New Program Proposal:

Master of Science (M.S) program in Human Movement and Rehabilitation Sciences

Executive Summary

A strong global need exists for interdisciplinary, innovative and translational research and practice directed towards improving quality of life and participation of all people in our communities. To meet this need, we propose a novel Master of Science Program in Human Movement and Rehabilitation Sciences. This MS degree will provide the missing opt-out path for our current PhD program in Human Movement and Rehabilitation Sciences and will be open for students interested in a MS 12-month degree via standard admission and via a plus One Pathway. The initial enrolment goal is a cohort of 40 students. This new MS program will be housed in the Department of Physical Therapy, Movement, and Rehabilitation Sciences (PTMRS). It will build on existing strengths across programs and departments within the Bouvé College of Heath Sciences, including Health Sciences, Communication Sciences and Disorders, Nursing, Applied Psychology, Exercise Science, Sports Performance. The program will leverage capacities and collaboration across colleges, including the Khoury College of Computer Sciences, the College of Engineering, and the College of Science.

The new program will prepare graduates to interpret basic, translational, and applied research as well as advance practice in Human Movement and Rehabilitation Sciences, with the goal of applying knowledge about mechanisms and methods of restoring and maximizing human functional capacity and wellbeing across the lifespan. The program will emphasize core competencies in biomechanics, motor control and motor learning, movement measurement and analysis, knowledge translation theory, and the use of traditional and emerging technologies. The program will be based on the integration of these core skills and concepts across the multiple disciplines that are associated with human movement and rehabilitation sciences, coupled with the acquisition of research skills and tools, and specialization within specific areas of human movement and rehabilitation research. Graduates of the program will be capable of assisting in the conducting, creating and communicating research and practice that contributes to advance the field of human movement and rehabilitation sciences in academic, industrial, policy, and governmental settings.

1. Program Description
a. New MS Program

Aligned with the 2025 Academic Plan, we propose a novel interdisciplinary M.S. Program housed in the Department of Physical Therapy, Movement and Rehabilitation Sciences. The mission of the program is to advance our understanding of the neurological and mechanical basis for human movement and function in order to translate this knowledge to improve healthy living for all people in all areas of life. The goals of the program are to enhance research and education around the following broad themes: biomechanics, musculoskeletal disorders, control of movement, motor learning, health and wellbeing through movement and design, human-cybernetic system interactions and neurorehabilitation of movement and function.

Program implementation will incorporate the multidisciplinary and multidimensional concepts of the World Health Organization's International Classification of Functioning, Disability, and Health (ICF).[1] This includes the concepts of body function and structure, activities of people, participation of people in all areas of life, and environmental factors that affect these experiences.

According to the 2017 report from the World Health Organization Rehabilitation 2030: A Call for Action[2], "there is a substantial and ever-increasing unmet need for rehabilitation." This need is a result of increases in non-communicable diseases and injuries across the globe resulting from advances in medicine that have led to increase survival from accidents and disease thus increasing life expectancy. Furthermore, approaches to functionality have changed as knowledge and technology have changed over time as well. As individual's health and functionality changes with this new knowledge and technology, research is critical in the use of these technologies in rehabilitation.

The vision for the proposed program is to become a global leader at the interface of the fundamental study of human movement and rehabilitation science with the implementation of the learned principles to advance rehabilitation sciences. Building from the department's international partners, this program will examine human movement and rehabilitation sciences from a global perspective, so that the outcomes of the program can positively impact people and societies around the world.

Graduates of the program will be capable of assisting in the conducting research that advances knowledge and practice about the development, identification and treatment of selected disabilities as well as mechanisms to understand movement, leading to improved health outcomes for individuals.

This new MS program will prepare graduates to assist in advancing basic, translational, and applied research as well as practice in human movement and rehabilitation sciences. The program will be based on the integration of core skills and concepts across the multiple disciplines that are associated with human movement and rehabilitation sciences, coupled with the acquisition of research skills and tools, and specialization with-in specific areas and tracks.

