

# Physical Therapy and Rehabilitation Science

## Chair

- Richard K. Shields

**Graduate degrees:** D.P.T.; M.A. in physical rehabilitation science; Ph.D. in physical rehabilitation science

**Faculty:** <https://medicine.uiowa.edu/pt/people/primary-appointments>

**Website:** <https://medicine.uiowa.edu/pt/>

Physical therapists provide services to patients and clients who have impairments, functional limitations, disabilities, pain, or changes in physical function resulting from injury, disease, or other causes. Physical therapists practice and collaborate with a variety of health professionals. In the area of health promotion and wellness, they provide screening examinations, prescribe fitness programs, and educate the public regarding healthy lifestyles. Research, teaching, consultation, and administration also are parts of a physical therapist's professional role.

The Department of Physical Therapy and Rehabilitation Science is located in the Carver College of Medicine on the University of Iowa health sciences campus, which includes University of Iowa Hospitals and Clinics, one of the nation's largest university-owned teaching hospitals. Students have access to faculty members in the basic sciences and medicine, basic sciences courses, clinical specialty expertise, and innovative learning experiences associated with a medical college environment.

## Programs

### Graduate Programs of Study

#### Majors

- Doctor of Physical Therapy
- Master of Arts in Physical Rehabilitation Science
- Doctor of Philosophy in Physical Rehabilitation Science

## Facilities

The department has state-of-the-art independent research laboratories and is well equipped for classroom and laboratory instruction and innovative research. The department's state-of-the-art research facilities include the Orthopedic Gait Analysis Laboratory and a spinal cord research laboratory at University Hospitals and Clinics; the Human Movement Control/Performance Laboratory; the Neurobiology of Pain Laboratory; the Neuromuscular Biomechanics Laboratory; the Human Integrative and Cardiovascular Physiology Laboratory; and the Applied Neuroplasticity Laboratory.

## Courses

### Physical Therapy and Rehabilitation Science Courses

#### **PTRS:5100 Professional Issues and Ethics** 1 s.h.

Evolution of physical therapy and rehabilitation science as a profession; contemporary issues in education and practice; ethical theory and approaches to analyzing and acting on ethical problems; professional and peer relationships.

#### **PTRS:5101 Introduction to Physical Therapy Practice** 2 s.h.

Lectures, case presentations, and group activities using the Guide to Physical Therapist Practice; elements of the patient/client management model, concepts of the disablement model, preferred practice patterns as applied in clinical problems; importance of professionalism, professional socialization; introduction to evidence-based practice; competence in medical terminology.

#### **PTRS:5102 Principles of Physical Therapy I** 2 s.h.

Patient management skills: interviewing, medical history taking, vital signs, positioning, draping, transfers, body mechanics, assisted gait, wheelchairs, and negotiation of architectural barriers.

#### **PTRS:5103 Principles of Physical Therapy II** 2 s.h.

Continuation of PTRS:5102; expansion of existing skills and provides new learning experiences in documentation, assessment of joint range of motion/goniometry, manual muscle testing, preambulatory intervention strategies, gait analysis; musculoskeletal, neuromuscular, and integumentary systems review. Prerequisites: PTRS:5102.

#### **PTRS:5131 Therapeutic Physical Agents** 2 s.h.

Theoretical and practical applications for safe, effective use of physical agents (superficial and deep heat, cold, hydrotherapy), electrotherapeutic modalities (biofeedback, NMES, TENS, iontophoresis); massage and soft tissue mobilization; emphasis on problem solving, clinical decision making.

#### **PTRS:5144 Interprofessional Education I: Team-Based Approach to Health Care** 1 s.h.

Development and interaction within small group of interprofessional students from physical therapy, medicine, pharmacy, dentistry, nursing, and public health; deans and faculty from each college facilitate; three-hour initial session for all disciplines followed by informal monthly electronic scenarios, second formal meeting followed by informal monthly electronic discussions.

#### **PTRS:5201 Musculoskeletal Therapeutics I** 3 s.h.

Musculoskeletal techniques and biomechanical principles applied to assessment and evaluation of common orthopedic problems of the spine; problem solving, case-study approach to clinical methods, skill acquisition.

