
EXERCISE SCIENCE

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About the Department

The mission of the Exercise Science Department is to provide a scientific background which promotes critical thinking as it relates to health, wellness and the attainment of human potential. The scientific process and clear articulation of ideas are introduced through a curriculum that investigates the impact of physical activity on the quantity and quality of life.

Departmental Goals

The primary goals of the Exercise Science Department are to:

1. Apply the scientific method of inquiry to issues and questions in the exercise science field;
2. Communicate effectively through discussion, written work, and oral presentation;
3. Demonstrate ability to assess, analyze, and evaluate from observation and sound data collection;
4. Articulate a personal standard of ethics and key values for work in the profession of exercise science;
5. Demonstrate ability to work independently and to assume a leadership role in the field of exercise science;
6. Complete a successful transition to advanced study within and outside the field of exercise science.

The sequencing of courses within the department is a well thought out progression of both knowledge and skills. First-year students often fulfill Chemistry 110 or 115, Math 160, and Biology 111. These courses provide a foundation of quantitative and scientific background necessary for upper division courses within the Exercise Science major. Second year courses include Introductory Research Methods (EXSC 200), and the year-long Human Anatomy and Human Physiology sequence (EXSC 221/222). Usually, Physics 111 is fulfilled in the second year also. In the third year, students complete Biomechanics, Exercise Physiology, Nutrition, and Neuromuscular Adaptation. In the fourth year, students will complete a Senior Capstone requiring a thesis activity. Additionally, students will choose two Exercise Science electives from 300-400 level course offerings.

General Requirements for the Major or Minor

General university degree requirements stipulate that 1) at least four units of the major or three units of the minor be taken in residence at Puget Sound; 2) students earn a GPA of 2.0 in courses taken for the major or the minor; and 3) all courses taken for a major or minor must be taken for graded credit. Any exceptions to these stipulations are indicated in the major and minor degree requirements listed below.

Requirements for the Bachelor of Science Degree

Completion of the following 5 areas:

1. EXSC 200 Introductory Research Methods; EXSC 221 Human Physiology; and EXSC 222 Human Anatomy.
2. Biology 111; Chemistry 105 or 110 or 115; Math 160; and Physics 111.
3. EXSC 301 Nutrition and Energy Balance; EXSC 328 Neuromuscular Adaptation; EXSC 329 Exercise Physiology; and EXSC 336 Biomechanics.
4. EXSC 450 Senior Capstone

5. Two units at the 300 level or higher in Exercise Science that are not counted toward the major in another capacity.

Requirements for the Minor

A Minor in Exercise Science requires completion of five courses to include EXSC 200, 221 and 222; and two of the following 300 level courses: EXSC 301, 328, 329, or 336.

Notes

1. A grade of C or higher must be earned in BIOL 111, CHEM 105 or 110 or 115, MATH 160 and PHYS 111
2. A grade of C- or higher must be earned in each of the following prerequisite courses: EXSC 200, 221, and 222.
3. The Exercise Science Department reserves the option of either excluding courses more than 10 years old from applying to a major or minor or requiring such courses to be repeated.

Course Offerings

Unless otherwise specified, each course carries 1 unit of credit and is offered at least once each academic year. Please see "Frequency of Course Offerings."

200 Introductory Research Methods This course is intended to introduce the student to reading and critiquing original research in exercise science. Common research techniques and terms are explored as they pertain to collecting data on human subjects. Students lead discussions, use statistical software for data analysis, and learn lab writing skills. *Prerequisite: MATH 160 or permission of instructor. Offered each semester.*

221 Human Physiology This course studies the functions of the different human systems including endocrine, muscular, nervous, circulatory, respiratory, and others. *Prerequisite: BIOL 111, CHEM 110 or 115, EXSC 222, or permission of instructor. Offered Spring semester only.*

222 Human Anatomy This course presents a systemic approach to studying the human body. This includes microscopic and gross anatomy of the circulatory, digestive, endocrine, muscular, skeletal systems and others. *Prerequisite: BIOL 111 with a grade of C or higher. Offered Fall semester only.*

280 Directed Research 0.25 - 1 unit This course provides a laboratory research experience for sophomores under the direction of a faculty member. Students may initiate a project or join a research project in the mentor's lab. Student and mentor fill out a department contract. A written research paper and a reflective summary of the research experience must be submitted for a final grade. *Prerequisite: BIO 111, CHEM 110, MATH 160 and instructor permission.*