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[1] https://www.cdc.gov/nchs/data/icd/icfoverview_finalforwho10sept.pdf
[2] http://www.who.int/disabilities/care/Rehab2030MeetingReport_plain_text_version.pdf?ua=1

b. Potential for future programs

The MS program will provide future growth opportunities for the Department's academic programs. Specifically, we see the MS degree as an advance/accelerated/plus one opportunity for undergraduate degree programs across all of Northeastern colleges and extending to regional campuses as well as an entry point for our Doctoral Program in Human Movement and Rehabilitation Sciences.

The MS program curriculum will also serve as a springboard for other degree and certificate programs in Human Movement and Rehabilitation Science. Completing the required courses can constitute completing a certificate program. In addition, the program provides an opt-out degree path for our current PhD. program.

2. Program support of the college, school and university mission

In line with Northeastern University's mission articulated in the Academic Plan 2025 for lifelong learning and discovery through evolving global networks, this program will give students a skill set while immersing them in the global research community that allows them to address the multiple dimensions of the World Health Organization's International Classification of Functioning, Disability, and Health conceptual framework using multidisciplinary approaches.[3] Additionally, the mission of the University to create and translate knowledge to meet global and societal needs has come to partial fruition with the initiation of the Ph.D. program in 2019 that creates the next leaders in research whose work results in applicable solutions to improving the quality of life for all people in all areas of life throughout the lifespan.

Furthermore, the proposed program aligns with Bouvé College's stated mission to train leaders in its professions. The creation of a viable and robust MS program in rehabilitation sciences will expand upon masters level offerings of the New School of Clinical and Rehabilitation Sciences and serve a pathway for the development of a plus one masters degree.

The design of the curriculum also allows for individualization of the program for each student. Depending upon interest, a student can create a custom program for their specific courses and capstone projects.

Since human movement and rehabilitation sciences is an international field, students will have several opportunities for international experiences. The program will encourage students to examine international research opportunities and collaborations for their experiential capstone projects. The faculty have an established and large international network from which the students will build their global experiential education. Many of the faculty are members of international scientific communities as well as adjunct appointments at Universities outside of the United States including Ecuador, Columbia, the Netherlands, and Sweden. Another example of international networks, the Department of Physical Therapy, Movement and Rehabilitation Sciences has a long-standing relationship with Hesav Sante, Lausanne, Switzerland for annual student exchanges program.

3. Program Clientele Analysis

a. Unique Aspects and Opportunity

Northeastern is ideally suited to be a leader in this venture. The program at Northeastern will leverage our strengths: our world-renowned engineering college and nationally, the highly-

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[33] https://www.cdc.gov/nchs/data/icd/icfoverview_finalforwho10sept.pdf

ranked programs in health professions at the Bouvé College of Health Sciences, successful programs in the College of Science and College of Engineering, and unique research laboratories focused on movement analysis and their applications to human movement and epidemiology.

Further, Northeastern has strong global network connections, enabling this venture to have global impacts. The faculty leaders of this proposal have demonstrated expertise and strengths in human movement and rehabilitation sciences. In brief, Northeastern has the opportunity and capability to advance the field of human movement and rehabilitation science and translate research to develop a personalized medicine approach to neurorehabilitation research.

As Northeastern does not have a medical school/hospital affiliation, students and faculty of the program are not constrained to conduct research at a local clinical facility or to target a specific patient population, as is the case for most other clinical research programs whose research focus tends to be narrowly defined by their clinics.

This program also builds upon a critical mass and concentration of faculty in the Department whose research has a focus on human movement sciences. While each of them conducts independent research, the common themes and methods will provide for collaborative learning and opportunities, which will attract and retain students in the program. In addition, the Department along with the University has a unique focus on technology and its uses in rehabilitation sciences. The Department built new research laboratories, utilizing state-of-the-art movement and rehabilitation methods including virtual reality, ultrasound, neuroscience, neurophysiology, robotics, and movement measurement technologies as well as building new partnerships for innovative epidemiology, intervention and teaching research (https://bouve.northeastern.edu/physical-therapy/research/).

b. Evidence for program demand and for ability to attract high quality students
According to the 2017 report from the World Health Organization Rehabilitation 2030: A Call for Action[4], "there is a substantial and ever-increasing unmet need for rehabilitation." This need is a result of increases in noncommunicable diseases and injuries across the globe resulting from advances in medicine that have led to increase survival from accidents and disease, thus increasing life expectancy.

