BIOMECHANICS (BMCH)

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).
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 8206 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 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 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 academian 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.