The University of Montana Graduate Programs in Integrative Physiology and Athletic Training

School of Integrative Physiology & Athletic Training
...advancing the tradition of Health & Human Performance at the University of Montana

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IPAT Graduate Program

Revised 5/24 C.Dumke
UNIVERSITY OF MONTANA

Nestled in the Rocky Mountain grandeur of western Montana, Missoula is the hub of five valleys and three major rivers – the Blackfoot, the Bitterroot and the Clark Fork. Halfway between Glacier and Yellowstone national parks, Missoula is a blend of small-town charm and big-city sophistication. Hiking, bicycling, fly fishing, river rafting and skiing are all big here. It’s no wonder that the book “How to Get an Ivy League Education at a State University” called Missoula “a Rocky Mountain Berkeley ... the kind of place many people hate to leave.”

Graduate Degrees in Integrative Physiology

The School of Integrative Physiology and Athletic Training (IPAT) in the College of Health at UM offers thematically related graduate degrees in Integrative Physiology at the Masters and Doctoral level. Masters degree options, focused on exercise science, include a research concentration for students with careers directed toward terminal degrees (clinical or research doctorates), and an applied concentration for students with career interests in clinical (e.g., cardiac rehabilitation), fitness/wellness, coaching, and training. The Doctoral degree in Integrative Physiology and Rehabilitation Sciences serves research-minded students with a career interest in academia, industry, and as an additional credential for collaborative work with physical therapy and other rehabilitation sciences.

- Integrative Physiology M.S. Exercise Science-Research concentration
- Integrative Physiology, M.S. Exercise Science-Applied concentration
- Integrative Physiology and Rehabilitation Sciences, Ph.D.

The Masters degree in IPAT is recognized by the Western Region Graduate Programs. This means that some qualifying students from WICHE States will not pay full out of state tuition. Instead, they will pay only 150% of a Montana resident’s in-state tuition; a considerable cost reduction for students from Western States.

Below are some of the paths our past graduates have pursued.

POTENTIAL CAREER OPPORTUNITIES:

Athletic Programs:
- Strength & Conditioning Coach
- Sport Coach
Exercise & Fitness Center:
- Program Director
- Personal Trainer
- Exercise Specialist
- Fitness Instructor
Hospital Wellness Programs:
- Program Director
- Exercise Specialist
- Fitness Instructor
- Health/Patient Educator
Corporate Fitness Programs:
- Program Director
- Exercise Specialist
- Health Promotion Specialist
Rehabilitation Centers:
- Exercise Specialist
- Exercise Testing Technician
- Employee Health Program Specialist

- University/College Student Wellness Program Specialist

Preparation for Further Study In:
- Physical Therapy
- Medicine
- Physician's Assistant
- Chiropractic Medicine
- Exercise Physiology
- Nutritional Science
- Graduate Programs (Ph.D.)
- Nursing
- Community Health/Public Health

Other Allied Areas:
- Athletic Training
- Research & Development
  -- Exercise Equipment
- Sales
  -- Exercise & Testing Equipment
  -- Pharmaceuticals
- Sports Performance & Fitness Testing

Useful links:

IPAT; Graduate School; Maps;
campus housing; financial aid; MT residency

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MS in EXERCISE SCIENCE

The **Research Option** is designed for those students who intend to pursue further graduate studies or careers in scientific or medical research. This option involves a more intensive study of laboratory methods and statistical and research design. A thesis is required.

The **Applied Option** is intended for those students who plan to pursue professional careers in Exercise or Applied Sciences (corporate/adult fitness, cardiac rehabilitation, strength and conditioning). This option involves additional required course work and an internship. Coursework is modified to meet student needs.

