

BIOMECHANICS

The mission of the Department of Biomechanics is to provide a new understanding of the dynamical aspects of human movement via multidisciplinary approaches. In particular, we aim to achieve the following specific objectives:

1. Quantitatively characterize the complex behavior in healthy and abnormal movement patterns via innovative analyses.
2. Educate and train students, clinicians, and basic scientists so they may apply concepts of human movement variability in their careers as educators and researchers.
3. Improve our understanding of basic healthy and abnormal movement patterns using an interdisciplinary approach in clinically oriented research.
4. Develop new diagnostic and prognostic tests and related biotechnology for a variety of movement disorders and aging.
5. Provide biomechanically related services to interested parties as well as to University and community partners.
6. Participate in community outreach activities that involve biomechanically related educational opportunities.

Biomechanics is the study of forces that act on the body and the effects they produce. It is an intersection of biology, physiology, anatomy, physics, mathematics, and chemistry. Biomechanics is a rapidly growing discipline that has many applications in robotics, forensics, ergonomics, clinical assessment and rehabilitation of movement disorders, design of prosthetics, sports performance, sports equipment design, safety, etc.

The B.S. in Biomechanics is an excellent choice for students planning to a) pursue graduate education and careers in research, b) work in biomechanically related industry and hospital laboratories, and c) pursue graduate education in professional schools for physical therapy, occupational therapy, medicine and other science-based programs.

The Minor in Biomechanics is ideal for those students who have a major outside of Biomechanics and would benefit from learning the basic principles of Biomechanics.

Contact Information

Biomechanics Research Building
402.554.3228
unonbcf@unomaha.edu

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

Other Information

Once students are admitted to the Bachelor of Science in Biomechanics they will be in the College of Education and will be required to maintain a cumulative college GPA of 2.5/4.0 scale and grades of "C-" or better in the core courses to remain in good standing in the College of Education.

The department highly encourages students to engage in undergraduate research with a faculty mentor. A list of Biomechanics faculty can be found on our website (<http://www.unomaha.edu/college-of-education/biomechanics-core-facility/about-us/directory>). There are also many undergraduate volunteer and student worker opportunities available in the Department.

Degrees Offered

- Biomechanics, Bachelor of Science (<http://catalog.unomaha.edu/undergraduate/college-education/biomechanics/biomechanics-bs>)

- Biomechanics Minor (<http://catalog.unomaha.edu/undergraduate/college-education/biomechanics/biomechanics-minor>)

BMCH 1000 INTRODUCTION TO BIOMECHANICS (3 credits)

This is an introductory course in biomechanics that provides a brief history, an orientation to the profession, and explores the current trends and problems and their implications for the discipline.

Distribution: Social Science General Education course

BMCH 1100 ETHICS OF SCIENTIFIC RESEARCH (3 credits)

This course is a survey of the main ethical issues in scientific research.

Distribution: Humanities and Fine Arts General Education course

BMCH 2200 ANALYTICAL METHODS IN BIOMECHANICS (3 credits)

Through this course, students will learn the fundamentals of programming and problem solving for biomechanics with Matlab and Excel. Students will also learn the attributes and uses of other programming languages.

BMCH 2400 HUMAN PHYSIOLOGY & ANATOMY I (4 credits)

The study of the structure and function of the systems of the body with an emphasis on the skeletal, muscular, cardiovascular and respiratory systems.

Distribution: Natural/Physical Sci General Education lecture&lab

BMCH 2500 HUMAN PHYSIOLOGY AND ANATOMY II (4 credits)

The study of the structure and function of the systems of the body with an emphasis on the nervous system, special senses, digestive system, endocrine system, metabolism and body temperature regulation, lymphatic system, and urinary system.

Prerequisite(s)/Corequisite(s): PE 2400 or BMCH 2400 with a grade of C- or better.

BMCH 3000 BIOMECHANICAL STATICS & DYNAMICS (3 credits)

This course is the study and exploration of the effect of forces on biological systems, mainly the human body, during static and dynamic situations.

Prerequisite(s)/Corequisite(s): PHYS 2110, PHYS 1154

BMCH 4100 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 the principles of how humans, other animals and plants function in their environment. These design principles from nature can be translated into novel devices and structures.

BMCH 4200 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.

Prerequisite(s)/Corequisite(s): BMCH 3000, BMCH 2200 with a grade of C- or better or department permission.

BMCH 4210 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, Methods in Biomechanics I.

Prerequisite(s)/Corequisite(s): BMCH 4200 with a grade of C- or better or department permission.

BMCH 4630 BIOMECHANICS (3 credits)

A study of the forces that act on a human body and the effects that they produce.

Prerequisite(s)/Corequisite(s): BMCH 2400 [previously PE 2400] or PE 2880 or BIOL 2740 or equivalent, and PHYS 1110 and PHYS 1154 or equivalent with a grade of C- or better.

BMCH 4640 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.

Prerequisite(s)/Corequisite(s): BMCH 4630, BMCH 3000, or department permission.

BMCH 4650 NEUROMECHANICS OF HUMAN MOVEMENT (3 credits)

A study of basic principles of neural process as they relate to human voluntary movement. Applications of neural and mechanical principles through observations and assessment of movement, from learning to performance, as well as development.

Prerequisite(s)/Corequisite(s): BMCH 1000 or PE 2430.

BMCH 4980 CAPSTONE DESIGN IN BIOMECHANICS I (4 credits)

Teams of senior-level students work with sponsors and faculty advisers to develop solutions to real problems in the biomechanics and health-care related fields.

BMCH 4990 CAPSTONE DESIGN IN BIOMECHANICS II (4 credits)

Teams of senior-level students work with sponsors and faculty advisers to develop solutions to real problems in the biomechanics and health-care related fields. The Capstone Design II course is intended to further develop and validate the concept direction chosen during Capstone Design I by designing the specific details necessary to build and test a proof-of-concept prototype.

Prerequisite(s)/Corequisite(s): BMCH 4980, or department permission.