# The University Senate of Michigan Technological University

# Proposal 11-14

(Voting Units: Academic)

# "Master of Science Degree Program in Kinesiology"

## 1. GENERAL DESCRIPTION

The faculty members of the Department of Kinesiology and Integrative Physiology (KIP) at Michigan Technological University seek to establish a Master of Science (MS) program in Kinesiology. We propose both a thesis option and coursework option focused on existing and emerging departmental strengths. For questions or clarification, please contact Dr. Jason R. Carter (department chair) at jcarter@mtu.edu or 906-487-2715.

## 2. RATIONALE

The KIP department offers two Bachelor of Science (BS) degrees within the fields of kinesiology and integrative physiology, but does not currently offer a graduate degree. Over the past 6 years, KIP faculty have advised graduate students via adjunct status through the following programs: Biological Sciences (7 graduated students over past 4 years; 3 current students), Human Factors (1 graduated student), and Biomedical Engineering (1 current student). Our motivations for a MS in Kinesiology include the following:

- With 4 tenure/tenure-track faculty, two ongoing tenure-track searches, four lecturer/instructors with MS degrees, and several key adjunct appointments with specialties related to kinesiology, the department finally has the critical mass to offer a nationally competitive graduate degree in Kinesiology. Having a graduate program in the department will provide increased national and international visibility, which is consistent with the Michigan Tech Strategic Plan and assist with enhanced recruitment of premiere students and faculty.
- Kinesiology and integrative physiology are highly interdisciplinary fields, as evidenced by our engagement in graduate education with Biological Sciences, Human Factors, and Biomedical Engineering. While we intend to continue a strong interdisciplinary component, there is a need to consolidate our current graduate students and faculty. The proposed degree aims to strengthen intra-departmental graduate research and teaching without damaging the existing strong interdisciplinary interactions.
- Inside Higher Ed recently reported that kinesiology is "one of the fastest-growing majors in the country."[1] Accordingly, there is a strong base of undergraduate students to draw from for this graduate program, and a need for high-quality graduate programs.
  [1](http://www.insidehighered.com/news/2010/08/11/kinesiology).
- While coursework MS programs are currently more common within Michigan Tech Engineering programs, there are areas within the College of Sciences and Arts where coursework MS programs may be desirable to students. We believe Kinesiology represents such an opportunity because many of our undergraduates that do not pursue a professional graduate degrees (i.e., medical school, physical therapy, physician assistant, etc.) go on to get a MS to make them more competitive for a career in strength and conditioning, fitness, or sports administration. Moreover, a coursework MS programs are professionally acceptable for many of these fitness/administrative careers. In short, we believe there is a market for a coursework MS in Kinesiology.

## 3. RELATED PROGRAMS

### 3.1. Related Programs at Michigan Tech

The programs most closely related to the proposed Kinesiology MS program are the Biological Sciences, Applied Cognitive Science and Human Factors, and Biomedical Engineering MS programs. Of those degrees, only Biomedical Engineering has the coursework option. In the case of coursework options, required coursework tends to be more prescribed than the thesis options. The average student

completes the thesis-based MS in 2-3 years, while the course-based MS is completed in 1-2 years. We have designed our Kinesiology MS degree with these successful programs as a template.

### 3.2. Related Programs at Other Institutions

There are 8 Michigan public universities that offer Master's degree programs in the field of kinesiology. We critically evaluated the MS programs offered in Michigan to ensure that our graduates will be competitive with those from other institutions. We found that many programs have similar core requirements, and that several have coursework options (including University of Michigan-Ann Arbor). Those with coursework options tend to be more prescriptive with required courses and/or include a graduate-level internship; our proposed program does both. Many of the existing programs also have specific concentrations (or areas of research), spanning exercise physiology, biomechanics, and motor behavior. Our program will be focused toward exercise physiology and general fitness/strength & conditioning, which represent two existing and emerging strengths in the department.

