



BIOMECHANICS

Department of Biomechanics

Graduate Program Handbook

Master of Science in Biomechanics

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Graduate Program Committee

The Biomechanics Graduate Program Committee shall consist of the Graduate Program Chair and two graduate faculty within the Department of Biomechanics. The Chair of the Department of Biomechanics is also considered an ex officio, non-voting member. The Graduate Program Chair is nominated by a member of the Graduate Program Committee in the initial meeting at the beginning of the academic year. This individual must accept the nomination and then all members of the committee take part in a vote to elect the Graduate Program Chair. The Chair will serve on the College of Education Graduate Program Committee.

The Graduate Program Committee handles all official matters requiring action on behalf of the program (other than normal administrative matters which are handled by the Graduate Program Chair). Members will serve three year terms, rotating so that no more than one member is replaced per year. Department faculty will determine who serves on the committee. The selection will take place in April, with new members beginning their responsibility the following fall. Two members of the graduate program committee will serve on the doctoral program committee as well. In the event of a tie vote, the Department of Biomechanics Chair will vote to break the tie. The committee will receive administrative support from an appointed Department of Biomechanics staff person.

MS in Biomechanics Program Overview

The MS in Biomechanics is housed within the Department of Biomechanics at the University of Nebraska at Omaha. It is a degree program designed to enable students from Nebraska, nationally, and abroad to develop skills and competencies in the field of Biomechanics. This program provides a new understanding of the dynamical aspects of human movement via multidisciplinary research using an evidence-based approach through clinical and translational research.

The goal of the program is to prepare students for the workforce or the pursuit of a doctoral degree. The coursework related to this degree program will provide the students with a strong and broad base which will enable students to enter the workforce at a professional level commensurate with a Master's degree or to continue their training in numerous doctoral program areas. An additional strength of the coursework is its emphasis on quantitative sciences. This emphasis allows students to stand out among other candidates for fellowships, assistantships, and scholarships given to these students.

The program is enhanced by an evidence-based approach through interdisciplinary clinical and translational research. This program is designed to be an excellent choice for students planning to continue their education beyond the bachelor's degree in the fields of Biomechanics, Medicine, Physical Therapy, Occupational Therapy, and other science based programs. With the high number of applicants in health professions, the MS in Biomechanics gives applicants additional training in movement and quantitative sciences to stand out among other applicants.

Admission

Applicants will submit an online application to the UNO graduate studies office www.unomaha.edu/admissions/apply/index.php. Applications are accepted throughout the year on a rolling basis. Once application materials are received, the graduate studies office will defer the application to the Department of Biomechanics.

Application requirements:

- Written statement of goals and rationale for entering the graduate program. Students need to identify the intended area of focus and name of the faculty advisor with whom they wish to work (maximum of 300 words).
- Two letters of recommendation.
- Official transcripts from previous institutions.*
- GRE Score.*
- Minimum GPA of 3.0 in undergraduate program.
- For applicants whose native language is not English, minimum total score of 80 on the internet based TOEFL, with at least 20 in all categories (listening, reading, writing, and speaking).
- *Applicants are encouraged to upload unofficial documents when first applying and uploading official documents upon admission

Undergraduate Course Deficiencies:

- BMCH 2400 Human Physiology and Anatomy I or equivalent
- BMCH 4630 Biomechanics or equivalent
- MATH 1950 Calculus I or equivalent

Undergraduate course deficiencies are determined by the Biomechanics Graduate Program Committee's review of the student's official transcripts. Students must complete Undergraduate Course Deficiencies within the first two semesters of enrollment.

Admission Categories

1. Regular
 - a. Regular admission is offered to students who meet all established admission criteria.
2. Provisional
 - a. Provisional admission is offered to students who lack specific admission requirements. All provisional requirements must be met within the deadline given before regular admission is granted. Failure to meet provisional requirements is grounds for dismissal from the program.

Once students are admitted to the MS in Biomechanics they will be in the Graduate College and will be required to maintain a cumulative GPA of 3.0 on a 4.0 scale, with no grade lower than a "B" in the required courses to remain in good standing. All course deficiencies must be passed with a grade of "C-" or higher.

