Physical Therapy and Rehabilitation Science

Chair
• Richard K. Shields

Graduate degrees: D.P.T.; M.A. in physical therapy; Ph.D. in physical rehabilitation science
Faculty: http://www.medicine.uiowa.edu/dept_primary_apr.aspx?appointment=Physical%20Therapy%20and%20Rehabilitation%20Science
Web site: http://www.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.

A wide variety of opportunities exist for professional practice in inpatient, outpatient, and community-based settings. Examples include practice in general or specialized hospitals, programs for children with disabilities, private physical therapy clinics, extended care facilities, nursing homes, community and governmental agencies, rehabilitation centers, the armed forces, foreign service, home health agencies, school systems, fitness centers, and athletic facilities. Research and teaching careers in academic institutions are available for those who earn a Ph.D. in rehabilitation science.

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. The department has seven state-of-the-art independent research laboratories and is well equipped for classroom and laboratory instruction and innovative research. 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.

Graduate Programs of Study
• Doctor of Physical Therapy
• Master of Arts in physical therapy
• Doctor of Philosophy in physical rehabilitation science

The Doctor of Physical Therapy (D.P.T.) is the entry-level professional degree for physical therapists. The Master of Arts in physical therapy is granted to students working toward the Doctor of Philosophy in physical rehabilitation science. Based on the number of outstanding applicants, 38-42 students are admitted to the D.P.T. program and around 20 students are enrolled in the Ph.D. program each year.

Doctor of Physical Therapy
The Doctor of Physical Therapy requires a minimum of 104 s.h. and is completed in two and a half years. The program is fully accredited by the Commission on Accreditation in Physical Therapy Education. Satisfactory completion of the professional program qualifies candidates to take the National Physical Therapy Examination for licensure to practice. The minimum passing score on the exam is the same in all jurisdictions.

Technical Standards for Graduation
Doctor of Physical Therapy graduates must possess and demonstrate the physical and cognitive skills and character attributes required to provide physical therapy services in a broad variety of clinical situations and environments. All D.P.T. candidates must perform, with or without reasonable accommodation, the following skills safely, effectively, efficiently, and in compliance with the legal and ethical standards set by the American Physical Therapy Association Code of Ethics and Standards of Practice:

• communicate effectively through appropriate verbal, nonverbal, and written communication with patients, families, and others;
• demonstrate ability to apply universal precautions;
• utilize appropriate tests and measures in order to perform a physical therapy examination; examples include, but are not limited to, examination and evaluation of cognitive/mental status, vital signs, skin and vascular integrity, wound status, endurance, segmental length, girth, volume, sensation, strength, tone, reflexes, movement patterns, coordination, balance, developmental stage, soft tissue, joint motion/play, cranial and peripheral nerve function, posture, gait, functional abilities, assistive devices fit/use, psychosocial needs, and the pulmonary system;
• demonstrate the ability to reach diagnostic and therapeutic judgments through analysis and synthesis of data gathered during patient/client examination in order to develop an appropriate plan of care;
• perform fully, or in a reasonably independent manner, physical therapy interventions appropriate to the patient's status and desired goals;
• apply teaching/learning theories and methods in health care and community environments;
• accept criticism and respond by appropriate behavior modification;
• possess the perseverance, diligence, and consistency to complete the physical therapy curriculum and enter the practice of physical therapy.

Applicants with health conditions or disabilities who need accommodation to meet the technical standards for graduation should contact the University's Student Disability Services office.

Curriculum
The Doctor of Physical Therapy degree requires the following course work (total of 104 s.h.).

First Summer Session
PTRS:5101 Introduction to Physical Therapy Practice 2 s.h.
PTRS:5102 Principles of Physical Therapy I 2 s.h.
PTRS:5205 Health Promotion and Wellness 3 s.h.

**First Semester (Fall)**
PTRS:5100 Professional Issues and Ethics 1 s.h.
PTRS:5103 Principles of Physical Therapy II 2 s.h.
PTRS:5144 Interprofessional Education I: Team-Based Approach to Health Care 1 s.h.
PTRS:5209 Surface Anatomy 1 s.h.
PTRS:5210 Kinesiology and Pathomechanics 4 s.h.
PTRS:5235 Case-Based Learning I 1 s.h.
PTRS:5790 Integrated Clinical Education in Physical Therapy I 1 s.h.
ACB:5108 Human Anatomy 5 s.h.
PATH:8133 Introduction to Human Pathology for Graduate Students 4 s.h.

