

EXERCISE SCIENCE, PHD

School of Health and Kinesiology, Department of Biomechanics,
College of Education

Vision Statement

The doctoral degree in exercise science at the University of Nebraska at Omaha (UNO) is a joint program between the Department of Biomechanics and the School of Health and Kinesiology. The degree is based on the physiology, biochemistry, biophysics, motor control and development, and psychology of human movement. The program is aimed at developing researchers who are working to improve movement function and physical activity using evidence-based approaches through interdisciplinary clinical and translational research. A problem-solving approach is used across the age and health spectrum for disease prevention, health enhancement, physical rehabilitation, and exercise motivation. The program offers four areas of concentration in biomechanics, physiology of exercise, motor development and control, and physical activity.

Program Contact Information

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Program Website (<https://www.unomaha.edu/college-of-education/biomechanics-core-facility/>)

Admissions

Application Deadlines (Spring 2021, Summer 2021, and Fall 2021)

Applications for this program are accepted on a rolling basis. All materials must be submitted prior to the beginning of the semester in which the student has elected to begin coursework.

Program-Specific Requirements

- GPA of 3.2 in master's program or in the last 30 hours of previous graduate work
- Master's degree, or minimum of 30 graduate hours in a related field, e.g., health, physical therapy
- Applicants are required to have a command of oral and written English. Those who do not hold a baccalaureate or other advanced degree from the United States, **OR** a baccalaureate or other advanced degree from a predetermined country on the waiver list (<https://www.unomaha.edu/graduate-studies/prospective-students/Proof%20of%20English%20Proficiency-%20International.pdf>), must meet the minimum language proficiency score requirement in order to be considered for admission. A score of 550 paper-based, 213 computer-based, 80 internet-based, 6.5 IELTS, or a 53 PTE is required, with a score of at least 20 in all categories (listening, reading, writing, and speaking)
- GRE Score:

- Total score (verbal and quantitative) of at least 297. Exam scores must have been taken within the last three (3) years.
- Three (3) Letters of Recommendation
- Statement of Purpose:
 - Needs to state goals and objectives for seeking the degree. Students will identify their intended area of focus and the name of the faculty advisor with whom they wish to work (maximum 500 words).
- Writing Sample:
 - Provide a writing sample which could include: first-author scientific paper, thesis proposal, research paper, or similar example showcasing the student's aptitude for writing.
- Resume/CV
- Undergraduate Course Deficiencies: these courses are determined by the student's mentor in collaboration with their supervisory committee. Each student's individual deficiency courses will be approved in their program of study.
- Identification and confirmation by a faculty member willing to act as advisor and mentor to the student (see program-related information). The applicant is expected to contact a potential advisor to determine if a suitable match in interests exists. This assures that the student will be able to develop a program of study that meets the specific goals intended. Please note that assistantship funding is a separate process and should be discussed with your faculty mentor.

Degree Requirements

Code	Title	Credits
Required Courses		21
KINS 9041 or BMCH 9031	ADVANCED STATISTICS ¹ BIostatistics in Biomechanics I	
HEKI 9031 or BMCH 9040	RESEARCH IN HEALTH & KINESIOLOGY ¹ BIostatistics in Biomechanics II	
BMCH 9000	GRANT WRITING FOR THE BIOMEDICAL SCIENCES	
BMCH 9010	PRINCIPLES AND PRACTICE OF BIOMEDICAL RESEARCH	
Take the following course for a minimum of 9 credit hours:		
BMCH/KINS 9910	DOCTORAL SEMINAR ²	
Concentrations		
See Exercise, PhD Concentrations		24
KINS 9990	DISSERTATION	15
Total Credits		60

¹ If HEKI 9031 and KINS 9041 (or equivalent courses) have previously been taken, additional research core courses must be taken in order to meet the 21-hour requirement.

² This seminar is designed to enhance success in academia and maximize the student's research experiences. The student will be required to register for 3 credit hours per semester. In these credit hours the student will attend formal reading clubs with the advisor where he/she will be engaged in reviewing the related literature via journal articles, conducting research projects, reviews of literature, meta-analyses, etc. In addition, the student will be taught how to write successful grants and develop a successful line of research. Each semester the student will have to produce as the graded outcome a manuscript based on data acquired in the laboratory from the ideas developed in the seminar, a grant that will support the research ideas developed, or significant progress on a research-related project. Ethical training will be offered as part of the seminar hours. In their first year, all doctoral students will be required to attend a training session on scientific integrity and the responsible conduct in research. A complementary, mandatory, web-based component will be completed before the didactic material. This component is offered through the UNMC IRB office and provides an extensive literature-based review of the topics, allowing interactive "chat-room" discussion of a series of relevant case-based problems.

