BIOMECHANICS AND KINESIOLOGY, PHD

Vision Statement

The doctoral degree in biomechanics and kinesiology 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 motivation for physical activity. The program offers four areas of concentration in biomechanics, physiology of exercise, motor development and control, and physical activity.

Program Contact Information

unobiomechanics@unomaha.edu

Program Website (https://www.unomaha.edu/college-of-education-health-and-human-sciences/biomechanics-core-facility/academic-programs/graduate-programs.php)

Admissions

General Application Requirements and Admission Criteria (http://catalog.unomaha.edu/graduate/admission/)

Program-Specific Requirements

Application Deadlines (Spring 2025, Summer 2025, and Fall 2025)

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. To receive full consideration for departmental assistantships, applications must be received by January 31st.

Other 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
- **English Language Proficiency:** 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/office-of-graduate-studies/admissions/entrance-exams.php), must meet the minimum language proficiency score requirement in order to be considered for admission.
    - Internet-based TOEFL: 80, IELTS: 6.5, PTE: 53 with a score of at least 20 in all categories (listening, reading, writing, and speaking), Duolingo: 110
- **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**
- **Letters of Recommendation:** Three are required
- 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.
- **Applicants with International Transcripts:** Any applicant to this program who has completed undergraduate or graduate coursework at an international higher education institution outside of the United States may submit transcripts and degree certificates (with an English translation) in lieu of a course-by-course transcript evaluation from World Education Services (https://www.wes.org/) (WES), Educational Credential Evaluations (https://www.ece.org/) (ECE), T (https://spantran.com/)he Evaluation Company (https://spanside.my.salesforce-sites.com/SpantranApplication/?Id=2cd44b28-3f98-4ded-9b1b-8746e0e5cf12), or Educational Perspectives (https://www.edperspective.org/). This graduate program will conduct an in-house credential evaluation of the transcript(s).
    - UNO reserves the right to require a course-by-course evaluation from WES, ECE, The Evaluation Company, or Educational Perspectives if the program is unable to complete an evaluation or should there be any questions or concerns about the documentation that is received. Applicants will be notified by the individual program if an external course-by-course evaluation is required.
    - Note: If admitted, official transcripts and degree certificates (with an English translation)/official course-by-course transcript evaluation, and any applicable official exam scores are required.

Degree Requirements

Code	Title	Credits
Required Courses		**21**
BMKI 9001	RESEARCH IN HEALTH & KINESIOLOGY	
or BMKI 9031	BIOSTATISTICS IN BIOMECHANICS I	
BMKI 9041	ADVANCED STATISTICS	
or BMKI 9040	BIOSTATISTICS IN BIOMECHANICS II	
BMKI 9000	GRANT WRITING FOR THE BIOMEDICAL SCIENCES	
BMKI 9010	PRINCIPLES AND PRACTICE OF BIOMEDICAL RESEARCH	
Take the following course for a minimum of 9 credit hours:		
BMKI 9910	DOCTORAL SEMINAR	
Concentrations		
See Biomechanics and Kinesiology, PhD Concentrations		24
BMKI 9990	DISSERTATION	15
Total Credits		**60**

[1] If required 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 at least 9 credit hours (typically 3 hours per semester following their first year in the program). 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 for a graded outcome, the student will have to produce material such as 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. Students will co-develop these graded outcomes each semester and submit them for approval to the doctoral program committee.