**Table 1. Related programs in Michigan**

| Institution | Master's Degree |
|---|---|
| **Central Michigan University** | MA, Exercise Science; MA, Sports Administration; MA, Therapeutic Recreation |
| **Eastern Michigan University** | MS, Exercise Physiology; MS, Sports Management; MS, Physical Education Pedagogy; MS, Health Education |
| **Michigan State University** | MS, Kinesiology (8 concentrations) |
| **Northern Michigan University** | MS, Exercise Science |
| **Oakland University** | MS, Exercise Science |
| **Univ of Michigan-Ann Arbor** | MS, Kinesiology; MA, Sports Administration |
| **Wayne State University** | MA, Sports Administration; M.Ed., Exercise and Sport Science; M.Ed., Physical Education Pedagogy |
| **Western Michigan University** | MS, Exercise and Sports Medicine; MS, Athletic Training; MA, Sports Administration; MA, Coaching Sport Performance; MA, Physical Education |

## 4. PROJECTED ENROLLMENT

Our goal is to have a total of 5-10 coursework MS students per year. We anticipate the majority of those coursework MS students being drawn from our own undergraduate population, thus having the 'senior rule' to draw upon and potentially completing within one year. Regarding the thesis-based MS degree, we estimate 1 MS student for every tenure/tenure-track faculty. We currently have 4 faculty and 2 ongoing searches, so in steady-state we expect approximately 6 thesis-based MS students. Therefore, in total we expect somewhere between 11-16 MS students in this program.

## 5. SCHEDULING PLANS

We intend to offer the proposed curriculum using a regular scheduling plan consistent with University policy.

## 6. CURRICULUM DESIGN

Graduate students in the Kinesiology MS program may enter from a variety of backgrounds such as kinesiology, physiology, biological sciences, or relevant disciplines. Faculty from the graduate program must approve the admission of graduate student applicants. Admission will be based on holistic review of the student's application package as well as the availability of space in the program.

### 6.1. Degree Requirements for Coursework Option

Students will be required to take 30 course credits, with the following requirements:

*Required Core Courses (18-21 credits)*

- EH 5310: Advanced Exercise Physiology (3 credits)
- EH 5320: Advanced Biomechanics (3 credits)
- EH 5330: Advanced Motor Behavior (3 credits)
- EH 5950: Graduate Kinesiology Internship (4-6 credits)
- EH 5920: Graduate Seminar (1 credit)*

* A minimum of 2 graduate seminar credits are required.

- At least one of the following statistical courses:
  - BE 5550: Biostatistics for Health Science Research (4 credits)
  - MA 4710: Regression Analysis (3 credits)
  - MA4720: Design and Analysis of Experiments (3 credits)
  - MA 5701: Statistical Methods (3 credits)
  - PSY 5210: Advanced Statistical Analysis and Design I (4 credits)
  - PSY 5220: Advanced Statistical Analysis and Design II (4 credits)

*Elective Courses*

- A minimum of 10 elective course credits approved by graduate program director or department chair. A list of approved elective courses within and outside the department is provided in Section 4.3, and this list will be updated annually by the department. Courses not on this list, but deemed relevant and appropriate by the student and advisor, can be used ad hoc if written approval is obtained from the graduate program director or KIP department chair.

*These degree requirements are consistent with University policy related to the distribution of credits for the Coursework option (i.e., minimum of 18 credits at 5000-6000 level, maximum of 12 credits at 3000-4000 level).*

### 6.2. Degree Requirements for Thesis Option

Students will be required to take 30 credits, with the following requirements:

*Required Core Courses (8-9 credits)*

- EH 5920: Graduate Seminar (1 credit)*

  * A minimum of 2 graduate seminar credits are required.
- At least one of the following:
  - EH 5310: Advanced Exercise Physiology (3 credits)
  - EH 5320: Advanced Biomechanics (3 credits)
  - EH 5330: Advanced Motor Behavior (3 credits)
- At least one of the following statistical courses:
  - BE 5550: Biostatistics for Health Science Research (4 credits)
  - MA 4710: Regression Analysis (3 credits)
  - MA4720: Design and Analysis of Experiments (3 credits)
  - MA 5701: Statistical Methods (3 credits)
  - PSY 5210: Advanced Statistical Analysis and Design I (4 credits)
  - PSY 5220: Advanced Statistical Analysis and Design II (4 credits)

