ORTHOTICS AND PROSTHETICS (ORPR)

Courses

ORPR 301. Orthotics and Prosthetics Laboratory and Technical Skills. 3 Units.
Introduces the baseline of material and safety practice of orthotics and prosthetics design, fabrication, and repairs. Provides a solid foundational knowledge of the principles and applications of orthotics and prosthetics materials, technologies, designs, and processes associated with the manufacture of custom devices.

ORPR 305. Orthotic Fitting Techniques. 3 Units.
Teaches methods of biometrics, shape capture, and fitting criteria for orthotic devices. Expands knowledge and techniques of applied anatomy in the fitting of orthotic and assistive devices in activities of daily living and patient’s occupational needs.

ORPR 310. Patient Management, Assessment, and Documentation. 3 Units.
Orthotic and prosthetic patient-care models, patient rights, and ethical practice of care. Advanced principles and processes of patient assessment, management, and complete documentation within the context of interprofessional referrals, interactions, and reimbursement as applied both to the in- and outpatient context.

ORPR 315. Pedorthics. 3 Units.
Clinical application of biomechanical interventions of the ankle-foot structure as it refers to walking, medical issues of the foot, and activity levels. Applied anatomical knowledge of the foot and sports medicine within the context of shoes and shoe modifications.

ORPR 320. Biomechanical Evaluation. 3 Units.
Establishes orthotic and prosthetic biomechanical principles and interventions in the context of normal body mechanics and musculoskeletal pathologies. Examines how these interventions serve to maximize healing, manage pain, support movement and function. Encompasses hole body considerations for the kinetic effects, including gait, ADL, occupational and recreational functions.

ORPR 323. Economics, Business Management, and Entrepreneurship. 3 Units.
Establishes principles of economics, financial management, and law as they apply to health-care settings, including: starting a new service, reimbursement, capital and operational budgeting, reading financial statements, and cost-saving measures.

ORPR 325. Medical Terminology. 3 Units.
Language of medicine, including: word construction, word analysis, definitions, and the use of terms related to medical science—specifically to orthotics and prosthetics. Course information organized by body systems. Applies knowledge to documentation, interdisciplinary communication, and medical justification as it applies to orthotic and prosthetic care.

ORPR 330. Lower Extremity Orthotics I. 3 Units.
Studies foot and ankle-foot orthoses—including myoelectric orthoses—from an anatomical design and fabrication perspective. Effects of their application to the body kinematics and kinetic chain. Considerations for specific pathological applications, as well as awareness of implied benefits and risks. Outcome measurements for particular static and dynamic designs.

ORPR 335. Spinal Orthotics. 3 Units.
Advanced study of knee-ankle-foot orthoses, knee orthoses, hip orthoses, reciprocating gait orthoses, and standing frames from an anatomical design and fabrication perspective. Effects of their application to the body kinetic chain. Considers specific pathological applications, including implied benefits and risks. Outcome measurements for particular static and dynamic designs. Introduces CAD/CAM technologies both for image capture and fabrication.

ORPR 340. Lower Extremity Prosthetics I. 3 Units.
Studies the etiology of amputations below the knee. Considers surgical and immediate postoperative issues as they relate to patient experience, prosthetic outcome, and gait. Looks at prosthetic component selection; socket, interface, and suspension designs in the context of ambulation levels and activities; and specialty applications. Examines skin and tissue physiology, both from a design and end-user perspective. Considers cost and efficiency based on component selection.

ORPR 345. Spinal Orthotics. 3 Units.
Examines the anatomy, biomechanics, and pathology of the spine. Presents fabrication, fitting, and application of various orthotic interventions in light of a critical and differential diagnosis—determining the best outcome with the most effective and comfortable fit. Includes application and proper fitting of halos and of cervical, thoraco-lumbar, and lumbar devices. Gives special consideration to design, plaster casting techniques, and CAD measurements for the management of scoliosis. Teaches student to read a standard radiograph and measure and interpret spinal deformities, and to make appropriate recommendations for orthotic management.

ORPR 402. Pathology I. 3 Units.
Fundamental mechanisms of disease, including cell injury; inflammation, repair, regeneration, and fibrosis; and vascular, cardiac, respiratory, gastrointestinal, hepatobiliary, urinary, reproductive, endocrine, and integumentary pathologies.