Exit Requirements

- Comprehensive Examination
- Dissertation

Program-Related Information

Advisor

- 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 Office of Graduate. 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. The student must submit the Appointment of Dissertation Committee form consisting of at least four University of Nebraska graduate faculty members, one of whom must be from outside the student's academic department/school in which the doctorate is to be granted. The chair of the dissertation committee must be a member of the graduate faculty. The outside representative must hold graduate faculty status within the NU system. The dean for 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, if the potential objectives of a dissertation topic change, 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

Biomechanics Concentration

Code	Title	Credits
Required Courses		**15**
BMKI 9451	ADVANCED BIOMECHANICS	
BMKI 9460	ADVANCED BIOMECHANICS II	
BMKI 9401	MOTOR LEARNING I	
or BMKI 9411	MOTOR CONTROL I	
or BMKI 9421	MOTOR DEVELOPMENT	
BMKI 9500	MOTOR LEARNING II	
or BMKI 9510	MOTOR CONTROL II	
or BMKI 9520	MOTOR DEVELOPMENT II	
PHYS 8455	CLASSICAL MECHANICS	
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	
BMKI 9101	Nonlinear Analysis for Movement Studies	
BMKI 9131	IMPLEMENTING PHYSICAL ACTIVITY IN DIVERSE POPULATIONS	
BMKI 9141	PHYSICAL ACTIVITY ASSESSMENT AND HEALTH RELATED RESEARCH	
BMKI 9201	MATLAB FOR MOVEMENT SCIENCES	
BMKI 9221	METHODS IN CARDIOVASCULAR BIOMATERIALS RESEARCH	
BMKI 9300	SYSTEMATIC REVIEW AND META-ANALYSIS	
BMKI 9411	MOTOR CONTROL I	
BMKI 9421	MOTOR DEVELOPMENT	
BMKI 9510	MOTOR CONTROL II	
BMKI 9520	MOTOR DEVELOPMENT II	
BMKI 9851	EXERCISE FOR SPECIAL POPULATIONS	
BMKI 9870	MUSCULOSKELETAL SIMULATION	
BMKI 9911	INDEPENDENT STUDY IN BIOMECHANICS	
BMKI 9951	ADVANCED EXERCISE PHYSIOLOGY	

BMKI 9960	ADVANCED EXERCISE PHYSIOLOGY II
BMKI 9691	MATHEMATICS OF BIOMECHANICAL DATA PROCESSING
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	PRINCIPLES OF 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
ACMP 8006	SPECIAL TOPICS IN IT INNOVATION
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
NEUR 8006	SYSTEMS NEUROSCIENCE
KINS 8086	CLINICAL EXERCISE PHYSIOLOGY
KINS 8856	CARDIOVASCULAR DISEASE PREVENTION AND REHABILITATION
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		**15**
BMKI 9421	MOTOR DEVELOPMENT	
BMKI 9460	ADVANCED BIOMECHANICS II	
BMKI 9500	MOTOR LEARNING II	
BMKI 9510	MOTOR CONTROL II	
BMKI 9101	Nonlinear Analysis for Movement Studies	
Electives		
Select 9 hours from the following:		9
BMCH 8206	METHODS IN BIOMECHANICS I	
BMCH 8216	METHODS IN BIOMECHANICS II	
BMKI 9141	PHYSICAL ACTIVITY ASSESSMENT AND HEALTH RELATED RESEARCH	
BMKI 9201	MATLAB FOR MOVEMENT SCIENCES	
BMKI 9221	METHODS IN CARDIOVASCULAR BIOMATERIALS RESEARCH	
BMKI 9300	SYSTEMATIC REVIEW AND META-ANALYSIS	
BMKI 9401	MOTOR LEARNING I	
BMKI 9411	MOTOR CONTROL I	
BMKI 9520	MOTOR DEVELOPMENT II	
BMKI 9451	ADVANCED BIOMECHANICS	
BMKI 9691	MATHEMATICS OF BIOMECHANICAL DATA PROCESSING	
BMKI 9810	HIGHER EDUCATION TEACHING SEMINAR	
BMKI 9820	SERVICE EXPERIENCE IN HIGHER EDUCATION	
BMKI 9851/ HEKI 8850	EXERCISE FOR SPECIAL POPULATIONS	
BMKI 9870	MUSCULOSKELETAL SIMULATION	
BMKI 9911	INDEPENDENT STUDY IN BIOMECHANICS	
BMKI 9951	ADVANCED EXERCISE PHYSIOLOGY	
BMKI 9960	ADVANCED EXERCISE PHYSIOLOGY II	
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 8856	CARDIOVASCULAR DISEASE PREVENTION AND REHABILITATION	
KINS 8700	PSYCHOLOGY OF PHYSICAL ACTIVITY	
HEKI 8300	ANALYSIS OF RESEARCH AND LITERATURE IN HUMAN MOVEMENT	
HEKI 8500	QUALITATIVE RESEARCH METHODS	
MATH 8400	DYNAMICAL SYSTEMS AND CHAOS	