Exit Requirements

- Comprehensive Examination
- Dissertation

Program-Related Information

Advisor and Supervisory Committee

- Preliminary contact is made with a potential advisor prior to applying to the program. Prior to being admitted, a student must confirm mentorship with an advisor based on mutual interests and willingness of the advisor to take on the student.

Program of Study (must have 45 hours remaining after approval)

- The student and his/her advisor will determine the Program of Study, including the required courses, deficiency courses, and general area of research for the dissertation. The Program of Study must be completed by the end of the first year and approved by the faculty mentor and one additional faculty member from their respective School or Department (considered the Program Committee) as well as the Doctoral Program Committee Chair. After this approval, the student will submit the Program of Study form with course information to the Graduate Studies Office. Please note, no more than six independent study/research credit hours are recommended; however, the Program of Study is determined by the student, faculty mentor, and an additional faculty member in the School or Department.

Comprehensive Exam

- The required comprehensive exam will be taken towards the end of the student's coursework. The supervisory committee, in conjunction with the student will determine the nature of the exam; the exam could include a take-home exam followed by an oral defense, or writing an NIH-type grant followed by an oral exam. The supervisory committee will evaluate the exam. Once a student passes their comprehensive exam they are considered a doctoral candidate.

Dissertation Committee

- In the first semester of a students' third year, the student must form a Dissertation Committee. It should consist of at least four Exercise Science-affiliated faculty members, three of whom must be graduate faculty within the NU system and one of whom must be from a department different than that of the dissertation advisor. The Dean of Graduate Studies at UNO will appoint the committee upon recommendation of the advisor. The committee will be responsible for approving the comprehensive exam, dissertation proposal, dissertation and its oral defense. Please note that if the potential objectives of a

dissertation topic changes, the dissertation committee can be altered at any time.

Dissertation Proposal Form

- Within one year of successfully completing the comprehensive exam and being admitted to candidacy, a formal research proposal for the dissertation topic should be presented to the supervisory committee. The format of the proposal is subject to approval by the advisor and the supervisory committee. The proposal could include a formal written proposal with an oral defense or oral presentation of the proposed research project.

Dissertation

- After successfully completing the comprehensive exam and being admitted to degree candidacy, the student must register for at least one credit hour of dissertation for each semester until completion of the degree. A minimum of 15 hours of dissertation credit must be completed within the course of the degree.
- It is expected that the dissertation will result in manuscript submissions in referred journals in the discipline.
- Upon completion of the dissertation, an updated CV must be submitted to the Doctoral Program Committee chair.

Residency

- The residency will be reasonably compact, continuous, and coherent, and a substantial portion done at and under close supervision of the university. Most of the students in the program will be full-time and continuously enrolled.

Concentrations

Physiology of Exercise Concentration

Code	Title	Credits
Required Courses		
KINS 9951/8950	ADVANCED EXERCISE PHYSIOLOGY	3
KINS 9960	ADVANCED EXERCISE PHYSIOLOGY II	3
HEKI 9851/8850	EXERCISE FOR SPECIAL POPULATIONS	3
KINS 8076	OPTIMIZING SPORTS PERFORMANCE	3
KINS 8086	CLINICAL EXERCISE PHYSIOLOGY	3
Electives		
Select 9 hours from the following:		9
BMCH 9451/8450	ADVANCED BIOMECHANICS	
BMCH 9460	ADVANCED BIOMECHANICS II	
KINS 9810	HIGHER EDUCATION TEACHING SEMINAR	
BMCH 9411/8410	MOTOR CONTROL I	
BMCH 9510	MOTOR CONTROL II	
BIOL 8146	CELLULAR BIOLOGY	
BIOL/CHEM 8654	BIOCHEMISTRY I LABORATORY	
BIOL/CHEM 8664	BIOCHEMISTRY II LABORATORY	
KINS 8120	CURRENT TOPICS IN WEIGHT MANAGEMENT	
KINS 9131/8130	IMPLEMENTING PHYSICAL ACTIVITY IN DIVERSE POPULATIONS	
KINS 9141/8140	PHYSICAL ACTIVITY ASSESSMENT AND HEALTH RELATED RESEARCH	
KINS 8206	PLANNING WORKSITE WELLNESS PROGRAMS	
KINS 8240	SPORT IN AMERICAN CULTURE	
KINS 8280	CURRICULUM IN PHYSICAL EDUCATION	
KINS 8460	OCCUPATIONAL BIOMECHANICS	
KINS 8506	BEHAVIORAL ASPECTS OF COACHING	