#### **PTRS:5205 Health Promotion and Wellness** 3 s.h.

Overview of health promotion, fitness, and wellness strategies, including information on levels of health promotion, risk assessment, applied physiology (skeletal muscle, energy metabolism, and physiological responses to exercise), exercise testing and training guidelines, body composition assessment, and development of individual weight management and exercise training programs; classroom and laboratory experiences.

- PTRS:5206 Cardiopulmonary Therapeutics** 3 s.h.  
Cardiorespiratory anatomy, physiology, and application of basic concepts, techniques in management of patients with acute and chronic cardiac, pulmonary disorders; laboratories.
- PTRS:5209 Surface Anatomy** 1 s.h.  
Laboratory teaching activities that parallel the human anatomy course; observation, palpation, and problem solving skills; upper- and lower-limb, head and neck, thorax, and abdomen.
- PTRS:5210 Kinesiology and Pathomechanics** 4 s.h.  
Normal and pathological movement based on understanding of muscle mechanics, segment and joint mechanics, muscle function; instructor- and student-centered learning experiences; EMG laboratories.
- PTRS:5215 Applied Clinical Medicine** 2 s.h.  
Pathological disorders frequently encountered by physical therapists in clinical practice, addressed by physicians and health professionals who are not physical therapists; physical therapy management.
- PTRS:5235 Case-Based Learning I** 1 s.h.  
Small group case study seminars and simulated patient instructor learning experiences; clinical problems coordinated with concurrent courses; student-centered, problem-based learning format with emphasis on evidence-based practice objectives. First in a two-course sequence.
- PTRS:5236 Case-Based Learning II** 1 s.h.  
Small-group case study seminars and simulated patient instructor learning experiences; clinical problems coordinated with concurrent courses taken in curriculum; student centered, problem-based learning format; emphasis on evidence-based practice objectives. Second in a two-part series of integrated courses. Prerequisites: PTRS:5235.
- PTRS:5790 Integrated Clinical Education in Physical Therapy I** 1 s.h.  
Integrated clinical experiences in area physical therapy clinics; overview of diverse nature of practice through half- or full-day experience; basic skills in examination, intervention, and documentation.
- PTRS:5791 Integrated Clinical Education in Physical Therapy II** 1 s.h.  
Continuation of PTRS:5790; integrated half-day clinical experiences. Prerequisites: PTRS:5790.
- PTRS:6120 Physical Therapy Management and Administration I** 2 s.h.  
The changing U.S. health care system; access to physical therapy services, reimbursement to health care providers, mechanisms for controlling costs while providing quality care; clinical vignettes, small group problem solving.
- PTRS:6121 Physical Therapy Management and Administration II** 1 s.h.  
Principles of management in physical therapy practice; historical perspective, current health care environment; business principles; marketing, managing risk, medical/legal concerns, preparing for the future.
- PTRS:6122 Psychosocial Aspects of Patient Care** 1 s.h.  
Emotional reactions to disability, psychosocial aspects of disability as they relate to patient-physical therapist interaction; specific problems of the angry, non-compliant, or chronic-pain patient; complementary roles of other health professionals; cultural competence in professional behavior and patient treatment; importance of holistic health care.
- PTRS:6133 Pain Mechanisms and Treatment** 1-2 s.h.  
Introduction to basic science mechanisms, assessment, and management of pain; basic science mechanism involved in transmission and perception of painful stimuli after tissue injury, assessment and physical therapy management of pain; emphasis on scientific principles and published literature to support treatment techniques.
- PTRS:6134 Physical Therapy Management of Integumentary System** 2 s.h.  
Overview of physical therapy examination and management of the integumentary system; wound pathology, diagnosis associated with the integumentary system, inflammation and repair, examination and reexamination techniques, documentation, clinical decision making, lecture and laboratory formats; interventions, including patient/client information, physical agents, electrotherapy, wound dressing.
- PTRS:6143 Selected Topics in Physical Therapy Practice** 2 s.h.  
Specialty topics in physical therapy; geriatrics, wheelchair seating/positioning, women's health, home health, industrial physical therapy; alternative or new treatments; guest lectures, lab component.
- PTRS:6145 Interprofessional Education II: Teaching Neural and Musculoskeletal Evaluation Principles** 1 s.h.  
Active involvement in integrating anatomy, kinesiology, and movement control principles as applied to a select group of pathologies with the goal of being able to teach content area; preassigned student group leaders; emphasis on student as active learner; opportunity to teach academic areas previously studied in first and second years of curriculum; may include teaching several of these musculoskeletal principles in a first-year medical student anatomy course.
- PTRS:6170 Management of People with Prosthetic and Orthotic Needs** 2 s.h.  
Physical therapy management and assessment of patients in need of prosthetic and orthotic devices; principles and components of prosthetic and orthotic design and use.
- PTRS:6172 Radiology/Imaging for Physical Therapists** 2 s.h.  
Basic principles and procedures for acquisition and interpretation of radiology and imaging in clinical practice and research; plain film radiographs, CT, MRI, other common imaging modalities; case-based, multidisciplinary approach.
- PTRS:6173 Differential Diagnosis in Physical Therapy** 2 s.h.  
Use of physical therapy examination and evaluation skills to diagnose physical therapy problems; focus on use of good clinical decision-making skills when analyzing a patient's history and administering physical therapy tests and measures to confirm or rule out differential diagnoses; components of the medical examination; importance of collaboration between therapists and other health professionals; interactive case studies presented by clinical experts.
- PTRS:6176 Pharmacology for Physical Therapists** 3 s.h.  
Contemporary pharmacology; overview of basic pharmacokinetic and pharmacodynamic principles; relation of drug therapy to therapeutic interventions provided by physical therapists; small group clinical case presentations.