MATH 9110	ADVANCED TOPICS IN APPLIED MATHEMATICS	
PSYC 9070	PROSEMINAR: COGNITIVE PSYCHOLOGY	
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		**15**
BMKI 9131	IMPLEMENTING PHYSICAL ACTIVITY IN DIVERSE POPULATIONS	
BMKI 9141	PHYSICAL ACTIVITY ASSESSMENT AND HEALTH RELATED RESEARCH	
BMKI 9300	SYSTEMATIC REVIEW AND META-ANALYSIS	
BMKI 9701/ KINS 8700	PSYCHOLOGY OF PHYSICAL ACTIVITY	
BMKI 9050	PHYSICAL ACTIVITY EPIDEMIOLOGY	
Electives		
Select 9 hours from the following:		9
KINS 8120	CURRENT TOPICS IN WEIGHT MANAGEMENT	
KINS 8856	CARDIOVASCULAR DISEASE PREVENTION AND REHABILITATION	
BMKI 9951	ADVANCED EXERCISE PHYSIOLOGY	
BMKI 9810	HIGHER EDUCATION TEACHING SEMINAR	
BMKI 9820	SERVICE EXPERIENCE IN HIGHER EDUCATION	
BMKI 9401	MOTOR LEARNING I	
BMKI 9411	MOTOR CONTROL I	
BMKI 9421	MOTOR DEVELOPMENT	
BMKI 9451	ADVANCED BIOMECHANICS	
BMKI 9460	ADVANCED BIOMECHANICS II	
BMKI 9500	MOTOR LEARNING II	
BMKI 9510	MOTOR CONTROL II	
BMKI 9520	MOTOR DEVELOPMENT II	
KINS 8206	PLANNING WORKSITE WELLNESS PROGRAMS	
KINS 8800	RISK MANAGEMENT FOR HEALTH FITNESS PROFESSIONALS	
KINS 8910	INTERNSHIP IN EXERCISE SCIENCE	
KINS 8966	TOPICS IN SPORTS MEDICINE	
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	
PSYC 8646	PERSONNEL PSYCHOLOGY	
PSYC 9430	PROSEMINAR: PERSONALITY	
PSYC 9440	PROSEMINAR: SOCIAL PSYCHOLOGY	
PSYC 9500	SOCIOEMOTIONAL DEVELOPMENT	
PSYC 9550	PSYCHOSOCIAL DEVELOPMENT	
SOC 8200	HEALTH & SOCIETY	
UNMC: BIOS 823, BIOS 825, BIOS 810, EPI 821, EPI 835, EPI 845, HPRO 902, HPRO 910, HPRO 998.		
Total Credits		**24**