**Prerequisites** for the Exercise Science option include a year of Anatomy and Physiology and Exercise Physiology.

### Core Requirements (20 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHP 520</td>
<td>Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>??? ???</td>
<td>Grad level Stats (SOC, BMED, etc..)</td>
<td>3</td>
</tr>
<tr>
<td>HHP 529</td>
<td>Advanced Physiology of Exercise I</td>
<td>3</td>
</tr>
<tr>
<td>HHP 525</td>
<td>Advanced Biomechanics</td>
<td>3</td>
</tr>
<tr>
<td>HHP 530</td>
<td>Advanced Physiology of Exercise II</td>
<td>3</td>
</tr>
<tr>
<td>HHP 531</td>
<td>Laboratory Procedures in Exercise Science</td>
<td>3</td>
</tr>
<tr>
<td>HHP 594</td>
<td>Graduate Seminar (2 X 1 credit each fall)</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total 20**

### Research Option Requirements: (38 credits minimum)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHP 699</td>
<td>Thesis</td>
<td>6</td>
</tr>
</tbody>
</table>

### Applied Option Requirements: (38 credits minimum)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHP 598</td>
<td>Internship</td>
<td>≥3</td>
</tr>
<tr>
<td>HHP 599</td>
<td>Professional Paper</td>
<td>3</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HHP 699</td>
<td>Thesis</td>
<td>6</td>
</tr>
<tr>
<td>OR</td>
<td></td>
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</tr>
</tbody>
</table>

Written comprehensive exam

**Possible Electives (to meet minimum credit requirements)**

Elective credits should be chosen in consultation with and approved by the student's academic advisor.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUTR 411</td>
<td>Nutrition for Sport</td>
<td>3</td>
</tr>
<tr>
<td>HHP 475</td>
<td>Legal &amp; Ethical Issues in the Exercise Professions</td>
<td>3</td>
</tr>
<tr>
<td>HHP 482</td>
<td>Electrocardiogram Assessment</td>
<td>1</td>
</tr>
<tr>
<td>HHP 483</td>
<td>Exercise, Disease and Aging</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 576</td>
<td>Sport Performance and Technology in AT</td>
<td>3</td>
</tr>
<tr>
<td>HHP 523</td>
<td>Case Studies in Sport Psychology</td>
<td>3</td>
</tr>
<tr>
<td>KIN 410</td>
<td>Advanced Strength Training Methods</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 580</td>
<td>Pharmacology in Sports Medicine</td>
<td>1</td>
</tr>
<tr>
<td>ATEP 569</td>
<td>Clinical Anatomy Lab</td>
<td>1</td>
</tr>
<tr>
<td>CTHH 485</td>
<td>Theories of Health Behavior &amp; Counseling</td>
<td>3</td>
</tr>
<tr>
<td>PUBH 540</td>
<td>Health Promotion Strategies</td>
<td>3</td>
</tr>
<tr>
<td>CTHH 492</td>
<td>Program Planning for Community Health</td>
<td>3</td>
</tr>
<tr>
<td>AHHS 430</td>
<td>Health Aspects of Aging</td>
<td>3</td>
</tr>
<tr>
<td>AHAT 479</td>
<td>Topics in Sports Medicine</td>
<td>3</td>
</tr>
<tr>
<td>HHP 465</td>
<td>Leading HHP Organizations</td>
<td>3</td>
</tr>
<tr>
<td>HHP 417</td>
<td>Fundamentals of Coaching</td>
<td>3</td>
</tr>
<tr>
<td>BIOH 462</td>
<td>Principles of Medical Physiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 468</td>
<td>Endocrinology</td>
<td>3</td>
</tr>
</tbody>
</table>