*Elective Courses*

- A minimum of 12 elective course credits approved by graduate program director or department chair. Multiple statistical courses are strongly recommended. A list of approved elective courses within and outside the department is provided in Section 4.3, and this list will be updated annually by the department. Courses not on this list, but deemed relevant and appropriate by the student and advisor, can be used ad hoc if written approval is obtained from the graduate program director or KIP department chair.

*Research Credits*

- A minimum of 6 research credits are required. Students are strongly encouraged to present (oral presentation or poster) at a national or international conference prior to thesis defense.

*These degree requirements are consistent with University policy related to the distribution of credits for the thesis option (i.e., 6-10 research credits, minimum of 20 coursework credits of which the distribution must include a minimum of 12 credits at 5000-6000 level and maximum of 12 credits at 3000-4000 level).*

*Additional details for the thesis option:*

### 6.2.1. Advisor and the advisory committee

Based on their research interests, graduate students should choose a primary (or co-advisors), no later than the end of the first academic year. The program will adhere to the graduate school policy for advisor and advisory committee. The advisory committee must be approved by the graduate program director or KIP department chair.

### 6.2.2. Thesis proposal

The thesis proposal should contain a review of the literature, a problem statement/rationale, study hypotheses, research design, proposed methods/research strategy, and pilot data when possible. The primary advisor, with input from the committee members, can decide on the proposal format. This thesis proposal should be reviewed and approved by the advisory committee.

### 6.2.3. Written thesis

The thesis will be written and prepared under the supervision of the primary advisor and the advisory committee according to the requirements of the Graduate School.

### 6.2.4. Final oral examination

The final requirement will be a public oral presentation of the thesis and an oral examination in accordance with the requirements of the Graduate School.

## 6.3. Course Offerings

### 6.3.1. Existing graduate courses

The following is a list of existing courses (in various departments) that demonstrates the breadth of courses currently available to students. We have sought input and obtained approval to include the non-departmental courses via the respective department chairs (i.e. BE, BL, MA, and PSY).

BE 5550 - Biostatistics for Health Science Research
An overview course of biostatistical methods used in the health sciences. Topics include a review of undergraduate statistical concepts, NIH, CDC, and FDA guidelines for clinical trial research, proper use of biostatistical methods including anova models, logistic regression, risk analysis, survivorship analysis and any other statistical methods that are common in the enrolled students' discipline. Credits: variable to 4.0

BL 4010 - Biochemistry I
Structure, biochemical properties, and function of important biomolecules such as proteins and nucleic acids. Introduces enzyme biochemistry (structure, function, catalysis, kinetics, and inhibition). Credits: 3.0

BL 4020 - Biochemistry II
Dynamic aspects of living systems. Broad exposure to cellular metabolic pathways, intermediary metabolism and its regulation and bioenergetics. Credits: 3.0

BL 4380 - Cardiopulmonary Physiology
Using a problem-based learning approach, course examines the physiology of the human body. In-class case-study analyses provide in-depth learning about the cardiovascular and pulmonary systems and their relationship with other organ systems. Promotes development of problem-solving skills. Credits: 3.0

BL 5350 - Special Topics in Physiology
A discussion of recent developments in physiology. Recent offerings have included respiratory physiology, renal physiology, clinical cardiology, and neurophysiology. Credits: variable to 10.0; Repeatable to a Max of 10

EH 4200 - Sports Nutrition Seminar
Human nutrition as it specifically applies to athletes. Specific needs for proteins, carbohydrates, fats, electrolytes and micronutrients. Use of ergogenic aids is covered. Students will research, write and present orally their findings on nutrition topics. Credits: 2.0