KINS 8800	RISK MANAGEMENT FOR HEALTH FITNESS PROFESSIONALS	
KINS 8856	CARDIOVASCULAR DISEASE PREVENTION AND REHABILITATION	
KINS 8700	PSYCHOLOGY OF PHYSICAL ACTIVITY	
KINS 8910	INTERNSHIP IN EXERCISE SCIENCE	
KINS 8966	TOPICS IN SPORTS MEDICINE	
KINS 9820	SERVICE EXPERIENCE IN HIGHER EDUCATION	
BMCH 9401/8400	MOTOR LEARNING I	
BMCH 9421/8420	MOTOR DEVELOPMENT	
BMCH 9500	MOTOR LEARNING II	
HEKI 8000	SPECIAL STUDIES	
HEKI 8220	PROBLEMS & ISSUES IN HPER	
HEKI 8100	RESEARCH PROJECT	
HEKI 8300	ANALYSIS OF RESEARCH AND LITERATURE IN HUMAN MOVEMENT	
HEKI 8500	QUALITATIVE RESEARCH METHODS	
BIOC 827	Metabolic Regulatory Mechanisms	
Total Credits		24

Biomechanics Concentration

Code	Title	Credits
Required Courses		
BMCH 9451	ADVANCED BIOMECHANICS	3
BMCH 9460	ADVANCED BIOMECHANICS II	3
BMCH 8400	MOTOR LEARNING I	3
or BMCH 8410	MOTOR CONTROL I	
or BMCH 8420	MOTOR DEVELOPMENT	
BMCH 9500	MOTOR LEARNING II	3
or BMCH 9510	MOTOR CONTROL II	
or BMCH 9520	MOTOR DEVELOPMENT II	
PHYS 8455	CLASSICAL MECHANICS	3
Electives		
Select 9 hours from the following:		9
BMCH 8106	BIOINSPIRED ROBOTICS	
BMCH 8206	METHODS IN BIOMECHANICS I	
BMCH 8216	METHODS IN BIOMECHANICS II	
BMCH 8646	ORTHOPEDIC BIOMECHANICS	
BMCH 9421	MOTOR DEVELOPMENT	
BMCH 9520	MOTOR DEVELOPMENT II	
BMCH 9401	MOTOR LEARNING I	
BMCH 9500	MOTOR LEARNING II	
BMCH 9411	MOTOR CONTROL I	
BMCH 9510	MOTOR CONTROL II	
BMCH 9101	NONLINEAR ANALYSIS FOR MOVEMENT STUDIES	
BMCH 9911	INDEPENDENT STUDY IN BIOMECHANICS	
BMCH 9201	MATLAB FOR MOVEMENT SCIENCES	
BMCH 9870	MUSCULOSKELETAL SIMULATION	
BSEN 814	Medical Imaging Systems	
BSEN 912	Advanced Diagnostic Ultrasound Imaging	
CEEN 8336	Microprocessor System Design	
CEEN 8366	Embedded Microcontroller Design	
CIP 814	Scientific Writing	
CIP 817	Applied Scientific Writing	