IPAT Graduate Program

Revised 5/24 C.Dumke
**PhD Integrative Physiology and Rehabilitation Sciences**

**Program overview:** The PhD in the Integrative Physiology and Rehabilitation Sciences (IPRS) graduate program educates, trains, and prepares students interested in applications of applied/integrative physiology and rehabilitative sciences. The IPRS PhD is a research-intensive terminal degree, which combines integrative physiology didactic coursework and experiential learning along with a rehabilitation-sciences directed research emphasis. The IPRS prepares graduate students that have completed an approved master’s degree (or clinical graduate degree, e.g., AT, PT, OT) to undertake academic and research-based careers in clinical and rehabilitative sciences such as Athletic Training, Cardiac Rehabilitation at research hospitals, Occupational Therapy, Physical Therapy, and other professions founded on an exercise and integrative physiology background. Possible research foci of IPRS students include Physiology, Biomechanics, Athletic Training, Cardiopulmonary Rehabilitation, Clinical Exercise Physiology, Exercise/Fitness/Sport/Wellness, Occupational Therapy, and Physical Therapy. Student research interests will correspond with an identified IPAT faculty mentor and/or faculty mentors in collaborating programs (e.g., School of Physical Therapy). Partnering with a faculty mentor begins by contacting that individual, discovering mutual research interests, and coming to an agreement for a doctoral plan of study. In addition to the identification of a mentor, and plan of study, it is expected that all incoming IPRS doctoral students will have an identified source of funding to cover their stipend (and possibly tuition and fees), research projects, and other doctoral activities. Typically, these funds are supported by the doctoral mentor’s grants, but other types of assistantships can be used to support graduate work, as available.

**Doctoral student admission decisions:** IPAT PhD students will be admitted by a majority decision of voting members of the IPRS Graduate Committee. Applicants will have completed an approved master’s degree (or clinical graduate degree, e.g., AT, PT, OT) and GRE prior to admission. GRE scores must be within the past five years OR a verifiable GRE scores if the test date is over five years old. International students may substitute the TOEFL exam for the GRE. In advance of admission, the student applicant will provide the committee with an identified dissertation chair and a brief description of topical expertise.

**Doctoral program plan of study:** The doctoral plan of study is typically 4 years (8 fall/spring semesters, plus summer work), although alternative plans of study are negotiable pending graduate committee approval. Graduate coursework includes the accumulation of credits based on the following:

| Credits in required courses | 54 |
| Credits from electives     | 18 |
| Total credits required beyond the MS | 72 |

A typical doctoral plan of study, with electives, is provided below:

<table>
<thead>
<tr>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>HHP 520 Educational Research</td>
</tr>
<tr>
<td>HHP 529 Advanced Exercise Physiology I</td>
</tr>
<tr>
<td>HHP 530 Advanced Exercise Physiology II</td>
</tr>
<tr>
<td>HHP 531 Lab Procedures in Exercise Physiology</td>
</tr>
<tr>
<td>HHP 526 Higher Education Pedagogy in Integrative Sciences</td>
</tr>
<tr>
<td>ATEP 569 Clinical Anatomy</td>
</tr>
<tr>
<td>BMED 605 Biomedical Research Ethics</td>
</tr>
<tr>
<td>HHP 594 Seminar: HHP Grad Research</td>
</tr>
<tr>
<td>BMED 628 Grantsmanship Skills</td>
</tr>
</tbody>
</table>

**Subtotal** 21

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Methods/Statistical Coursework (6-9 credits)</td>
</tr>
<tr>
<td>Electives</td>
</tr>
<tr>
<td>A total of 27 credits is required from Preparatory Research and Dissertation</td>
</tr>
<tr>
<td>Dissertation</td>
</tr>
</tbody>
</table>

**Total** 72

*Up to 15 transferable credits can be carried into the IPRS PhD program pending approval from the IPAT Graduate Committee*
ADMISSION REQUIREMENTS
1. Application Materials and Deadline

To ensure consideration for a teaching assistantship for the fall semester, application packet materials must be received by March 1st. All applicants are encouraged to apply by March 1st. Application packets submitted after this date are reviewed by the IPAT Graduate Committee depending upon program space. Applications for spring semester will be evaluated on a case-by-case basis.

Instructions for applying to the Graduate School are in the Applying for Admission section of the UM Graduate School web site.

In addition to the application materials required by the Graduate School, IPAT also requires:

- A statement of purpose of your background and goals, including your degree option choice. (max 500 words)
- A resume/curriculum vitae

2. Requirements for Full Admission

- A complete application
- A bachelor’s degree.
- Minimum overall average GPA of 3.0 for all college work.
- Prerequisites of one year of Anatomy and Physiology and Exercise Physiology for MS.
- Evidence of completion of Masters degree or clinical doctorate for IPRS PhD.