EH 4210 - Exercise Physiology

Focuses on the functional changes brought by acute and chronic exercise sessions. Topics include muscle structure and function, bioenergetics, cardiovascular and respiratory adaptations, exercise training for sport, sport nutrition, ergogenic aids, and other health and fitness topics. Credits: 2.0

EH 4211 - Exercise Physiology Laboratory
A companion course to EH4210. Hands-on experience in making physiological measurements as related to exercise. Cardiovascular and respiratory changes during exercise will be monitored. A virtual lab is used to simulate changes in physiological measurements that cannot be performed on live subjects. A student designed laboratory project is required. Credits: 1.0

EH 4220 – EKG Interpretation
Course is designed for students who are going to pursue future career related to cardiac rehabilitation, physical therapy and students in the Pre-Med program. Students will learn cardiac electrophysiology, the pathophysiology, the diagnosis, and treatment of cardiac arrhythmias, and related cardiovascular diseases. Class will build bridge between basic sciences and human health. Credits: 2.0

EH 4400 - Motor Learning and Control
Designed for upper level undergraduates or graduates, this course will provide the current theories and concepts involved in the processes of motor skill acquisition and performance from a behavioral perspective. Credits: 3.0

EH 4420 - Motor Development
Designed for upper level undergraduates or graduates, this course will focus on the changes in motor behavior across a life span, and examine the study and practice of fundamental patterns within the context of development theory. Credits: 3.0

EH 4500 - Biomechanics of Human Movement
An in-depth view of the biomechanical properties of the musculoskeletal system. The course provides detailed analyses of the kinetics of human movement, material properties of the component tissues, and dynamic processes of adaptation to stress and strain of the system. Credits: 3.0

EH 4600 – Sports and Fitness Promotions
Development and implementation of marketing plans for sports and fitness businesses. Topics include marketing of sporting events and fitness programs, use of traditional media for promotion, web-based advertising (new media), and business branding. Credits: 3.0

EH 4620 – Legal Issues in Sport and Fitness Management
Review of legal issues that apply to sport and fitness organizations such as liability, risk management, facility concerns, and labor laws. Basic components of the U.S. legal system and guidelines, and rules of the National Collegiate Athletic Association will be covered. Credits: 3.0

EH 5350 - Special Topics in Kinesiology
Selected additional topics in kinesiology for advanced students based on interests of faculty and students. Interested students should contact the Exercise Science, Health and Physical Education department. Credits: variable to 9.0; Repeatable to a Max of 9

MA 4710 – Regression Analysis
Covers simple, multiple, and polynomial regression; estimation, testing, and prediction; weighted least squares, matrix approach, dummy variables, multicollinearity, model diagnostics and variable selection. A statistical computing package is an integral part of the course. Credits: 3.0

MA 4720 – Design and Analysis of Experiments
Covers construction and analysis of completely randomized, randomized block, incomplete block, Latin squares, factorial, fractional factorial, nested and split-plot designs. Also examines fixed, random and mixed effects models and multiple comparisons and contrasts. The SAS statistical package is an integral part of the course. Credits: 3.0

MA 5701 - Statistical Methods

Introduction to design, conduct, and analysis of statistical studies, with an introduction to statistical computing and preparation of statistical reports. Topics include design, descriptive, and graphical methods, probability models, parameter estimation and hypothesis testing. Credits: 3.0

PSY 5010 - Cognitive Psychology
A systematic survey of classical and contemporary research topics in human information processing and learning. Topics include models of cognition, perception/pattern recognition, attention, the nature of mental representation and processing; the architecture of memory, imagery, concepts, and prototypes; reasoning, decision making, problem solving, and cognitive development. Credits: 3.0

PSY 5210 - Advanced Statistical Analysis and Design I
An overview of research ethics, experimental design, proposal writing, and univariate statistics such as t-tests and ANOVA. Credits: 4.0