CSCI 8325	DATA STRUCTURES	
CSCI 8400	ADVANCED COMPUTER GRAPHICS	
CSCI 8456	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	
CSCI 8476	PATTERN RECOGNITION	
CSCI/MATH 8500	NUMERICAL LINEAR ALGEBRA	
CSCI/MATH 8510	NUMERICAL DIFFERENTIAL EQUATIONS	
CSCI 8626	COMPUTER GRAPHICS	
CSCI 8256	HUMAN COMPUTER INTERACTION	
ELEC 8606	Labview Programming	
ELEC 8636	Digital Signal Processing	
ELEC 9150	Adaptive Signal Processing	
ENGL 8610	PROFESSIONAL AND TECHNICAL WRITING	
GCBA 812	Human Neuranatomy	
GERO/PHHB 8556	HEALTH ASPECTS OF AGING	
GERO 9460	SEMINAR IN AGING AND HUMAN BEHAVIOR	
HEKI 8300	ANALYSIS OF RESEARCH AND LITERATURE IN HUMAN MOVEMENT	
HEKI 8500	QUALITATIVE RESEARCH METHODS	
ITIN 8006	SPECIAL TOPICS IN IT INNOVATION	
HEKI 9851/8850	EXERCISE FOR SPECIAL POPULATIONS	
MATH 8250	PARTIAL DIFFERENTIAL EQUATIONS	
MATH 8336	INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS	
MATH 8356	ORDINARY DIFFERENTIAL EQUATIONS	
MATH 8080	DESIGN AND ANALYSIS OF ALGORITHMS	
MATH/CSCI 8306	DETERMINISTIC OPERATIONS RESEARCH MODELS	
MATH/CSCI 8316	PROBABILISTIC OPERATIONS RESEARCH MODELS	
MATH 8400	DYNAMICAL SYSTEMS AND CHAOS	
MATH/CSCI 8766	TOPICS IN APPLIED MATHEMATICS	
MATH 9110	ADVANCED TOPICS IN APPLIED MATHEMATICS	
MENG 8386	MECHANICS OF BIOMATERIALS	
NEUR 8006	SYSTEMS NEUROSCIENCE	
KINS 8086	CLINICAL EXERCISE PHYSIOLOGY	
KINS 9131	IMPLEMENTING PHYSICAL ACTIVITY IN DIVERSE POPULATIONS	
KINS 9141/8140	PHYSICAL ACTIVITY ASSESSMENT AND HEALTH RELATED RESEARCH	
KINS 8460	OCCUPATIONAL BIOMECHANICS	
KINS 8856	CARDIOVASCULAR DISEASE PREVENTION AND REHABILITATION	
KINS 9951/8950	ADVANCED EXERCISE PHYSIOLOGY	
KINS 9960	ADVANCED EXERCISE PHYSIOLOGY II	
PHYS 8505	ELEMENTS OF ELECTRONICS	
PSYC 9010	PROSEMINAR: STATISTICAL METHODS I	
PSYC 9020	PROSEMINAR: STATISTICAL METHODS II	
PSYC 9070	PROSEMINAR: COGNITIVE PSYCHOLOGY	
Total Credits		24

Motor Development and Control Concentration

Code	Title	Credits
Required Courses		
BMCH 9421/8420	MOTOR DEVELOPMENT	3
BMCH 9460	ADVANCED BIOMECHANICS II	3
BMCH 9500	MOTOR LEARNING II	3
BMCH 9510	MOTOR CONTROL II	3
BMCH 9101	NONLINEAR ANALYSIS FOR MOVEMENT STUDIES	3

Electives

Select 9 hours from the following:		9
BMCH 8206	METHODS IN BIOMECHANICS I	
BMCH 8216	METHODS IN BIOMECHANICS II	
BMCH 9401	MOTOR LEARNING I	
BMCH 9411	MOTOR CONTROL I	
BMCH 9421	MOTOR DEVELOPMENT	
BMCH 9101	NONLINEAR ANALYSIS FOR MOVEMENT STUDIES	
BMCH 9201	MATLAB FOR MOVEMENT SCIENCES	
BMCH 9451	ADVANCED BIOMECHANICS	
BMCH 9911	INDEPENDENT STUDY IN BIOMECHANICS	
BMCH 9460	ADVANCED BIOMECHANICS II	
BMCH 9870	MUSCULOSKELETAL SIMULATION	
CSCI 8626	COMPUTER GRAPHICS	
CSCI 8256	HUMAN COMPUTER INTERACTION	
ELEC 8606	Labview Programming	
ELEC 8636	Digital Signal Processing	
ELEC 9150	Adaptive Signal Processing	
ENGL 8610	PROFESSIONAL AND TECHNICAL WRITING	
GERO/PHHB 8556	HEALTH ASPECTS OF AGING	
GERO 9460	SEMINAR IN AGING AND HUMAN BEHAVIOR	
NEUR 8006	SYSTEMS NEUROSCIENCE	
KINS 8086	CLINICAL EXERCISE PHYSIOLOGY	
KINS 8130/9131	IMPLEMENTING PHYSICAL ACTIVITY IN DIVERSE POPULATIONS	
KINS 9141/8140	PHYSICAL ACTIVITY ASSESSMENT AND HEALTH RELATED RESEARCH	
KINS 8460	OCCUPATIONAL BIOMECHANICS	
KINS 8856	CARDIOVASCULAR DISEASE PREVENTION AND REHABILITATION	
KINS 8700	PSYCHOLOGY OF PHYSICAL ACTIVITY	
KINS 9810	HIGHER EDUCATION TEACHING SEMINAR	
KINS 9820	SERVICE EXPERIENCE IN HIGHER EDUCATION	
KINS 9951/8950	ADVANCED EXERCISE PHYSIOLOGY	
KINS 9960	ADVANCED EXERCISE PHYSIOLOGY II	
HEKI 8300	ANALYSIS OF RESEARCH AND LITERATURE IN HUMAN MOVEMENT	
HEKI 8500	QUALITATIVE RESEARCH METHODS	
HEKI 9851/8850	EXERCISE FOR SPECIAL POPULATIONS	
MATH 8400	DYNAMICAL SYSTEMS AND CHAOS	
MATH 9110	ADVANCED TOPICS IN APPLIED MATHEMATICS	

