

# Exercise and Rehabilitation Science, MS

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**Program Director: Marie Hoeger Bement M.P.T., Ph.D.**

Exercise and Rehabilitation Science website (<https://www.marquette.edu/physical-therapy/exercise-rehabilitation-science.php>)

## Degree Offered

Master of Science

## Department of Physical Therapy Mission

To prepare future health care practitioners and researchers with an education rich in clinical experiences, community outreach, and research opportunities to develop leaders guided by the values of "Cura Personalis."

## Learning Outcomes

The exercise and rehabilitation science (EXRS) master's program is designed to help students gain advanced knowledge in exercise physiology principles while developing skills related to research to help transition successfully to a doctoral program or clinical post-baccalaureate programs.

## Graduates of the Master's Degree in Exercise and Rehabilitation Science Will be Able to:

1. Deliver an effective oral presentation of the thesis or project.
2. Demonstrate a comprehensive understanding of pertinent literature of the chosen topic.
3. Gather, organize, analyze and report data as appropriate for the project and as defined by mentor.
4. Adhere to requirements for protection of human subjects.
5. Interpret results in a way that relates to the research findings and adds to understanding in the field.
6. Make a contribution to the scholarship or clinical practice in the field of exercise or rehabilitation medicine.

## Program Description

The master of science degree in exercise and rehabilitation science (<https://www.marquette.edu/grad/programs-exercise-rehabilitation-science-graduate-program.php>) is open to those with a related science major interested in strengthening their core undergraduate major with advanced course work in research methods, exercise physiology and rehabilitation science.

A master's degree may strengthen a pre-professional student's application for entry into physical therapy, physician assistant studies, occupational therapy or medical school. A student may choose from a variety of areas of emphasis for their degree including: community wellness, exercise physiology, neurologic control of movement, movement disorders, sports medicine including biomechanics or performance enhancement. Both thesis and non-thesis options are available.

**The Clinical and Translational Science Institute of Southeastern Wisconsin** is a major partner with Marquette's exercise and rehabilitation science program. Marquette's participation in this consortium expands opportunities for academic, medical and clinical research within Milwaukee. CTSI partner institutions include the Medical College of Wisconsin, University of Wisconsin-Milwaukee, the Milwaukee School of Engineering, the Zablocki V.A. Medical Center, Children's Hospital of Wisconsin and Versiti Blood Center of Wisconsin.

## General Information

Students applying to the doctoral program must have successfully completed either a master's degree in a related discipline or a post-baccalaureate clinical degree (D.P.T., M.P.T., M.P.A., M.S.N., M.D., etc.) with a minimum cumulative GPA of 3.000 (based on a 4.000 scale). Applicants to the master's program must have an undergraduate degree in a related field with a minimum cumulative GPA of 3.000 (based on a 4.000 scale).

The GRE (if applicable) must have been completed within the previous six years, and official scores must be sent to Marquette University directly from Educational Testing Service.

## Academic Standards

A cumulative GPA of 3.000 is required in the exercise and rehabilitation science program. The Policies (<https://bulletin.marquette.edu/policies/>) tab describes the criteria and procedures for academic warnings, probation, removal of probation and dismissal. The exercise and rehabilitation science program strictly follows these policies and procedures.

## Exercise and Rehabilitation Science Master of Science

The master of science in exercise and rehabilitation science requires a minimum of 36 credit hours. If a student is admitted with prerequisite deficiencies, completion of prerequisite courses does not apply toward degree requirements. The program of course work and research is determined in consultation

with the student's advisory committee. Each student is advised to take courses that are properly related to their academic background and research interests.

## Thesis Program (Plan A)

The typical master's student in Plan A must complete 21 credit hours of required core course work and 9 credit hours of electives. In addition, master's students in Plan A complete 6 thesis credit hours, for a total of 36 credit hours. Students must defend their thesis to the satisfaction of their committee.

## Non-Thesis Program (Plan B)

The typical master's student in Plan B completes 21 credit hours of required core course work, 12 credit hours of electives, and 3 credit hours in project design and professional project courses for a total of 36 credit hours. Students must develop and submit a project, as approved by their mentor.

## Required Course Work for Plan A and Plan B

Advised by the director of graduate studies and/or the student's mentor, an admitted student creates a program plan of study that fulfills the requirements for a master's degree in exercise and rehabilitation science within that particular student's area of interest.

