

Department of Nutrition, Exercise and Health Sciences Central Washington University

Integrative Human Physiology, MS

The master of science degree in Integrative Human Physiology integrates knowledge from multiple sciences including anatomy, physiology, physics-mechanics, biochemistry-metabolism, exercise physiology, nutrition, and statistics to advance understanding of human function under a variety of stimuli. Stimuli include human movement, disease, aging, environmental stressors, physical injuries, and ergogenic aids. The program prepares students for further study at the doctoral or professional level, careers in higher education, clinical settings, corporate and community fitness/wellness centers and athletic development programs. Prospective candidates holding a degree in a relevant major, including physiology, exercise physiology, biology, exercise science, biomechanics, chemistry, nutrition, or health sciences, are encouraged to apply. Courses encompassing anatomy, physiology, physics, biomechanics, exercise physiology, kinesiology, biology, chemistry, statistics, and nutrition are strongly recommended at the undergraduate level. The Graduate Record Examination (GRE) and a scientific writing example, per department requirements, are required.

Admission Requirements:

- **Baccalaureate degree in a science-based discipline, such as Physiology, Physiology of Exercise, Exercise Science, Biology, Kinesiology, Health Sciences, Human Physiology, Chemistry, Nutrition.**
- **Minimum 3.0 undergraduate GPA (last 90 credits)**
- **Three letters of recommendation with at least two letters from professors in science based classes.**
- **A written statement of purpose (a clear, informative letter about your interest in graduate study, research interests, pertinent work experience, and career goals)**
- **GRE scores**
- **Scientific writing example. Prepare a brief appropriately referenced (maximum of 5 references) review paper (two page maximum, single spaced, 1" margins, 12 pt Times font), on the following topic:**

Describe the impact of biological aging (focus on ~ 25 years and older) on aerobic capacity and strength in apparently healthy, physically active individuals. Highlight the significance of these changes for exercise performance or one's ability to perform everyday tasks of daily living

Academic Preparation:

Students are expected to have satisfactorily completed (B or better) an undergraduate course of study that encompasses most if not all the following: human anatomy, human physiology, physiology of exercise, physics, kinesiology, biomechanics, sport nutrition, biochemistry and statistics.

Required Courses

- IHP 551 - Metabolism and Skeletal Muscle **Credits:** (5)
- IHP 552 – Cardiopulmonary Physiology **Credits:** (5)
- IHP 553 - Laboratory Techniques in Stress Physiology **Credits:** (5)
- IHP 557 - Research Design **Credits:** (4)
- IHP 560 - Inferential Statistics **Credits:** (4)
- IHP 564 - Gross Human Anatomy: Cadaver Dissection **Credits:** (1)*
- IHP 575 – Musculoskeletal Biomechanics **Credits:** (3)
- IHP 700 - Master's Thesis, Project Study, and/or Examination **Credits:** (1-6)
(Must be taken for 6 credits)

*IHP 564 (1 credit) is to be taken twice for a total of two (2) credits.

Electives

- A minimum 11 credits from following courses:
 - IHP 555 - Environmental Stress and Human Performance **Credits:** (3)
 - IHP 556 - Ergogenic Aids and Human Performance **Credits:** (3)
 - IHP 559 - Applied Kinesiology **Credits:** (3)
 - IHP 562 - Clinical Exercise Physiology **Credits:** (3)
 - IHP 595 - Graduate Research **Credits:** (1-6)
 - Other electives by advisement

Total Credits: 45

Integrative Human Physiology Courses

IHP 551. Metabolism and Skeletal Muscle (5). Application of physiological principles to regulation, control and adaptation of skeletal muscle and cellular metabolic processes to acute and chronic internal and external stimuli including physical activity, metabolic and musculoskeletal diseases, obesity, nutritional strategies, and aging. Prerequisite: Admission into NEHS graduate program, or permission of instructor.