PSYC 9070	PROSEMINAR: COGNITIVE PSYCHOLOGY	
PSYC 9210	PROSEMINAR: PERCEPTION	
PSYC 9230	PROSEMINAR: BEHAVIORAL NEUROSCIENCE	
PSYC 9560	PROSEMINAR: DEVELOPMENTAL PSYCHOLOGY	
UNMC: GCBA 812, PEDS 913, PHYT 942		
Total Credits		24

Physical Activity Concentration

Code	Title	Credits
Required Courses		
KINS 9131/8130	IMPLEMENTING PHYSICAL ACTIVITY IN DIVERSE POPULATIONS	3
KINS 9141/8140	PHYSICAL ACTIVITY ASSESSMENT AND HEALTH RELATED RESEARCH	3
KINS 9701/8700	PSYCHOLOGY OF PHYSICAL ACTIVITY	3
HEKI 9851/8850	EXERCISE FOR SPECIAL POPULATIONS	3
KINS 9040	PHYSICAL ACTIVITY EPIDEMIOLOGY	3

Electives

Select 9 hours from the following:		9
KINS 8120	CURRENT TOPICS IN WEIGHT MANAGEMENT	
KINS 8856	CARDIOVASCULAR DISEASE PREVENTION AND REHABILITATION	
KINS 9951/8950	ADVANCED EXERCISE PHYSIOLOGY	
KINS 9810	HIGHER EDUCATION TEACHING SEMINAR	
BMCH 9451/8450	ADVANCED BIOMECHANICS	
BMCH 9460	ADVANCED BIOMECHANICS II	
BMCH 9411/8410	MOTOR CONTROL I	
BMCH 9510	MOTOR CONTROL II	
KINS 8206	PLANNING WORKSITE WELLNESS PROGRAMS	
KINS 8460	OCCUPATIONAL BIOMECHANICS	
KINS 8800	RISK MANAGEMENT FOR HEALTH FITNESS PROFESSIONALS	
KINS 8910	INTERNSHIP IN EXERCISE SCIENCE	
KINS 8966	TOPICS IN SPORTS MEDICINE	
BMCH 9401/8400	MOTOR LEARNING I	
BMCH 9421/8420	MOTOR DEVELOPMENT	
BMCH 9500	MOTOR LEARNING II	
HEKI 8000	SPECIAL STUDIES	
HEKI 8100	RESEARCH PROJECT	
HEKI 8220	PROBLEMS & ISSUES IN HPER	
HEKI 8300	ANALYSIS OF RESEARCH AND LITERATURE IN HUMAN MOVEMENT	
HEKI 8500	QUALITATIVE RESEARCH METHODS	
PHHB 8450	EPIDEMIOLOGY & PREVENTION OF DISEASE	
PHHB/SOC 8706	WOMEN'S HEALTH AND ISSUES OF DIVERSITY	
PHHB 8750	PROGRAM EVALUATION AND INSTRUMENTATION	
PHHB 8850	HEALTH ASPECTS OF STRESS MANAGEMENT	
GEOG 8056	GEOGRAPHIC INFORMATION SYSTEMS I	
GEOG 8666	GEOGRAPHIC INFORMATION SYSTEMS II	

MATH/CSCI 8316	PROBABILISTIC OPERATIONS RESEARCH MODELS
MATH/CSCI 8766	TOPICS IN APPLIED MATHEMATICS
PA 8740	HEALTH CARE POLICY
PA 8760	THE U.S. HEALTH CARE SYSTEM
PSYC 8646	PERSONNEL PSYCHOLOGY
PSYC 9430	PROSEMINAR: PERSONALITY
PSYC 9440	PROSEMINAR: SOCIAL PSYCHOLOGY
PSYC 9500	SOCIOEMOTIONAL DEVELOPMENT
PSYC 9550	PSYCHOSOCIAL DEVELOPMENT
SOC 8200	SOCIETY & HEALTH
UNMC: BIOS 823, BIOS 825, BIOS 810, EPI 821, EPI 835, EPI 845, HPRO 902, HPRO 910, HPRO 998.	

Total Credits

24

BMCH 8000 SEMINAR IN BIOMECHANICS (0 credits)

Required non-credit course for graduate students in biomechanics. Intended to familiarize the graduate student with current ongoing biomechanical research at UNO and other institutions. The seminar will additionally include topics focusing on professional development, job and educational opportunities, and biomechanical methodologies.

Prerequisite(s)/Corequisite(s): Must be a student in BMCH graduate program. Not open to non-degree graduate students.