PSY 5220 - Advanced Statistical Analysis and Design II
A continuation of PSY 5210 covering multivariate and nonparametric statistics such as MANOVA, ANCOVA, Multiple Regression, faction analysis, and Chi Square. Credits: 4.0

PSY 5850 - Human Factors Psychology
Advanced concepts critical to the design of human-technological systems, such as capitalizing upon human capabilities and compensating for human limitations. Topics may include perceptual and motor abilities, human error and cognitive engineering. Credits: 3.0

PSY 6991 - Special Topics in Human Factors
Study of special topics in human factors as designed by section title. Credits: variable to 3.0; Repeatable to a Max of 9

**6.3.2. New graduate courses**

The Department of Kinesiology and Integrative Physiology will offer the following new graduate courses for this program. With the addition of the proposed Professor of Practice (see section 7 below), and the two ongoing tenure-track faculty searches, we have the expertise and sufficient number of faculty/staff to deliver this curriculum. Course proposals for the internal Michigan Tech Curriculum Binder Process are included in Appendix A. New courses will be phased in, and some courses are offered every other year (or on demand), to ensure faculty workload is appropriate. A teaching-load analysis is provided in Appendix C.

***New core courses for both options (thesis and coursework):***

EH 5920: Graduate Seminar (1 credit; need to take at least twice)

***New core courses for coursework option:***

EH 5310: Advanced Exercise Physiology (3 credits)
EH 5320: Advanced Biomechanics (3 credits)
EH 5330: Advanced Motor Behavior (3 credits)
EH 5950: Graduate Internship in Kinesiology (6 credits)

***New core course for thesis option:***

EH 5990: Master's Thesis in Kinesiology (variable – 9 credits)

***New elective courses:***

EH 4710: Stress Physiology (2 credits)
EH 4720: Sleep and Circadian Physiology (3 credits)
EH 4730: Neuroendocrine Physiology (3 credits)
EH 4760: Computational Biomechanics (3 credits)
EH 4770: Specificity of Exercise Assessment and Prescription (3 credits)
EH 5500: Advanced Sport Psychology (3 credits)
EH 5510: Advanced Strength and Conditioning (3 credits)
EH 5900: Laboratory Techniques in Integrative Physiology (2 credits)

## 7. NEW COURSE DESCRIPTIONS

EH 4710 Stress Physiology*
This course focuses on stress physiology in humans. Topics include neural and hormonal responses to mental stress, interactions between physical and mental stress, bidirectional relations between stress and disease, and health disparities associated with stress. Credits: 2.0

EH 4720 Sleep and Circadian Physiology*
This course focuses on the role of sleep and circadian rhythm on physiological control systems. Topics include basic mechanisms of the sleep-wake cycle, role of sleep and circadian clock on cardiovascular and respiratory control, overview and treatment strategies for common sleep disorders, and techniques in sleep medicine research. Course content will be delivered using a combination of lecture, seminar, scientific articles, and group work. Credits: 3.0

EH 4730 Neuroendocrine Physiology*
This course will focus on understanding how the neural and the endocrine system are regulated under both normal physiological conditions and pathophysiological states. The major objective of this course is to prepare graduate students to develop critical thinking and problem solving skills related to the function of the nervous system and endocrine system, and their complex interaction with each other. This will be done through a combination of lecture, seminar, scientific articles, lab techniques, and group work. Credits: 3.0

EH 4760 Computational Biomechanics*
Computational Biomechanics provides an introduction to the application of computer simulation to solve some fundamental problems in biomechanics and bioengineering. Musculoskeletal mechanics, joint mechanics, and inter-subject variability will be considered. An emphasis will be placed on understanding the limitations of the computer model as a predictive tool and the need for rigorous verification and validation of computational techniques. Credits: 3.0