3. International Students

- Application deadline of January 1
- TOEFL results.
- See the following sections on the UM Graduate School web site.

  Graduate school:  http://www.umt.edu/grad/
  Grad school resources:  https://www.umt.edu/grad/explore/resources.php
  Graduate admissions:  https://www.umt.edu/grad/apply/default.php

GRADUATE ASSISTANTSHIPS (GA)

UM provides teaching assistantships which are limited to ½ time assistantships. The stipend (2 semesters) for a teaching assistantship in IPAT is $5000. All ½ time teaching assistantships come with a one semester tuition waiver. The most common duties of graduate assistants in the IPAT include helping with academic classes, and assisting with undergraduate lab classes and instructing activity classes. Additionally, grant funding from individual faculty members may be available to supplement student funding. These funds depend on faculty research grants. Prospective students are encouraged to contact faculty to inquire about these opportunities. Extra funding from additional sources can allow students to apply for out of state waivers through the TARA guidelines. Current tuition rates can be found here. Tuition waivers cover the cost of in-state or out-of-state tuition and the $30 registration fee for one semester. Other fees charged by the University are not covered. Fees depend on number of credits and residency status. They range from $500-$3000.
**Assistantship Application and Deadline**

*New students*: Students should indicate their interest in an assistantship within the admission materials of the graduate school application. Students should request a GA application from Dr. Dumke following the completion of their application to the program.

*Returning students*: submit a letter of intent and GA application to the graduate coordinator, Chuck Dumke, McGill 206 or charles.dumke@umontana.edu.

**Contact info about graduate programs, admission, and address to send in GA application:**

Charles Dumke, PhD, FACSM  
Graduate Program Coordinator  
University of Montana  
Integrative Physiology and Athletic Training  
206 McGill Hall  
32 Campus Drive  
Missoula, MT 59812  
charles.dumke@umontana.edu  
406.243.6176

**FACULTY RESEARCH INTERESTS**

The backgrounds, areas of expertise, and research interests of the IPAT faculty are expansive and provide a broad base to accommodate the needs and specific interests of graduate students. Please also refer to our web page for additional information about our faculty and their research interests. The following are short descriptions and an abbreviated list of most representative publications by our faculty.

**Dr. Charles Dumke** researches the effect of exercise, environment and nutrition on fuel metabolism and the adaptations associated with training. More can be found [here.](#)


**Dr. John Quindry** examines the relationship between lifestyle, the environment, and cardiovascular disease. Studies are conducted in both human and animal models and emphasize clinical relevance in addition to the prevention of disease and disease recurrence. More can be found [here.](#)

1. Quindry, J., McNamara, M., Oser, C., & Fogle, C. *Cardiac rehabilitation and resting blood pressure: Montana Outcome Project cardiac rehabilitation registry findings* *Journal of Cardiovascular Rehabilitation and Prevention* (in press).
Dr. Brent Ruby researches the effects of environmental stress (heat, cold, hypoxia) on the human capacity to adapt and acclimatize. In addition, Dr. Ruby is interested in the use of stable isotope tracers for measures of total energy expenditure and water turnover and the dietary needs of ultra-endurance athletes and workers during operations and recovery. More can be found [here](#).


Dr. Matt Bundle, and his students, study the relationship between the forces produced by human muscle and the resulting movements of the body. At present we are actively investigating, 1) how musculo-skeletal function influences the top sprinting speeds human runners can attain, 2) how the mechanics of muscular contraction influence the rates of performance loss that occur as individuals perform brief exhaustive exercise, and 3) how the physiology of muscle failure can be applied for clinical, workplace and athletic performance benefits. More can be found [here](#).


Dr. Valerie Moody’s research is primarily focused on concussion legislation and policy development. Other areas of interest include injury prevention strategies in wild land firefighters as well as improving pedagogical practices of athletic training educators. More can be found [here](#).