- PTRS:6200 Pediatric Physical Therapy** 2 s.h.  
Preparation for physical therapy practice in pediatric settings using interdisciplinary family-centered practice; normal and abnormal development, standardized assessment, service-delivery settings, interventions, management strategies specific to pediatrics.
- PTRS:6202 Musculoskeletal Therapeutics II** 3 s.h.  
Pathology, assessment, management of orthopedic disorders of the upper quarter; problem-solving approach to evaluation and management of patients with musculoskeletal conditions. Prerequisites: PTRS:5201.
- PTRS:6203 Musculoskeletal Therapeutics III** 4 s.h.  
Pathology, assessment, management of orthopedic disorders of the lower quarter; problem-solving approach to evaluation and management of patients with musculoskeletal conditions. Prerequisites: PTRS:6202.
- PTRS:6204 Progressive Functional Exercise** 2 s.h.  
Therapeutic exercise options (e.g., isometrics, isotonic, isokinetics, plyometrics, endurance exercises, stretching exercises) and training principles; application to functional activities, including those of daily living, work, recreation, and sport; laboratory component.
- PTRS:6224 Activity-Based Neural and Musculoskeletal Plasticity in Health Care** 4 s.h.  
Examination of neural, muscular, and skeletal plasticity to increased and decreased use in normal and pathological states (chronic inactivity, obesity, metabolic syndromes, orthopedic and neurological injuries); principles of genetic regulation with physical activity including underlying mechanisms contributing to acute and chronic adaptations of muscle, spinal circuitry, and supra-spinal centers; integration of movement control concepts through contemporary papers evaluating short and long latency reflexes, posture and balance control, spasticity, and motor learning in individuals with acute and chronic perturbations to the nervous system.
- PTRS:6225 Neuromuscular Therapeutics** 3 s.h.  
Evidence-based application of clinical neuroscience, motor control, and learning principles to practice of neurological physical therapy; approaches to evaluation and therapeutic intervention for clients with adult-onset neurological conditions, with emphasis on examination, developing a diagnosis, clinical decision making, and prescribing interventions that help clients accomplish goals. Prerequisites: PTRS:6224.
- PTRS:6237 Service Learning I** 1 s.h.  
Service-learning work experience with community partners; students develop individual learning goals for these experiences; classroom reflection on service activities, experiences with elderly and/or disabled, and social responsibility, advocacy, and professionalism in physical therapy; written reflection assignments. First in a two-course sequence.
- PTRS:6238 Service Learning II** 1 s.h.  
Service-learning work experience with community partners; students develop individual learning goals for these experiences; classroom reflection on service activities, experiences with elderly and/or disabled, and social responsibility, advocacy, and professionalism in physical therapy; written reflection assignments. Second in a two-course sequence. Prerequisites: PTRS:6237.
- PTRS:6250 Critical Inquiry I: Evidence-Based Practice** 2 s.h.  
Topics relevant to evidence-based practice and research design; identification of appropriate questions for research and clinical applications, location and evaluation of available evidence, identification of issues that affect validity of research designs, interpretation of basic statistical analyses.
- PTRS:6251 Critical Inquiry II: Rehabilitation Research** 2 s.h.  
Experience conducting group research projects under faculty supervision; data collection and analysis, manuscript preparation, oral defense of research findings during a formal poster presentation. Prerequisites: PTRS:6250.
- PTRS:6252 Critical Inquiry III: Clinical Application** 1 s.h.  
Principles and procedures learned in PTRS:6250 and PTRS:6251 applied to a clinical setting; students write and present a case report with an evidence-based practice focus, using a clinical case from their final internships. Prerequisites: PTRS:6251. Requirements: Physical Therapy and Rehabilitation Science program enrollment.
- PTRS:6253 Functional Neuroanatomy** arr.  
Basic principles of neuroanatomy and neurophysiology; emphasis on human central nervous system; laboratory emphasis on anatomical study of spinal cord and brain. Offered spring semesters. Requirements: physical therapy and rehabilitation science enrollment or graduate standing. Same as ACB:6252.
- PTRS:6792 Integrated Clinical Education in Physical Therapy IV** 1 s.h.  
Two-week, full-time clinical experience in physical therapy clinics in Iowa, under guidance of physical therapists; theory and practice of physical therapy procedures, competence building in basic skills. Prerequisites: PTRS:6793.
- PTRS:6793 Integrated Clinical Education in Physical Therapy III** 3 s.h.  
Six-week, full-time clinical education experience with focus on acute, skilled, long term, or geriatric care in a general hospital, skilled nursing facility, long term care center, or home health setting. Prerequisites: PTRS:5791. Requirements: Doctor of Physical Therapy program enrollment.
- PTRS:6794 Terminal Clinical Education in Physical Therapy I** arr.  
Nine week, full-time clinical education experience divided among various settings; development of competence in independent examination, evaluation, and treatment of patients under supervision of clinical faculty. Prerequisites: PTRS:6792. Requirements: Doctor of Physical Therapy program enrollment.
- PTRS:6795 Terminal Clinical Education in Physical Therapy II** 4 s.h.  
Nine-week, full-time clinical education experience divided among various settings; development of competence in independent examination, evaluation, and treatment of patients under supervision of clinical faculty. Prerequisites: PTRS:6794. Requirements: Doctor of Physical Therapy program enrollment.
- PTRS:6796 Terminal Clinical Education in Physical Therapy III** 4 s.h.  
Nine-week, full-time clinical education experience divided among various settings; development of competence in independent examination, evaluation, and treatment of patients under supervision of clinical faculty. Prerequisites: PTRS:6795. Requirements: Doctor of Physical Therapy program enrollment.

