Doctor of Philosophy in Exercise and Nutrition Sciences

The doctor of philosophy in Exercise and Nutrition Sciences prepares future scholars and industry experts to teach and mentor students, lead research and development, and create knowledge relating to the impacts of exercise/physical activity and nutrition on human health and function. This program builds on the MS program in Exercise and Nutrition Sciences at MSU, or related MS degrees from other institutions. The program will leverage expertise of exercise science program faculty and nutrition sciences program faculty and established collaborations with other STEM researchers and programs at MSU to deliver the following doctoral options: 1) exercise nutrition, metabolism, and physiology, and 2) biomechanics and motor control. These applied science options build on the foundational sciences of biochemistry, cellular and molecular biology, anatomy, physiology, physics, and mathematics. The program requires a minimum of 60 credits, including a minimum of 18-28 credits of dissertation and consideration of up to 21 non-research credits from a master’s degree. Coursework for both options focuses on core content for exercise and nutrition sciences, research design and statistical analyses, and advanced coursework specific to each option. Additionally, each student will develop an academic portfolio that includes research (presentations, peer-reviewed publications, grant writing) and teaching (development of course materials, instruction, student mentoring).

Admission Requirements:

Master of Science in one of the following areas: Exercise Science, Kinesiology, Biomechanics, Motor Control, Nutrition Science, or related disciplines

Application Requirements

1. Completed Graduate School Application
2. Curriculum Vita
3. Personal essay (2-3 typed, double-spaced pages) addressing: research interests and experiences, alignment with faculty interests and expertise, and professional goals
4. Copy of graduate research paper or thesis completed (or in process) from masters degree. Either is potentially acceptable for admission, however, thesis is preferred.
5. Three letters of recommendation, at least one from the candidate’s master’s committee
6. Academic transcripts from Bachelors and Masters degree coursework

Admissions Committee

Faculty in the Department of HHD serving as PhD committee chairs or committee members will collectively serve as the admissions committee to evaluate applications and admit students to the Exercise and Nutrition Sciences PhD program.

Program Requirements:

1. Completion of 60 credits, including 18-28 dissertation credits
2. Completion of comprehensive examination
3. Completion of dissertation
4. Completion of research portfolio including ≥ 3 manuscripts submitted to peer-reviewed journals, ≥ 1 submitted grant application, and ≥ 3 presentations at national or international conferences.

Sequence of Program Requirements

Year 1 – Fall – coursework (6 credits)
Year 1 – Spring – coursework (6 credits); program of study and committee selection
Year 1 – Summer – comprehensive examination preparation; research
Year 2 – Fall – coursework (0-3 credits); comprehensive examination; research
Year 2 – Spring – coursework (0-3 credits); research
Year 2 – Summer - research
Year 3 – Fall – research
Year 3 – Spring – research; dissertation defense

Committee Requirements:

Doctoral committees will be made up of at least four PhD prepared individuals with appropriate expertise. It is recommended that two to three committee members be faculty in the department of Health and Human Development actively participating in the EXNS PhD program, but committee composition may vary according to individual needs.

Comprehensive Examination:

The EXNS PhD program comprehensive exam will be conducted by the students committee, typically in the beginning of the third year of the program. Students will prepare a grant proposal based on one or more elements of his/her proposed dissertation research. The proposal will be prepared according to specifications of a potential funding source (NIH, NSF, USDA, or other comparable funding source). The proposal will be submitted to the committee a minimum of seven days prior to an oral exam. The oral exam will consist of questions relating to the proposal and to the relevant science pertaining to the EXNS program option of the student.

Dissertation Requirements:

Students in the EXNS PhD program will complete dissertations of the Manuscript Format Option of the Montana State University Graduate School, with a minimum of three completed manuscripts for which the candidate is first author. At least two of these manuscripts need to original research.

Exercise Nutrition, Metabolism, and Physiology Curriculum

Courses offered by HHD

42-46 Credits

At least 3 of the following:

KIN 515 – Exercise Performance and Nutrition 3

KIN 545 – Graduate Exercise Physiology 3

NUTR 511 – Exercise Metabolism and Nutrition 3

NUTR 521 – Macronutrient Metabolism 3
### Biomechanics/Motor Control Curriculum

#### Option 1: Master's and PhD at MSU (5 years to complete PhD)

**Existing MS in Exercise and Nutrition Sciences (2 years)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>KIN 515</td>
<td>Exercise Performance and Nutrition OR</td>
<td>3</td>
</tr>
<tr>
<td>KIN 511</td>
<td>Exercise Metabolism and Health</td>
<td></td>
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<tr>
<td>KIN 525</td>
<td>Orthopedic Biomechanics **(convert existing KIN 525)</td>
<td>3</td>
</tr>
<tr>
<td>KIN 5XX</td>
<td>Motor Control **</td>
<td>3</td>
</tr>
<tr>
<td>KIN 545</td>
<td>Graduate Exercise Physiology</td>
<td>3</td>
</tr>
<tr>
<td>HHD 512</td>
<td>Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>KIN 594</td>
<td>Seminar – 1 credit but may be repeated each semester</td>
<td>4</td>
</tr>
<tr>
<td>KIN 590</td>
<td>Thesis</td>
<td>10</td>
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#### Courses offered by other departments