All students are required to take the following courses:

Code	Title	Hours
BISC 5135	Clinical Human Anatomy	4
EXPH 5192	Advanced Exercise Physiology	3
EXPH 5195	Advanced Exercise Physiology Laboratory	1
BISC 5145	Human Physiology	4
EXRS 6001	Applied and Rehabilitative Systems Physiology	3
EXRS 6958	Readings and Research 1	1
HEAL 8015 or MSSC 5720	Applied Statistics for Health Sciences Statistical Methods	3
EXRS 6953	Journal Club in Exercise and Rehabilitation Science	1
EXRS 6957 or EXRS 6960	Inquiry and Scientific Method 1 Inquiry and Scientific Method 2	1
Plan A (Thesis) or Plan B (Non-thesis) - refer to requirements below.		15
<b>Total Credit Hours:</b>		<b>36</b>

## Additional course requirements - Plan A (Thesis Option)

Students select elective courses to develop a plan of study that is consistent with their personal and professional interests.

Code	Title	Hours
EXRS 6999	Master's Thesis	6
Additional 9 credits of electives from courses listed below or any approved graduate-level course:		
BISC 5140	Functional Neuroanatomy	3
BISC 5155	Diseases of the Brain	3
BISC 5160	Molecular Pathology	3
BISC 5340	Human and Applied Medical Genetics	3
BISC 7130	Human Gross Anatomy	5
BISC 7180	Clinical Neuroanatomy	3
EXPH 5187	Clinical Exercise Physiology for Special Populations	3
EXPH 7189	Nutrition and Exercise Performance	4
EXRS 6001	Applied and Rehabilitative Systems Physiology	3
EXRS 6020	Measurements, Tests, and Techniques in Rehabilitation Science	3
EXRS 6030	Advanced Principles and Instrumentation in Biomechanics	3
EXRS 6130	Neuromechanical Control and Regulation of Coordinated Movement	2
EXRS 6201	Neurophysiological Principles in Disease and Rehabilitation	3
EXRS 6290	Brain Dissection	1
EXRS 6320	Molecular and Biochemical Techniques in Rehabilitation Health Science	2
EXRS 6380	Contemporary Pain Rehabilitation	2
EXRS 6515	Neuromuscular Plasticity in Health and Disease	3

EXRS 6540	Fatigue in Health and Disease	3
EXRS 6560	Systematic Reviews and Meta-analysis	2
EXRS 6570	Neuromodulation Techniques and Applications in Rehabilitation Science	3
EXRS 6550	Physiology of Aging	3
EXRS 6590	Performance and Rehabilitation	2
EXRS 6650	Research Methods in Exercise and Rehabilitation Science	1-6
EXRS 6931	Topics in Exercise and Rehabilitation Science	1-3
EXRS 6957	Inquiry and Scientific Method 1	1
EXRS 6960	Inquiry and Scientific Method 2	1
EXRS 6995	Independent Study in Exercise and Rehabilitation Science	1-3

### Additional course requirements - Plan B (Non-Thesis Option)

Students select elective courses to develop a plan of study that is consistent with their personal and professional interests.

Code	Title	Hours
EXRS 6600	Project Design and Development in Exercise and Rehabilitation Science	1
EXRS 6998	Professional Project in Exercise and Rehabilitation Science	2
Additional 12 credits of electives from courses listed below or any approved graduate-level course:		
BISC 5140	Functional Neuroanatomy	3
BISC 5155	Diseases of the Brain	3
BISC 5160	Molecular Pathology	3
BISC 5340	Human and Applied Medical Genetics	3
BISC 7130	Human Gross Anatomy	5
BISC 7180	Clinical Neuroanatomy	3
EXPH 5187	Clinical Exercise Physiology for Special Populations	3
EXPH 7189	Nutrition and Exercise Performance	4
EXRS 6001	Applied and Rehabilitative Systems Physiology	3
EXRS 6020	Measurements, Tests, and Techniques in Rehabilitation Science	3
EXRS 6030	Advanced Principles and Instrumentation in Biomechanics	3
EXRS 6130	Neuromechanical Control and Regulation of Coordinated Movement	2
EXRS 6201	Neurophysiological Principles in Disease and Rehabilitation	3
EXRS 6250	Neural Control of Locomotion	3
EXRS 6290	Brain Dissection	1
EXRS 6320	Molecular and Biochemical Techniques in Rehabilitation Health Science	2
EXRS 6380	Contemporary Pain Rehabilitation	2
EXRS 6505	Aging and Physical Activity	2
EXRS 6510	Obesity - A Comprehensive Approach	2
EXRS 6515	Neuromuscular Plasticity in Health and Disease	3
EXRS 6520	Physiological Adaptations to Environmental Stress	2
EXRS 6530	Spinal Mechanisms of Motor Control and Implications of Rehabilitation	2
EXRS 6540	Fatigue in Health and Disease	3
EXRS 6550	Physiology of Aging	3
EXRS 6590	Performance and Rehabilitation	2
EXRS 6650	Research Methods in Exercise and Rehabilitation Science	1-6
EXRS 6931	Topics in Exercise and Rehabilitation Science	1-3
EXRS 6957	Inquiry and Scientific Method 1	1
EXRS 6960	Inquiry and Scientific Method 2	1
EXRS 6995	Independent Study in Exercise and Rehabilitation Science	1-3