Physiology of Exercise Concentration

Code	Title	Credits
Required Courses		
BMKI 9951	ADVANCED EXERCISE PHYSIOLOGY	3
BMKI 9960	ADVANCED EXERCISE PHYSIOLOGY II	3
BMKI 9851	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
BMKI 9131	IMPLEMENTING PHYSICAL ACTIVITY IN DIVERSE POPULATIONS	
BMKI 9141	PHYSICAL ACTIVITY ASSESSMENT AND HEALTH RELATED RESEARCH	
BMKI 9300	SYSTEMATIC REVIEW AND META-ANALYSIS	
BMKI 9401	MOTOR LEARNING I	
BMKI 9411	MOTOR CONTROL I	
BMKI 9421	MOTOR DEVELOPMENT	
BMKI 9451	ADVANCED BIOMECHANICS	
BMKI 9460	ADVANCED BIOMECHANICS II	
BMKI 9500	MOTOR LEARNING II	
BMKI 9510	MOTOR CONTROL II	
BMKI 9810	HIGHER EDUCATION TEACHING SEMINAR	
BMKI 9820	SERVICE EXPERIENCE IN HIGHER EDUCATION	
BIOL 8146	CELLULAR BIOLOGY	
BIOL/CHEM 8654	BIOCHEMISTRY I LABORATORY	
BIOL/CHEM 8664	BIOCHEMISTRY II LABORATORY	
KINS 8120	CURRENT TOPICS IN WEIGHT MANAGEMENT	
KINS 8206	PLANNING WORKSITE WELLNESS PROGRAMS	
KINS 8240	SPORT IN AMERICAN CULTURE	
KINS 8280	CURRICULUM IN PHYSICAL EDUCATION	
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	
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**

Graduate Courses

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): Must be a student in BMCH graduate program. Not open to non-degree graduate students.

BMCH 8006 BIOMATERIALS (3 credits)
Students will learn the classification, properties, characterization methods, body interactions, applications, and design principles of biomaterials. (Cross-listed with BMCH 4000).

BMCH 8016 WEARABLE MATERIALS FOR BIOMECHANICAL PERFORMANCE I (3 credits)
This course contains lecture and lab components focused on the design and characterization of wearable materials used in biomechanical and biomedical applications for heat management, moisture removal, and respiratory protection. Students will learn the classification, properties, evaluation methods, and design principles of wearable materials. (Cross-listed with BMCH 4010).
Prerequisite(s): BMCH 8006 or BMCH 8676 or Department Permission

BMCH 8020 WEARABLE MATERIALS FOR BIOMECHANICAL PERFORMANCE II (3 credits)
This course contains lecture and lab components focused on the design and characterization of wearable materials used in biomechanical and biomedical applications for protection against physical and chemical threats. Students will learn the classification, properties, evaluation methods, and design principles of wearable materials. (Cross-listed with BMKI 9021).
Prerequisite(s): BMCH 4010/BMCH 8016 (WEARABLE MATERIALS FOR BIOMECHANICAL PERFORMANCE I) or Department Permission

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 BMKI 9031)
Prerequisite(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 BMKI 9101).
Prerequisite(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 8116 3D PRINTING IN HEALTHCARE (3 credits)
A study of basic principles and applications of additive manufacturing (i.e., 3D printing) in healthcare settings. This course will incorporate introductory lectures, practical applications, case studies, and hands-on experiences incorporating basic design techniques and 3D printing. Students will be exposed to various 3D printing techniques and approaches. This course will equip students with knowledge and hands-on experience of basic design techniques and 3D printing. Students will demonstrate, evaluate, and apply technical knowledge about computer aided design and 3D printing. The final project includes a presentation of short grant proposal. (Cross-listed with BMCH 4110).

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 BMKI 9201).
Prerequisite(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): 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): BMCH 8206 or Department Permission

BMCH 8220 METHODS IN CARDIOVASCULAR BIOMATERIALS RESEARCH (3 credits)
This course contains lecture and lab components focused on cardiovascular biomaterial development and characterization methods used in academia and industry. The lecture component will provide the necessary clinical background of cardiovascular diseases and the theoretical background of cardiovascular biomaterials and state-of-the-art research methods. The lab component will provide practical experience focused on cardiovascular biomaterial design, manufacturing, and characterization methods. (Cross-listed with BMKI 9221).

BMCH 8300 STEM TEACHING METHODS FOR DEVICE DESIGN (3 credits)
STEM Teaching in Biomechanics focuses on principles in teaching including teaching models (Problem-Based, Team-Based, Inquiry-Based teaching), student assessment, classroom logistics/organization, and device design through a mentorship project. (Cross-listed with BMKI 9301, STEM 8300).

