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/profile/?appointment=PRIMARY&category=&query=&page=1&size=10
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 & 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 Movement and Rehabilitation Laboratory and a spinal cord research laboratory at University Hospitals & Clinics, the Human Movement Control/Performance Laboratory, the Neurobiology of Pain Laboratory, the Neuromuscular Biomechanics Laboratory, the Human Integrative and Cardiovascular Physiology Laboratory, the Applied Neuroplasticity Laboratory, the Human Performance and Clinical Outcomes Laboratory, and the Orthopaedic Gait Analysis Laboratory.

Courses

Physical Therapy and Rehabilitation Science Courses

PTRS:5100 Professional Issues and Ethics 1 s.h.
Contemporary issues in clinical practice and professional development; legal and ethical perspectives on human rights, ethical theory and principles for analyzing and acting on ethical problems; professional and peer relationships.

PTRS:5101 Introduction to Physical Therapy Practice 2 s.h.
Professional development of physical therapists; evolution of profession; analysis of current role in health care and public health with respect to societal health challenges; patient management terminology including medical terminology and language utilized in the Guide to Physical Therapist Practice; concepts of enablement models and disablement models, including World Health Organization’s International Classification of Functioning, Disability and Health model in the biopsychosocial model of health; introduction to evidence-based practice principles.

PTRS:5102 Principles of Physical Therapy I 2 s.h.
Patient management skills: fostering therapeutic alliance, history taking, systems review, 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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTRS:5205</td>
<td>Health Promotion and Wellness</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>PTRS:5206</td>
<td>Cardiopulmonary Therapeutics</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>PTRS:5209</td>
<td>Surface Anatomy</td>
<td>1 s.h.</td>
</tr>
<tr>
<td>PTRS:5210</td>
<td>Kinesiology and Pathomechanics</td>
<td>4 s.h.</td>
</tr>
<tr>
<td>PTRS:5212</td>
<td>Human Pathology for the Physical Therapist</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>PTRS:5215</td>
<td>Applied Clinical Medicine</td>
<td>2 s.h.</td>
</tr>
<tr>
<td>PTRS:5235</td>
<td>Case-Based Learning I</td>
<td>1 s.h.</td>
</tr>
<tr>
<td>PTRS:5236</td>
<td>Case-Based Learning II</td>
<td>1 s.h.</td>
</tr>
<tr>
<td>PTRS:5790</td>
<td>Integrated Clinical Education in Physical Therapy I</td>
<td>1 s.h.</td>
</tr>
<tr>
<td>PTRS:6120</td>
<td>Physical Therapy Management and Administration I</td>
<td>2 s.h.</td>
</tr>
<tr>
<td>PTRS:6121</td>
<td>Physical Therapy Management and Administration II</td>
<td>1 s.h.</td>
</tr>
<tr>
<td>PTRS:6122</td>
<td>Psychosocial Aspects of Patient Care</td>
<td>1 s.h.</td>
</tr>
<tr>
<td>PTRS:6133</td>
<td>Pain Mechanisms and Treatment</td>
<td>1-2 s.h.</td>
</tr>
<tr>
<td>PTRS:6134</td>
<td>Physical Therapy Management of Integumentary System</td>
<td>2 s.h.</td>
</tr>
<tr>
<td>PTRS:6143</td>
<td>Physical Therapy Management and Administration</td>
<td></td>
</tr>
<tr>
<td>PTRS:6145</td>
<td>Physical Therapy Management and Administration</td>
<td></td>
</tr>
<tr>
<td>PTRS:6154</td>
<td>Selected Topics in Physical Therapy Practice</td>
<td>2 s.h.</td>
</tr>
<tr>
<td>PTRS:6165</td>
<td>Interprofessional Education II: Teaching Neural and Musculoskeletal Evaluation Principles</td>
<td>1 s.h.</td>
</tr>
</tbody>
</table>

**Base Course Descriptions**

**Health Promotion and Wellness**
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.

**Cardiopulmonary Therapeutics**
Cardiorespiratory anatomy, physiology, and application of basic concepts, techniques in management of patients with acute and chronic cardiac, pulmonary disorders; laboratories.

**Surface Anatomy**
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.

**Kinesiology and Pathomechanics**
Normal and pathological movement based on understanding of muscle mechanics, segment and joint mechanics, muscle function; instructor- and student-centered learning experiences; integrative human movement system laboratories.