301 Nutrition and Energy Balance This course provides students with the basic concepts of nutrition and energy balance as they relate to health and the prevention of disease. The functions of the six essential nutrients are explored in detail with attention to their roles in metabolism, optimal health, and chronic diseases. The In lab, the energy values of food and physical activity are quantified while undertaking an in depth case study and written analysis of personal dietary intake and physical activity. Additional labs may include measuring metabolic rate, assessing components of physical fitness, and biochemical analyses of blood biomarkers of nutritional relevance. Students will read scientific literature, develop informed opinions, and debate controversial issues such as organically grown and genetically modified foods, and dietary supplements. Other potential topics include, nutrition and dieting fads, adver-

tising, weight control and the obesity epidemic, sport nutrition, menu planning, and nutritional needs throughout the life cycle. *Prerequisite: BIOL 101 or 111.*

322 Human Dissection Anatomy .25 academic credit This course provides students with hands-on laboratory experience in human cadaver dissection by expanding on content learned previously in Human Anatomy. With weekly direction from the instructor, students work in teams in the laboratory to dissect several regions of a human cadaver, which may include the muscles, nerves, and vessels of the limbs, thorax, and/or abdomen. Students may also focus on specialized areas of interest, such as a joint capsule, hand, or internal organ. Students will learn and practice proper safety practices, dissection technique, and cadaver care. *Prerequisite: grade B or higher in EXSC 222 and instructor permission; priority given to EXSC majors. Offered every spring.*

327 Evaluation of Sports Injuries This introductory course explores the management of conditions limiting the functional capabilities of the physically active individual whose activities may range from occupational tasks to recreational sports. Information dealing with the prevention, recognition and management of these injuries or conditions is presented. Practical application of taping and bandaging techniques is also included. *Offered occasionally.*

328 Neuromuscular Adaptation This course explores the role of the nervous system in controlling movement and learning coordinated motor tasks such as locomotion and physical activity. A survey of the nervous system and sensorimotor control set the stage for an exploration of topics such as neuromuscular activation and neuromotor control, neuromuscular fatigue, endurance and strength training adaptations of the nervous system, and the neuromuscular responses to decreased activity. Other current topics such as the activity-dependent expression of neurotrophic factors and their effects on neurorehabilitation may be explored. *Prerequisites: EXSC 200, 221, and 222. Recommended: NRSC 201.*

329 Exercise Physiology This course explores the body's acute responses and long-term adaptations to various levels of exercise and modes of activities. Students focus on understanding how the body's bioenergetic, cardiovascular, respiratory, neuromuscular, and endocrine systems respond to the physiological stress of exercise and how physical activity and exercise training affect health, disease, and the quality of life. Throughout the course, variations in responses between gender and age groups are considered. Lecture and laboratory topics include bioenergetics, cardiorespiratory and neuromuscular function, ergometry, fatigue, body composition, growth and maturation, inactivity-related diseases, and other current topics. Formal laboratory reports and a review of literature are required. *Prerequisites: EXSC 200, 221, and 222.*

330 Sport Nutrition and Ergogenic Aids This seminar reviews the requirements for energy macronutrients (carbohydrates, proteins, and lipids), micronutrients (vitamins and minerals), and fluid intake as well as basic principles of digestion and absorption. The regulations on the sale of dietary supplements in the US is discussed and debated. The specific ergogenic aids covered in the course are determined by the interests of the students in consultation with the instructor. Groups of two or three students work together to locate, select, and lead discussion/presentations of primary research studies that address their topics of interest. Each student also designs a diet plan for a specific athlete and presents the plan to the class. *Prerequisite: EXSC 221/222, 301, and 329. Offered occasionally.*

331 Scientific Writing in Exercise Science This class is a writing-intensive experience that is designed for those students who anticipate

submitting an application for summer research, completing a senior thesis and or continuing to graduate school. The writing includes an application for approval from the Institutional Review Board, a grant proposal, a review of literature, and a poster or oral presentation. Both peer and faculty review the written submissions. Each student will present their results in a poster format. *Prerequisites: At least two of the following: EXSC 301, 328, 329, 336, or concurrent enrollment or permission of instructor. Offered occasionally.*

336 Biomechanics This course introduces both qualitative and quantitative approaches to evaluating human movement. Functional anatomy, kinematics, and kinetics are explored in relation to human movement. Students may be exposed to a variety of biomechanical equipment including video analysis, force plate, EMG, isokinetic dynamometers, and others. Each student will complete an analysis of a human motion. *Prerequisites: EXSC 200, EXSC 222 with a grade C- or higher, and PHYS 111 with a grade C or higher. Offered each Spring. Offered each Spring.*