### ACCELERATED BACHELOR'S-MASTER'S DEGREE PROGRAM

The accelerated degree program (ADP) is designed for undergraduate students in related fields at Marquette University (i.e., exercise physiology, biomedical sciences, speech pathology) who wish to complete both their undergraduate degree as well as the master of science degree in exercise and rehabilitation science in just five years.

Students with a GPA of 3.000 or above may apply for admission to the five-year program during their junior year. Students must submit an application to the Graduate School, indicate their interest in the five-year program, and meet all other admission criteria as stated in the Application Requirements section.

ADP students complete graduate course work during their undergraduate senior year, which may be applied toward completion of the master of science degree with appropriate approvals. Courses are selected from 5000-level, 6000-level and 7000-level graduate courses based on the student's academic background and with approval from the director of graduate studies. A maximum of 18 credit hours (50%, or 18 of the total 36 credits) can count toward the master of science degree in exercise and rehabilitation science. Note, however, that only 14 of the 18 credits can also count toward the student's undergraduate degree. The additional 4 credit hours completed while earning the bachelor of science degree count only toward the graduate degree upon transitioning to the master's program.

## University Policies

- Academic Censure - Graduate School (<https://bulletin.marquette.edu/policies/academic-censure/graduate/>)
- Academic Integrity (<https://bulletin.marquette.edu/policies/academic-integrity/>)
- Academic Misconduct (<https://bulletin.marquette.edu/policies/academic-misconduct-policy/>)
- Academic Program Definitions (<https://bulletin.marquette.edu/policies/academic-programs-defined/>)
- Accelerated Degree Programs (<https://bulletin.marquette.edu/policies/accelerated-degree-programs/>)
- Attendance - Graduate School (<https://bulletin.marquette.edu/policies/attendance/graduate/>)
- Awarding Diplomas and Certificates (<https://bulletin.marquette.edu/policies/awarding-diplomas-certificates/>)
- Background Checks, Drug Testing (<https://bulletin.marquette.edu/policies/background-checks-drug-testing/>)
- Class Rank (<https://bulletin.marquette.edu/policies/class-rank/>)
- Commencement (<https://bulletin.marquette.edu/policies/commencement/>)
- Conferral of Degrees and Certificates (<https://bulletin.marquette.edu/policies/conferral-degrees-certificates/>)
- Course Levels (<https://bulletin.marquette.edu/policies/course-levels/>)
- Credit Hour (<https://bulletin.marquette.edu/policies/credit/>)
- Credit Load - Graduate School (<https://bulletin.marquette.edu/policies/credit-load/graduate/>)
- Faculty Grading (<https://bulletin.marquette.edu/policies/faculty-grading/>)
- Family Education Rights and Privacy Act-FERPA (<https://bulletin.marquette.edu/policies/ferpa/>)
- Grade Appeals (<https://bulletin.marquette.edu/policies/grade-appeals/>)
- Grading System - Graduate School and Graduate School of Management (<https://bulletin.marquette.edu/policies/grading-system/graduate-management/>)
- Graduation - Graduate School (<https://bulletin.marquette.edu/policies/graduation/graduate/>)
- Immunization and Tuberculosis Screening Requirements (<https://bulletin.marquette.edu/policies/immunization-and-tuberculosis-screening/>)
- Last Date of Attendance/Activity (<https://bulletin.marquette.edu/policies/last-dateof-attendance-activity/>)
- Military Call to Active Duty or Training (<https://bulletin.marquette.edu/policies/militarycall-active-duty-training/>)
- Registration - Graduate School (<https://bulletin.marquette.edu/policies/registration/graduate/>)
- Repeated Courses - Graduate School (<https://bulletin.marquette.edu/policies/repeated-courses/graduate/>)
- Student Data Use and Privacy (<https://bulletin.marquette.edu/policies/student-data-use-privacy/>)
- Transcripts-Official (<https://bulletin.marquette.edu/policies/transcripts-official/>)
- Transfer Course Credit - Graduate School (<https://bulletin.marquette.edu/policies/transfer-course-credit-policy/graduate/>)
- Withdrawal - Graduate School (<https://bulletin.marquette.edu/policies/withdrawals/graduate/>)