In the past decade several MS and Ph.D. programs have emerged based on the recognized need to address these new health demands and train a new-minded type of workforce: individuals who understand neuroscientific and biological principles, who have an understanding of engineering and technology, and who have a solid foundation in the scientific method and who are clinically-fluent to understand normal and pathological movement. These programs are well enrolled and at top-notched institutions. As such they attract top rated students.

Using exercise science as an example for the demand for human movement and rehabilitation sciences, there has been an increase over the past five years for master's degree programs. In 2019, there were over 3,100 exercise science-related master's degrees conferred nationally. Conferrals increased 24% from 2015, faster than the average growth rate of 12% across all

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[4] http://www.who.int/disabilities/care/Rehab2030MeetingReport_plain_text_version.pdf?ua=1

master's conferrals. Conferrals have continued to grow dramatically among online students though; in 2019 there were 704 online students, up 151% from 2015 and up 28% from 2018.[5]

c. Competition from Other Programs

There are about two dozen MS. programs in Human Movement and Rehabilitation Sciences, or related disciplines in this country, and about a dozen more world-wide. The programs that have emerged are housed in some of the top-tier institutions world-wide (Northwestern University, University of Illinois-Chicago, Washington University, University of Southern California, UNC-Chapel Hill, Emory University, University of Oxford, University of Cambridge, University College London).

Compared to other degree programs in psychology, neuroscience, bioengineering or related fields, human movement and rehabilitation has relatively few competitor programs. As these programs emerge the program at Northeastern is well situated to become a leader in the field and distinguish itself from its competitors. Northeastern will not focus on one disease or geographical region, we will link to our well-established co-op education model, and we will merge a large but currently dispersed faculty into a single mission-driven program.

Graduates of our program will be competitive to pursue career paths in a range of departments in academia, hospital / rehabilitation centers, and technological companies in the human movement and rehabilitation market sector. The good news is that the global availability of such programs is still in the dozens, so the demand for programs still far exceeds the supply. This is an opportune time for Northeastern to advance the field of human movement and rehabilitation by leveraging our unique strengths to develop a premiere experiential-based global and innovative training program that will stand out from the other relatively few programs.

d. Impact on other programs at Northeastern

This program will have a positive impact on other programs at Northeastern. The proposed program will introduce new research and new students into our other interdisciplinary programs, such as population science, personal health informatics, and bioengineering. The new program will complement these efforts building and expanding our existing expertise and training opportunities. In addition, the program will develop new courses with a focus on human movement and rehabilitation sciences which is currently are not offered by the other colleges. Programs in bioengineering, biology, and health sciences will benefit from these courses providing the community at large with the knowledge of these courses.

4. Educational Objectives and Curriculum

a. Education Objectives

This MS. program will focus on applied research within a highly interdisciplinary setting with an emphasis on the rigorous education of graduate students. It will operate with the support of University based research activities at the interface of rehabilitation, neuroscience, and movement sciences that span the colleges of the university. It will emphasize the importance of linking and the intersection of basic, translational, and applied research associated with human movement and rehabilitation science in order to improve the quality of life of those with neuromuscular diseases. Finally, it will emphasize the core competencies of any graduate

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[5] Northeastern University's Office of Enrollment Research and Analytics MS Exercise Science Market Assessment August 28, 2020

research program including effective communication and collaborative partnerships to complete research.

b. Admission Criteria and Process

Application Process. Application materials will include transcript(s), statement of purpose, resume/CV, three letters of reference, GRE scores, and TOEFL score for international applicants. Applications to the program will be evaluated by an Admissions Committee comprised of members of the program's core faculty. The requirements for admission to and completion of the program will conform to the University Graduate Council By-laws. Applications will be accepted on a rolling basis throughout the year.

