

MASTER OF SCIENCE IN BIOKINESIOLOGY

STUDENT HANDBOOK



Division of Biokinesiology & Physical Therapy

School of Dentistry

University of Southern California

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What is Biokinesiology?

Biokinesiology – n. The study of the biological bases of both healthy and disordered human movement.

The focus of biokinesiology is on understanding how the human body adapts to growth and experience as well as its adapting to injury, disease, and aging. Three fundamental principles provide a rationale for the study of biokinesiology as the foundation science of physical therapy. They are:

1. Human health and quality of life depend on the ability to move skillfully and efficiently.
2. Specific biological mechanisms are responsible for skilled and efficient motor output, and an understanding of these mechanisms is essential to developing better methods for treating disorders that affect movement
3. Movement is used by humans to accomplish meaningful goals. This means that a behavioral or action-based perspective is therefore essential to understanding the determinants of both normal and dysfunctional movement

Biokinesiology is inherently interdisciplinary. In order to elucidate the causal mechanisms in movement behavior, research programs are designed to analyze movement across different levels of observation. Biokinesiology integrates the study of movement across three broadly defined hierarchical levels. First, movement is analyzed at the molecular, cellular, organ, and systems levels. This is accomplished by using techniques developed in the life sciences in order to discover the basic structural and physiological mechanisms that account for movement adaptability. These techniques are often invasive and involve animal models and advanced clinical models. Second, movement itself is studied from the outside using non-invasive or minimally invasive techniques for measuring movement trajectories, the forces that produce movement, and the muscle contractions that produce force. Included in this outside-in perspective are psychophysical and behavioral approaches for describing and analyzing the nature of information processing and the course of learning and adaptability. Lastly, clinical investigations are designed to determine the best ways to measure pathologic movement and to test the efficacy of interventions intended to rehabilitate individuals with disorders that affect their movement.

Master of Science in Biokinesiology Program Philosophy & Objectives

The Master of Science in Biokinesiology program prepares graduates to be research scientists in the field of biokinesiology, MS students conduct basic or clinical research usually under the direction of a principal investigator. The philosophy of the MS in biokinesiology program is that graduates will be prepared to conduct collaborative, interdisciplinary research. This requires that they are conversant in all areas of biokinesiology and that they are able to conceptualize research questions across several levels of analysis. The curriculum strikes a balance between providing students with a broad exposure to the variety of disciplines within biokinesiology and giving students the advanced skills necessary to excel in a specialized area. Students achieve breadth of knowledge by taking a set of required core courses, and they develop depth by taking elective courses in their areas of concentration. MS students also learn specialized research skill by completing a project in one of the laboratories of the biokinesiology program.

Master of Science in Biokinesiology Emphasis in Sports Science Program Philosophy & Objectives

The Master of Science in Biokinesiology with an emphasis in Sports Science prepares graduates to become a member of a multi-disciplinary team for athlete performance and well-being working in athletics, industry and academics. MS-Sports Science students conduct clinical or basic research usually under the direction of a principal investigator and complete an internship in a sports science setting. This requires that students are conversant in all areas of Biokinesiology, are able to conceptualize all aspects of experimental design across several levels of analysis. It is imperative that they are able to apply and communicate their knowledge to individuals across disciplines. The curriculum provides students with a solid understanding of physiological, biomechanical and neurological basis of movement while giving students the advanced skills necessary to excel in a specialized area related to sport and exercise. Graduates will have a theoretical and practical understanding of the concepts and tools used in sports performance assessment and interpretation with respect to injury, injury risk and optimal performance.

Division Requirements for the Masters Degree in Biokinesiology

Important facts

- 1) 32 units required for MS degree
- 2) Students must maintain at least a 3.0 GPA (grades less than “C” are considered failing)
- 3) MS students are considered full time if enrolled in at least 4 units. For students who have teaching or research assistantships, 6 units are required.
- 4) All MS students are required to attend the graduate student seminar and BKN survival series (usually held every other Thursday).