- PTRS:7812 Biomedical Instrumentation and Measurement** 3 s.h.  
Introduction to biomedical instrumentation and measurement; understanding sources of error and noise in biomedical research applications; basic circuit analysis, calibration of measurement tools, A/D conversion, digital filtering; lab components. Offered fall semesters of even years.
- PTRS:7820 Seminar in Rehabilitation Science** 1 s.h.  
Exploration of research related to rehabilitation science; lectures by faculty, graduate students, and guest scholars with expertise in areas relevant to rehabilitation science (e.g., neuroscience, physiology, medicine, engineering, pharmacology, integrated physiology).
- PTRS:7826 Scientific Writing in Rehabilitation Science** 3 s.h.  
Knowledge of and experience related to scientific writing, critical review of scientific literature, publication in the biomedical sciences, thesis/dissertation writing, grant writing, scientific presentation, writing used in academic and scientific careers.
- PTRS:7875 Analysis of Activity-Based Neural and Musculoskeletal Plasticity** 3 s.h.  
Examination of neural, muscular, and skeletal plasticity to increased/decreased use in normal and pathological states (chronic inactivity, obesity, metabolic syndromes, orthopedic and neurological injuries); genetic regulation with physical activity and underlying mechanisms contributing to acute and chronic adaptations of muscle, spinal circuitry, and supra-spinal centers; integration of movement control concepts through contemporary papers evaluating short and long latency reflexes, posture and balance control, spasticity, and motor learning in individuals with acute and chronic perturbations to the nervous system; individual research projects.
- PTRS:7880 Teaching Practicum** arr.  
Individual instruction, observation, experimentation in teaching, guidance, analysis of evaluation processes in Physical Therapy and Rehabilitation Science.
- PTRS:7884 Practicum in Research** arr.  
Laboratory experiences connected with investigative process; individual instruction, observation, activities in methodological development, data acquisition, data analysis aspects of research.
- PTRS:7885 Biomechanical Analysis in Rehabilitation** 3 s.h.  
Assessment of pathological movement through human movement analysis techniques, including link segment modeling and analysis, mechanical energy and power analysis, electromyography and muscle modeling.
- PTRS:7895 Advanced Seminar in Rehabilitation Science** arr.  
Current status of research for biological, mechanical, psychological components pertinent to cardiopulmonary, musculoskeletal, neuromuscular areas of rehabilitation science; preparation for comprehensive exam.
- PTRS:7899 Introduction to Pain: Overview of Theories, Concepts, and Mechanisms** 1 s.h.  
Overview of pain concepts and mechanisms; general overview of pain, models of pain, peripheral and central mechanisms, and pain inhibition. Requirements: prior neuroscience course.
- PTRS:7900 Rehabilitation Research Capstone Project** arr.  
Specific phases of the research process; development of a research question and associated hypotheses, collection and analysis of data, interpretation and discussion of the information's meaning; presentation to sponsoring mentor's laboratory/program, and written document.