IHP 552. Cardiopulmonary Physiology (5). Responses and adaptations of cardiovascular and pulmonary systems and supporting organ systems (neural, endocrine) to acute and chronic internal and external stimuli. Stimuli include physical activity, cardiopulmonary diseases, obesity, and aging. Prerequisite: Admission to the NEHS graduate program or permission of the instructor

IHP 553. Laboratory Techniques in Stress Physiology (5). Techniques for the assessment of human physiological characteristics during rest and exercise stress. Prerequisites: IHP 551 and IHP 552 or permission of instructor. Three hours lecture and four hours lab per week.

IHP 555. Environmental Stress and Human Performance (3). Influence of a variety of environmental factors on human performance. Adaptations to environmental stressors through constant exposure. Prerequisites: IHP 551 and IHP 552, or permission of instructor.

IHP 556. Ergogenic Aids and Human Performance (3). Use of physical, physiological, pharmacological, and psychological aids to improve human performance. Prerequisites: IHP 551 and IHP 552 or permission of instructor.

IHP 557. Research Design (4). Study concepts of scientific research process including selection of a research topic, literature review, methods and design, hypothesis testing, and research proposals. Prerequisite: Admission to the NEHS graduate program or permission of the instructor

IHP 559. Applied Kinesiology (3). Study of human movement from a multidisciplinary perspective. Disciplines may include anthropology, sociology, psychology, economics, medicine, exercise physiology, biomechanics, nutrition, motor learning, motor development and physical education . Prerequisite: IHP 551 and IHP 552 or Permission of instructor

IHP 560. Inferential Statistics (4). Inferential statistics focuses on the use of appropriate statistical procedures used in the fields of human physiology and nutrition. This course covers quantitative inferential statistics methods in theory and practice. Prerequisite: Admission to the NEHS graduate program or permission of the instructor

IHP 562. Clinical Exercise Physiology (3). This course introduces students to exercise principles and applications as they relate to individuals with chronic diseases and disabilities. Prerequisites: IHP 551 and IHP 552 or by permission of the instructor.

IHP 564. Gross Human Anatomy: Cadaver Dissection (1). Gross anatomy dissection of cadaver. One lab session weekly. Can be repeated for up to 2 credits during the same quarter.

IHP 590. Cooperative Education (1-6). An individualized, contracted field experience with business, industry, government, or social service agencies. The contractual arrangement involves a student learning plan, cooperating employer supervision, and faculty coordination. Prior approval is required. Grade will be S or U. Prerequisite: permission of instructor.

IHP 595. Graduate Research (1-6). Development and investigation of an approved laboratory or field research problem. May be repeated. Maximum of 6 credits may be included in course of study for the master's degree.

IHP 596. Individual Study (1-6). Prerequisite: permission of instructor. May be repeated.

IHP 598. Special Topics (1-5).

IHP 599. Seminar (1-5). May be repeated for credit.

IHP 700. Master's Thesis, Project Study, and/or Examination (1-6). Designed to credit and record supervised study for the master's thesis, non-thesis project, and/or examination. Prerequisite: permission of chair of student's graduate faculty supervisory committee. May be repeated for up to 6 credits. Grade will be either S or U.

Additional advisor approved electives that graduate students have added to their academic experience:

IHP 596 Individual Studies Credits: 1 to 6

PSY 561 Human Neuroanatomy Credits: 4

PSY 452 Adult Development and aging Credits: 4

EMS 443 Myocardial Disease and Arrhythmia Diagnosis Credits: 3

EMS 444 12 Lead Electrocardiograph Credits: 4

EMS 455 Introduction to Pathophysiology Credits: 3

CHEM 431 Biochemistry Credits: 5

Additional course work in human anatomy, physiology, genetics, cellular and molecular biology is available in the Department of Biology.

Additional course work in statistics is available in the Department of Psychology.

Assistantships:

Graduate Assistantships are available to outstanding graduate candidates. Students assist with research, instruct in clinical physiology and exercise science lecture and laboratory classes, with opportunities also available in athletic training.

