



Taken from the CAAHEP O&P Standards
Appendix B

2017
Core Curriculum
Guide
Master's Level

CORE CURRICULUM FOR EDUCATIONAL PROGRAMS IN ORTHOTICS AND PROSTHETICS

Section A ENTRY-LEVEL COMPETENCIES

The graduate entering the profession must effectively demonstrate competence in the following content areas:

- A.1. Exemplify the role of the orthotist / prosthetist in providing ethical, patient-centered care by applying accepted professional responsibilities in clinical practice experiences.
- A.2. Practice safety of self and others, and adhere to safety procedures throughout the provision of orthotic / prosthetic services.
- A.3. Demonstrate appropriate insight into clinical practice, clinical operations, and practice management.
- A.4. Demonstrate an awareness of the humanity and dignity of all patients and related individuals within a diverse and multicultural society.
- A.5. Comprehend and demonstrate knowledge of the collaborative role of the orthotist / prosthetist as a member of the interdisciplinary rehabilitation team in providing patient-centered care.
- A.6. Demonstrate the ability to employ evidence-based practice with an understanding of the research processes and how to use research findings to appropriately influence clinical practice.
- A.7. Demonstrate the ability to integrate knowledge of the fundamental concepts of human function (physical, cognitive, social, psychological) with the practice framework of assessment, formulation, implementation, and follow-up of a comprehensive orthotic / prosthetic treatment plan.
- A.8. Demonstrate the ability to make clinical decisions designed to meet patient needs and expectations, and measure effectiveness of O&P intervention by utilizing (or administering) appropriate outcome measures.
- A.9. Demonstrate the ability to provide effective education to patients, their support networks, health care professionals, and the public at large.
- A.10. Document pertinent information that supports the provision of effective communication and meets the requirements of legal, business, and financial parameters for patient care.
- A.11. Demonstrate proficiency in fundamental technical procedures that support orthotic / prosthetic practice.

Section B BASIC SCIENCE CURRICULUM

The basic science curriculum must include appropriate content in:

- B.1. Life Sciences / Biology
- B.2. Chemistry

- B.3. Physics
- B.4. Human Anatomy and Physiology
- B.5. Psychology
- B.6. Statistics

Each sponsoring educational institution should determine whether components of the Basic Science Curriculum are incorporated into the professional curriculum or are required prior to entry into the program.

Section C PROFESSIONAL CURRICULUM

C.1.0 Foundational Content Areas

The following content areas relating to the foundations of orthotic and prosthetic practice must be included in the curriculum:

- C.1.1 Behavioral Sciences
- C.1.2 Clinical Pathology
- C.1.3 Clinical Pharmacology
- C.1.4 Clinical Skills
- C.1.5 Clinical Technologies
- C.1.6 Communication Skills
- C.1.7 Diagnostic Studies
- C.1.8 Ethics
- C.1.9 Evidence-Based Practice
- C.1.10 Health Care Economics
- C.1.11 Human Anatomy and Physiology
- C.1.12 Kinesiology and Gait Analysis
- C.1.13 Materials Science and Mechanical Principles
- C.1.14 Models of Disablement
- C.1.15 Neuroscience
- C.1.16 Practice Management
- C.1.17 Professional Issues
- C.1.18 Rehabilitation Science
- C.1.19 Research Methods
- C.1.20 Technical Skills

Definitions for Foundational Content Areas:

- C.1.1 **Behavioral Science:** The study of fundamental psychological concepts in personality and disability in relation to healthcare, self-care and the role of relationship building in clinical decision making. Strategies include the recognition of behaviors; ability to work with individuals in distress, stages of grief and emotional adjustment; identification of problematic psychological symptoms necessitating referral to appropriate health care providers; application of motivational techniques; and care for one’s own physical, mental and emotional health.

- C.1.2 **Clinical Pathology:** The study of conditions commonly referred for orthotic / prosthetic services. Content emphasizes orthopedic, neurological, neuromuscular, vascular and psychological disorders and diseases.