Required Courses (28 units required)

BKN 550	Neurobehavioral basis of movement (4 units)
BKN 551	Musculoskeletal and biomechanical basis of movement (4 units)
BKN 552	Physiological basis of voluntary movement (4 units)
BKN 553	Experimental methods for the study of human movement (4 units)
BKN 559	Readings in Biokinesiology (4 units)
BKN 590	Directed research (4 units)
PM 510	Principles of biostatistics (4 units)

Summative Research Experience

There is no Division requirement for a Master’s thesis or Comprehensive Examination. Instead, students are required to complete a summative research experience. The culminating event of the summative research experience can include, but is not limited to, the following: 1) Poster presentation at the Division Research Day or at a state or national conference, or 2) Oral presentation at Division Seminar or at a state or national conference.

Suggested Plan of Study

A *suggested* plan of study is outlined below. Students should consult with their academic advisor to set up a plan of study designed to meet individual needs.

Year 1 (Fall)

BKN 551 (4 units)

BKN 553 (4 units)

(Spring)

BKN 550 (4 units)

BKN 552 (4 units)

Year 2 (Fall)

BKN 559 (4 units)

PM 510 (4 units)

(Spring)

BKN 590 (4 units)

Elective(s) (4 units)

Summative Research Requirement (BKN 559 & 590)

In order to fulfill the summative research requirement, the following plan is suggested however, each plan can be individualized based on the needs of the student and/or advisor.

1. Select a research professor (from the division) whose work interests them (Ideally this should be done by the end of Year 1)
2. After receiving the professor's approval, register for BKN 559 (4 units) and complete a semester reading the literature pertinent to the professor's work.
3. The following semester, sign up for BKN 590 (4 units) and participate in an ongoing research project which is being conducted by the professor.

Division Requirements for the Masters Degree-Emphasis in Sports Science in Biokinesiology

Important facts

- 5) 32 units required for MS degree
- 6) Students must maintain at least a 3.0 GPA (grades less than “C” are considered failing)
- 7) MS students are considered full time if enrolled in at least 4 units. For students who have teaching or research assistantships, 6 units are required.
- 8) All MS students are required to attend the graduate student seminar and BKN survival series (usually held every other Thursday).

Required Courses (24 units required)

BKN540: Foundations for Athlete Readiness (4 units)
BKN553: Experimental Methods for the Study of Human Movement (4 units)
BKN560: Movement Analysis for Sport (4 units)
BKN552: Physiological Basis of Voluntary Movement (4 units)
BKN599: Principles of Biostatistics in Sports Science (4 units)
BKN590 Directed Research (summative research; 2units)
BKN600 Sports Science Internship Units (2 units)

Students will take up to 8 units of electives MS Sports Science Emphasis. Elective courses indicated below are only suggested. Location within the schedule indicates when they are offered. Students will work with the Director of the program to set up a plan of study designed to meet needs.

Summative Research Experience

There is no Division requirement for a Master’s thesis or Comprehensive Examination. Instead, students are required to complete a summative research experience. The culminating event of the summative research experience can include, but is not limited to, the following: 1) Poster presentation at the Division Research Day or at a state or national conference, or 2) Oral presentation at Division Seminar or at a state or national conference.

Suggested Plan of Study

A summer start is suggested if students: 1) wish to prepare for the National Strength and Conditioning Association's certification exam to become a Certified Strength and Conditioning Specialist (CSCS) and/or 2) require an introductory statistics and programming course. Classes can be taken in the Summer of Academic Year 2, but they may conflict with internship opportunities.

Year 1

(Summer) 6 units

BKN510 Principles of Biostatistics in Sports Science (4 units)

BKN630: Resistance Training Techniques for High Performance Athletes (2 units)

(Fall) 10 units

BKN540: Foundations for Athlete Readiness (4 units)

BKN553: Experimental Methods for the Study of Human Movement (4 units)

(Spring) 10 units

BKN560: Movement Analysis for Sport (4 units)

BKN 552: Physiological Basis of Voluntary Movement (4 units)

BKN610: Technology in Sport: Field Assessment of Athlete Performance (2 units)

Year 2 - Availability, dates and required credits of internships will vary according to internship site.