EH 4770 Specificity of Exercise Assessment and Prescription*
Peer-reviewed literature will be utilized to understand the sport-specific needs of athletes in regard to how they are tested and trained. Students will be expected to design a year-round training program for a particular sport that includes at least 3 testing sessions to evaluate the athlete. Laboratory sessions will cover measurement techniques such as expired air analysis, blood lactate assessment, and surface electromyography. Credits: 3.0

EH 5310: Advanced Exercise Physiology
This course focuses on exercise physiology in both humans and rodents. Topics include detailed muscle physiology, fatigue mechanisms, the autonomic nervous system, advanced cardiovascular adaptations with exercise, exercise metabolism, and environmental exercise physiology. The importance of translational research will be highlighted. Credits: 3.0

EH 5320: Advanced Biomechanics
This course includes the quantitative analysis of human motion through bioinstrumentation during dynamic performance. A detailed analysis of different movements and movement techniques, from both a clinical and exercise science perspective, as well as investigations into the mechanics of tissues and their function, are integral features of this course. Students will also learn how to interpret the data recorded by biomechanical equipment, and how to apply this to the body of knowledge in sport science. Credits: 3.0

EH 5330: Advanced Motor Behavior
Peer-reviewed literature will be utilized to acquaint students with scholarly issues and topics in motor learning and control that are relevant to their fields. The theoretical concepts related to motor control, motor learning, and motor development will be covered. Students will be expected to design a scientific research study related to their specific interest goals. Credits: 3.0

EH 5500 Advanced Sports Psychology
This course is designed to educate students for roles dealing with ethical performance enhancement in sport and exercise. Upon completion of the course, students will understand the importance of theoretical foundations for improving performance, research and evaluation, developing relationships, individual and group skills, normal and abnormal behavior, and the various psychological factors that affect performance in sport and exercise. This course provides students an opportunity to develop a foundation in applied sport psychology and a knowledge base in the physiological, motor, and psychosocial aspects of sport behavior. Credits: 3.0

EH 5510 Advanced Strength and Conditioning

Advanced theory and practice in development and administration of comprehensive strength and conditioning programs for both the athlete and individual of any level. Includes knowledge, safety concerns and skill techniques necessary for teaching and administering any strength and conditioning facility. This will be done through a combination of lecture, seminar, scientific articles and practical experience. Credits: 3.0

EH 5900 Laboratory Techniques for Integrative Physiology
This course will expose graduate students to various methodologies in integrative physiology. Student will rotate between various laboratories and observe techniques such as microneurography, electrophysiology, molecular physiology, muscular fatigue, etc.; both human and animal methodologies will be examined. Credits: 2.0

EH 5920 Graduate Seminar
Graduate seminars are designed to facilitate critical discussions of student research projects and peer-reviewed research in related fields. The presenter will provide an overview or seminar of the research of interest, which will establish the foundation for the discussion thereafter. Credits: 1.0

EH 5950 Master's Internship in Kinesiology
Practical experience in the field of kinesiology at an approved internship site. Provides experience in a variety of exercise science or medical settings. Internships must be approved by the department chair or graduate director, and work a minimum of 50 hours for each credit earned. Credits: 4.0 – 6.0

EH 5990 Master's Research in Kinesiology
An original research investigation in kinesiology that culminates in a thesis. Credits: variable up to 9.0 per semester.

* Courses that will be cross-listed for both graduate and undergraduate students.

## 8. LIBRARY AND OTHER LEARNING RESOURCES

The existing library and learning resources are adequate for the proposed graduate degree; no new resources are requested.