Program of Study

The student and faculty advisor will determine the Program of Study, including the elective courses and general area of research for the thesis. The Program of Study must be submitted to the Graduate Program Committee by the end of the student's first semester.

The 36 credit hour curriculum for the MS (**thesis option**) is composed of three components. They include:

- Core Coursework (15 credit hours)
- Electives (15 credit hours)
- Thesis (6 credit hours)

The 36 credit hour curriculum for the MS (**non-thesis option**) is composed of three components. They include:

- Core Coursework (15 credit hours)
- Electives (21 credit hours)
- Comprehensive Exam

Core Coursework (15 Credit Hours)

Statistics Requirement (3 credit hours)

BMCH 8030/9031 Biostatistics in Biomechanics I (3 credits)

Or

PE 8040/9041 Advanced Statistics (3 credits)

Motor Requirement (3 credit hours)*

BMCH 8400/9401 Motor Learning I (3 credits)

BMCH 8410/9411 Motor Control I (3 credits)

BMCH 8420/9421 Motor Development I (3 credits)

BMCH 8450/9451 Advanced Biomechanics I (3 credits)

BMCH 8200/9201 Matlab for Movement Sciences (3 credits)

BMCH 8000 Seminar Series (0 credits)**

BMCH 8900/9901 Independent Research (3 credits)

*Only one is required, the others may be used as electives

**Two semesters of Seminar Series are required

Electives (15-21 Credit Hours)

Pertinent graduate coursework will be taken at UNO, with the option to take elective coursework at UNMC and UNL as well. The Faculty Advisor and Graduate Program Committee must approve any elective courses not on the list below. Suggested courses include the following:

BMCH 8006 Biomaterials

BMCH 8696 Cardiovascular Biomechanics

BMCH 8646 Orthopedic Biomechanics

BMCH 9460 Advanced Biomechanics II (3 credits)

BMCH 8400 Motor Learning I (3 credits)

BMCH 8410 Motor Control I (3 credits)

BMCH 8420 Motor Development I (3 credits)

BMCH 8100 Nonlinear Analysis

BMCH 8910 Independent Study

BMKI 9500 Motor Learning II

BMKI 9520 Motor Development II

BMKI 9510 Motor Control II

BMKI 9040 Biostatistics in Biomechanics II

MATH 8400 Dynamic Systems and Chaos

PSYC 9070 Proseminar: Cognitive Psychology

PSYC 9230 Proseminar: Behavioral Neuroscience

ITIN 8006 or 8086: Special Topics in IT Innovation

CSCI 8080 or MATH 8080: Design and Analysis of Algorithms

CSCI 8256: Human Computer Interaction
CSCI 8766 or MATH 8766: Topics in Modeling
CEEN 8336: Microprocessor System Design
CEEN 8366: Embedded Microcontroller Design
ELEC 8606: Labview Programming
PHYS 8505: Elements of Electronics
CSCI 8456 Introduction to AI
CSCI 8476 Pattern Recognition
CSCI 8510 Advanced Numerical Methods II
CSCI 8400 Advanced Computer Graphics
CSCI 8500 Advanced Numerical Methods I
CSCI 8626 Computer Graphics
MATH 8306 Operations Research I
MATH 8316 Operations Research II
MATH 8370 Fuzzy Set Theory & Operations Research
MATH 8766 Topics in Modeling-Time Series
MATH 9110 Advanced Topics in Applied Math
PE 8140/9141 Physical Activity Measurement
PE 8856 Cardiac Rehabilitation Principles and Practices
PE 8076 Optimizing Sport Performance
PE 8086 Clinical Exercise Physiology
HPER 8850 Exercise for Special Population
PEDS 913 Advanced Gen Pediatrics (UNMC)
PHYT 942 Special Topics in Pediatric Physical Therapy (UNMC)
GCBA 812 Human Neuroanatomy (UNMC)
BSEN 815: Intro to MRI (UNL College of Engineering)
ENGR 816: Physical Ergonomics (UNL College of Engineering)
MECH 940: Fracture Mechanics (UNL College of Engineering)
ECEN 4000/8006 - Electronic Instrumentation (UNL College of Engineering)
MECH 958 - Advanced Mechatronics (UNL College of Engineering)

Graduate Courses with BMCH, BMKI, KINS, or HEKI prefix

Thesis (for thesis option)

BMCH 8990 Thesis (6 credits)

DegreeWorks

DegreeWorks is UNO's degree audit system and can be used to check degree progress, plan future courses, and review course history. DegreeWorks should be reviewed with the student's faculty advisor for accuracy and corrections should be made if errors exist.