380 Directed Research 0.25 - 1 unit This course provides a laboratory research experience for juniors under the direction of a faculty member. Students may initiate a project or join a research project in the mentor's lab. Student and mentor fill out a department contract. A written research paper, a reflective summary of the research experience, and an oral or poster presentation must be submitted for a final grade. *Prerequisite: BIO 111, CHEM 110, MATH 160 and instructor permission.*

424 Recent Advances in Cellular and Molecular Mechanisms of Neuroplasticity This course explores the cellular and molecular mechanisms related to neuroplasticity. Topics such as Alzheimer's, stroke, Parkinson's, muscular dystrophy, cerebral palsy, multiple sclerosis, aging, spinal cord injury, and others will be discussed. Up-to-date molecular and cellular findings from the topics listed above and their effects on our understanding of neuroplasticity and/or neurorehabilitation will be explored. *Prerequisites: EXSC 200, 221, and 222, or permission of instructor. Recommended: NRSC 201. Offered every other year.*

430 Special Topics in Exercise Science This seminar class is structured according to the expertise and research interests of the professor. Each topic will be unique and encompass a current issue in the field of exercise science. *Prerequisite: must have completed two of the following: EXSC 301, 328, 329, 336, concurrent enrollment or permission of instructor. Offered occasionally. May be repeated for credit.*

437 Psycho-Social Issues in Exercise and Sport Participation, performance, and satisfaction in sport and exercise are mediated by social structures, as well as individual psychological traits and states. This seminar examines how psychological and social variables affect learning and performance in all types of physical activity, including leisure recreation, fitness, physical education classes, and competitive sport. Emphasis is placed on integrating sound theory with useful practical applications. Students examine how to implement psychological skills training for peak sport performance, how to create positive social climates, and how emerging sport and exercise trends shape the future. *Offered occasionally.*

439 Designing Interdisciplinary Exercise Prescriptions This course will focus on designing programs intended to improve performance or quality of life with special populations. The student will perform a semester long project designing a complete program for a specific client. The student may choose an elite athlete or disease model intended to improve performance or health. A background in nutrition, exercise physiology, biomechanics and neuroscience will help lay the foundation for a well rounded program intended to address all aspects

of the individual. Diet, agility, balance, strength, aerobic, anaerobic training, as well as the combination of training effects will be explored. Contraindications to exercise will also be examined as they relate to health. *Prerequisite: EXSC 301, 328, 329, 336, or permission of instructor. Offered occasionally.*

440 Biomechanics of Sports Injuries This course is designed to study the basic mechanical bases of musculoskeletal injury, and to better understand: 1) the mechanisms that seem to cause injury, 2) the effect injury has on movement biomechanics, and 3) how injury may be prevented from a biomechanical perspective. Many different types of injury will be discussed with the students responsible for leading these discussions. Students will write a review article on an injury condition and present their findings to the class. *Prerequisites: EXSC 336. Offered Occasionally.*

450 Senior Capstone Students work in small collaborations to identify a relevant scientific question, research the literature, and design and complete a research thesis written in format of a journal style manuscript. The specific topic(s) of the course vary by semester based upon the research expertise of the faculty instructor assigned to the course, and may include topics in either biomechanics, neuromuscular adaptation, exercise physiology, or nutrition. Lecture sessions focus on primary research within the expertise of the faculty instructor and students participate by leading and taking part in lectures and discussions. Laboratory experiences include reviewing techniques from prerequisite courses and acquiring new skills required to propose and conduct original research, and present results in oral and written formats. *Prerequisite: EXSC 301, 328, 329, and 336, or permission of instructor.*

480 Directed Research 0.25 - 1 unit This course provides a laboratory research experience for seniors under the direction of a faculty member. Students may initiate a project or join a research project in the mentor's lab. Student and mentor fill out a department contract. A written research paper, a reflective summary of the research experience, and an oral or poster presentation must be submitted for a final grade. *Prerequisite: BIO 111, CHEM 110, MATH 160 and instructor permission.*

490 Senior Thesis in Exercise Science Experimental research is performed under the guidance and in the area of expertise of a faculty member that may include specialized topics in kinesiology/biomechanics, exercise physiology, nutrition and physical activity or neuroscience. Students must write a proposal that is approved by the department thesis advisor and the Institutional Review Board, carry out the research, write the thesis, and orally defend the thesis at a research symposium. Application details can be obtained from the Scientific Writing instructor, faculty research advisor, or department chair. *Prerequisite: EXSC 331 and permission of the advisor.*

495/496 Independent Study 0.5 - 1 unit Research under the close supervision of a faculty member on a topic agreed upon. Application and proposal must be submitted to the department chair and research advisor. Recommended for majors prior to the senior research semester. *Prerequisite: Junior or senior standing, EXSC major and permission of advisor.*