**12 Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>STAT 511</td>
<td>Methods of Data Analysis I</td>
<td></td>
</tr>
<tr>
<td>STAT 512</td>
<td>Methods of Data Analysis II</td>
<td></td>
</tr>
<tr>
<td>STAT 425/525</td>
<td>Biostatistical Data Analysis</td>
<td></td>
</tr>
<tr>
<td>STAT 431</td>
<td>Nonparametric Statistics</td>
<td></td>
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<tr>
<td>STAT 437</td>
<td>Introduction to Applied Multivariate Analysis</td>
<td></td>
</tr>
<tr>
<td>STAT 439</td>
<td>Introduction to Categorical Data Analysis</td>
<td></td>
</tr>
<tr>
<td>STAT 441/541</td>
<td>Experimental Design (requires M 221)</td>
<td></td>
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<tr>
<td>STAT 448</td>
<td>Mixed Effects Models</td>
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**At least 2 of the following:**

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>BCH 521</td>
<td>Mass Spectrometry</td>
<td></td>
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<tr>
<td>BCH 544</td>
<td>Molecular Biology</td>
<td></td>
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<tr>
<td>BCH 543</td>
<td>Proteins</td>
<td></td>
</tr>
<tr>
<td>BCH 546</td>
<td>Metabolomics and Systems Biology</td>
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<tr>
<td>BIOB 524</td>
<td>Ethical Practice of Science</td>
<td></td>
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<tr>
<td>BIOE 540</td>
<td>Analysis of Ecological Communities</td>
<td></td>
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<tr>
<td>MB 505</td>
<td>Host-Associated Microbiomes</td>
<td></td>
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<tr>
<td>MB 520</td>
<td>Microbial Physiology</td>
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<tr>
<td>CHTH - 540</td>
<td>Principles of Epidemiology</td>
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**Up to 21 credits from the above list at MSU or equivalent from another university earned for the MS will be considered for credit toward the PhD.**

### Electives

3 credits

**Total MS Program**

35 credits

**Considered for credit toward PhD**

18 - 21 credits

**PhD in Exercise and Nutrition Sciences (3 years)**

39 - 42 credits

### Required Core:

24 – 34 credits

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>KIN 594</td>
<td>Seminar</td>
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<tr>
<td>KIN 690</td>
<td>Dissertation</td>
<td>18 – 28</td>
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</tbody>
</table>

### Coursework (program developed in consultation with Chair)

5 – 18 credits

Courses offered by MIE & HHD

<table>
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<tr>
<th>Course Code</th>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>KIN 592</td>
<td>Independent Study</td>
<td>3</td>
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</table>

### EMECH/KIN 591A

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td></td>
<td>Kinematics and Kinetics of Human Movement</td>
<td>3</td>
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</tbody>
</table>
EMECH/KIN 591B – Modeling and Simulation of Human Movement 3

EMECH/KIN 591C – Nonlinear Analysis of Human Movement 3

Courses offered by other departments

STAT 511: Methods of Data Analysis I 3

STAT 512: Methods of Data Analysis II 3

STAT 425/525: Biostatistical Data Analysis 3

STAT 431: Nonparametric Statistics 3

STAT 437: Introduction to Applied Multivariate Analysis 3

STAT 439: Introduction to Categorical Data Analysis 3

STAT 441/541: Experimental Design (requires M 221) 3

STAT 448: Mixed Effects Models 3

Total PhD 60 credits

Biomechanics/Motor Control Curriculum

Option 2: Master's done elsewhere, start directly into PhD (3 – 4 years depending on prior coursework)

12 - 21 credits considered for credit toward the PhD (exact courses to be transferred for credit determined by department)

PhD in Exercise and Nutrition Sciences (3 - 4 years) 39 - 48 credits

Required Core:

24 – 34 credits

KIN 594 – Seminar 6

KIN 690 – Dissertation 18 – 28

Coursework (program developed in consultation with Chair)

5 – 24 credits

Courses offered by HHD

KIN 515 - Exercise Performance and Nutrition 3

KIN 511 Exercise Metabolism and Health 3

KIN 525 - Orthopedic Biomechanics **(convert existing KIN 525) 3

KIN 5XX – Motor Control ** (new course to be created) 3

KIN 545 – Graduate Exercise Physiology 3

Courses offered by MIE & HHD

EMECH/KIN 591A – Kinematics and Kinetics of Human Movement 3

EMECH/KIN 591B – Modeling and Simulation of Human Movement 3

EMECH/KIN 591C – Nonlinear Analysis of Human Movement 3

Courses offered by other departments

STAT 511: Methods of Data Analysis I 3

STAT 512: Methods of Data Analysis II 3

STAT 425/525: Biostatistical Data Analysis 3

STAT 431: Nonparametric Statistics 3

STAT 437: Introduction to Applied Multivariate Analysis 3

STAT 439: Introduction to Categorical Data Analysis 3

STAT 441/541: Experimental Design (requires M 221) 3

STAT 448: Mixed Effects Models 3

Total PhD 60 credits