ORPR 404. Materials Science in Orthotics and Prosthetics. 3 Units.
Introduces the science of materials found in the body, as well as those used to support the body. Includes the composition of common orthopedic and prosthetics materials used in everyday practice. Provides an overview of mathematics, physics, movement (both simple and complex), anatomy, physiology, and thermodynamics that creates a well-rounded understanding of and rationale behind material and fabrication choices. Provides students with knowledge of chemical composition, stress-strain curves, fatigability, and other essential characteristics to be considered in orthotic and prosthetic design.

ORPR 405. Gait Analysis. 3 Units.
Observation and analysis of normal human locomotion contrasted with pathological gait, and their implications for orthotic and prosthetic interventions and care.

ORPR 410. Orthotic and Prosthetic Clinical Rotation. 1 Unit.
Assigns student to a weekly clinic, department, or specialty—with a focus on familiarization with specific orthotic and prosthetic services. Student reports to his/her cohorts in a once-a-month didactic presentation at the weekly grand rounds, which can include lectures from industry providers on the topic of choice. Site allocation determined by program director; student accountable to quarterly assigned clinical supervisor.

ORPR 414. Kinesiology I. 3 Units.
Introduces advanced kinesiology topics, including movement science dealing with the behavioral basis of motor control and motor learning from an information-processing perspective. Kinesiology from an O&P perspective focusing primarily on the lower limbs, with some introduction to upper limb involvement.

ORPR 415. Lower Extremity Orthotics II. 3 Units.
Advanced study of knee-ankle-foot orthoses, knee orthoses, hip orthoses, reciprocating gait orthoses, and standing frames from an anatomical design and fabrication perspective. Effects of their application to the body kinetic chain. Considers specific pathological applications, including implied benefits and risks. Outcome measurements for particular static and dynamic designs. Introduces CAD/CAM technologies both for image capture and fabrication.
ORPR 420. Lower Extremity Prosthetics II. 3 Units.
Studies etiology of above-the-knee amputations. Surgical and immediate postoperative considerations as they relate to patient experience, prosthetic outcome, and potential for gait. Considers prosthetic component selection, socket interface, and suspension designs in the context of ambulation levels and activities; specialty applications. Presents mechanical, hydraulic, and electronic knee-motion control. Includes cost and efficiency calculations based on component selection. Introduces CAD/CAM shape capture and fabrication considerations, with attention to mechanical and electronic alignment capture.

ORPR 425. CAD/CAM Technologies. 3 Units.
Studies applications of CAD/CAM technologies as they are used in today’s clinical practice. Familiarizes the student with the most common shape/image capture systems, manipulations, and interfaces with the various central fabrication methods available in the industry. Includes use of CADs/CAMs in both orthotics and prosthetics, including foot orthoses, spinal orthoses, and cranial helmets. Prepares student to be able to store and manipulate data and familiarizes student with the technical support and fabrication process.

ORPR 430. Upper Extremity Orthotics. 3 Units.
Applies anatomy, kinesiology, and biomechanics to serve specific upper extremity neuromuscular needs. Determines the use of functional and electrically powered orthoses based on differential diagnoses. Examines myoelectric assisted translateral motion rehabilitation. Teaches function, purpose, and building of wrist- and cable-driven orthoses.

ORPR 435. Upper Extremity Prosthetics. 3 Units.
Studies the etiology of upper limb and forequarter amputations. Considers shape capture, socket design, interface, and suspension in the context of cosmetic, body-powered, and myoelectric functional prostheses. Includes special needs adaptations for occupational and sports situations. Give attention to the distinctions of functionality, efficacy, and cost. Studies the bionic arm and hand and the computer training that goes with this particular technology.

ORPR 439. Computers and Electronics for O&P Clinicians. 3 Units.
Basic theory of electricity, transistors, computer circuits, and computer programming. Discusses electrons, structure of the atom, resistance, capacitance, Ohm’s law, and basic transistor theory. Windows programming. Includes laboratories and three programming assignments.

ORPR 440. Bionics and Cyborg Technology. 3 Units.
Examines emerging bionic technologies aimed at merging man with machine. Includes competencies and promotion of these devices in the context of scientific research and potential patient applications. Examines bionic control systems’ embedded software development and associated function. Topics include proficiency in the implementation of cybernetic feedback systems in ortho-prosthetic devices.