**Second Semester (Spring)**
PTRS:5131 Therapeutic Physical Agents 2 s.h.
PTRS:5201 Musculoskeletal Therapeutics I 3 s.h.
PTRS:5206 Cardiopulmonary Therapeutics 3 s.h.
PTRS:5215 Applied Clinical Medicine 2 s.h.
PTRS:5236 Case-Based Learning II 1 s.h.
PTRS:5791 Integrated Clinical Education in Physical Therapy II 1 s.h.
ACB:6252 Functional Neuroanatomy 4 s.h.

**Second Summer Session**
PTRS:6120 Physical Therapy Management and Administration I 2 s.h.
PTRS:6143 Selected Topics in Physical Therapy Practice 2 s.h.
PTRS:6176 Pharmacology for Physical Therapists 3 s.h.
PTRS:6793 Integrated Clinical Education in Physical Therapy III 3 s.h.

**Third Semester (Fall)**
PTRS:6122 Psychosocial Aspects of Patient Care 1 s.h.
PTRS:6134 Physical Therapy Management of Integumentary System 2 s.h.
PTRS:6145 Interprofessional Education II: Teaching Neural and Musculoskeletal Evaluation Principles 1 s.h.
PTRS:6170 Management of People with Prosthetic and Orthotic Needs 2 s.h.
PTRS:6200 Pediatric Physical Therapy 2 s.h.
PTRS:6202 Musculoskeletal Therapeutics II 3 s.h.
PTRS:6224 Activity-Based Neural and Musculoskeletal Plasticity in Health Care 4 s.h.
PTRS:6237 Service Learning I 1 s.h.
PTRS:6250 Research in Physical Therapy 2 s.h.

**Fourth Semester (Spring)**
PTRS:6121 Physical Therapy Management and Administration II 1 s.h.
PTRS:6133 Pain Mechanisms and Treatment 2 s.h.
PTRS:6172 Radiology/Imaging for Physical Therapists 2 s.h.
PTRS:6173 Differential Diagnosis in Physical Therapy 2 s.h.
PTRS:6203 Musculoskeletal Therapeutics III 4 s.h.
PTRS:6204 Progressive Functional Exercise 2 s.h.
PTRS:6225 Neuromuscular Therapeutics 3 s.h.
PTRS:6238 Service Learning II 1 s.h.
PTRS:6251 Critical Inquiry in Physical Therapy I 2 s.h.
PTRS:6792 Integrated Clinical Education in Physical Therapy IV 1 s.h.

**Third Summer Session**
PTRS:6794 Terminal Clinical Education in Physical Therapy I 4 s.h.

**Fifth Semester (Fall)**
PTRS:6252 Critical Inquiry in Physical Therapy II 1 s.h.
PTRS:6795 Terminal Clinical Education in Physical Therapy II 4 s.h.
PTRS:6796 Terminal Clinical Education in Physical Therapy III 4 s.h.

**Admission**
Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations of the Graduate College. They must have completed a baccalaureate degree and all prerequisite course work from an accredited institution in the United States, or anticipate completing the degree before enrolling in the D.P.T. program. They must have a cumulative g.p.a. of at least 3.00 and must have completed the following prerequisite course work, preferably with a g.p.a. of at least 3.00. All science courses must include the appropriate laboratory instruction. The prerequisite courses must have been taken for a letter grade. Credit awarded through advanced placement testing may be applied only to the mathematics requirement.

**Biological sciences**: a complete introductory course in principles of general biology or zoology and advanced course work in biology or zoology (for which an introductory course is prerequisite) equivalent to 12 s.h.

**Physics**: a complete introductory course equivalent to 8 s.h.

**Chemistry**: a complete introductory course equivalent to 8 s.h.

**Physiology**: a systemic human physiology course equivalent to 3 s.h.

**Psychology**: courses equivalent to 6 s.h.

**Mathematics**: a college-level mathematics course, at the level of trigonometry or higher, equivalent to 3 s.h.

**Statistics**: a statistical methods course equivalent to 3 s.h.

All applicants must take the Graduate Record Examination (GRE) General Test. They must take the test early enough for their scores to be received prior to the application deadline.

Applications are submitted online through the Physical Therapist Centralized Application Service (PTCAS). PTCAS allows applicants to use a single application and one set of
materials to apply to multiple physical therapy programs. Once the application portfolio is complete, PTCAS forwards it to the University of Iowa.