Thesis

The student must register for thesis hours after required core coursework is complete, in the final semester of enrollment. Six hours of thesis credit must be completed for the degree for thesis-option students. Thesis planning should begin a minimum of twelve months prior to the planned date of graduation.

Thesis Committee Chairperson and Committee Members

The student will identify a thesis faculty advisor who agrees to serve as the committee chairperson. The student along with the committee chairperson will select committee members who can offer assistance regarding the tentative topic. The composition of the committee is structured as follows:

- Minimum of two faculty members with a primary appointment within BMCH graduate program (includes chairperson).
- Minimum of one faculty member with a primary appointment outside BMCH graduate program with knowledge of thesis topic.
 - *The faculty member must have an appointment within the University of Nebraska system and be approved as graduate faculty as per the College of Graduate Studies.*

The Dean of Graduate Studies at UNO will appoint the committee upon recommendation of the advisor. The committee will be responsible for approving the thesis proposal and defense.

The student is required to obtain the “Proposed Supervisory Committee Form” and obtain the required signatures of proposed committee members and advisor. The thesis committee chairperson will forward the list of tentative committee members to the Chair of the Biomechanics Graduate Program Committee for approval. The Chair of the Biomechanics Graduate Program Committee will submit the names of tentative committee members to the Dean of Graduate Studies for approval and appointment.

Proposed Supervisory Committee Form:

https://www.unomaha.edu/graduate-studies/_files/supervisory-committee-form.pdf

Thesis Proposal

A student must propose their thesis the semester before they plan to enroll in thesis hours and graduate. A final copy of the thesis proposal must be delivered to the Supervisory Committee members a minimum of two weeks prior to the scheduled thesis proposal. Thesis proposals that involve human or animals subjects must receive approval from the Institutional Review Board (IRB) before the thesis proposal date. The format required is at the discretion of the Supervisory Committee Chair. The thesis proposal will be scheduled once a majority of Supervisory Committee members have determined that the proposal is appropriate.

Thesis proposals will be open to the public. An invitation will be sent to Biomechanics faculty and students, as well as staff and students who work in the Biomechanics Research Building. The student will present a summary of proposed research and then answer questions from the committee, faculty, and guests. After questions have been answered, the Supervisory Committee will meet to decide whether the thesis proposal will receive a pass, conditional pass, re-examination, or failure. Results will then be shared with the student. The student cannot receive more than one dissenting vote from committee members to receive a passing grade. Students who fail the thesis proposal may repeat the process and present a new or modified thesis proposal within 6 months of the original thesis proposal date.

Approval of the thesis proposal by the Supervisory Committee must be obtained. The student is required to obtain the “Thesis Proposal Approval Form” from the Graduate Office and obtain the required signatures of Supervisory Committee members once the thesis proposal is approved. The thesis committee chairperson will forward the form to the Chair of the Biomechanics Graduate

Program Committee for approval. The Chair of the Biomechanics Graduate Program Committee will submit the form to the Dean of Graduate Studies.

Thesis Proposal Approval Form:

https://www.unomaha.edu/graduate-studies/_files/thesis-proposal-approval-form.pdf

Thesis Defense

Students in the thesis-option track must defend their thesis in order to graduate from the program. The thesis defense will be scheduled once the Supervisory Committee Chair determines the defense is appropriate. A copy of the thesis documents must be given to the Supervisory Committee members a minimum of two weeks before the scheduled thesis defense. Thesis defenses will be open to the public. An invitation will be sent to Biomechanics faculty and students, as well as staff and students who work in the Biomechanics Research Building. The student will present a summary of completed research and then answer questions from the committee, faculty, and guests. After questions have been answered, the Supervisory Committee will meet to decide whether the thesis is accepted, rejected, or accepted pending revisions. Results will then be shared with the student. The student cannot receive more than one dissenting vote from committee members to receive a passing grade.