## Graduate School Policies

- Academic Performance (<https://bulletin.marquette.edu/graduate/policies/academic-performance/>)
- Academic Programs Overview (<https://bulletin.marquette.edu/graduate/policies/academic-programs-overview/>)
- Advising (<https://bulletin.marquette.edu/graduate/policies/advising/>)
- Assistantships and Fellowships (<https://bulletin.marquette.edu/graduate/policies/assistantships-andfellowships/>)
- Certificate Concurrent Enrollment (<https://bulletin.marquette.edu/graduate/policies/certificate-concurrent-enrollment/>)
- Conduct (<https://bulletin.marquette.edu/graduate/policies/conduct/>)
- Confidentiality of Proprietary Information (<https://bulletin.marquette.edu/graduate/policies/confidentiality-proprietary-information/>)
- Continuous Enrollment (<https://bulletin.marquette.edu/graduate/policies/continuous-enrollment/>)
- Courses and Prerequisites (<https://bulletin.marquette.edu/graduate/policies/courses-prerequisites/>)
- Cross-listed Courses (<https://bulletin.marquette.edu/graduate/policies/cross-listed-courses/>)
- Deadlines (<https://bulletin.marquette.edu/graduate/policies/deadlines/>)

- Graduate Credit (<https://bulletin.marquette.edu/graduate/policies/graduate-credit/>)
- Graduate School Policies (<https://bulletin.marquette.edu/graduate/policies/>)
- Independent Study (<https://bulletin.marquette.edu/graduate/policies/independent-study/>)
- Intellectual Property (<https://bulletin.marquette.edu/graduate/policies/intellectual-property/>)
- Research Involving Humans, Animals, Radioisotopes or Recombinant DNA/Transgenic Organisms (<https://bulletin.marquette.edu/graduate/policies/research-involving-humans-animals-radioisotopes-recombinant-dnatransgenic-organisms/>)
- Temporary Withdrawal from Graduate Program (<https://bulletin.marquette.edu/graduate/policies/temporary-withdrawal-graduate-program/>)
- Time Limitations (<https://bulletin.marquette.edu/graduate/policies/time-limitations/>)
- Working with Minors (<https://bulletin.marquette.edu/graduate/policies/working-minors/>)

## Exercise and Rehabilitation Science Graduate Programs

- Exercise and Rehabilitation Science, MS (p. 1)
- Exercise and Rehabilitation Science, PHD (<https://bulletin.marquette.edu/graduate/exercise-rehabilitation-science-phd/>)

### EXRS 6001 Applied and Rehabilitative Systems Physiology (3 credits)

An advanced and in-depth presentation of the impact of disease and rehabilitation on the major and physiologic systems. Systems may include skeletal muscle, cardiovascular, pulmonary, endocrine, immune and intermediary metabolism. Addresses clinical and translational models from a systems and disease perspective. Examples may include aging, fatigue, immobilization, cancer, multiple sclerosis, mitochondrial and metabolic disorders, chronic stress and pain.

*Prerequisite:* BISC 5135 and BISC 5145.

*Level of Study:* Graduate

*Last four terms offered:* 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206001>)

### EXRS 6020 Measurements, Tests, and Techniques in Rehabilitation Science (3 credits)

An overview of the tests, measurements and evaluation used in exercise and rehabilitation science research. Advanced discussion of validity and reliability of measurements tools and devices. Topics include physiological and psychosocial testing.

*Prerequisite:* Admitted to the graduate EXRS or NURS program; graduate course in statistics.

