercise Science</td>
<td>2</td>
<td>Spring</td>
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</table>

### MSES Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Semester Offered</th>
<th>Grade</th>
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</thead>
<tbody>
<tr>
<td>EXSC 210</td>
<td>Advanced Exercise Physiology I</td>
<td>3</td>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>EXSC 211</td>
<td>Advanced Exercise Physiology II</td>
<td>3</td>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>EXSC 212</td>
<td>Psychological Aspects of Sport, Exercise, and Fitness</td>
<td>3</td>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>EXSC 213</td>
<td>Administration of Physical Activity and Health Programs</td>
<td>3</td>
<td>Spring</td>
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</table>

### Program Specific Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Semester Offered</th>
<th>Grade</th>
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</thead>
<tbody>
<tr>
<td>EXSC 270</td>
<td>Power Training for Sports Performance</td>
<td>2</td>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>EXSC 271</td>
<td>Science and Theory of Resistance Training</td>
<td>3</td>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>EXSC 272</td>
<td>Current Topics in Strength and Conditioning</td>
<td>1</td>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>EXSC 273</td>
<td>Biomechanical Analysis</td>
<td>3</td>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>Approved by Program Director</td>
<td>3</td>
<td>Fall, Spring, Summer</td>
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Students will choose one of the following as a culminating experience:

- EXSC 298 and EXSC 299
- OR

<table>
<thead>
<tr>
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<th>Credits</th>
<th>Semester Offered</th>
<th>Grade</th>
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<tbody>
<tr>
<td>EXSC 283</td>
<td>Graduate Internship and Comprehensive Exam</td>
<td>6</td>
<td>Fall, Spring, Summer</td>
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</tr>
</tbody>
</table>

OR

- EXSC 283
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. **Grade Point Requirement**: A 3.0 (B average) overall grade point average is required.
4. **Time Limit Requirement**: The degree must be completed within four years.
5. **“Additional Course(s)” Requirements**: “Additional Course(s)” are determined at the time of admission to the MSES Department and do not count toward the 36 graduate credit requirement. Take these courses *only if the SPHHS Committee on Admissions has required you to do so.
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.

### Additional Course Requirements*

Note: These courses can be taken for a grade or as pass/fail. When taken for a grade the grade is calculated into the cumulative grade point average.

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<tbody>
<tr>
<td>EXSC 154</td>
<td>Applied Anatomy and Lab I</td>
<td>4</td>
<td>Fundamentals of human anatomy and physiology for students preparing for health sciences professions. Emphasis placed on bones, joints, muscles, innervation, and blood supply. Laboratory fee, $40. Fall</td>
</tr>
<tr>
<td>STAT 53</td>
<td>Introduction to Statistics in Social Sciences</td>
<td>3</td>
<td>Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, regression and correlation, with application to social science. Summer, Fall, Spring.</td>
</tr>
<tr>
<td>EXSC 152</td>
<td>Exercise Physiology</td>
<td>3</td>
<td>The physiological functions for the body and the effect of exercise on these functions. Prerequisite: EXSC 154</td>
</tr>
<tr>
<td>EXSC 151</td>
<td>Kinesiology</td>
<td>3</td>
<td>Analysis of human movement with emphasis on the biomechanics of exercise and sport movement patterns. Prerequisite: EXSC 154 or equivalent, an approved course in anatomy.</td>
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</tbody>
</table>