- C.1.3 Clinical Pharmacology: The study of the effects of current pharmacological treatments and the impact on clinical decisions for conditions encountered in orthotic / prosthetic patient care. Strategies emphasize the clinical effects on physiological (i.e. volume management, cardiac performance, pain, spasticity, dermatological reaction) and psychological function.
- C.1.4 Clinical Skills: The study and supervised practice of skills in orthotic / prosthetic practice. Strategies include the development of professional relationships, use of assessment tools and objective measures to determine intervention strategies, development and implementation of treatment plans, use of evidence-based practices to answer clinical questions, education of stakeholders, and maintenance of documentation in compliance with legal regulations and requirements.
- C.1.5 Clinical Technologies: The study of conventional and emerging theories, techniques and technologies and their integration into clinical orthotic / prosthetic practice. Strategies include application of these technologies to the assessment, formulation, implementation, follow-up and/or practice management of an orthotic / prosthetic treatment plan.
- C.1.6 Communication Skills: The study of communication and interaction with others along the continuum of care including the patient, family, caregivers, members of the healthcare team and others involved in achieving expected treatment outcomes. Interactions should be sensitive to the cultural, psychosocial, age, disability and socio-economic status of the person(s) with whom the interaction takes place.
- C.1.7 Diagnostic Studies: The study and consideration of information derived from medical reports, tests, and measures that aid the provision of orthotic / prosthetic care.
- C.1.8 Ethics: The study of ethical reasoning inclusive of the identification, analysis and application of principles to make judgments based on scientific facts. Strategies emphasize the consideration of all stakeholders' views, ethical principles, respect for persons, maximizing benefits/minimizing harms and justice.
- C.1.9 Evidence-Based Practice: The study of integrating scientific knowledge with clinical expertise to design, implement and evaluate patient-specific orthotic / prosthetic interventions. Strategies include the critical appraisal and synthesis of patient values and goals, scientific evidence, and clinical expertise.
- C.1.10 Health Care Economics: The study of economics related to efficiency, effectiveness, value and behavior in the production and consumption of health care to understand how the orthotic / prosthetic profession fits in the entire healthcare industry and economy.
- C.1.11 Human Anatomy and Physiology: The study of anatomical structures and physiological functions of the nervous, musculoskeletal, cardiopulmonary and integumentary systems of the human body. Strategies include the identification and differentiation of gross anatomical structures and the palpation of surface anatomy and relating structures to corresponding functional anatomy.
- C.1.12 Kinesiology and Gait Analysis: The study of normal and pathological human movement, performance and function through the application of biomechanical and motor control principles with an emphasis on joints, moments, and ground reaction forces. Strategies include methods to study normal and pathological movements via gait analysis; the action and effects of external and internal forces on the musculoskeletal system; the body structure/function changes due to over-, under- and non-use of body segments; and the

influence of orthotic / prosthetic devices on skin integrity, muscular tissue, bone growth, posture, balance and mobility.