*Level of Study:* Graduate

*Last four terms offered:* 2013 Fall Term, 2011 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206020>)

### EXRS 6030 Advanced Principles and Instrumentation in Biomechanics (3 credits)

Presents biomechanical concepts important to the study of human movement and activity and explores the instrumentation used in this study. Discusses and applies biomechanical principles including Newton's laws, anthropometrics, statistics, dynamics, material properties, kinetics and kinematics. Instrumentation such as electromyography, accelerometers, force transducers, optical sensor and force plates are discussed and utilized in the study of human movement. Discusses the design, implementation and calibration of these instruments.

*Prerequisite:* EXRS 6001 which may be taken concurrently.

*Level of Study:* Graduate

*Last four terms offered:* 2021 Fall Term, 2019 Fall Term, 2017 Fall Term, 2015 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206030>)

### EXRS 6130 Neuromechanical Control and Regulation of Coordinated Movement (2 credits)

In-depth study of the neural, mechanical and muscular determinants that affect the control and regulation of coordinated movement in healthy and pathological populations.

*Prerequisite:* EXRS 6030.

*Level of Study:* Graduate

*Last four terms offered:* 2018 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206130>)

### EXRS 6201 Neurophysiological Principles in Disease and Rehabilitation (3 credits)

Examines system level neurophysiological principles in disease and rehabilitation.

*Prerequisite:* BISC 5135 and EXRS 6001.

*Level of Study:* Graduate

*Last four terms offered:* 2022 Spring Term, 2020 Spring Term, 2018 Spring Term, 2016 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206201>)

### EXRS 6250 Neural Control of Locomotion (3 credits)

In-depth study of the neural mechanisms underlying locomotor movements, with emphasis on human locomotion.

*Prerequisite:* EXRS 6201.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206250>)

**EXRS 6290 Brain Dissection (1 credits)**

An in-depth approach to the anatomy of the human brain. Emphasizes correlations between structure and function.

*Prerequisite:* Admitted to the graduate EXRS program.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Summer Term, 2022 Summer Term, 2021 Summer Term, 2019 Summer Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206290>)

**EXRS 6320 Molecular and Biochemical Techniques in Rehabilitation Health Science (2 credits)**

Covers medical and forensic molecular biology, including a review of DNA/RNA structure and function, and biochemical analysis. Relevant laboratory techniques include isolation of genomic DNA from various tissue samples, PCR, RFLP, molecular diagnosis of cancer, detection of infectious agents and identification of inherited diseases. Discusses proper sample processing, handling and storage. Special topics related to specific clinical populations based upon student interests discussed and techniques reviewed.

*Level of Study:* Graduate

*Last four terms offered:* 2022 Fall Term, 2020 Fall Term, 2018 Fall Term, 2016 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206320>)

**EXRS 6380 Contemporary Pain Rehabilitation (2 credits)**

Concepts relating to understanding the basic mechanisms of pain transmission, modulation, including how these influence clinical decision making.

*Prerequisite:* PPTH 7530, which may be taken concurrently.

*Level of Study:* Graduate

*Last four terms offered:* 2022 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206380>)

**EXRS 6505 Aging and Physical Activity (2 credits)**

Explores the aging process using a multi-focal approach. Examines mental, physical and social facets of aging and develops the skills to program fitness and wellness activities for older adults of variable levels of health. Allows hands-on experience in leading and programming exercise with older adults while offering an opportunity to provide a valuable community service in the Milwaukee area.

*Prerequisite:* EXRS 6001.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206505>)

**EXRS 6510 Obesity - A Comprehensive Approach (2 credits)**

Explores obesity as a disease process using a multi-focal approach. Examines mental, physical and social facets of obesity, as well as, approaches to treatment and prevention. For EXPH/ATTR students, application of classroom material occurs via service learning at a variety of sites in MPS and other area facilities.

*Prerequisite:* EXRS 6001.

*Level of Study:* Graduate

*Last four terms offered:* 2014 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206510>)

**EXRS 6515 Neuromuscular Plasticity in Health and Disease (3 credits)**

Examines system level neurophysiological adaptations to activity, disease and rehabilitation with emphasis on sensory and motor systems.

*Prerequisite:* EXRS 6001 and EXRS 6201.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2021 Spring Term, 2019 Spring Term, 2015 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206515>)

**EXRS 6520 Physiological Adaptations to Environmental Stress (2 credits)**

Systems based physiological responses and adaptations to acute and chronic environmental stress. Considerations given to rest and exercise conditions. Topics may include spaceflight and microgravity, hyperbaric environments, hypoxia, high altitude, heat and cold.