**Human Pathology for the Physical Therapist**
Students gain a cursory understanding of the physiologic mechanisms of human health and pathologic mechanisms of disease; emphasis on morphologic changes of cells and tissues, identification of causes of change (etiology), mechanisms of development (pathogenesis), and clinical manifestations of specific disease processes; influence of disease and medical diagnosis on physical therapy practice and physical therapy diagnosis.

**Applied Clinical Medicine**
Pathological disorders frequently encountered by physical therapists in clinical practice, addressed by physicians and health professionals who are not physical therapists; physical therapy management.

**Case-Based Learning I**
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.

**Case-Based Learning II**
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.

**Integrated Clinical Education in Physical Therapy I**
Integrated clinical experiences in area physical therapy clinics; overview of diverse nature of practice through half-day experiences; basic skills in examination, intervention, and documentation.

**Integrated Clinical Education in Physical Therapy II**
Continuation of PTRS:5790; integrated clinical experiences in area physical therapy clinics; overview of diverse nature of practice through full-day clinical experiences; basic skills in examination, intervention, and documentation. Prerequisites: PTRS:5790. Requirements: Doctor of Physical Therapy program enrollment.

**Physical Therapy Management and Administration I**
The changing U.S. health care system; physical therapy services across continuum of care, reimbursement to health care providers, mechanisms for controlling costs while providing quality care; clinical vignettes, small group problem solving.

**Physical Therapy Management and Administration II**
Principles of management in physical therapy practice; historical perspective, current health care environment; business principles; marketing, managing risk, medical/legal concerns, professional and personal growth and development.

**Psychosocial Aspects of Patient Care**
Emotional reactions to illness/trauma; social determinants of health; recognition of mental illness in physical therapy examination and intervention; psychosocial aspects of disability as they relate to patient-physical therapist interaction; effective communication strategies; cultural competence in professional behavior and patient care.

**Pain Mechanisms and Treatment**
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.

**Physical Therapy Management and Integumentary System**
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.

**Selected Topics in Physical Therapy Practice**
Specialty area of practice including wheelchair seating and prescription, pelvic health, home assessment, durable medical equipment (DME) recommendations, and geriatrics; topics dictated by changing needs of health care and the profession; emphasis on clinical decision making, synthesis and evaluation of information with respect to first-year physical therapy curriculum.

**Interprofessional Education II: Teaching Neural and Musculoskeletal Evaluation Principles**
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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTRS:6170</td>
<td>Management of People with Prosthetic and Orthotic Needs</td>
<td>2 s.h.</td>
</tr>
<tr>
<td>PTRS:6172</td>
<td>Radiology/Imaging for Physical Therapists</td>
<td>2 s.h.</td>
</tr>
<tr>
<td>PTRS:6173</td>
<td>Differential Diagnosis in Physical Therapy</td>
<td>2 s.h.</td>
</tr>
<tr>
<td>PTRS:6176</td>
<td>Pharmacology for Physical Therapists</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>PTRS:6200</td>
<td>Pediatric Physical Therapy</td>
<td>2 s.h.</td>
</tr>
<tr>
<td>PTRS:6202</td>
<td>Musculoskeletal Therapeutics II</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>PTRS:6203</td>
<td>Musculoskeletal Therapeutics III</td>
<td>4 s.h.</td>
</tr>
<tr>
<td>PTRS:6204</td>
<td>Progressive Functional Exercise</td>
<td>2 s.h.</td>
</tr>
<tr>
<td>PTRS:6224</td>
<td>Activity-Based Neural and Musculoskeletal Plasticity in Health Care</td>
<td>4 s.h.</td>
</tr>
<tr>
<td>PTRS:6225</td>
<td>Neuromuscular Therapeutics</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>PTRS:6227</td>
<td>Community Outreach and Engagement I</td>
<td>1 s.h.</td>
</tr>
<tr>
<td>PTRS:6228</td>
<td>Community Outreach and Engagement II</td>
<td>1 s.h.</td>
</tr>
<tr>
<td>PTRS:6250</td>
<td>Critical Inquiry I: Evidence-Based Practice</td>
<td>2 s.h.</td>
</tr>
<tr>
<td>PTRS:6251</td>
<td>Critical Inquiry II: Rehabilitation Research</td>
<td>2 s.h.</td>
</tr>
<tr>
<td>PTRS:6252</td>
<td>Critical Inquiry III: Clinical Application</td>
<td>1 s.h.</td>
</tr>
<tr>
<td>PTRS:6253</td>
<td>Functional Neuroanatomy</td>
<td>arr.</td>
</tr>
<tr>
<td>PTRS:6792</td>
<td>Integrated Clinical Education in Physical Therapy IV</td>
<td>1 s.h.</td>
</tr>
</tbody>
</table>