## 9. COMPUTING ACCESS FEE

No applicable fee

## 10. CORE AND AFFILIATED FACULTY (RESUMES)

The KIP department has four tenure/tenure-track faculty, two ongoing tenure-track faculty searches, and several key adjunct faculty that will assist with the proposed degree. The curricula vitae of these faculty members are available at the following website:

http://www.mtu.edu/kip/graduate/masters

### 10.1. Core KIP Faculty

Jason R. Carter, Ph.D.
Associate Professor and Chair

Qing-Hui Chen, M.D. & Ph.D.
Assistant Professor

Zhiying (Jenny) Shan, Ph.D.
Assistant Professor

Tejin Yoon, Ph.D.
Assistant Professor

TBD, Ph.D. *(Search In Progress)*
Assistant/Associate Professor

TBD, Ph.D. *(Search In Progress)*
Assistant Professor

Mary Ann Klooster, M.A.
Senior Lecturer

Amber Leonard, M.S.
Instructor and Advisor

Craig Pellizzaro, M.S.
Instructor and Intramural Director

Matt Thome, M.S.
Instructor and Head Strength and Condition Coach

Kate Hagenbuch, M.S.
Instructor and Director for NCAA Compliance and Student Services

Joseph Haggenmiller, J.D.
Instructor and Coach

### 10.2. Adjunct Faculty

Michael D. Brothers, Ph.D.
Professor and Chair, Department of Aerospace Studies

John J. Durocher, Ph.D.
Assistant Professor, Department of Biological Sciences

L. Syd Johnson, Ph.D.
Assistant Professor, Department of Humanities

Mark Randell, PT, DPT, MTC, FAAOMPT
Director of Portage Health Sports Medicine Institute

Carl Smoot, D.O.
Director of the Portage Health Sleep Disorders Center

Cameron Williams, PT, DPT, MS
PTA Program Director and Professor, Finlandia University

## 11. DESCRIPTION OF AVAILABLE/NEEDED EQUIPMENT

The KIP department currently has all of the necessary equipment for the proposed program. The department includes six designated research and/or teaching laboratories related to exercise physiology, biomechanics, and motor behavior. Some relevant pieces of equipment available for this program include:

- microneurography nerve traffic analysis system
- electrocardiogram units and amplifiers
- electrophysiology equipment for patch-clamp studies
- pneumobelt for respiratory excursions
- venous occlusion plethysmography for limb blood flow measurements (calf and forearm)
- automated sphygmomanometer – four units
- finger plethysmography (i.e., Finometer) for beat-to-beat blood pressure recordings
- 24 hour ambulatory blood pressure monitoring system -- four units
- limb actigraphy system -- eight units
- motorized tilt table
- lower body negative pressure chamber
- three cycle ergometers, including a Wingate bike

- portable metabolic cart (i.e., Oxycon Mobile) for aerobic capacity testing with all accompanying accessories
- stationary metabolic cart (i.e., Oxycon Mobile) for aerobic capacity testing with all accompanying accessories
- phlebotomy chair and all equipment/accessories needed for venipuncture
- six Vicon motion-capture cameras
- in-ground force plate in biomechanics laboratory with motion-capture cameras
- blood lactate analyzers -- two units
- multi-use Biopac systems for EMG, EEG, ECG, etc.
- fat calipers, underwater body weighing, and other body composition equipment
- Biodex machine for isokinetic testing

Additionally, the KIP department also has shared oversight of departmental exercise training equipment within the Student Development Complex. Specifically, students will have access to the 7,256 $ft^2$ student exercise training complex for aerobic and resistance training (i.e., strength and conditioning curriculum). Equipment available in this training complex include:

- *Aerobic equipment*: 12 stationary bicycles, 14 treadmills, 6 eliptical machines, 3 stairmaster machines, 3 rowing ergometers
- *Resistance equipment (free weight)*: 2 full sets of 100 lb (5 lb increment) dumbells, barbells (10-110 lbs), 5 free weight bench press units (1 incline and 1 decline), 3 squat racks, 1 military press, 3 dual cable crossover units
- *Resistance equipment (free motion and hammer strength machines) for*: bicep, tricep, deltoid, pectoralis, latissimus dorsi, rhomboids, hamstring, quadricep, gastrocnemius, soleus, and abdominal muscles

**There is sufficient equipment and space currently available for the proposed graduate degree, and no new resources are requested for equipment.** The department expects to continue making strategic investments of available internal (i.e., department general fund, laboratory fees, summer teaching return, etc.) and external (i.e., external research grants) resources to build upon the existing infrastructure.