Admittance. Students will be considered who have a bachelor's or higher degree in a technical discipline (e.g., bio engineering, biomechanics), in a biological science discipline (e.g., physiology, biology) or in a health science discipline (e.g., nursing, medicine, physical therapy, pharmacy, public health, exercise science, occupational therapy). The admissions committee will consider students' pervious academic record; however applicants will be expected to have a minimum of 3.000 undergraduate GPA and have taken courses in physics and calculus receiving grades of B or higher, minimum total GRE percentiles of 75 percentile, and, for international applicants, a minimum TOEFL score of 105. No single part of the application file alone determines admission.

c. Degree Requirements

Degree requirements are listed below. Detailed procedures and forms for each of these will be created once the program has been approved. In addition, these degree requirements will be communicated to the students via a Student Handbook again to be developed once the program has approval.

i. _Credit Hour Requirements_

32 Credit Hours including a capstone project course

ii. _Minimum Academic Standards and Requirements_

There will be no additional standards outside of those in place for Bouvé College graduate students at Northeastern University; grades in courses submitted to satisfy, in whole or in part, the requirements for any graduate degree of advance study must yield a cumulative quality point average of 3.0 or higher. Grades for courses granted transfer credits from another institution will not be used in computing the cumulative grade point average.

iii. _Requirements, as applicable, such as residency requirement, qualifying examination, comprehensive examination, proposal defense, language or tool requirements, field component, teaching, thesis or dissertation requirements. For Ph.D. programs, state the point at which doctoral students become degree candidates._

Capstone Project: Each candidate then must successfully complete and defend a capstone project. The capstone project must be proposed to and approved by the MS program director one semester prior to graduation. The student shall present the project in a public seminar.

Capstone Project Advising. Each student will have one primary academic advisor from the departmental faculty to guide the capstone project development.

d. Learning Outcomes (graduate degrees)

Graduates of the program will be capable of assisting and supporting independent, new research projects related to human movement and rehabilitation sciences. It is expected that graduates will be well-prepared to enter into a number of career paths including: industrial research positions, government consultants, PhD programs, or positions in private industry or academic institutions.

e. Curriculum Requirements

The curriculum requirements consist a core set of classes for all students to have core competencies in human movement and rehabilitation sciences as well as have completed a set of electives defining specific track for each individual student. All students will have exposure to basic, translational and applied research training, since these are considered hallmarks of the program. The curriculum will incorporate global concepts for human movement and rehabilitation sciences. Specifically, the curriculum will include the multidisciplinary and multidimensional concepts of the World Health Organization's International Classification of Functioning, Disability, and Health (ICF)

At the end of the first year of study, students must submit a final plan for their individualized track. This track must be approved by the program head and submitted to the Bouvé College Associate Dean of Graduate Studies.

i. _Required and Elective Courses_

Students must complete 32 credit hours of courses. These courses must be taken for a grade and cannot be taken pass/fail. These courses must include the required courses. Elective courses will be determined on a case by case methods with individual plans for each student and approved by the student's primary advisor final plan of courses needs to be submitted to the program director and the associate dean of graduate studies within the first 12 months.

ii. _Required Courses_ (24 SH)

We expect each student in the program to have core knowledge and skills addressing the common issues for human movement and rehabilitation sciences as well as research methods. These are reflected in the core courses in