Personal interviews are required of applicants selected for consideration by the admissions committee. Interviews are conducted at the University of Iowa. The physical therapy admissions committee selects applicants who appear to be best qualified for the study and practice of the profession. Some preference is given to Iowa residents.

Applications are accepted from July 1 to November 1 for entry the following summer. Prospective students should apply as early as possible.

**EARLY ADMISSION**

The D.P.T. program offers an early admission plan for highly qualified applicants. Early admission applicants must have outstanding grade-point averages, generally 3.75 or higher. They also must have Graduate Record Examination (GRE) General Test scores at or above the 50th percentile for all sections. Application materials are the same as those for regular admission. Application deadline for the early admission plan is September 15; applicants are notified of admission by December 1. Those who are interviewed but are not selected for early admission are automatically placed in the final general applicant pool. Contact the Department of Physical Therapy and Rehabilitation Science for more information.

**Background Checks**

Enrollment in the Doctor of Physical Therapy program is contingent on a successful criminal background check. Drug screening may be required for some clinical rotations.

**Expenses**

Applicants admitted to the D.P.T. program must make an advance tuition payment which is forfeited if the applicant does not enroll. In addition to paying University tuition and fees, students are assessed laboratory fees for the human anatomy and neuroanatomy courses and are responsible for purchasing supplies, such as lab coats, patient evaluation kits, and course packets.

All students are required to comply with the pre-entry and periodic health screening program developed by Student Health & Wellness in cooperation with University of Iowa Hospitals and Clinics. Students must pay for the health screenings. Students also are required to have health insurance.

**Master of Arts in Physical Therapy**

The Master of Arts in physical therapy is granted to students pursuing knowledge about the underlying science of rehabilitation. Students often work toward the Doctor of Philosophy in physical rehabilitation science with the goal to promote scholarship in the field. The M.A. degree does not prepare students to practice physical therapy.

**Ph.D. in Physical Rehabilitation Science**

The Doctor of Philosophy in physical rehabilitation science requires a minimum of 72 s.h. of graduate credit. The program is designed to advance the student's ability to independently develop and carry out research that establishes the scientific basis for prevention, evaluation, and treatment of impairments, functional limitations, and disability. The curriculum is flexible enough to accommodate research focusing on basic, applied, or clinical studies in the rehabilitation sciences. Students have access to the program's research laboratories (see "Research Facilities" later in this section).

Graduates who complete the program are prepared for academic appointments that emphasize research, scholarship, and teaching. They possess:

- theoretical and scientific knowledge to perform basic, applied, or clinical-level original research that leads to scientific presentations, publication in peer-reviewed journals, and competition for extramural funding through scientific grant writing;
- breadth of knowledge in exercise physiology, biomechanics, neuroscience, or motor control specialty areas as they relate to impairment, functional limitation, and disability; and
- theoretical and practical skills required for college or university teaching at the professional entry and advanced graduate levels.

**Curriculum**

Ph.D. students complete a minimum of 72 s.h. beyond the baccalaureate. Each student and his or her faculty advisor develop an individualized study plan. A preliminary study plan is developed within the first 9 s.h. of graduate study; a final plan is submitted to the Graduate College when the Ph.D. comprehensive examination is scheduled.

To ensure breadth of knowledge, all students complete specific core, research, and scientific specialty area content courses. Elective courses are selected to provide in-depth study of the specialty; they are complemented by an advanced seminar course specific to the student's specialty and taken in preparation for the comprehensive examination.

Students must satisfactorily complete the comprehensive examination, which is taken after all required course work is completed. Doctoral study culminates with 12 s.h. of thesis research and an oral examination.

**GENERAL CORE REQUIREMENT**

Ph.D. students must complete the following core requirements. Exception: the capstone course PTRS:7900 Rehabilitation Research Capstone Project is recommended but not required for students who enter the program with a master's or doctoral-level degree; however, it is required for all students who enter the program with a bachelor's degree.

All of these:

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<tr>
<th>Course Code</th>
<th>Credit Hours</th>
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<tr>
<td>PTRS:7812</td>
<td>3 s.h.</td>
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<tr>
<td>PTRS:7820</td>
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<td>PTRS:7826</td>
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Revised Curriculum

PSQF:7385 Teaching and Learning in Higher Education 3 s.h.

One of these:
BIOS:5110 Introduction to Biostatistics 3 s.h.
STAT:4143 Introduction to Statistical Methods 3 s.h.

One of these:
BIOS:5120 Design and Analysis of Biomedical Studies 3 s.h.
STAT:6513 Intermediate Statistical Methods 4 s.h.