## 12. ESTIMATED PROGRAM COSTS

Three-year costs will be $155,194, with projected tuition revenue of $288,542 during the same period. Each year thereafter we project a surplus of tuition revenue over costs of approximately $100,000. The major expense to the University will be support for a Professor of Practice who will help coordinate the MS course-work option and serve as a key instructor. We acknowledge additional hidden cost in offering this additional program, but the surplus of tuition revenue over costs should be more than sufficient to cover such costs. The Professor of Practice will be expected to help with graduate student recruitment, advising, and internship coordination (~25% effort), and teach courses (~75% effort). Potential courses might include Specificity of Exercise Assessment and Prescription, Advanced Strength and Conditioning, Advanced Sports Psychology, or other courses of appropriate expertise. No additional faculty needs are anticipated.

Based on the projected enrollment of a gradual increase to 3rd year steady state enrollments of 4 MS thesis option students and 6 MS coursework option students, we estimate costs and revenue for this new program in Table 1 below. The estimates for the number of thesis and coursework option students is based on 1) expectation of approximately one thesis student per tenure/tenure-track faculty (which is extremely conservative given the number of Biological Sciences MS students advised by KIP faculty over the past 4-5 years), and 2) number of students that have expressed an interest over the past 2-3 years in staying for a coursework MS if we offered (exit interviews with advisor and/or department chair). Professor of Practice salary is $55,000 plus the current 39% fringe rate, with an estimated 3% annual increase. Tuition is based on estimated rates as posted on the sponsored programs website.

**Table 2. Program Cost Analysis**

| | **2014-15** | **2015-16** | **2016-17** |
|---|---|---|---|
| **Professor of Practice** | **-----** | **$76,450** | **$78,744** |

| | | | |
|---|---|---|---|
| **(salary and fringe)** | | | |
| **Total # of M.S. students (thesis option)** | **2** | **3** | **4** |
| **Total # of M.S. students (coursework option)** | **3** | **4** | **6** |
| **Tuition per credit** | **$820** | **$852** | **$886** |
| **Tuition revenue based on 9 credits per semester for thesis option students** | **$29,520** | **$46,008** | **$63,792** |
| **Tuition revenue based on 12 credits per semester for coursework option students** | **$59,040** | **$122,688** | **$122,688** |
| **Income developed from program** | **$88,560** | **$92,246** | **$107,736** |

Note that revenue may be greater than shown in the table as some of the coursework option students may come from other schools and not qualify for the senior rule (i.e., will need more than 2 semesters of 12 credits).

We recognize additional resources required for student recruitment and other administrative duties, but these will be handled by existing departmental budgets.

Appendix B includes additional budgetary information per University Senate policy 51-04.

Appendix D includes a mock schedule to demonstrate students eligible for the Michigan Tech 'senior rule' could finish the coursework option with one additional year beyond their undergraduate degree.

## 13. SPACE

There are no new requests for additional space related to this program.

## 14. POLICIES, REGULATIONS, AND RULES

All policies, regulations, and rules have been previously outlined, and are superseded by University policy (including Graduate School policies).

## 15. ACCREDITATION REQUIREMENTS

There are no specific accreditation requirements.

## 16. INTERNAL STATUS OF THE PROPOSAL

This proposal has been preliminarily reviewed and modified in consultation with the KIP department faculty, KIP chair, Dean of the College of Sciences and Arts, Dean of the Graduate School, College of Sciences and Arts College Council, and Deans Council. We are now seeking review and feedback from the Graduate Faculty Council and University Senate.

## 17. PLANNED IMPLEMENTATION DATE

We aim to have this degree available in Fall 2014.



**Introduced to Senate: 11 December 2013**

**Approved by Senate: 22 January 2014**
**Approved by Administration: 02 February 2014**
**Approved by BOC: 21 February 2014**
**Approved by State: 11 April 2014**