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 whole 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 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, fatigueability, 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.
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 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 translatable 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 505. Current Issues in Orthotics and Prosthetics. 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.
Examines bionic control systems' embedded software development and
considers fabrication with attention to mechanical and electronic alignment capture.

ORPR 510. Advanced Clinical Rotations. 1 Unit.
Assigns student to a weekly clinic, department, or specialty—with a
focus on familiarization with specific orthotic and prosthetic services.
Under direct supervision, student provides comprehensive orthotic and
prosthetic clinical care. Student reports to his/her cohort 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
assignment determined by program director; student accountable to
quarterly assigned clinical supervisor.

ORPR 514. Clinical Affiliation. 8 Units.
Establishes a clinical affiliation with a facility that complies with ENCOPE
residency standards and that has been approved by the Professional
Development Committee and the EL-MSOP locally assigned site
supervisor. Student completes the 500 clinical contact hours required for
graduation.

ORPR 515. Topics in Orthotics and Prosthetics. 1-6 Units.
Lecture and discussion related to the practice of orthotics and
prosthetics. Content varies from quarter to quarter. (May be repeated for
additional credit for a maximum 6 quarter units.).

ORPR 518. Kinesiology II. 3 Units.
Examines the mechanical basis of movement in the human body in
relation to the length of muscles; the tension developed by muscles
under various conditions; the anatomical arrangement of the origin and
insertion of the bones and joints; and the biomechanics of complex
movement, such as gait and balance. Uses physics principles to
explain the mechanics of movement in the body. Topics include: linear
movement, rotational movement, work and energy, muscle-length tension
relationships, single and multiple joint biomechanics, and gait and
balance.

ORPR 522. Self-Care Portfolio and Community Outreach. .5 Units.
Inventory of self-care and process to accomplish it. Puts self-care in the
context of life-long learning, relational responsibility, and social justice.
Applies principles of effective community leadership engagement, locally and
globally.

ORPR 526. Prosthetics III. 3 Units.
Foci on both upper limb and lower limb amputations and prosthetic
interventions. Includes the etiology of hip and transcorporeal
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.