BMCH 8030 BIostatISTICS IN BIOMECHANICS I (3 credits)

The focus of the course is to prepare students to understand and apply research and biostatistical methods needed in the design and analysis of biomechanical investigations. The major topics to be covered include research design and multiple linear regression. (Cross-listed with BMCH 9031)

Prerequisite(s)/Corequisite(s): Graduate Standing in Biomechanics program or Department Permission.

BMCH 8100 NONLINEAR ANALYSIS FOR MOVEMENT STUDIES (3 credits)

This course is to introduce different nonlinear methods for the analysis of biological and movement time series. Emphasis will be given on understanding the algorithms behind each nonlinear method. (Cross-listed with BMCH 9101)

Prerequisite(s)/Corequisite(s): Instructor Permission.

BMCH 8106 BIOINSPIRED ROBOTICS (3 credits)

The goal of the course is to involve students in an interdisciplinary vision of biomechanics, biology, engineering and architecture by learning how humans and other animals function in their environment. These design principles from nature can be translated into novel devices, structures, and robots. (Cross-listed with BMCH 4100).

BMCH 8200 MATLAB FOR MOVEMENT SCIENCES (3 credits)

Introduction to Matlab software, plotting data, spectral analysis and the Fourier transform, data smoothing, and image analysis of movement related data. All topics will be implemented using Matlab. (Cross-listed with BMCH 9201)

Prerequisite(s)/Corequisite(s): Instructor permission.

BMCH 8206 METHODS IN BIOMECHANICS I (3 credits)

In this course students learn about the methods and equipment used in biomechanics as well as the analysis of data collected from those methods. Course experiences include both lecture and lab based learning. (Cross-listed with BMCH 4200).

Prerequisite(s)/Corequisite(s): Department Permission

BMCH 8216 METHODS IN BIOMECHANICS II (3 credits)

In this course students learn about advanced methods and equipment used in biomechanics, as well as the analysis of data collected from those methods. Course experiences include both lecture and lab based learning. This course builds on the experience gained in BMCH 4200/8206, Methods in Biomechanics I. (Cross-listed with BMCH 4210).

Prerequisite(s)/Corequisite(s): BMCH 8206 or Department Permission

BMCH 8400 MOTOR LEARNING I (3 credits)

Discussion and analysis of scientific principles related to the learning of motor skills; review related literature and research in motor learning. The focus of the course is on recent theories of how movements are acquired and performed, and on factors that have implications for motor learning throughout the life span. (Cross-listed with BMCH 9401)

Prerequisite(s)/Corequisite(s): Department Permission.

BMCH 8410 MOTOR CONTROL I (3 credits)

The focus of the course is to explore the study of the conditions and factors that influence the control and performance of motor skills from both neurophysiological and psychobiological perspectives. (Cross-listed with BMCH 9411)

Prerequisite(s)/Corequisite(s): Department Permission. Not open to non-degree graduate students.

BMCH 8420 MOTOR DEVELOPMENT (3 credits)

This course focuses on the study of motor development, the processes that underlie this development and the factors that influence it. Students will gain an understanding of the major theoretical perspectives of motor development across the life span with special emphasis given in child development. (Cross-listed with BMCH 9421)

Prerequisite(s)/Corequisite(s): Department Permission.

BMCH 8450 ADVANCED BIOMECHANICS (3 credits)

The course will address the biomechanical basis of human performance including mechanical analysis of human gait, fundamental movement patterns and techniques used for collecting biomechanical data. (Cross-listed with BMCH 9451)

Prerequisite(s)/Corequisite(s): BMCH 4630 (Biomechanics) [previously PE 4630] or Instructor Permission.

BMCH 8646 ORTHOPEDIC BIOMECHANICS (3 credits)

Orthopedic Biomechanics focuses on the use of biomechanical principles and scientific methods to address clinical questions that are of particular interest to professionals such as orthopedic surgeons, physical therapists, rehabilitation specialists, and others. (Cross-listed with BMCH 4640).

Prerequisite(s)/Corequisite(s): Department Permission

BMCH 8666 CLINICAL IMMERSION FOR RESEARCH AND DESIGN (3 credits)

This course will involve exposure to current clinical practices, identification of unmet clinical needs, and information regarding future career options. In this course, students will be matched with local clinical sites to provide a unique opportunity for innovative and interdisciplinary approaches to problem solving subject to practical constraints. Concepts in clinical rehabilitation, integrated assessments, regulation of medical devices in health care will be covered. This course will review the latest research efforts for rehabilitation in the context of device design and implementation. (Cross-listed with BMCH 4660).

