

# IF2- Investment Fund for the Future - Entry #204 2018-2019

## PROPOSAL SUMMARY

**Title:** Development of the Power Training Program in the Biomechanics Lab

**Project Lead Name:** Christopher Williams

**Project Lead eMail Address:** cwilliams@brockport.edu

**Project Lead Department:** Kinesiology, Sport Studies, and Physical Education

**Project Lead School/Division:** School of Education, Health, & Human Services

**Total Amount Requested:** \$21,840.00

**Name of Sponsor 1:** Thomas Hernandez

## A. PROPOSAL DESCRIPTION & IMPACT

A-1. Description of the Initiative.

This initiative is designed to acquire equipment essential to continued development of the Biomechanics Lab – specifically, an electromyography (EMG) system integrated with a data acquisition software platform.

The Biomechanics Lab at the College at Brockport is a unique facility, and is the only facility of its kind within a one-hour radius. Since 2011, the lab has further differentiated itself as unique in the world with the initiation of the Power Training Program (PTP) – a program that applies biomechanical theory and unique equipment to the investigation of a line of research on neuromuscular function, rate of force development, and human performance. The PTP is also an independent study program that has enrolled 185 students (as of spring 2018). Students in the PTP have investigated topics on neuromuscular rate of force development, and have applied results to training athletes across 23 sports team on campus.

PTP research typically involves training studies using a range of equipment in the lab. To transform these capabilities, a data acquisition software platform with electromyography (EMG) capabilities is essential. EMG allows investigation of the electrical activation of muscles, which provides insights into neuromuscular function, efficiency, and activation patterns. The data acquisition software platform allows EMG to be integrated with several existing pieces of equipment in the lab, including force platforms, electrogoniometers, load cells, trigger lights (for reaction time testing and motion capture), the Ariel Computerized Exercise System (ACES), and the Biodex isokinetic dynamometer. When integrated into a synchronous system, muscle activation can be associated with a vast number of physical measures and performance outcomes. And when investigated within the scope of a training study, strategies to optimize neuromuscular performance can be developed and applied to explosive power in athletes, rehabilitation and return to play criteria after injury, and proprioceptive deficiencies such as balance impairment.

The use of EMG and integrated devices such as motion capture, force platforms, load cells and dynamometers, and electrogoniometers is the only way to investigate neuromuscular function and human performance correlates, which are strong interests among students and faculty across several

majors in the Department of Kinesiology, Sport Studies, and Physical Education. As a result of the success of this initiative, the College at Brockport will continue to develop into a great college at which to learn and great college at which to work, and one that provides more opportunity to engage with students, faculty, and the greater community into the 21st century.

A-2. Impact Statement: What change will this project deliver in the short term? What are the expected longer-term impacts?

Research with the equipment in this proposal – namely EMG and integrated peripheral devices – will begin immediately. On average, approximately 10 students per semester have enrolled in the PTP under independent study contracts since spring 2011 (currently, 13 are enrolled in spring 2018). The PTP is an ongoing program, with student enrollment numbers expected to remain relatively constant in fall 2018 and beyond. In addition, one independent study project is in planning for summer 2018, which could utilize EMG (if available), and an Honor's thesis is under development for 2018-2019 which could utilize EMG. As part of a continuing line of research, the data acquisition software platform would be used on an almost continual basis to explore theory and application associated with neuromuscular rate of force development.

From a long-term perspective, an EMG and data acquisition software platform enables the Biomechanics Lab to pursue a wide range of research questions related to human performance across many disciplines. The capabilities of the Biomechanics Lab have been utilized by more than just biomechanics faculty and PTP students, including faculty in pedagogy and exercise physiology, students in classes such Lab Techniques in Exercise Physiology, coaches and student-athletes in the Athletic Department, and a number of community members. In fact, the Biomechanics Lab is the only such facility of its kind within a one-hour radius of campus. By transforming the capabilities of the Biomechanics Lab, the College at Brockport continues to differentiate itself as an academic institution of excellence, unparalleled in the greater Rochester community and beyond.

## **B. STRATEGIC ALIGNMENT**

B-1. Outline the ways in which the proposed investment will contribute to the College Strategic Plan Goals, and if appropriate, their Measures of Success.

