Date of request: 10-SEP-2018

Request ID: E-2018-HPHE-62

College: E

Department: HPHE

Initiator name: Timothy Michael

Initiator email: tim.michael@wmich.edu

Proposed effective term: 201940

Does course need General Education approval?: N

Will course be used in teacher education?: N

If 5000 level course, prerequisites apply to: G

Proposed course data:
Change Course HPHE 6740
Specific Course Change type selected: Title
Specific Course Change type selected: Description

1. Existing course prefix and number:
HPHE 6740

2. Proposed course title:
Neuromuscular Control

3. Existing Banner course title:
Clinical Exercise Physiology

4. Proposed course title to be entered in Banner:
Neuromuscular Control

A. Please choose Yes or No to indicate if this class is a Teacher Education class:
No

B. Please choose the applicable class level:
Graduate

C. Please choose Yes or No to indicate if this class is a General Education class:
No

D. Explain briefly and clearly the proposed improvement.
This course will now have a title that will let students know specifically what the course is about and will cover. Along with the new title the course description will lend to a greater clarity as to the content of the course.

E. Rationale. Give your reason(s) for the proposed improvement. (If your proposal includes prerequisites, justify those, too.).
The proposed improvement is part of an overall change in the degree. The current degree, MS Exercise and Sport Medicine: Exercise Physiology has been in place for approximately 10 years or so. Since then a number of things have occurred that prompt this change: 1) This degree was first established with two concentrations, Exercise Physiology and Athletic Training. Athletic Training has gone on to become its own degree, thus having the title as it is currently, is no longer appropriate; 2) the need to update the curriculum is apparent by professional changes in the field as well as student requests and concerns; 3) new faculty have been hired that changes the expertise and allows for a greater breadth of offerings then was previously.

F. List the student learning outcomes for the proposed course or the revised or proposed major, minor, or concentration. These are the outcomes that the department will use for future assessments of the course or program.
Upon completion of this course students will be able to demonstrate their knowledge in:

Relation between neuromuscular physiology and biomechanics

Varying theories of movement control

Reflexes and voluntary control of movement

The control of force and torque development

Hypotheses related to generalized motor programming

Program assessment learning outcomes:

a. Demonstrate an understanding of exercise physiology and biomechanics beyond the undergraduate level.
b. Demonstrate the ability to critically evaluate scientific literature and apply the scientific method in the exercise sciences.
c. Interpret empirical data and communicate effectively in an academic setting and/ or professional meeting
d. Be able to apply knowledge of the exercise sciences through successful oral and written presentations
e. Demonstrate professional behavior and effective written and oral communication skills in academic and/or professional settings
f. Demonstrate an understanding of exercise physiology and biomechanical concepts related to human performance by evaluating current research related to biomechanics and exercise physiology

G. Describe how this curriculum change is a response to student learning assessment outcomes that are part of a departmental or college assessment plan or informal assessment activities.
The proposed improvement is part of an overall change in the degree. The current degree, MS Exercise and Sport Medicine: Exercise Physiology has been in place for approximately 10 years or so. Since then a number of things have occurred that prompt this change: 1) This degree was first established with two concentrations, Exercise Physiology and Athletic Training. Athletic Training has gone on to become its own degree, thus having the title as it is currently, is no longer appropriate; 2) the need to update the curriculum is apparent by professional changes in the field as well as student requests and concerns; 3) new faculty have been hired that changes the expertise and allows for a greater breadth of offerings then was previously.

H. Effect on other colleges, departments or programs. If consultation with others is required, attach evidence of consultation and support. If objections have been raised, document the resolution. Demonstrate that the program you propose is not a duplication of an existing one.
There will be no effect on other colleges, departments or programs as this is a an existing program and course.

I. Effect on your department's programs. Show how the proposed change fits with other departmental offerings.
There will be a small effect on other department programs as this is a an existing program and course.

J. Effects on enrolled students: are program conflicts avoided? Will your proposal make it easier or harder for students to meet graduation requirements? Can students complete the program in a reasonable time? Show that you have considered scheduling needs and demands on students'

time. If a required course will be offered during summer only, provide a rationale.
Currently students complete their course work by taking classes FALL>SPRING>SUMMER>FALL>SPRING and it is expected that this will continue with the revised program. We currently have 2 required courses that are offered every Summer, with the new revised curriculum we will continue to require 2 courses in the Summer. The rationale for offering courses in the summer is the same as it is now, that is all faculty who teach in this graduate program also teach in the heavily enrolled undergraduate program. To be able to have faculty teach in both programs, the graduate program has only been able to function by offering some of the required courses in the Summer.

K. Student or external market demand. What is your anticipated student audience? What evidence of student or market demand or need exists? What is the estimated enrollment? What other factors make your proposal beneficial to students?
As this is part of a revised curriculum of an already established program we can simply state that enrollment has been between approximately 20-30 students/ year over the past 10 years. Currently labor statistics show that employment for exercise science related careers to be "faster than average" between 2014-2024. Students who study exercise science, particularly exercise physiology and biomechanics often go on to careers in the health fields such as physical therapy, occupational therapy, kinesiotherapy, medical school, chiropractic school. Others may go on to biomedical engineering, prosthetics, research and development in exercise and sport related companies etc

L. Effects on resources. Explain how your proposal would affect department and University resources, including faculty, equipment, space, technology, and library holdings. Tell how you will staff additions to the program. If more advising will be needed, how will you provide for it? How often will course(s) be offered? What will be the initial one-time costs and the ongoing base-funding costs for the proposed program? (Attach additional pages, as necessary.)
The current resources are adequate in terms of equipment, space, technology, and library holdings. However, because we will be offering an additional biomechanics course, Dr. Lee will need to teach one less undergraduate course during the Fall Semester, this will most likely require a part-time instructor be hired or to have a graduate teaching assistant assigned to this class.