RESEARCH REQUIREMENT

Students complete at least 24 s.h. from the following.
PTRS:7884 Practicum in Research arr.
PTRS:7895 Advanced Seminar in Rehabilitation Science 3 s.h.
PTRS:7925 Independent Study arr.
PTRS:7927 Research in Rehabilitation Science arr.
PTRS:7990 Thesis: Rehabilitation Science 12 s.h.

SPECIALTY CONTENT REQUIREMENT

Each student must complete at least 9 s.h. in his or her scientific specialty area. Students may choose courses from the following list, but other courses suited to the student's background knowledge and interest area are considered.

Anatomy and Cell Biology
ACB:8401 Advanced Human Anatomy arr.

Epidemiology
EPID:6900 Design of Intervention and Clinical Trials 3 s.h.

Health and Human Physiology
HHP:4130 Skeletal Muscle Physiology 3 s.h.
HHP:4220 Biomechanics of Human Motion 3 s.h.
HHP:4300 Neural Control of Posture and Movement 3 s.h.
HHP:4410 Exercise Physiology 3 s.h.
HHP:4460 Cardiovascular Physiology 3 s.h.
HHP:6300 Seminar in Motor Control 1 s.h.

Neuroscience
ACB:8114 Medical Neuroscience 4 s.h.
NSCI:7235 Neurobiology of Disease 3 s.h.

Occupational and Environmental Health
OEH:4310 Occupational Ergonomics I 3 s.h.
OEH:6310 Clinical Ergonomics 3 s.h.
OEH:6320 Occupational Ergonomics II 3 s.h.

Pharmacology
PCOL:5137 Neurotransmitters 1 s.h.
PCOL:6035 Topics in Pain and Analgesia 1 s.h.
PCOL:6207 Ion Channel Pharmacology 1 s.h.
PCOL:6250 Advanced Problem Solving in Pharmacological Sciences 1 s.h.

Physical Therapy
PTRS:5210 Kinesiology and Pathomechanics 4 s.h.
PTRS:6224 Activity-Based Neural and Musculoskeletal Plasticity in Health Care 4 s.h.
PTRS:7875 Analysis of Activity-Based Neural and Musculoskeletal Plasticity 3 s.h.
PTRS:7885 Biomechanical Analysis in Rehabilitation 3 s.h.
PTRS:7899 Introduction to Pain: Overview of Theories, Concepts, and Mechanisms 1 s.h.
PTRS:7901 Clinical Correlates of Pain: Syndromes and Management 1 s.h.
PTRS:7902 Molecular, Cellular, and Neural Mechanisms of Pain 2 s.h.

Admission

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations of the Graduate College. They should have a cumulative g.p.a. of at least 3.00 and scores at or above the 50th percentile for each section of the Graduate Record Exam (GRE) General Test. A minimum of two years of clinical experience is desirable.

Applicants whose first language is not English must score at least 100 (Internet-based) on the Test of English as a Foreign Language (TOEFL).

Application materials must include a complete Graduate College application form, test scores, transcripts, three letters of recommendation, and a statement of purpose. Completed applications should be sent to the Department of Physical Therapy and Rehabilitation Science.

Personal interviews are required of all applicants selected for consideration by the admissions committee. On-campus interviews are preferred, but telephone interviews may be substituted when necessary.

Application deadlines are October 15 for spring semester entry (notification by December 15); March 15 for summer entry (notification by May 15); and May 15 for fall semester entry (notification by July 15).

Financial Support

A number of research assistantships are available for Ph.D. students. Faculty advisors provide guidance for students seeking external scholarship support through foundations and federal programs that support Ph.D. training.

Research Facilities

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 Musculoskeletal Biomechanics and Sports Medicine Research Laboratory; the Neurobiology of Pain Laboratory; the Neuromuscular Biomechanics Laboratory; the Human Integrative and Cardiovascular Physiology Laboratory; and the Applied Neuroplasticity Laboratory. Use of other laboratories may be arranged.
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 pharmokinetic 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, 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.

**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.  
Application of clinical neuroscience knowledge and motor control and motor learning concepts to the practice of neurological physical therapy; emphasis on diagnosis and therapeutic intervention for persons with central nervous system dysfunction of adult onset. 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 Research in Physical Therapy**  
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 in Physical Therapy I**  
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 in Physical Therapy II**  
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: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.  

**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**  
arr.  
Problem solving experience in biomechanics, 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.