The primary strategic goal is to make the College at Brockport a great place to learn and work by transforming the capabilities of the Biomechanics Lab and the Power Training Program and enabling investigations into the complex relationships between neuromuscular function and human performance. By acquiring the equipment in this proposal, EMG and integrated devices can directly measure neuromuscular function and human performance correlates, and this is the only way to do so. In meeting this goal, Brockport students will be provided with the tools to investigate these relationships relative to their own interests and goals – opportunities that are otherwise not available in the greater Rochester community.

The Department of Kinesiology, Sport Studies, and Physical Education, and specifically the Exercise Science, Kinesiology, and Athletic Training majors include students and faculty with strong interests in neuromuscular function. Students completing the PTP experience have often described it as a great learning experience that has been critical to their success when applying to post-baccalaureate opportunities. Furthermore, the PTP experience has allowed them to meaningfully contribute to those endeavors immediately upon entry. The result has fostered the perception of incoming, current, and

former students that the College at Brockport is a great place to learn. And by fostering a positive outlook and opportunity to pursue research interests, the college becomes a great place to work for faculty.

## **C. SUSTAINABILITY**

C-1. How will this initiative become self-sustaining beyond the initial funding period? The equipment acquired in this initiative is expected to have a life of approximately 20 years with minimal maintenance. Individual components of the system are also replaceable, and additional components can be added to expand capabilities. As with most equipment in the Biomechanics Lab, the technical components are robust, and the data acquisition software platform

## **D. IMPLEMENTATION PLAN**

D-1. Identify the specific activities to be funded from the Investment Fund. Provide an estimated timeline for implementation and for activities anticipated to be ongoing. As previously stated, two student projects are scheduled for 2018-2019, both of which will utilize EMG, if available. In addition, the PTP will continue to investigate neuromuscular rate of force development and performance. In spring 2018, research has begun to investigate the effect of neuromuscular training on rate of force development and joint kinematics (angular velocities and accelerations at the ankle, knee, and hip) during a vertical jump. If funded, this study can be replicated with the addition of measuring muscle activation patterns associated with joint kinematics. When combined with the measurement of ground reaction forces from a force plate, the resulting data set provides a comprehensive view of neuromuscular function, multi-joint movement patterns, and performance. Similar studies will be performed in subsequent semester adding direct measurements of muscle activation to provide a more comprehensive description of neuromuscular function and efficiency. And from this line of research, faculty and student presentations and publications are expected for the foreseeable future.

## **E. CONSULTATION**

E-1. For requests involving technology. Has the Chief Information Officer (Bob Cushman or his designee) reviewed this proposal and verified potential costs as it relates to technology: Not Applicable

E-2. For requests involving facilities. Has the Director of Facilities & Planning (John Osowski or his designee) reviewed this proposal and verified potential costs as it relates to facilities: Not Applicable

E-3. The Project Lead has confirmed other required resources with the appropriate supervisor: Not Applicable

## F. BUDGET & OTHER FUNDING SOURCES

F-1. Itemized Budget (Excel format ONLY): [On file]

F-2. Total Amount Requested: \$21,840.00

F-3. This proposal includes: Not applicable.

F-4. Other funding sources\* for this proposal? Not applicable.

F-5. Is the success of the project contingent on receipt of funds from any additional funding source(s)? No

## G. ASSESSMENT PLAN

G-1. How will you assess/measure the effectiveness of this initiative? Provide anticipated outcomes and specific measurements for success.

The success of this initiative begins with the successful acquisition of the equipment. Once acquired, success will be determined by the completion of faculty and student research projects in the Biomechanics Lab on a semester-by-semester basis. It is anticipated this equipment will be used each and every semester. As projects are completed, the final measure of success will be determined by accepted presentations and publications by faculty and students. Targeted organizations for presentations and publication include the National Strength and Conditioning Association (NSCA), the American College of Sports Medicine (ACSM), the National Conference for Undergraduate Research (NCUR), and the American Society of Biomechanics (ASB), among other possibilities.

## H. ADDITIONAL INFORMATION

H-1. Please provide any additional information to assist in the review of the proposal, including why the initiative cannot be funded from divisional resources.

Divisional resources are obviously limited, and the cost of this equipment is prohibitive.

Upload up to three supplemental files here (not required): [On file]

**Signature of Project Lead:** [on file]

**Project Lead Email:** cwilliams@brockport.edu

***Signatures of sponsors are on file in the Administration and Finance Division.***