**Course Descriptions**

**Management of People with Prosthetic and Orthotic Needs**: Physical therapy management and assessment of patients in need of prosthetic and orthotic devices; principles and components of prosthetic and orthotic design and use.

**Radiology/Imaging for Physical Therapists**: 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.

**Differential Diagnosis in Physical Therapy**: 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.

**Pharmacology for Physical Therapists**: Contemporary pharmacology; overview of basic pharmokinetic and pharmacodynamic principles; relation of drug therapy to therapeutic interventions provided by physical therapists; small group clinical case presentations.

**Pediatric Physical Therapy**: 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.

**Musculoskeletal Therapeutics II**: 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.

**Musculoskeletal Therapeutics III**: 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.

**Progressive Functional Exercise**: Therapeutic exercise options (e.g., isometrics, isotonics, isokinetics, plyometrics, endurance exercises, stretching exercises) and training principles; application to functional activities, including those of daily living, work, recreation, and sport; laboratory component.

**Activity-Based Neural and Musculoskeletal Plasticity in Health Care**: 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.

**Neuromuscular Therapeutics**: 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.

**Community Outreach and Engagement I**: Outreach and engagement activities with individuals and organizations in the community; students select service learning experiences from current community partners, or may suggest their own idea, and develop their individual learning goals for these experiences; discussion and written assignments focus on reflection about student experiences with persons who are different than themselves, and on social responsibility, advocacy, and professionalism in the field of physical therapy; first in a two-course series. Prerequisites: PTRS:6237.

**Critical Inquiry I: Evidence-Based Practice**: 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.

**Critical Inquiry II: Rehabilitation Research**: 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.

**Critical Inquiry III: Clinical Application**: 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.

**Functional Neuroanatomy**: 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.

**Integrated Clinical Education in Physical Therapy IV**: Two-week, full-time clinical experience in physical therapy clinics under guidance of physical therapists; theory and practice of physical therapy procedures, competence building in basic skills. Prerequisites: PTRS:6793. Requirements: Doctor of Physical Therapy Program enrollment.
Projects.

PTRS:6793 Integrated Clinical Education in Physical Therapy III
Six-week, full-time clinical education experience in a rural health environment. Prerequisites: PTRS:5791. Requirements: Doctor of Physical Therapy program enrollment.

PTRS:6794 Terminal Clinical Education in Physical Therapy I
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
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
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
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
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
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
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 supraspinal 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

PTRS:7884 Practicum in Research
Laboratory experiences connected with investigative process; individual instruction, observation, activities in methodological development, data acquisition, data analysis aspects of research.

PTRS:7895 Advanced Seminar in Rehabilitation Science
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
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
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
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
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
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
Problem-solving experience in physical therapy; commensurate with student's interest, ability.

PTRS:7927 Research in Rehabilitation Science
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
Problem solving experience in neuro-mechanical systems, commensurate with student interest, ability.
PTRS:7931 Critical Thinking in Pain  
Problem solving experience in pain, commensurate with student interest, ability.

PTRS:7932 Critical Thinking in Biomechanics and Human Performance Assessment  
Problem solving experience in biomechanics and human performance assessment, commensurate with student interest, ability.

PTRS:7933 Critical Thinking in Activity-Based Plasticity  
Problem solving experience in movement control/human performance, commensurate with student interest, ability.

PTRS:7934 Critical Thinking in Neural Plasticity  
Problem solving experience in neural plasticity, commensurate with student interest, ability.

PTRS:7935 Critical Thinking in Movement Science  
Problem solving experience in movement science, commensurate with student interest; ability.

PTRS:7936 Critical Thinking in Cardiovascular Physiology  
Problem solving experience in cardiovascular physiology, commensurate with student interest, ability.

PTRS:7990 Thesis: Rehabilitation Science  