The student is required to obtain the “Report on Completion of Degree Form” from the Graduate Office and obtain the required signatures of Supervisory Committee members. The thesis committee chairperson will forward the form to the Chair of the Biomechanics Graduate Program Committee for approval. The Chair of the Biomechanics Graduate Program Committee will submit the form to the Dean of Graduate Studies. A student’s thesis must be submitted electronically to graduate studies 12 business days prior to commencement in order to be eligible for graduation.

Report on Completion of Degree Form:

https://www.unomaha.edu/graduate-studies/_files/report-completion-degree-form.pdf

Electronic Submission of Thesis:

<https://www.unomaha.edu/graduate-studies/current-students/thesis-submit.php>

Sample Thesis Timeline

First Semester (Fall) - Speak with Faculty Advisor/Thesis Committee Chair about thesis topic and program of study and submit Program of Study to Graduate Program Committee.

Second Semester (Spring) – Determine Supervisory Committee members, complete the Proposed Supervisory Committee Form and submit form to Graduate Program Committee. Begin preparing for Institutional Review Board (IRB) submission.

Third Semester (Fall) – Complete thesis proposal, complete the Thesis Proposal Approval Form and submit it to the Graduate Program Committee, obtain IRB approval, and begin research study.

Fourth Semester (Spring) – Enroll in thesis hours, complete research study, apply for graduation, complete thesis defense, complete the Report on Completion of Degree Form and submit it to

Graduate Program Committee, submit electronic version of thesis to graduate studies, and graduate.

Comprehensive Exam

The student will complete a comprehensive exam in their last semester of coursework. The exam must be completed for the non-thesis option students. The student must register for the comprehensive exam by the registration deadline. A registration form can be obtained from the Departmental Academic Program Coordinator. The student will work with their faculty advisor to determine the graduate faculty members that will serve on the Comprehensive Exam Committee and write each of the comprehensive exam questions. Once identified, the student will contact each of the faculty members requesting their participation on their committee. Once the questions are written and distributed to the student, they will have three weeks (21 days) to complete the exam. The completed exam must be submitted to the academic program coordinator. Once submitted, the committee members will evaluate the answers submitted and complete their portion of the Comprehensive Exam Evaluation Form. Faculty will submit this form to the academic program coordinator. The student is required to pass all five comprehensive exam questions in order to pass the comprehensive exam and graduate. If the student fails any of the questions, they will have one opportunity to re-answer each question they fail. This must be completed within one semester of the failed attempt. A student's comprehensive exam results must be submitted to graduate studies 12 working days prior to commencement in order to be eligible for graduation.

Comprehensive Exam Questions

The comprehensive exam will consist of five questions based on the student's coursework. Three questions must pertain to the core coursework and two must pertain to elective coursework. Each question should take the student 4-5 hours to answer and the quality of work must be equivalent to a B letter grade.

*Plagiarism or academic dishonesty of any kind will result in automatic failure of the comprehensive exam and dismissal from the program.

Sample Comprehensive Exam Timeline

October 4 – Registration Deadline

October 11-15 – Faculty Write Comprehensive Exam Questions and Submit to Graduate Program Committee

October 18-22 – Graduate Program Committee and Comprehensive Exam Committee evaluate questions. Faculty rewrite questions if deemed necessary.

October 25 – Student is sent exam

November 12 – Completed Comprehensive Exams are due at 4:00 pm

November 15-26 – Designated Faculty Evaluate Comprehensive Exam Submission

December 2 – Comprehensive Exam Results Sent to Graduate Studies

Independent Study and Independent Research

Master's degree students are allowed to take 6 credit hours of Independent Study and 6 credit hours of Independent Research. Additional independent study and independent research credit will not count towards degree completion.

Students must obtain an Independent Study/Research Application from the Departmental Academic Program Coordinator and submit it to the Graduate Program Committee. The Graduate Program Committee then reviews and either approves, denies, or requests changes be made to the application before approval.

Transfer Credits

Students with graduate coursework from other institutions may transfer up to 9 credit hours that count towards the Master of Science in Biomechanics degree. Possible transfer courses will be reviewed by the Graduate Program Committee for approval. Course syllabi may be requested by the committee to determine if a transfer course is eligible.