*Prerequisite:* EXRS 6001; BISC 5135; and EXPH 4192 or EXPH 5192.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206520>)

**EXRS 6530 Spinal Mechanisms of Motor Control and Implications of Rehabilitation (2 credits)**

Primarily journal-based discussion with exposure to various motor control laboratories in the Midwest.

*Prerequisite:* EXRS 6001 and EXRS 6201.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206530>)



**EXRS 6540 Fatigue in Health and Disease (3 credits)**

An advanced and in depth presentation of the neuromuscular fatigue in healthy, diseased and disabled populations. Explores neural and muscular mechanisms of neuromuscular fatigue for different task conditions and populations that may include: aging, gender, cognitive demand, environmental temperature, practice and neural and muscular disorders, such as, multiple sclerosis, cancer, chronic and acute stress conditions, Alzheimer's disease and stroke.; or cons. of instr.

*Prerequisite:* EXRS 6001 or equiv.

*Level of Study:* Graduate

*Last four terms offered:* 2022 Spring Term, 2020 Spring Term, 2014 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206540>)

**EXRS 6550 Physiology of Aging (3 credits)**

Provides an understanding of the physiology of normal aging and how that differs at times to the pathophysiology of human disease. Presents the normal aging process and disease processes to determine between normal and pathologic presentation, in order to design and implement appropriate therapeutics. Describes modifications in practical areas that will enhance care of the geriatric patient. Topics may include cardiovascular, respiratory, neural systems, cognition, renal, endocrine, immunology, bone and special senses. Each class session ends in a discussion of the clinical implications as they relate to common practice or professions of choice.

*Prerequisite:* EXRS 6001.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206550>)

**EXRS 6560 Systematic Reviews and Meta-analysis (2 credits)**

Examines the steps for conducting systematic reviews and introduction to meta-analysis. Emphasis is on practical application of the steps involved in conducting systematic reviews.

*Prerequisite:* Admitted to the graduate EXRS program.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2021 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206560>)

**EXRS 6570 Neuromodulation Techniques and Applications in Rehabilitation Science (3 credits)**

Discusses the theoretical and practical aspects of neuromodulation as a means to understand and treat disorders of the nervous system and their specific application in neurorehabilitation. Includes demonstrations and laboratory experiences.

*Prerequisite:* Admitted to the graduate EXRS program and concurrent enrollment in EXRS 6201.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206570>)

**EXRS 6590 Performance and Rehabilitation (2 credits)**

Focuses on providing an advanced level understanding of the physiology of performance enhancement as it relates to rehabilitation. Topics include advanced training procedures, assessment techniques and elite training theories. Discusses common surgical procedures and rehabilitation techniques associated with elite athletes with opportunities for observation as permitted. Addresses various subsets of the population, when appropriate, regarding specificity of responses to speed, agility and power training (elite, college, women and sport specific programs). Understanding is demonstrated by incorporation of and application of background knowledge obtained in other courses (exercise physiology, strength and conditioning, biomechanics, kinesiology and orthopedic physical therapy) into the development of exercise programs for specific populations with the purpose of performance enhancement. Includes consideration of the rehabilitation of elite athletic populations experiencing conditions commonly requiring physical therapy intervention (upper or lower extremity or core injuries).

*Prerequisite:* EXRS 6001.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206590>)

**EXRS 6600 Project Design and Development in Exercise and Rehabilitation Science (0-3 credits)**

Provides mentorship in the design and development of the non-thesis master's project to include selecting the topic, population, community or site for project, design of methods and developing the agreements or contracts for the project. 0 credit will be SNC/UNC grade assessment; 1-3 credits will be S/U grade assessment.

*Prerequisite:* Admitted to the graduate EXRS program.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Summer Term, 2023 Spring Term, 2022 Summer Term, 2022 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206600>)

**EXRS 6650 Research Methods in Exercise and Rehabilitation Science (1-6 credits)**

Introduction to and mastery of specific research techniques and methods associated with the research expertise of faculty in clinical and translational rehabilitation health.

*Prerequisite:* Admitted to the graduate EXRS program.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206650>)

**EXRS 6931 Topics in Exercise and Rehabilitation Science (1-3 credits)**

Topics of current interest to exercise and rehabilitation science.