As a result, scheduling of Academic Year 2 will depend on 1) nature of student internship, 2) remaining required courses and 3) desired electives

(Summer) *In the case of a Fall start, students will be required to take BKN510 (see above)*

(Fall) 4 units

BKN611: Technology in Sport: Physiological Assessments (2 units)

**BKN590 Directed Research (summative research; 2-6 units)

(Spring) 2 units

**BKN600 Sports Science Internship Units (2-6 units)

*may be substituted with higher level statistics course if appropriate (requires division approval)

**Minimum requirement for BKN600 and BKN590 is 2 units.

Division Policy Regarding the Transfer or Substitution of Coursework

The transfer of units into the Biokinesiology program requires the following approvals

- 1) Advisor approval
- 2) Approval by the Graduate School
- 3) Approval from the Director of the Biokinesiology program

Similarly, substituting a previously taken course for a required course within the Biokinesiology Program requires the following approvals

- 1) Advisor approval
- 2) Approval of the course director
- 3) Approval of the Director of the Biokinesiology program

In order to substitute a course for a required course, the student must provide evidence (i.e. texts, syllabus, etc.) that the content of the course to be substituted is equivalent in content to the course offered within the division.

Leave of Absence Policy

Departments are permitted to grant Leaves of Absence without Graduate School approval for one semester at a time, for up to four semesters total for domestic students. International students must receive Office of International Services (OIS) approval for each semester, in addition to the department's approval. After four semesters, additional Graduate School approval is required.

Health Leave of Absence

The purpose of the Voluntary Health Leave of Absence (VHLA) is to provide students time away from school for treatment of a physical or mental health condition that impairs a student's ability to function safely and successfully as a member of our community. The authority to grant a VHLA and permission to return from a VHLA resides with the university's Health Leave Coordinator (HLC) in consultation with the student's academic unit, treatment providers and relevant campus partners, as needed. The Health Leave Coordinator aims to support the student through the process, providing information about guidance about the tasks associated with a health leave and helping the student to develop and implement a plan that will facilitate their recovery and return to school. A student may initiate a request for a VHLA by contacting the Health Leave office, at 213-740-0411.

Process for Appealing Dismissal from the MS Program

The student may appeal in writing to the department chair or program director within 30 days of the date of dismissal. If the student is dissatisfied with the outcome of the appeal, then, within 30 days of the date of the department's or program's decision, they may appeal in writing to the dean of the school. If the second appeal is unsuccessful, then the student may appeal in writing to the Vice Provost for Graduate Programs. Such an appeal must be received within 6 months after the student has received notice of the outcome of the school's decision.

Required Certifications & Health Related Requirements

Students enrolled in the Biokinesiology program are required to maintain the following certifications:

- 1) Collaborative IRB Training Initiative (CITI) certification. This online human subjects education program can be accessed online through the USC website. <http://www.usc.edu/admin/provost/oprs/citi>
- 2) Health Insurance Portability and Accountability Act (HIPAA) certification. The HIPAA education program can be accessed through the USC Office of Compliance. http://www.usc.edu/admin/compliance/hipaa_program.html
- 3) Cardiopulmonary Resuscitation (CPR)
CPR and Automated External Defibrillation (AED) certification is required, and must be kept current.

Additional information concerning the roles and responsibilities of student researchers at USC can be found at the following website:

<http://www.usc.edu/admin/provost/oprs/research/student.html>

All students are required to have health insurance coverage while enrolled in the BKN program. Immunizations and titers are required as well as annual TB screenings. All health clearances must be kept current the entire time students are in the program.