GPA Requirements

Students must receive a grade of B or better in all coursework and maintain a GPA of 3.00 on a 4.00 scale to be considered in good academic standing.

Enrollment Requirements

Students are considered full time when they are enrolled in 9 graduate credit hours. Students are considered part-time when they are enrolled in 4 graduate credit hours.

Academic Appeals

Policies and procedures for appealing grades in graduate level courses are outlined in the UNO Graduate Catalogue under **Academic Appeals**. Students can quickly access specific issues concerning academic/grade appeals through the following links:

- [Appeal of Grades in Graduate-Level Course](#)
- [Appeal of General Academic Matters Related to Student Program](#)
- [Graduate Student Academic Appeal Policy](#)

While all academic appeal policies and procedures are important, students should take particular note of the following policy found under the “**Appeal of Grades in Graduate Level Courses**”:

“Students who believe their evaluation in a course has been prejudiced or capricious must first attempt to resolve the matter with the course instructor and then the department through which the course was offered.”

Intercampus Enrollment

Students may choose to take elective coursework at University of Nebraska Medical Center or University of Nebraska-Lincoln.

University of Nebraska Medical Center Intercampus Enrollment:

<https://www.unmc.edu/gradstudies/admissions/steps-to-admission/intercampus-enrollment.html>

University of Nebraska-Lincoln Intercampus Enrollment:

<https://wam.unl.edu/gradstudies/apply>

Quality Standards

There are certain expectations of all students in Graduate Studies. For detailed information on GPA, automatic dismissal, probation or dismissal, student responsibilities, and other standards, visit <https://www.unomaha.edu/graduate-studies/current-students/quality-standards.php>.

Graduate Assistantships

Recruitment, Selection, and Renewal

Students interested in a graduate assistantship must apply for an assistantship through the UNO Human Resources website and submit all required documents. Applications will be reviewed by the Graduate Program Committee and scored using the approved rubric (see Appendix 1). All graduate assistants must attend an orientation at the beginning of the year, review and sign the policies and procedures document, attend team meetings and reading clubs, and attend seminar series.

Assistantships are not automatically renewed each year. Renewal is contingent on the performance of their work in the laboratory and courses, and evaluation by the faculty mentor.

Workload

Graduate assistants are expected to work 20 hours per week for the duration of the appointment. An allotment of two weeks of vacation is to be given to each graduate assistant at the discretion of the faculty mentor. Additional jobs outside of the assistantship is highly discouraged.

Duties

Overall job duties are outlined by the graduate assistantship contract and detailed job duties are determined by the faculty mentor. Duties assigned are to be directly related to and in support of the students' graduate studies in their chosen field of study. The majority of the assistantship duties will be related to the research interests of the student and designated faculty mentor. Other activities may include teaching courses or lab sections, preparing research materials or presentations, and other duties related to direct knowledge and application related to the field of study.

Course load

Graduate assistants must enroll in a minimum of six graduate credit hours per semester and may not register for more than 12 graduate credit hours per semester. The six-hour minimum may be waived if the student is in the last semester of graduate coursework and requires less than six credit hours of graduate credit in order to complete the degree requirements. International graduate

assistants must enroll in a minimum of nine graduate credit hours per semester to maintain their F-1 student visa status. For additional information, consult the International Studies Office.

Appointment Length

Assistantships may be appointed on an academic-year basis, a calendar year basis, or semester-by-semester basis. Master's Degree students are limited to receiving graduate assistantship funding to two years. These appointments may be extended on an individual basis upon the recommendation of the Graduate Program Committee and approval of the Dean of Graduate Studies.

Justification of New Assistants

In order to receive permission to create new assistantships, whether state-funded or grant-funded, a brief statement of justification must be submitted for approval to the cognizant College Dean and the Dean of Graduate Studies prior to being sent to the Vice Chancellor of Academic Affairs. Assistantships supported by external funding will usually be terminated once the funding ends. No special approval is required in such cases. The Dean of Graduate Studies should also be notified of any proposed redistribution of Graduate Assistant lines from one department to another.