Dr. Shane Murphy’s research interests encompass pathological posture and gait mechanics, with a particular interest measuring asymmetrical movement patterns with wearable technology during whole body movements. More can be found [here](#).


Dr. Charles Palmer researches the human factors involved in high risk professions, particularly wildland firefighters. More can be found [here](#).

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RECENT GRADUATE STUDENT RESEARCH:

In addition, graduate students at University of Montana have completed research. Following is a brief list of some of the projects that graduate students have completed in recent years. More can be found on the UM e-thesis site which is searchable by department: [http://scholarworks.umt.edu/etd/](http://scholarworks.umt.edu/etd/)

Katherine Christison – “MUSCLE SORENESS AND DAMAGE DURING WILDLAND FIREFIGHTER CRITICAL TRAINING"

Shae Gurney – “METABOLIC AND CARDIOVASCULAR MARKER ALTERATIONS DURING CRITICAL TRAINING IN WILDLAND FIREFIGHTERS"

Brennan Mickelson - "The Relationship between Training Load and Injury or Illness Symptoms Using an Acute and Chronic Workload Ratio in Collegiate Cross-Country Runners;"

Alex Marks - "Total energy intake and self-selected macronutrient distribution during wildland fire suppression."

Christopher Alfiero - “Establishing a Metric of Job Specific Fitness for Wildland Firefighters Using Heart Rate Response During the Arduous Work Capacity Test”

Shannon Flynn - Effects of potato based and prepackaged sport supplement products on muscle glycogen recovery and exercise performance in trained males and females

Jeffrey Strang - Metabolic Energy Requirements during Load Carriage: Implications for the Wildland Firefighter Arduous Pack Test

Maryn Lowry - Bone Stress Injuries in Collegiate Distance Runners: A Review of Incidence, Distribution, and Risk Factors

Isabella Callis - EXAMINING INJURY TRENDS IN WILDLAND FIREFIGHTERS TO DEVELOP AN INJURY SCREENING ASSESSMENT PILOT PROJECT


Michael Powell - Design and Testing of High Speed Instrumented Treadmill.

Tyler Gallo - Continuous measures of muscle blood flow during all-out dynamic exercise.

Timothy Hampton – IMPLICATIONS OF DISCONTINUOUS EXERCISE (WALK/RUN) ON THE MAINTENANCE OF THERMOREGULATION IN THE HEAT

Felipe VonSydow - EFFECTS OF EXOGENOUS ICE SLURRY ON THE MITIGATION OF PSI

Michael Cramer - The effects of fast food versus commercial recovery product dietary choices on immediate post-exercise glycogen re-synthesis and exercise performance

Hilary Palakovich - Theophylline and Ambrisentan in Combination at Altitude to Improve Physical Performance and Mitigate Acute Mountain Sickness

Nate Keck - Effect of lower limb compression (NormaTec) on glycogen resynthesis

Whitney Tameler - Cardiac Rehabilitation Referral and Enrollments Rates with Different Referral Strategies.

Joseph Pellegrino - RUNNING ECONOMY: IMPROVEMENTS IN PHYSIOLOGICAL EFFICIENCY ATTAINED THROUGH CHANGES IN MUSCLE STRUCTURAL MORPHOLOGY

Cory Kaufman - ICE SLURRY AND COLD DRINK REDUCES EXERCISE INDUCED PHYSIOLOGICAL STRAIN IN THE HEAT

Brianna Lui - HEAT ACCLIMATIZATION DURING SEASONAL WILDFIRE SUPPRESSION

Benjamin Lovelace - Evaluation of Physical Fitness Tests and the Usefulness of an Internal Crew Questionnaire to Predict Job Readiness in Hotshots

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Lauren McGuigan - Vitamin D and Athletic Performance A Critical Assessment for Coaches and Athletes

Drew Babcock - Injury Rates, Severity of Injury and Access to Specialty Health Care of American Indian High School Athletes in Montana