Final culminating experiences conducted by our graduate students in collaboration with faculty

- Effect of carbohydrate mouth rinse on high intensity multiple sprint performance
- Cardiorespiratory responses to head out water immersion, high intensity interval exercise.
- Physiological responses to self-selected submaximal and maximal shallow water exercise efforts.
- Neuromechanics in female runners with and without a history of iliotibial band syndrome during a prolonged run
- Rear-foot biomechanics during running using HOKA versus “neutral” new balance running shoes
- Muscular activity in collegiate football linemen with and without a prefabricated functional knee brace.
- Temporal aspects of sway and balance in younger and older populations
- Overuse lower leg injuries in athletes
- Impact of dynamic versus static warmup on explosive power production
- Accelerometer derived activity counts and oxygen consumption between young and elderly individuals.
- The effects of exercise on symptoms of restless leg syndrome
- The acute effect of caffeine consumption on resting metabolic rate.
- Comparison of post-exercise chocolate milk and a commercial recovery beverage consumption between endurance cycling workouts on recovery and performance
- Delayed onset muscular soreness induction using a modified step test
- The effect of yoga training on fall risk factors in older adults
- The effects of orthotics on comfort and performance among male collegiate rugby players
- Validation of the Borg 15 point RPE scale for tetraplegic athletes
- Validation of the progressive aerobic endurance run (PACER) test for children 7-13 years old.
- Age-related performance decrements in elite age-group triathletes
- The effects of aging on swimming and running performance.
- Circumference measures reflect weight and adipose loss in obese patient following a 12-week behavior management program.

- Exercise dose required to enhance quality of life in cancer survivors.
- Physiologic responses to sustained high intensity exercise in collegiate distance runners.
- Swimming performance and velocity at OBLA are linked to propelling efficiency.
- The effect of the use of different anticoagulants in test tubes in the determination of lactate threshold.
- Physiological responses to running, cycling, and water exercise.
- The effects of exercise intervention on recovery from cancer therapy.
- Effects of visual orientation on running economy.
- Validity and reliability of new indirect calorimeter and its associated telemetry systems: the Aerosport KB1-C.
- Creatine monohydrate and swimming performance..
- Cardiovascular & metabolic demands of shallow water exercise.
- Eating attitudes, feelings, and behaviors of collegiate female athletes during competitive and noncompetitive seasons.
- Propelling efficiency in freestyle swimming.
- The Effect of Glycerol Augmented Overhydration on prolonged, varied intensity cycle ergometry.
- Effect of exercise on acute mountain sickness and cognitive function in women taking oral contraceptives.
- Anthropometric, physiological and fitness characteristics of young Japanese males: a comparison with young American males.

Graduate Faculty and Interests

Dr. Tim Burnham, Ph.D. Oregon State University, 2000
 Exercise and education programs for cancer survivors
 Clinical physiology
 Cross-country skiing physiology
 Thermoregulation

Dr. Leo D'Acquisto, Ed.D. University of Northern Colorado, 1993
 Effects of aging on athletic performance
 Physiology and mechanics of swimming and running
 Physiological responses to head-out water immersion during rest and exercise
 Limits of human performance

Dr. James DePaepe, Ph.D. University of New Mexico, 1982
Neurophysiology
Motor behavior

Dr. Vince Nethery, Ph.D. University of Oregon, 1989
Environmental Physiology
Clinical physiology
Nutrition, hydration and human performance
Age related decrements in athletic performance
Delayed onset muscular soreness

Dr. Karen Roemer, Ph.D., Chemnitz University of Technology, 2004
Gait stability and variability in human walking
Pediatric obesity and impact on lower extremity biomechanics
Biomechanics of select aspects of volleyball, walking, running and rowing

Dr. Eric Foch, Ph.D., University of Tennessee 2012
Biomechanics of knee injury in running
Motor control strategies associated with balance

Dr. Kelly Pritchett, Ph.D., University of Alabama, 2008
Pre-exercise nutrition and athletic performance
Nutrition and recovery from exercise
Thermoregulation
Eating disorders in athletes

Dr. Robert Pritchett, Ph.D., University of Alabama, 2007
Environmental physiology
Nutrition, hydration and human performance
Athletes with spinal cord injuries

Information:

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Applying to graduate school:

www.cwu.edu/ > click **Admissions** > click **Apply Now** or **I Want to Apply**

➤ follow outlined steps

You may also go directly to the School of Graduate Studies Web Site and request an electronic application.