- Biostatistics: PHTH 5210 Biostatistics in Public Health (3 SH).
- PT 7001 Core Concepts in Rehabilitation Science and Research: (3-SH)
- PT 7010 Measurement and Analysis of Human movement and Bioinstrumentation. (4 SH)
- PT 7020 Emerging Technologies in Rehabilitation The course will cover emerging technologies that have relevance to rehabilitation of individuals with disorders of movement. (4 SH)
- PT 7030 Interdisciplinary Seminar in Rehabilitation Science (1 SH) x 2 semesters
- PT 5321 (new) Applications of Biomechanics in Human Function and Movement (4SH)
- PT 6320 (new) Capstone Project: Human Movement and Rehabilitation Sciences (4SH)

iib _Electives_

Elective courses will be selected from an approved list. Students must petition to take any elective outside of the approved list. Approved electives include:

- HLTH 5450: Research Methods in Health Care Research (3 + 1 Recitation)
- PT 5133. Kinesiology. 3 Hours.
- BIOE 5320. Advanced Biomedical Measurements and Instrumentation. 4 Hours.
- BIOE 5810. Design of Biomedical Instrumentation. 4 Hours.
- BIOE 5235. Biomedical Imaging. 4 Hours.
- BIOE 7300. Special Topics in Biomechanics. 4 Hours.
- PT 5410. Functional Human Neuroanatomy. 4 Hours.
- PT 5138. Neuroscience. 4 Hours.
- PT 5150. Motor Control, Development, and Learning. 4 Hours.
- PT 5209. Neurological Rehabilitation 1. 4 Hours.
- PT 5600. Ergonomics and the Work Environment. 3 Hours.
- PT 6221. Neurological Rehabilitation 2. 4 Hours
- ME 5250. Robot Mechanics and Control. 4 Hours.
- ME 5659. Control Systems Engineering. 4 Hours.
- ME 5665. Musculoskeletal Biomechanics. 4 Hours.
- ME 7247. Advanced Control Engineering. 4 Hours.
- EECE 5644. Introduction to Machine Learning and Pattern Recognition.
- EECE7200 Linear System Analysis, 4 Hours
- BIOL 5601. Multidisciplinary Approaches in Motor Control. 4 Hours.
- PHTH 6210. Applied Regression Analysis. 3 Hours.
- PHTH 6440. Advanced Methods in Biostatistics. 3 Hours.
- EXSC5210: Physical Activity and Exercise: Prescription, Measurement and Testing

Table: Example of a 12-month Course Pattern for Full Time Student*

Fall	Spring	Summer
PHTH 5210 Biostatistics 3 PT7001 Core Concepts 3* PT5321 Applied Biomechanics 4* PT7030 Seminar 1*	PT7010 Measurement & Analysis 4* PT7020 New Technology 4* PT7030 Seminar 1* Electives 4	PT 6320 Capstone 4* Electives 4
11 SH Total	*13 SH Total*	*8 SH Total*

* Core courses, all required.

Experiential learning opportunities during in the curriculum will be working on their capstone project in research groups either here in the department or with our global academic and industrial partners. These include internship with say MicroSoft or Oculous or working with our academic partners in Switzerland, Sweden, and the Netherlands. These experiences will be shared with other students in discussion during the PT Research Seminar Course.

> ii. *New Courses*

For the MS program we will develop two new courses. A capstone course and Applications of Biomechanics Human Function and Movement. The later course, we expect to attract students from outside the MS program including graduate students from our department, from other graduate programs such as the exercise science MS program in Bouvé as well as students from the College of Engineering and the College of Science.

- PT 5321 *Applications of Biomechanics in Human Function and Movement (4 credits)*
  This is an experiential learning-based course designed to help students develop an understanding of biomechanical concepts as they apply to the analysis of human movement and function. Students will be introduced to emerging methodologies and techniques in the field of biomechanics, particularly as it relates to human movement. They will complete activities that require both computational analyses as well as conceptual understanding. Students will become familiar with the types of data acquisition, reduction, analysis, and interpretations. Additional course concepts will involve those factors which identify limitations to the action and measurement of human movement. Upon completion of the course, students will be able to integrate knowledge emerging from multiple disciplines, including biomechanics, movement sciences, biology, and physics as it applies to functional human movement.