Biokinesiology Student Council

The purpose of the BKN Student Council is to encourage interaction among students in the PhD and MS programs and represent BKN students at division-wide events. The Biokinesiology student body is represented by a student council consisting of 5 members: a President, one PhD representative from each research domain (Exercise Physiology, Biomechanics, Motor Behavior/Control/Development), and one Master's student representative. Representatives will serve a one year term, starting in January and ending at the end of the calendar year.

Elections:

Council members will be elected by the BKN student body. Voting will occur in late November or early December of each year. Students will nominate candidates for the role of President, and then voting will occur. Following election of the President, students from each research domain will nominate and vote for their own representative. Only Master's students will vote for the Master's representative. Nominated candidates have the option of declining the nomination.

Typically, first year students are not nominated for representative positions. In addition, students usually serve one year as a representative before being nominated for the President position.

Roles:

The BKN Student Council President will oversee all representatives and will oversee BKN council activities and meetings. Council meetings should occur at least once a semester. The President will attend BKN faculty meetings as the student representative and will act as a liaison between the faculty and the BKN student body.

The PhD and Master's student representatives will bring any concerns, comments, and questions from their respective sections to the attention of the President. The representatives also will assist in planning various activities throughout the year.

As a whole, the BKN Student Council will strive to address the concerns of BKN students and encourage representation of BKN students at division-wide events.

Biokinesiology Seminar/Survival Series

The Biokinesiology Seminar/Survival series is held weekly (either Tuesday or Wednesday) from 12-1 pm throughout the fall and spring semesters. Students will be assigned a date to present once every academic year. Students who are in their first year or last year of the PhD program can be excused from presenting. Presentations should be 25-30 minutes in length. The goal of the presentation should be to generate discussion among students and faculty on the given topic.

Three faculty members and one student will be assigned to each week's seminar to serve the role of discussion facilitators. Faculty will gage questions and discussion in accordance with the student's level in the program. The goal is to create a positive and collaborative environment to help stimulate thought and discussion.

Attendance of all BKN students is mandatory. To be excused from seminar, the following procedure needs to be followed:

- 1) Obtain approval from your advisor.
- 2) Obtain approval from the director of the BKN program.
- 3) Once both approvals have been obtained, please notify the BKN student in charge of attendance so they can mark you down as "excused".

Unexcused absences from seminar are not permitted. An unavoidable class conflict or attendance at a scientific meeting is a valid excuse for missing seminar. Data collection is NOT a valid excuse for missing seminar!

Ethics Guidelines For Graduate Study

Division of Biokinesiology & Physical Therapy

INTRODUCTION

“The scientific research enterprise, like other human activities, is built on a foundation of trust. Scientists trust that the results reported by others are valid. Society trusts that the results of research reflect an honest attempt by scientists to describe the world accurately and without bias. The level of trust that has characterized science and its relationship with society has contributed to a period of unparalleled scientific productivity. But this trust will endure only if the scientific community devotes itself to exemplifying and transmitting the values associated with ethical scientific conduct” (1).

The faculty of the Division of Biokinesiology and Physical Therapy has identified two areas of ethical conduct we believe are critical to your development as an independent researcher: 1) faculty and graduate student relations, and 2) responsible conduct in research. In an effort to familiarize you with these areas we have organized the following references for your review. Please take time to review these materials and discuss them with your advisor. Once reviewed, please sign the attached signature page. This written assurance of ethical conduct will be kept in your student file for the duration of your tenure as a graduate student in the Division of Biokinesiology and Physical Therapy.

ACADEMIC INTEGRITY: A GUIDE FOR GRADUATE STUDENTS

Reference: Student Handbook: USC Office of Student Affairs

ON BEING A SCIENTIST: RESPONSIBLE CONDUCT IN RESEARCH

Reference: National Academies Press, 3rd ed., <http://nap.edu/12192>

AGREEMENT:

Your signature indicates that you have read the attached documents and that you agree to adhere to the policies and procedures required for ethical scientific study.

Student's Name _____

Students Signature _____

Date _____

(1) On Being a Scientist, 2nd ed., National Academy Press, Washington D.C., 1995