Graduate Portfolio

In the Spring semester, each student must submit a graduate portfolio. It is expected that each student will meet with their faculty advisor and discuss their progress in the program. The graduate program committee will use the information contained in the portfolio to evaluate student's progress in the program. The graduate portfolio is comprised of the following items:

- Section 1: Degree Progress/Status Form
 - Include Plan of Study
 - Include DegreeWorks printout
- Section 2: Annual Progress Evaluation
- Section 3: Advisor Summary/Recommendation Form
- Section 4: Curriculum Vitae
- Section 5: Evidence of Achievement

The portfolios will be evaluated using the Graduate Program Committee Portfolio Evaluation Form. Evaluations will be distributed to the Department Chair and Department Faculty. The specific due date will be emailed to faculty and students.

The Department of Biomechanics will use the portfolio materials to evaluate students for Departmental Graduate Assistantship funding using the approved rubric (Appendix 1). Graduate Assistantships funded by grants are evaluated by the PI of the grant.

Course Numbering System

Courses numbered 8000-8999 are graduate level courses designed for Masters students but also open to Doctoral students. Courses numbered 9000-9999 are graduate level courses designed for Doctoral students but also open to Masters students. Permission numbers may be needed for certain courses and can be obtained by the Departmental Academic Program Coordinator.

Time Limits for Degree Completion

The degree program (as defined in the plan of study, and comprehensive exams, if required) for master's and Ed.S. degrees must be completed within ten consecutive calendar years. Course work

which would be over 10 years old (30 consecutive terms) at the completion of the degree program (as defined in the plan of study) cannot be used for a master's or Ed.S. degree. The first day of class of the earliest course which appears on the student's plan of study is the beginning of the student's graduate education.

Student Checklist

1. Apply for admission into the MS in Biomechanics program at <https://applynow.unomaha.edu/>
2. Complete all items on the MavLink To Do list
3. Notified by Graduate Studies via mail of acceptance or non-acceptance into the program
4. Schedule meeting with faculty advisor to discuss course schedule
5. Thesis-option students should determine thesis supervisory committee members and begin planning their thesis within the first year of the program
 - a. Submit Thesis Supervisory Committee Form
6. Thesis-option students complete thesis proposal
 - a. Submit Thesis Proposal Approval Form
7. Thesis-option students complete thesis defense
 - a. Submit Report on Completion of Degree Form
 - b. Submit electronic version of thesis to Graduate Studies at least 12 working days prior to commencement
8. Non-thesis option students register for comprehensive exam and determine faculty that will provide comprehensive exam questions
9. Non-thesis option students pick up, complete, and submit comprehensive exam in the final semester of coursework
 - a. Comprehensive exam results must be submitted to Graduate Studies at least 12 working days prior to commencement
10. During final semester, apply for graduation via MavLink
11. Order cap and gown from the UNO Bookstore

12. Complete all items on the MavLink To Do list and ensure all degree requirements are met
by checking DegreeWorks
13. Graduate!

Appendix 1

Criteria	Highest Score: 4	3	2	Lowest Score = 1 (0 if missing)
Student History	Returning supported student	Returning unsupported student	Incoming student	
GPA	4.0-3.75	3.74-3.50	3.49-3.2	<3.2
1st Year Achievements (Returning Students)	Outstanding evidence of within program productivity (e.g. teaching evals, outreach participation, literature review)	Strong evidence of within program productivity (e.g. teaching evals, outreach participation, literature review, grant)	Moderate evidence of within program productivity (e.g. teaching evals, outreach participation, literature review)	Poor or no evidence of within program productivity (e.g. teaching evals, outreach participation, literature review)
Quantitative GRE (Incoming Students)	90th percentile	75th percentile	60th percentile	Below 60th percentile
Scholarly Productivity	All previous publication in peer-reviewed journal.	Regional or national conference presentation.	Local presentation	No previous presentations
Letter(s) of recommendation*	Strong letters of recommendation	Positive letters of recommendation	Weak letters of recommendation	No letters of recommendation
Awards	Previous success in national, regional, and local academic and research awards.	Previous success in regional and local academic and research awards.	Previous success in local academic and research awards.	No previous success in academic and research awards.
Extracurricular Activities	High level of participation in extracurricular activities.	Moderate level of participation in extracurricular activities.	Low level of participation in extracurricular activities.	No participation in extracurricular activities

*For Teaching Assistantships, include 1-page letter from course instructor