- PT 6320 *Capstone (4 credits)*
  This course is a graduate seminar designed to support students in their successful completion of the MS in Human Movement and Rehabilitation required capstone experience. As such, it depends on active student engagement to shape the focus of the course and to assure the effective completion of the capstone requirements. All students are expected to produce a high-quality written deliverable and professional presentation at the end of the semester. Their final paper will be in the format of a peer-reviewed journal article and detail the methodology, results, limitations, and recommendations for further action based on the outcomes of their projects.

    f. Program Assessment

        i.   <u>Learning Objectives</u>

Graduates of the program will be capable of assisting and supporting independent, new research projects related to rehabilitation and movement sciences. It is expected that graduates will be well-prepared to enter into a number of post-graduate career paths including: industrial research positions, government consultants, and research assistant positions in private and academic institutions in either technology programs or schools of health science, public health, or medicine.

        ii.   <u>Other than GPA, what data/evidence is used to determine that graduates have achieved the stated outcomes for the degree? Who interprets the evidence? What is the process for interpretation</u>?

The program directors and capstone advisor will provide the primary evaluation that a student has achieved the non-course work requirements of the degree.

        iii.   <u>Describe how assessment results will be utilized to improve on the program's effectiveness</u>.

Program faculty will meet regularly to discuss results and outcomes of student's final projects, grades, and academic standing. Program administrators will maintain a database of student postgraduate placement, academic, industry, or government, publications, grant funding and employment. Publication venues will provide a means to assess the quality of the program, as well as the research projects. External research funding and incoming student quality will be

used to measure program strength. In addition, graduates will be asked for feedback concerning their training and program preparation. Both faculty and student surveys will be utilized to collect anonymous feedback in conjunction with teaching evaluations. Results from these feedback systems will be reviewed by all active faculty and through a democratic process, recommended changes will be incorporated into the program. The success of the program will be based on student placements post completion and qualitative reviews of the educational experience collected.

> iv. *Timeline for assessment*

We will employ a continuous improvement approach to evaluating the program through regular meetings of the core faculty and larger systematic reviews every five years. Program faculty will meet regularly to discuss results and outcomes of student's final projects, dissertations, manuscripts, and exams. Program administrators will maintain a database of student postgraduate academic placements, publications, grant funding, and employment.

> v. *Tracking of Program Graduates*

Working with the alumni association we will track the careers of graduates to document their success in pursuing careers in workplace health and safety. In addition, Program administrators will maintain a database of student postgraduate placement, academic, industry, or government, publications, grant funding and employment. We will document these in the program's annual report.

> g. Program accreditation or adherence to licensing standards

The Commission on Accreditation in Physical Therapy Education (CAPTE) grants specialized accreditation status to qualified entry-level education programs for physical therapists and physical therapist assistants. As part of their process they examine the quality of the PhD program on the training for the DPT students.

5. **Resources**
   a. Assess the faculty strength and expertise currently available to the program and identify any additional faculty resources needed to produce a strong program known for excellence.

A strength of this MS proposal is the faculty in the Department Physical Therapy, Movement, and Rehabilitation Sciences. A critical mass of faculty in the area of human movement and rehabilitation science exists in the department. Since 2012, the research faculty and external funding in this area has grown substantially with appointments at the assistant, associate, and full professor levels. These faculty have made and impact on the field through their research and teaching and this impact has been recognized by governmental and non-governmental funding agencies.

The faculty also represent the many disciplines required for the interdisciplinary program. The disciplines represented by the degrees of our tenure-track faculty include engineering, epidemiology, neuroscience, kinesiology, exercise science, anatomy, biology, physiology, education, public health, rehabilitation science, and neurobiology. Our clinical faculty have expertise in orthopedic, musculoskeletal systems, neurology, cardiovascular, and sport performance as well as anatomy and education. Many have academic degrees in addition to clinical expertise.