*Prerequisite:* Admitted to the EXRS M.S. or Ph.D. program; or cons. of instr.

*Level of Study:* Graduate

*Last four terms offered:* 2022 Spring Term, 2021 Spring Term, 2020 Fall Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206931>)

**EXRS 6953 Journal Club in Exercise and Rehabilitation Science (0-3 credits)**

Scholarly presentations by visiting faculty and clinicians, resident faculty and graduate and undergraduate students on current topics related to clinical and translational health. 0 credit will be SNC/UNC grade assessment; 1-3 credits will be S/U grade assessment.

*Prerequisite:* Admitted to the graduate EXRS program.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Summer Term, 2022 Summer Term, 2021 Summer Term, 2020 Summer Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206953>)

**EXRS 6957 Inquiry and Scientific Method 1 (1 credits)**

Seminar style course with a discussion section for research graduate students on the principles and methods related to interpreting and presenting research.

*Prerequisite:* Admitted to the graduate EXRS program.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2022 Spring Term, 2021 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206957>)

**EXRS 6958 Readings and Research 1 (0-3 credits)**

Introduces readings and ongoing research in individual laboratories of faculty within the CTSI. The number of hours varies, but the rotation typically consists of two-three rotations. Involves laboratory work, attending laboratory meetings, individual meetings with laboratory PI and oral presentation of progress made in this rotation. Directs students toward potential laboratories with interest or expertise as identified by the student in areas related to exercise and rehabilitation health. Presents various techniques and methods in individual laboratories. Students select their research mentor and collaborators for their project by the end of the course. 0 credit will be SNC/UNC grade assessment; 1-3 credits will be S/U grade assessment.

*Prerequisite:* Admitted to the graduate EXRS program.

*Level of Study:* Graduate

*Last four terms offered:* 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206958>)

**EXRS 6959 Readings and Research 2 (0-3 credits)**

Introduces readings and ongoing research in individual laboratories of faculty within the CTSI. The number of hours varies, but the rotation typically consists of two-three-two rotations. Involves laboratory work, attending laboratory meetings, individual meetings with laboratory PI and oral presentation of progress made in this rotation. Directs students toward potential laboratories with interest or expertise as identified by the student in areas related to exercise clinical and translational rehabilitation health. Presents various techniques and methods in individual laboratories. Students select their research mentor and collaborators for their project by the end of the course. 0 credits will be SNC/UNC grade assessment; 1-3 credits will be S/U grade assessment.

*Prerequisite:* Admitted to the graduate EXRS program.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206959>)

**EXRS 6960 Inquiry and Scientific Method 2 (1 credits)**

Advanced seminar and discussion course allowing research graduate students to take leadership roles in relation to interpreting and presenting research.

*Prerequisite:* Admitted to the graduate EXRS program.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206960>)

**EXRS 6995 Independent Study in Exercise and Rehabilitation Science (1-3 credits)**

Faculty-supervised, independent study/research of a specific area or topic in Exercise and Rehabilitation Science.

*Prerequisite:* Cons. of instr. and cons. of prog. dir.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2022 Spring Term, 2021 Fall Term, 2021 Summer Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206995>)



**EXRS 6998 Professional Project in Exercise and Rehabilitation Science (0-3 credits)**

0 credit will be SNC/UNC grade assessment; 1-3 credits will be S/U grade assessment.

*Prerequisite:* Cons. of instr.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206998>)

**EXRS 6999 Master's Thesis (1-6 credits)**

S/U grade assessment.

*Prerequisite:* Cons. of instr.

*Level of Study:* Graduate

*Last four terms offered:* 2022 Spring Term, 2020 Fall Term, 2018 Spring Term, 2017 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%206999>)

**EXRS 8995 Independent Study in Exercise and Rehabilitation Science (1-3 credits)**

In-depth research on a topic or subject matter usually not offered in the established curriculum with faculty and independent of the classroom setting.

*Prerequisite:* Cons. of instr. and cons. of prog. dir.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%208995>)

**EXRS 8999 Doctoral Dissertation (1-12 credits)**

S/U grade assessment.

*Prerequisite:* Cons. of instr.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2022 Fall Term, 2022 Spring Term, 2021 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%208999>)

**EXRS 9970 Graduate Standing Continuation: Less than Half-Time (0 credits)**

Fee. SNC/UNC grade assessment. Designated as less than half-time status only, cannot be used in conjunction with other courses, and does not qualify students for financial aid or loan deferment.