- PTRS:7901 Clinical Correlates of Pain: Syndromes and Management** 1 s.h.  
Common pain conditions and management of pain using an interdisciplinary focus; lectures by University of Iowa Hospitals and Clinics clinicians on a variety of acute and chronic pain conditions and management approaches. Requirements: prior neuroscience course.
- PTRS:7902 Molecular, Cellular, and Neural Mechanisms of Pain** 2 s.h.  
Basic science mechanisms of pain and pain modulation; understanding molecular basis for pain in nociceptive afferents (peripheral sensitization), underlying molecular and neuronal mechanisms of central processing of pain (central sensitization), cortical pain processing, animal and human experimental pain models; readings from past and current literature. Prerequisites: PTRS:7899. Requirements: prior neuroscience course.
- PTRS:7903 Rehabilitation Management of Pain** 1 s.h.  
Basic principles of rehabilitation for pain control including education, exercise, and electrophysical modalities; evidence-based approach to rehabilitation covering mechanisms of action and clinical effectiveness; case studies. Prerequisites: PTRS:7899 and PTRS:7901.
- PTRS:7925 Independent Study** arr.  
Problem-solving experience in physical therapy; commensurate with student's interest, ability.
- PTRS:7927 Research in Rehabilitation Science** arr.  
Placement of physical therapy on sound scientific base; therapy; initiation, refinement, establishment of methods in physical therapy evaluation, treatment; direct clinical and laboratory approach, philosophical treatise, or research proposal.
- PTRS:7930 Critical Thinking in Neuro-Mechanical Systems** arr.  
Problem solving experience in neuro-mechanical systems, commensurate with student interest, ability.
- PTRS:7931 Critical Thinking in Pain** arr.  
Problem solving experience in pain, commensurate with student interest, ability.
- PTRS:7932 Critical Thinking in Biomechanics and Human Performance Assessment** arr.  
Problem solving experience in biomechanics and human performance assessment, commensurate with student interest, ability.
- PTRS:7933 Critical Thinking in Movement Control/ Human Performance** arr.  
Problem solving experience in movement control/human performance, commensurate with student interest, ability.
- PTRS:7934 Critical Thinking in Neural Plasticity** arr.  
Problem solving experience in neural plasticity, commensurate with student interest, ability.
- PTRS:7935 Critical Thinking in Sports Medicine** arr.  
Problem solving experience in sports medicine, commensurate with student interest; ability.

**PTRS:7936 Critical Thinking in Cardiovascular**

**Physiology**

**arr.**

Problem solving experience in cardiovascular physiology, commensurate with student interest, ability.

**PTRS:7990 Thesis: Rehabilitation Science**

**arr.**

Investigative process: formulation of problem, literature search and analysis, procedure for collecting data, data analysis, organization and writing of thesis proposal, thesis.

**PTRS:8133 Introduction to Human Pathology for Graduate Students**

**4 s.h.**

Human disease; basic disease processes, organ-related and multisystem diseases; case analysis. Offered fall semesters. Same as PATH:8133.