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 BMKI 9401).
Prerequisite(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 BMKI 9411).
Prerequisite(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 BMKI 9421).
Prerequisite(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 BMKI 9451).
Prerequisite(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): 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): Instructor Permission. Not open to non-degree graduate students.

BMCH 8676 INTRODUCTION TO MECHANICS OF BIOMATERIALS (3 credits)
In this course students will learn how to analyze the stresses and strains in different structures under complex loading conditions with extensive examples from biomaterials and materials generally used in the medical device field. (Cross-listed with BMCH 4670).
Prerequisite(s): BMCH 3000 or Department Permission

BMCH 8686 SPORTS BIOMECHANICS (3 credits)
This course is intended to provide students with a foundational knowledge on how to analyze sport movements through biomechanical analytical methods. Students will utilize foundational biomechanical principles and apply them to a variety of sports and associated movements. (Cross-listed with BMCH 4680).
Prerequisite(s): BMCH 4630 or KINS 4100 or Instructor Permission

BMCH 8690 MATHEMATICS OF BIOMECHANICAL DATA PROCESSING (3 credits)
Biomechanics is a rapidly changing and technologically dependent field of study. A thorough understanding of the factors influencing outcome measures is critical to correctly interpreting results. Students will be exposed to various data acquisition systems, approaches, and choices required to assess the computational aspects of biomechanical data critically. This course will equip students to complete independent processing from raw data to 3D joint angles and forces. (Cross-listed with BMKI 9691).
Prerequisite(s): Departmental Permission

BMCH 8696 CARDIOVASCULAR BIOMECHANICS (3 credits)
This course will introduce students to cardiovascular biomechanics, emphasizing the integration of analytical and experimental methods to better understand the mechanobiology of tissues. (Cross-listed with BMCH 4690).
Prerequisite(s): BMCH 3000, BMCH 4670, or Department Permission

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): 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 BMKI 9911).
Prerequisite(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): Department Permission. Not open to non-degree graduate students.

BMKI 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.

BMKI 9001 RESEARCH IN HEALTH & KINESIOLOGY (3 credits)
The course introduces students to scientific writing, quantitative research design, and statistical methods. Considerable emphasis is placed on evaluation of research in scholarly publications. A research proposal in the form of a grant proposal is written as one of the course requirements. Students will develop the skills necessary to analyze study designs in existing literature and create a research proposal. (Cross-listed with HEKI 8030).
Prerequisite(s): Graduate standing. Not open to non-degree graduate students.

BMKI 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.

BMKI 9021 WEARABLE MATERIALS FOR BIOMECHANICAL PERFORMANCE II (3 credits)
This course contains lecture and lab components focused on the design and characterization of wearable materials used in biomechanical and biomedical applications for protection against physical and chemical threats. Students will learn the classification, properties, evaluation methods, and design principles of wearable materials. (Cross-listed with BMCH 8020).
Prerequisite(s): BMCH 4010/BMCH 8016 (WEARABLE MATERIALS FOR BIOMECHANICAL PERFORMANCE I) or Department Permission

BMKI 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): Graduate Standing in Biomechanics program or Department Permission.

BMKI 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): Graduate Standing, BMCH 8030/BMKI 9031 or equivalent

BMKI 9041 ADVANCED STATISTICS (3 credits)
This course will be a study in the statistical methods commonly used in descriptive and experimental research in physical education and exercise science. Application, particularly regarding the purpose, selection, and interpretation of statistical procedures will be emphasized. (Cross-listed with KINS 8040).
Prerequisite(s): HPER 8030/HEKI 8030 or BMKI 9001/HPER 9031/HEKI 9031 or equivalent

BMKI 9050 PHYSICAL ACTIVITY EPIDEMIOLOGY (3 credits)
This course will cover the broad scope of the issues related to epidemiological methods that are relevant to the study of physical activity populations. It is intended to enhance students' ability to understand and apply epidemiological methods to physical activity related research.
Prerequisite(s): PE 8130/KINS 8130 and PE 8040/KINS 8040 or related course, or permission by the instructor. Not open to non-degree graduate students.