Prerequisite(s)/Corequisite(s): Instructor Permission. Not open to non-degree graduate students.

BMCH 8900 INDEPENDENT RESEARCH IN BIOMECHANICS (1-6 credits)

In this course individuals or groups will conduct research projects for the study and analysis of biomechanical topics.

Prerequisite(s)/Corequisite(s): Permission of the Department and approval by Faculty Advisor. Not open to non-degree graduate students.

BMCH 8910 INDEPENDENT STUDY IN BIOMECHANICS (1-6 credits)

This is a variable credit course designed for graduate students in Biomechanics who would benefit from independent reading assignments and problems. Independent study enables individual students or a small group of students to focus on topics typically not explored in other offerings or to explore topics currently offered in further depth. (Cross-listed with BMCH 9911)

Prerequisite(s)/Corequisite(s): Graduate student in BMCH and approval by Faculty Advisor. Not open to non-degree graduate students.

BMCH 8990 THESIS IN BIOMECHANICS (1-6 credits)

A research project, designed and executed under the supervision of the chair and approval by members of the graduate student's advisory committee. In this project the student will develop skills in research design, research conduct, data analysis, and reporting. The final product of this course will be an original thesis of independent scientific investigation.

Prerequisite(s)/Corequisite(s): Department Permission. Not open to non-degree graduate students.

BMCH 9000 GRANT WRITING FOR THE BIOMEDICAL SCIENCES (3 credits)

The purpose of this course is to introduce students to the scientific process and translate it to effective grant writing for biomedical sciences. Topics covered include hypotheses development, strong inference, how to write specific aims, how to generate ideas, federal grant processes with emphasis on National Institutes of Health, National Science Foundation and Veterans' Affairs, how to evaluate calls for grant applications, grant construction, and stylistic writing approaches. Students will compare and contrast successful and unsuccessful grant submissions.

BMCH 9010 PRINCIPLES AND PRACTICE OF BIOMEDICAL RESEARCH (3 credits)

The purpose of this course is to introduce students to a variety of topics related to research practice that will allow them to be successful, independent scientists. Topics covered include manuscript writing and plagiarism, authorship, mentoring, research ethics, responsible conduct of research, presentation skills, research notebook keeping, scientific etiquette, and time and laboratory management.

BMCH 9031 BIostatISTICS IN BIOMECHANICS I (3 credits)

The focus of the course is to prepare students to understand and apply research and biostatistical methods needed in the design and analysis of biomechanical investigations. The major topics to be covered include research design and multiple linear regression. (Cross-listed with BMCH 8030)

Prerequisite(s)/Corequisite(s): Graduate Standing in Biomechanics program or Department Permission.

BMCH 9040 BIostatISTICS IN BIOMECHANICS II (3 credits)

The focus of the course is to prepare graduate students to understand and apply advanced research and biostatistical methods needed in the design and analysis of biomechanical investigations. The major topics to be covered include advanced research design and the general linear model. This course builds upon basic research design and linear regression learned in Biostatistics in Biomechanics I for the application in single factor and multi-factor experimental analyses.

Prerequisite(s)/Corequisite(s): Graduate Standing, BMCH 8030/9031 or equivalent

BMCH 9101 NONLINEAR ANALYSIS FOR MOVEMENT STUDIES (3 credits)

This course is to introduce different nonlinear methods for the analysis of biological and movement time series. Emphasis will be given on understanding the algorithms behind each nonlinear method. (Cross-listed with BMCH 8100)

Prerequisite(s)/Corequisite(s): Instructor Permission

BMCH 9201 MATLAB FOR MOVEMENT SCIENCES (3 credits)

Introduction to Matlab software, plotting data, spectral analysis and the Fourier transform, data smoothing, and image analysis of movement related data. All topics will be implemented using Matlab. (Cross-listed with BMCH 8200)

Prerequisite(s)/Corequisite(s): Instructor permission.

BMCH 9401 MOTOR LEARNING I (3 credits)

Discussion and analysis of scientific principles related to the learning of motor skills; review related literature and research in motor learning. The focus of the course is on recent theories of how movements are acquired and performed, and on factors that have implications for motor learning throughout the life span. (Cross-listed with BMCH 8400)

Prerequisite(s)/Corequisite(s): Department Permission.

BMCH 9411 MOTOR CONTROL I (3 credits)

The focus of the course is to explore the study of the conditions and factors that influence the control and performance of motor skills from both neurophysiological and psychobiological perspectives. (Cross-listed with BMCH 8410)

Prerequisite(s)/Corequisite(s): Department Permission. Not open to non-degree graduate students.