We have also put forth university cluster proposals that will further support this program

Faculty, Department of Physical Therapy, Movement, and Rehabilitation Sciences:

- Debbie Bangs, PT, DPT Assistant Clinical Professor and Academic Clinical Coordinator Clinical Education Musculoskeletal Disorders
- Christopher Cesario, PT, DPT, MBA. Associate Clinical Professor and Director of Clinical Education; ACL prevention and clinical education
- Stephen Clark, PT, DPT, MS, ATC, CSCS Assistant Clinical Professor; Sports Medicine: managing the injured athlete from initial injury through return to play; interdisciplinary care of student-athletes; management of athletic hip injuries; concussion care
- Marie Corkery, PT, DPT, MHS, FAAOMPT. Associate Clinical professor; Prevention and treatment of lower back pain, Manual therapy interventions for the spine and extremities
- Jack Dennerlein, Ph.D., Professor – Occupational Ergonomics and Safety. Dr. Dennerlein is the director of the Occupational Biomechanics and Ergonomics Laboratory (http://www.northeastern.edu/ergonomics/). Trained as an engineer, Dr. Dennerlein's research examines the physical design of work and tools as well as examining the effects of other conditions of work including psychosocial and organizational factors on worker safety and health. (https://bouve.northeastern.edu/directory/jack-dennerlein/
- Pamela Donlan, PT, DPT, EdD, Assistant Clinical Professor; Neurorehabilitation, investigating best practices in PT education, and exploring the psychosocial aspects of long-term disease and disability on patients and caregivers
- Diane Fitzpatrick, PT, DPT, MS, GCS, CEEAA. Clinical Professor; Geriatric Clinical Specialist, American Board of Physical Therapy Specialties Geriatrics and Aging
- Eric Folmar, PT, DPT, OCS, CKTP. Assistant Clinical Professor; Director, Transitional DPT Program; Orthopedic Clinical Specialist, American Board of Physical Therapy Specialties; Certified Kinesiotaping Practitioner; Orthopedic and sports Medicine; Biomechanics.
- Ann Golub-Victor, PT, MPH, DPT. Clinical Professor and Interim Associate Chair; Pediatric Physical Therapy, Developmental Disabilities, Service-Learning
- Kristin Curry Greenwood, PT, DPT, EdD, MS, GCS. Clinical Professor and Chair; Geriatric Clinical Specialist, American Board of Physical Therapy Specialties; Preparation of Doctor of Physical Therapist Students for Acute Care Entry Level Practice, Simulation Education, Interprofessional Education and Practice
- CJ Hasson, Ph.D., Assistant Professor. Dr. Hasson is the director of the Neuromotor Systems Laboratory at Northeastern University (http://nuweb.neu.edu/cjhasson/). His research aims to understand how the complex interactions between the musculoskeletal and central nervous systems affect movement control and learning in humans. To achieve this understanding, Dr. Hasson uses a combination of techniques from neurophysiology, musculoskeletal modeling, and robotics to non-invasively manipulate neuromuscular dynamics in living humans. https://bouve.northeastern.edu/directory/christopher-hasson/
- Lorna Hayward, EdD, PT, MPH, Associate Professor. Dr. Hayward has won multiple grants and written close to 40 articles on her work. Her current research projects involve examining the use of innovative student assessment strategies, such as student pedagogical teams, and community based participatory research to understand the

impact of international service-learning efforts on the community partner.
https://bouve.northeastern.edu/directory/lorna-hayward/

- Charles Hillman, Ph.D., Professor, Department of Psychology and Department of Physical Therapy, Movement and Rehabilitation Sciences. Dr. Hillman directs the new Center for Cognitive and Brain Health, which has the mission of understanding the role of health behaviors on brain and cognition to maximize health and well-being, and promote the effective functioning of individuals across the lifespan http://www.northeastern.edu/cos/faculty/charles-hillman/

- Mary Hickey, PT, DPT, MHP. Associate Clinical Professor; Back pain related to back pack use in children. Evidence based practice in orthopedics, Use of standardized patients as a teaching methology.