*Prerequisite:* Cons. of prog. dir.

*Level of Study:* Graduate

*Last four terms offered:* 2021 Spring Term, 2020 Fall Term, 2020 Spring Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209970>)

**EXRS 9974 Graduate Fellowship: Full-Time (0 credits)**

Fee. SNC/UNC grade assessment. Designated as full-time status. If a student is already registered in other courses full time, this continuation course is not needed.

*Prerequisite:* Cons. of prog. dir.

*Level of Study:* Graduate

*Last four terms offered:* 2017 Summer Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209974>)

**EXRS 9975 Graduate Assistant Teaching: Full-Time (0 credits)**

Fee. SNC/UNC grade assessment. Designated as full-time status. If a student is already registered in other courses full time, this continuation course is not needed.

*Prerequisite:* Cons. of prog. dir.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209975>)

**EXRS 9976 Graduate Assistant Research: Full-Time (0 credits)**

Fee. SNC/UNC grade assessment. Designated as full-time status. If a student is already registered in other courses full time, this continuation course is not needed.

*Prerequisite:* Cons. of prog. dir.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2022 Fall Term, 2022 Spring Term, 2021 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209976>)

**EXRS 9984 Master's Comprehensive Examination Preparation: Less than Half-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week toward their master's comprehensive exam.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209984>)

**EXRS 9985 Master's Comprehensive Examination Preparation: Half-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week toward their master's comprehensive exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209985>)

**EXRS 9986 Master's Comprehensive Examination Preparation: Full-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week toward their master's comprehensive exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209986>)

**EXRS 9987 Doctoral Qualifying Examination Preparation: Less than Half-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week toward their doctoral qualifying exam.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

*Last four terms offered:* 2014 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209987>)

**EXRS 9988 Doctoral Qualifying Examination Preparation: Half-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week toward their doctoral qualifying exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209988>)

**EXRS 9989 Doctoral Qualifying Examination Preparation: Full-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week toward their doctoral qualifying exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

*Last four terms offered:* 2018 Fall Term, 2017 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209989>)

**EXRS 9991 Professional Project Continuation: Less than Half-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week on their professional project. Any professional project credits required for the degree should be completed before registering for non-credit Professional Project Continuation.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209991>)

**EXRS 9992 Professional Project Continuation: Half-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week on their professional project. Any project credits required for the degree should be completed before registering for non-credit Professional Project Continuation.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209992>)

**EXRS 9993 Professional Project Continuation: Full-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week on their professional project. Any professional project credits required for the degree should be completed before registering for non-credit Professional Project Continuation.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

*Last four terms offered:* 2022 Summer Term, 2022 Spring Term, 2021 Fall Term, 2021 Summer Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209993>)

**EXRS 9994 Master's Thesis Continuation: Less than Half-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week on their master's thesis. All six thesis credits required for the degree should be completed before registering for non-credit Master's Thesis Continuation.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209994>)

**EXRS 9995 Master's Thesis Continuation: Half-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week on their master's thesis. All six thesis credits required for the degree should be completed before registering for non-credit Master's Thesis Continuation.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209995>)

**EXRS 9996 Master's Thesis Continuation: Full-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week on their master's thesis. All six thesis credits required for the degree should be completed before registering for non-credit Master's Thesis Continuation.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2022 Fall Term, 2022 Summer Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209996>)

**EXRS 9997 Doctoral Dissertation Continuation: Less than Half-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week on their doctoral dissertation. All 12 dissertation credits required for the degree should be completed before registering for non-credit Doctoral Dissertation Continuation.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2022 Fall Term, 2022 Spring Term, 2021 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209997>)

**EXRS 9998 Doctoral Dissertation Continuation: Half-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week on their doctoral dissertation. All 12 dissertation credits required for the degree should be completed before registering for non-credit Doctoral Dissertation Continuation.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

*Last four terms offered:* 2020 Fall Term, 2019 Fall Term, 2019 Summer Term, 2019 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209998>)

**EXRS 9999 Doctoral Dissertation Continuation: Full-Time (0 credits)**

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week on their doctoral dissertation. All 12 dissertation credits required for the degree should be completed before registering for non-credit Doctoral Dissertation Continuation.

*Prerequisite:* Cons. of graduate prog. dir.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2022 Fall Term, 2022 Summer Term, 2022 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=EXRS%209999>)