BMCH 9421 MOTOR DEVELOPMENT (3 credits)

This course focuses on the study of motor development, the processes that underlie this development and the factors that influence it. Students will gain an understanding of the major theoretical perspectives of motor development across the life span with special emphasis given in child development. (Cross-listed with BMCH 8420)

Prerequisite(s)/Corequisite(s): PE 2800 (Motor Behavior) or permission of instructor.

BMCH 9451 ADVANCED BIOMECHANICS (3 credits)

The course will address the biomechanical basis of human performance including mechanical analysis of human gait, fundamental movement patterns and techniques used for collecting biomechanical data. (Cross-listed with BMCH 8450)

Prerequisite(s)/Corequisite(s): BMCH 4630 (Biomechanics) [previously PE 4630] or Instructor Permission.

BMCH 9460 ADVANCED BIOMECHANICS II (3 credits)

A comprehensive and advanced detailed investigation of the biomechanics of motor performance in special populations such as stroke, Parkinson's disease, and amputees. Includes advanced study of the mechanical analysis of motor skills and movement patterns and the research techniques for collecting and interpreting biomechanical data. Detailed lectures will cover etiology of such special populations with a focus on the endpoint movement disorders.

Prerequisite(s)/Corequisite(s): BMCH 8450 or BMCH 9451 or Instructor Permission. Not open to non-degree graduate students.

BMCH 9500 MOTOR LEARNING II (3 credits)

The focus of the course is to further explore the study of the conditions and factors that influence the learning and performance of motor skills.

Prerequisite(s)/Corequisite(s): BMCH 8400, BMCH 9401 or Instructor Permission. Not open to non-degree graduate students.

BMCH 9510 MOTOR CONTROL II (3 credits)

The focus of the course is to further explore the study of the conditions and factors that influence the control and performance of motor skills.

Prerequisite(s)/Corequisite(s): BMCH 8410, BMCH 9411 or Department Permission. Not open to non-degree graduate students.

BMCH 9520 MOTOR DEVELOPMENT II (3 credits)

This course focuses on the study of motor development, the processes that underlie this development and the factors that influence it. This course will focus on exploring motor development in clinical populations of people with autism, down syndrome, cerebral palsy, etc. and the factors that influence the progression of motor skills.

Prerequisite(s)/Corequisite(s): BMCH 8420 or permission from instructor.

BMCH 9870 MUSCULOSKELETAL SIMULATION (3 credits)

This course covers knowledge and skills needed to generate dynamic models, analyses, and simulations of the human musculoskeletal system for different types of movement. In this course, students build and analyze computer simulations implemented on common software platforms to gain insight into movement biomechanics and control. The materials covered in this course may be of interest to engineers, physical therapists, and biomedical researchers looking to apply their technical skills to solving clinical problems. This course emphasizes the technical skills necessary to conduct and analyze musculoskeletal simulations of movement.

Prerequisite(s)/Corequisite(s): Department Permission.

BMCH 9910 DOCTORAL SEMINAR (3 credits)

The major goal of this course is to teach the graduate student how to write manuscripts/grants and be an effective academician with strong ethics. The outcome of this course is for the student to produce a manuscript based on data acquired in the laboratory from the ideas developed in the seminar or submit a grant that will support the research ideas developed in at least one semester. The material covered is intended to equip students with the skills necessary to be successful in their academic careers with emphasis given on writing scientific papers. (Cross-listed with KINS 9910).

Prerequisite(s)/Corequisite(s): Admission into the PhD program. Not open to non-degree graduate students.

BMCH 9911 INDEPENDENT STUDY IN BIOMECHANICS (1-6 credits)

This is a variable credit course designed for graduate students in Biomechanics who would benefit from independent reading assignments and problems. Independent study enables individual students or a small group of students to focus on topics typically not explored in other offerings or to explore topics currently offered in further depth. (Cross-listed with BMCH 8910)

Prerequisite(s)/Corequisite(s): Graduate student in BMCH and approval by Faculty Advisor. Not open to non-degree graduate students.

BMCH 9990 DISSERTATION (1-15 credits)

The course provides doctoral candidates in Exercise Science with a process to complete a dissertation research plan. The course learning activities will focus on the completion of a candidate's dissertation. The course is designed to allow advanced doctoral candidates to demonstrate technical mastery of the discipline and to advance knowledge by completing an investigation. (Cross-listed with KINS 9990).

Prerequisite(s)/Corequisite(s): Admittance to the UNO Doctoral Program in Exercise Science, successful completion of doctoral coursework & comprehensive exams, approval of the dissertation supervisory committee chair & advancement to candidacy. Not open to non-degree graduate students.