ORPR 491. Research I. 1.5 Unit.
Introduces the scientific method in health science research. Focuses on the major steps of the research process: problem identification, literature review, conceptual framework, identification of variables, statement of hypothesis, experimental design, and analysis and presentation of data. Includes critical evaluation of research literature. Applies the research process to problems in related specific allied health fields. Develops a research proposal. Pilot-tests a research proposal. Tests procedures and data forms. Implements the research proposal in a practice setting. Prerequisite: AHCJ 471, AHCJ 472.

ORPR 492. Research II. 1.5 Unit.
Reviews and discusses concerns and current advances relating to orthotics and prosthetics, e.g., legislation, regulations, education, professional organization, interdisciplinary patient care, and reimbursement issues.

ORPR 493. Research III. 1.5 Unit.
Examines emerging bionic technologies aimed at merging man with machine. Includes competencies and promotion of these devices in the context of scientific research and potential patient applications. Examines bionic control systems’ embedded software development and associated function. Topics include proficiency in the implementation of cybernetic feedback systems in ortho-prosthetic devices.

ORPR 500. Advanced Specialty Tracks in Orthotics and Prosthetics. 3 Units.
Focusses on both upper limb and lower limb amputations and prosthetic interventions. Includes the etiology of hip and transcorporectomy amputations. Surgical and immediate postoperative considerations as they relate to patient experience, prosthetic outcome, and potential for gait. Considers the care of the extreme sports-user amputee. Includes selection, socket interface, and suspension designs in the context of ambulation levels and activities’ specialty applications. Examines skin and tissue physiology both from a design and an end-user perspective. Includes mechanical, hydraulic, and electronic knee-motion control. Considers cost and efficiency based on component selection. Introduces CAD/CAM shape capture, and considers fabrication with attention to mechanical and electronic alignment capture. Integrates complex cases of upper extremity prosthetics as unique methods of treatment and intervention.
ORPR 527. Orthotics III. 3 Units.
Advanced study of myoelectric and electronic control to upper extremity
and lower extremity orthoses from a design and fabrication perspective.
Effects of their application to the body kinetic chain. Considerations for
specific pathological applications; awareness of implied benefits and
risks. Studies outcome measurements for particular static, dynamic, and
electrodynamic designs, including EFS.

ORPR 538. Biomechatronics. 3 Units.
Development of competencies in biomechatronics. Bionic technology,
embedded design programming, and fabrication. Robotic actuation and
senses. Advanced material use and fabrication techniques.

ORPR 540. Rehabilitative Care in Developing Nations. 3 Units.
Examines the physical rehabilitation state of affairs in developing
nations. Outlines specific challenges with rehabilitation delivery from
logistics, materials, and cost perspectives. Points out alternative
methods to maximize rehabilitation with minimal cost.

ORPR 544. Applied Functional Neuroanatomy. 3 Units.
Evidence-based coverage of the applied functional neuroanatomy of
several common adult progressive and nonprogressive neurological
diseases. Emphasizes motor control, stroke, traumatic brain injury,
spinal cord injury, multiple sclerosis, Parkinson’s disease, Guillain-Barre
syndrome, amyotrophic lateral sclerosis, and vestibular pathology.
Includes literature review, lecture, discussion, and laboratory sessions.

ORPR 575. Couples, Families, and Disabilities. 3 Units.
Examines not only the effects disabilities have on couples and family
systems, but also what contributions family members are making to the
rehabilitation process of disabled individuals. Looks at the discourse
patterns taking place within a person with a disability; within the disabled
person’s family and social support system; and most importantly,
within the context of the individual, the family, and the medical and
rehabilitation providers. Addresses the issues of human sexuality,
reproduction, and disability.

ORPR 592. Research II. 1.5 Unit.
Guides and equips students as they work toward completion of their
capstone research thesis, which is presented at the annual Capstone
Research Day. Includes data-collection review and completion, APA-style
formatting rules, data analysis with application of appropriate statistics,
graphing, write up of discussion and results.

ORPR 593. Research III. 3 Units.
Culminates all research-track courses in a project comprising a master’s
degree thesis, a research paper, a presentation, and a poster. Includes
data analysis and statistical interpretation.