BMKI 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): Instructor Permission

BMKI 9131 IMPLEMENTING PHYSICAL ACTIVITY IN DIVERSE POPULATIONS (3 credits)
This course will focus on information necessary to assess, design, implement, and evaluate the need for and effectiveness of physical activity interventions in diverse populations, races, and ethnicities. These populations will include: African American, Native American, Hispanic, Asian American, Pacific Islanders, and Caucasian. Additionally, candidates will complete a health and physical activity service learning project in which they will work with diverse populations in the community. (Cross-listed with KINS 8130).
Prerequisite(s): PE 3900/KINS 3900 or PE 8905/KINS 8905 or PE 8700/KINS 8700 or HED 8600/PHHB 8600.

BMKI 9141 PHYSICAL ACTIVITY ASSESSMENT AND HEALTH RELATED RESEARCH (3 credits)
This course will cover the broad scope of research on physical activity and public health. Emphasis will be placed on the application of physical activity assessment techniques. (Cross-listed with KINS 8140).

BMKI 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): Instructor permission.

BMKI 9221 METHODS IN CARDIOVASCULAR BIOMATERIALS RESEARCH (3 credits)
This course contains lecture and lab components focused on cardiovascular biomaterial development and characterization methods used in academia and industry. The lecture component will provide the necessary clinical background of cardiovascular diseases and the theoretical background of cardiovascular biomaterials and state-of-the-art research methods. The lab component will provide practical experience focused on cardiovascular biomaterial design, manufacturing, and characterization methods. (Cross-listed with BMCH 8220).

BMKI 9230 ADVANCED CARDIOVASCULAR BIOMECHANICS (3 credits)
This course is a continuation of BMCH 4690/8696 Cardiovascular Biomechanics. It will introduce applied techniques to analyze cardiovascular biomechanics data and draw conclusions. It will provide graduate students majoring and concentrating in biomechanics and related disciplines to gain applied knowledge of cardiovascular biomechanics.
Prerequisite(s): BMCH 8696, BMCH 8676, Department Permission

BMKI 9300 SYSTEMATIC REVIEW AND META-ANALYSIS (3 credits)
This course is designed to introduce students to the process of completing systematic reviews and meta-analyses. The objective of the course is to provide students with a foundation of the requisite skills necessary to perform a quantitative and qualitative synthesis of the literature within their area of interest.
Prerequisite(s): HEKI 8030 or equivalent research methods course.

BMKI 9301 STEM TEACHING METHODS FOR DEVICE DESIGN (3 credits)
STEM Teaching in Biomechanics focuses on principles in teaching including teaching models (Problem-Based, Team-Based, Inquiry-Based teaching), student assessment, classroom logistics/organization, and device design through a mentorship project. (Cross-listed with BMCH 8300, STEM 8300).

BMKI 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): Department Permission.

BMKI 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): Department Permission. Not open to non-degree graduate students.

BMKI 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): PE 2800 (Motor Behavior) or permission of instructor.

BMKI 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): BMCH 4630 (Biomechanics) [previously PE 4630] or Instructor Permission.

BMKI 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): BMCH 8450 or BKMI 9451/BMCH 9451 or Instructor Permission. Not open to non-degree graduate students.

BMKI 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): BMCH 8400, BMKI 9401/BMCH 9401 or Instructor Permission. Not open to non-degree graduate students.

BMKI 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): BMCH 8410, BMKI 9411/BMCH 9411 or Department Permission. Not open to non-degree graduate students.

BMKI 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): BMCH 8420 or permission from instructor.