M. With the change from General Education to WMU Essential Studies, this question is no longer used.
For courses requesting approval as a WMU Essential Studies course, a syllabus identifying the student learning outcomes and an action plan for assessing the student learning outcomes must be attached in the Banner Workflow system.
Not Applicable

N. (Undergraduate proposals only) Describe, in detail, how this curriculum change affects

transfer articulation for Michigan community colleges. For course changes, include detail on necessary changes to transfer articulation from Michigan community college courses. For new majors or minors, describe transfer guidelines to be developed with Michigan community colleges. For revisions to majors or minors, describe necessary revisions to Michigan community college guidelines. Department chairs should seek assistance from college advising directors or from the admissions office in completing this section.
Not Applicable

O. Current catalog copy:
HPHE 6740 Clinical Exercise Physiology
The purpose of this course is to instruct the student in the pathophysiology of various disease states and how that change in physiology affects the evaluation and prescription of exercise for these populations. Special attention will be given to the ACSM KSAs for Clinical Exercise Specialists and Registered Clinical Exercise Physiologists. Open to graduate students only.
3 hours

P. Proposed catalog copy:
HPHE 6740 Neuromuscular Control
The course will examine the theories, processes, and structures that determine the execution of our voluntary movements and how we control this movement. This will entail a review of the neurophysiological components, a review of reflexive actions necessary to control skeletal movement and theories that describe how motor functions are controlled. Additionally, there will discussions of how we can research and study motor control and test the theories involved.
3 hours

Department Curriculum Chair approver: Carol Weideman

Department Curriculum Chair comment:

Date: 24-OCT-2018

Department approver: Yuanlong Liu

Chair comment:

Date: 25-OCT-2018

WESTERN MICHIAN UNIVERSITY

HPHE 6740: Neuromuscular Control

Instructor Information

Timothy J. Michael, PhD

Office: SRC 1054

Phone: (269) 387-2691

Email: tim.michael@wmich.edu

Office Hours: TBD

Classroom: TBD

Course Description

The course will examine the theories, processes, and structures that determine our movement and the control of the movement. This will entail a review of the neurophysiological components necessary to establish and execute a movement. Additionally, this course will review the reflexive actions necessary to control skeletal movement and theories that describe how this motor control can be described. Finally, there will discussions of how we can research and study motor control and test the theories involved.

Course Outcomes

Upon completion of this course students will be able to demonstrate their knowledge in:

1. The relation between neuromuscular physiology and biomechanics
2. Varying theories of movement control
3. Reflexes and voluntary control of movement
4. The control of force and torque development
5. Various hypotheses related to generalized motor programming

Course Textbook

Fundamentals of Motor Control (2012). Mark Latash. Elsevier; Academic Press

Course Outline & Topics Covered

Relation of biomechanics and neurophysiology

Nikolai Bernstein and his theory of different levels of movement construction

The system for movement production

Muscle

- Neurons and neural pathways
- Sensory receptors
- Reflexes
- Motor redundancy
- Motor variability

Posture–movement paradox

Tonic stretch reflex and voluntary movements

Equifinality and its violations

Effects of deafferentation on voluntary movements

Control with forces and torques

- Force control, The leading-joint hypothesis, Generalized motor programs

Control with muscle activations

- Dual-strategy hypothesis, Pulse–step model, Control of multi-muscle systems: muscle synergies

Control theory approaches

- The basic notions, Servo-control and Merton's servo-hypothesis, Optimal control
- Physical approaches, Mass-spring models, Threshold control, The equilibrium-point hypothesis, Control with referent configurations

Coordination

- Optimization, Dynamical systems approach, Synergy, Perception–action interactions, Perception–action coupling

Neurophysiological structures

- The spinal cord, Central pattern generators, The brain: A general overview, Cortex of the large hemispheres, Loops through the basal ganglia, Loops involving the cerebellum

Exemplary behaviors

- Posture, Locomotion, Reaching, Prehension

Effects of practice and adaptation

- Learning to be quick and accurate: Speed–accuracy and speed–difficulty trade-offs

Learning motor synergies

- Stages in motor learning, Neural maps and their changes with practice

Methods in motor control studies

General methodological issues, Mechanical analysis, Electromyography, Electroencephalography and magnetoencephalography, Transcranial magnetic stimulation, Brain imaging

Academic Integrity and Disability Support

You are responsible for making yourself aware of and understanding the policies and procedures in the Undergraduate and Graduate Catalogs that pertain to Academic Honesty. These policies include cheating, fabrication, falsification and forgery, multiple submission, plagiarism, complicity and computer misuse. (The policies can be found at http://catalog.wmich.edu under Academic Policies, Student Rights and Responsibilities.) If there is reason to believe you have been involved in academic dishonesty, you will be referred to the Office of Student Conduct. You will be given the opportunity to review the charge(s). If you believe you are not responsible, you will have the opportunity for a hearing. You should consult with your instructor if you are uncertain about an issue of academic honesty prior to the submission of an assignment or test. In addition, you are encouraged to read important information on the following web page: http://osc.wmich.edu, www.wmich.edu/registrar, and www.wmich.edu/disabilityservices to access the Code of Honor and general academic policies on such issues as diversity, religious observance, student disabilities, etc.

Grading Policy

1. Exams (75%)
   A. 3 exams (25% each)
2. Article critiques of current research literature in exercise metabolism (25%)
3. Grading: A (92%+), BA (87%+), B (83%+), CB (78%+), C (70%+), DC (65%+), D (60%+), and E (59%-),