- Sheri Kiami, PT, DPT, MS, NCS Associate Clinical Professor, Neurological Clinical Specialist, American Board of Physical Therapy Specialties; Teaching and Learning Scholarship, Balance Assessment and Falls Prevention

- Sonya Larrieux Ph.D., MA, PT, C/NDT, Associate Clinical Professor Emeritus, Diversity & equity issues related to health care, Workforce development in health care, Developmental disabilities

- Danielle Levac, Ph.D., MSc, PT. Assistant Professor. Dr. Levac is the Director of the Rehabilitation Games and Virtual Reality Laboratory (http://www.northeastern.edu/regamevrlab/). Her research evaluates motor learning paradigms in virtual environments to understand how task practice conditions impact motor learning processes and outcomes. Dr. Levac's research program focuses on promoting the sustainable, evidence-based integration of virtual reality (VR) and active video gaming systems into rehabilitation. https://bouve.northeastern.edu/directory/danielle-levac/

- Alexandre Lopes, PT, PhD, Clinical Professor, Physical Activity, Sports Biomechanics, Athletic Injuries,

- Alycia Markowski, PT, DPT, MPhtyS (manipulative), FAAOMPT, OCS. Associate Clinical Professor, Orthopedic Clinical Specialist, American Board of Physical Therapy Specialties; Rehabilitation of musculoskeletal disorders and pain.

- Jessical Maxwell, PT, DPT, Ph.D., OCS. Associate Clinical Professor, Orthopedic Clinical Specialist, American Board of Physical Therapy Specialties; Functional and participation-level outcomes of knee osteoarthritis and knee replacement

- Matthew Nippins, PT, DPT, CCS. Assistant Clinical Professor, Cardiopulmonary Clinical Specialist, American Board of Physical Therapy Specialties Cystic Fibrosis

- David Nolan, PT, DPT, MS, OCS, SCS, CSCS. Associate Clincial Professor and Director of Sports Physical Therapy Residency Orthopedic rehabilitation, Orthopedic and Sports Clinical Specialist, American Board of Physical Therapy Specialties; Sports related injury of the upper and lower quarter, Gait and running biomechanics, Balance and proprioception in musculoskeletal injury

- Robert Sikes, Ph.D., Associate Professor. Dr. Sikes research the neurophysiology of the cingulate cortex; in particular, the role of cingulate cortex in pain sensation. His research has investigated pathways through which pain information is transmitted and are currently contrasting the effects of somatic and visceral noxious stimulation on cingulate neuron activity. https://bouve.northeastern.edu/directory/robert-sikes/

- Adam Thomas, PT, DPT, SCS, MA, ATC Director Transitional DPT Program, Sports Physical Therapy, Orthopedics, Blood Flow Restriction, Dry Needling.
- Eugene Tunik, Ph.D., PT. Associate Professor and Associate Dean, Dr. Tunik's research mission is to advance knowledge of human neural control of movement and leverage this information to improve motor function for those with neurological impairment (http://www.northeastern.edu/tuniklab/). The goals include to study the neural processes that govern perception and action in health and disease, translate principles of neuroscience into practical interventions for individuals with motor impairment, and advance techniques for studying human motor neurophysiology https://bouve.northeastern.edu/directory/eugene-tunik/
- Maureen Watkins, PT, DPT, OCS, MBA, LMT Assistant Clinical Professor, Orthopedic Clinical Specialist, American Board of Physical Therapy Specialties; Scholarship of teaching and learning of Real time Ultrasound Imaging, Injury Prevention/ Role of Wellness in physical therapy and Education of the female athlete
- Sheng-Che Yen, Ph.D., PT. Associate Clinical Professor. Dr. Sheng-Che Yen's research goals are to understand the sensorimotor control of healthy and pathological gait and to advance the effectiveness of gait rehabilitation in patients with neuromuscular disorders. He is also interested in large dataset analysis to determine the effectiveness of therapeutic outcomes.https://bouve.northeastern.edu/directory/sheng-che-yen/

b. Space Needs
No space needed.

c. Library Resources
None

6. Budget ---

To Be Submitted to the Dean's and Provost's office separately.