BMKI 9691 MATHEMATICS OF BIOMECHANICAL DATA PROCESSING (3 credits)
Biomechanics is a rapidly changing and technologically dependent field of study. A thorough understanding of the factors influencing outcome measures is critical to correctly interpreting results. Students will be exposed to various data acquisition systems, approaches, and choices required to assess the computational aspects of biomechanical data critically. This course will equip students to complete independent processing from raw data to 3D joint angles and forces. (Cross-listed with BMCH 8690).
Prerequisite(s): Departmental Permission

BMKI 9701 PSYCHOLOGY OF PHYSICAL ACTIVITY (3 credits)
The central purpose of this course is to examine the psychological antecedents and consequences of exercise and physical activity behaviors. The course will focus on traditional theories/principles of psychology as they relate to various physical activity settings. (Cross-listed with KINS 8700).

BMKI 9810 HIGHER EDUCATION TEACHING SEMINAR (3 credits)
The seminar is designed to prepare students for entry into a higher education teaching career. This seminar requires doctoral students to teach an undergraduate or graduate lecture course relevant to their field of preparation. The seminar includes an examination of the roles, responsibilities, and privileges associated with teaching in higher education.
Prerequisite(s): Admittance to the UNO Doctoral Program in Biomechanics and Kinesiology and successful completion of 24 hours of doctoral coursework and approval from advisor. Not open to non-degree graduate students.

BMKI 9820 SERVICE EXPERIENCE IN HIGHER EDUCATION (3 credits)
This seminar will allow students the opportunity to gain valuable knowledge of the service expectations of faculty in higher education settings. The seminar will focus on service opportunities within the university, within the profession and within the community. Participants in the seminar will complete appropriate service activities.
Prerequisite(s): Admittance to the UNO Doctoral program in Biomechanics and Kinesiology, successful completion of 24 hours of doctoral coursework, and approval from advisor. Not open to non-degree graduate students.

BMKI 9851 EXERCISE FOR SPECIAL POPULATIONS (3 credits)
The course will examine the physiological and medical limitations imposed on people with various common chronic diseases/conditions including arthritis, osteoporosis, exercise-induced asthma, obesity, diabetes, hypertension and pregnancy. Special groups such as children and elders will be discussed. Content will emphasize the etiology and guidelines for exercise testing, prescription, and supervision. (Cross-listed with HEKI 8850).
Prerequisite(s): PE 4940/KINS 4940 or PE 8946/KINS 8946

BMKI 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): Department Permission.

BMKI 9910 DOCTORAL SEMINAR (1-24 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.
Prerequisite(s): Admission into the PhD program. Not open to non-degree graduate students.

BMKI 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): Graduate student in BMCH and approval by Faculty Advisor. Not open to non-degree graduate students.

BMKI 9951 ADVANCED EXERCISE PHYSIOLOGY (3 credits)
A detailed analysis of selected topics including acute and chronic effects of exercise on metabolic, pulmonary, and cardiovascular function; and sports nutrition. Current research findings and methodology will be emphasized. (Cross-listed with KINS 8950).
Prerequisite(s): PE 4940/KINS 4940 or equivalent

BMKI 9960 ADVANCED EXERCISE PHYSIOLOGY II (3 credits)
The focus of this course is a detailed analysis of the mechanisms responsible for acute and chronic responses to exercise at the cellular and molecular level. Current and historical research will be emphasized.
Prerequisite(s): PE 8950/KINS 8950 or BMKI 9951/PE 9951/KINS 9951. Not open to non-degree graduate students.

BMKI 9971 TOPICS IN SPORTS MEDICINE (3 credits)
This course is designed to help students synthesize and apply their knowledge of athletic training and sports medicine to current topics, unique populations, and other areas of exercise, sports medicine and health care. (Cross-listed with KINS 8970).

BMKI 9990 DISSERTATION (1-15 credits)
The course provides doctoral candidates in Biomechanics & Kinesiology 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.
Prerequisite(s): Admittance to UNO Doctoral Program in Biomechanics & Kinesiology, successful completion of doctoral coursework & comprehensive exams, dissertation supervisory committee chair approval & advancement to candidacy. Not open to non-degree graduate students.