### MSES Core Course Requirements

<table>
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<th>Course Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>EXSC 205</td>
<td>Biostatistics for Exercise Science</td>
<td>2</td>
<td>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</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
<td>Description</td>
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<tr>
<td>EXSC 207</td>
<td>Epidemiology for Exercise Science</td>
<td>2</td>
<td>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</td>
</tr>
<tr>
<td>PUBH 204</td>
<td>Environmental and Occupational Health in a Sustainable World</td>
<td>2</td>
<td>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. Summer, Fall, Spring</td>
</tr>
<tr>
<td>EXSC 210</td>
<td>Advanced Exercise Physiology I</td>
<td>3</td>
<td>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</td>
</tr>
<tr>
<td>EXSC 211</td>
<td>Advanced Exercise Physiology II</td>
<td>3</td>
<td>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</td>
</tr>
<tr>
<td>EXSC 212</td>
<td>Psychological Aspects of Sport, Exercise, and Fitness</td>
<td>3</td>
<td>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</td>
</tr>
<tr>
<td>EXSC 213</td>
<td>Administration of Physical Activity and Health Programs</td>
<td>3</td>
<td>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</td>
</tr>
<tr>
<td>Course Code</td>
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<td>Credits</td>
<td>Prerequisites</td>
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<tr>
<td>EXSC 270</td>
<td>Power Training for Sports Performance</td>
<td>3</td>
<td>Understanding and application of power training methods. Prerequisite: EXSC 152 or Equivalent. Co-require: EXSC 252,223. Fall</td>
</tr>
<tr>
<td>EXSC 271</td>
<td>Science and Theory of resistance Training</td>
<td>3</td>
<td>Examination of human physiological adaptations to resistance training with neuromuscular system as primary focus. Prerequisite/co-require: EXSC 152 or Equivalent. Co-require: EXSC 252,223. Spring</td>
</tr>
<tr>
<td>EXSC 272</td>
<td>Current Topics in Strength and Conditioning</td>
<td>3</td>
<td>Current scientific findings related to the field of strength and conditioning. Prerequisite/co-require: EXSC 152 and EXSC 271. Co-require: EXSC 252, 223. Spring</td>
</tr>
<tr>
<td>EXSC 273</td>
<td>Biomechanical Analysis</td>
<td>3</td>
<td>Application of mechanical analysis techniques to the human body in motion. Prerequisite: EXSC 151 or Equivalent. Co-require: EXSC 252, 223. Spring</td>
</tr>
<tr>
<td>EXSC 283</td>
<td>Graduate Internship</td>
<td>1-6</td>
<td>For MS degree candidates enrolled in the department. Fieldwork, internship, and/or instructional practice, including conference and/or seminar. May be repeated for credit to a maximum of 6 credits with permission of advisor.</td>
</tr>
<tr>
<td>EXSC 298</td>
<td>Thesis Seminar</td>
<td>3</td>
<td>Required for those students planning to write a thesis and will culminate in the development of a research protocol. The course will cover the principles, concepts, and procedures of research design, including how to interpret the scientific literature, how to design a statistical plan and apply basic statistical techniques, and how to communicate scientific findings both professionally and to the general public.</td>
</tr>
<tr>
<td>EXSC 299</td>
<td>Thesis Research</td>
<td>3</td>
<td>Students work independently to conduct research under the oversight of a faculty research committee. Limited to MS degree candidates in Exercise Science. Fall, Spring, Summer</td>
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</table>
Suggested Course Sequence

Fall Semester, 1st year (9 credits)

EXSC 205  Biostatistics for Exercise Science (2)
EXSC 207  Epidemiology for Exercise Science (2)
EXSC 210  Advanced Exercise Physiology I (3)
EXSC 270  Power Training for Sports Performance (2)

Spring Semester, 1st year (9 credits)

EXSC 211  Advanced Exercise Physiology II (3)
EXSC 271  Science & Theory of Resistance Training (3)
EXSC 298  Thesis Seminar (3) OR
Elective  Approved by Program Director

Fall Semester, 2nd year (9 credits)

PUBH 204  Environmental and Occupational Health in a Sustainable World (2)
EXSC 212  Psychological Aspects of Sport, Exercise, & Fitness (3)
EXSC 272  Current Topics in Strength and Conditioning (1)
EXSC 283  Graduate Internship (3) OR
Elective  Approved by Program Director (3)

Spring Semester, 2nd year (9 credits)

EXSC 213  Administration of Physical Activity & Health Programs (3)
EXSC 273  Biomechanical Analysis (3)
EXSC 283  Graduate Internship (3) OR
EXSC 299  Thesis Research

Prerequisites/Co-requisites: Human Anatomy/Physiology, Physiology of Exercise, and Statistics/Measurement/Evaluation.

For additional information about the Strength and Conditioning concentration, contact Dr. Todd Miller at 202-994-2572 or tamiller@gwu.edu.