- C.1.13 Material Science and Mechanical Principles: The study of physical / mechanical properties and behavior for the appropriate design and selection of materials commonly used in orthotic / prosthetic practice. Strategies include the evaluation of components' physical / mechanical / material properties and behavior in relation to its common clinical application. Concepts include, but are not limited to force vectors, design geometry (including stress concentrations), pressure distribution, stress/strain, friction, fatigue resistance, stiffness and corrosion resistance.
- C.1.14 Models of Disablement: The study of frameworks used to define and delineate the consequences of disease and injury on both personal and societal levels. Strategies emphasize effective communication with all members of the rehabilitation team.
- C.1.15. Neuroscience: The study of neuroanatomy and related neurological function. Content emphasizes neurological disorders encountered in clinical orthotic / prosthetic practice.
- C.1.16 Practice Management: The study of business practices within the orthotic / prosthetic clinical environment. Content includes clinical decision-making, thorough and ethical documentation, coding and prescription recommendations, compliance with regulatory accreditation agencies, legal considerations surrounding patient care, quality improvement, time management and project management. In addition, content on the business aspect of practice related to personnel policies and procedures.
- C.1.17 Professional Responsibilities: The study of the expectations of the orthotist-prosthetist as a professional and his/her role within the profession itself and the profession within society. Strategies include the exploration and understanding of the organizations and documents that guide practice within the profession (e.g., Scopes of practice, Code of Professional Responsibility, Practice Analysis); the role of the orthotist-prosthetist and related personnel in the healthcare team; and the responsibilities to further professional development of self and others.
- C.1.18 Rehabilitation Science: The study of the scope and variance of rehabilitation practices within sociocultural contexts. Strategies include the understanding of stakeholders' perspectives in orthotic / prosthetic patient care; appreciating the implications of stakeholder perspectives on clinical decision-making; analyzing and synthesizing clinical and functional outcomes; and identifying efficacy of provision of orthotic / prosthetic services.
- C.1.19 Research Methods: The study of the methods required to formulate clinically-relevant scientific questions and suitable hypotheses to support evidence-based practice. Strategies include understanding of the ethical considerations involved in the design, implementation and reporting of research findings; the rights of human subjects; identification and recruitment of participants; collection and analysis of data; and dissemination of research findings.
- C.1.20 Technical Skills: The study and supervised practice of psychomotor skills necessary to ensure the safe and appropriate use of tools and equipment to formulate and implement orthotic / prosthetic treatment plans. Strategies include the use of technical/mechanical problem solving to assess, adjust, and direct the fabrication of orthoses/prostheses to meet patient-specific needs.

C.2.0 Patient Assessment

The graduate must demonstrate the ability to complete the following essential elements of the patient evaluation process competently:

- C.2.1 Effectively communicate with the patient or caregiver to gather cogent and useful information for orthotic and/or prosthetic assessments.
- C.2.2 Identify concerns (e.g., ADL, gait training) necessitating referral to other health care providers and determine methods and criteria for referral.
- C.2.3 Document services using established record-keeping techniques to record patient assessment and treatment plans, to communicate fabrication requirements and to meet standards for reimbursement and requirements of external agencies.
- C.2.4 Perform a comprehensive assessment of the patient using standardized methods to obtain an understanding of the individual's potential orthotic / prosthetic needs. Students must demonstrate the ability to acquire the following through interview, review of clinical documentation, physical exam, and administration of performance measures.
 - C.2.4.1 Patient History
 - i. Chief Complaint
 - ii. Current health condition, including comorbidities
 - iii. Prior medical conditions and surgical history (e.g. heart / musculoskeletal / allergies / skin)
 - iv. Diagnostic imaging reports
 - v. Medications
 - vi. Past orthotic / prosthetic management
 - vii. Review of clinical chart
 - C.2.4.2 Patient Assessment
 - i. Body Structure & Function: Volumetric measures, Skin integrity / Wounds, Condition of contralateral side, Range of motion / Joint integrity and stability, Sensory testing / Proprioceptive sense / Pain, Muscle Tone / Strength, Neuromusculoskeletal integration / Motor control, Cognitive ability
 - ii. Activity & Participation: Observational gait analysis, Postural & balance evaluation, Vocation / Daily functional demands, Recreational activities, Mobility / Activity Level
 - iii. Personal Factors: Patient goals / Motivation level / Social support, Personal implications of impairment, Financial information
 - iv. Environmental Factors: Living environment, Work environment, Recreational environment
 - C.2.4.3 Outcome Assessment: Use and interpret appropriate, patient-reported and performance-based outcome measures to assess achievement of patient-specific orthotic / prosthetic outcomes as compared to baseline measures.
 - i. Assessment of outcome data and evaluation and interpretation of findings
 - ii. Reassessment of healthcare and/or biomechanical needs over time
 - iii. Alteration of treatment plan as indicated to increase or maintain optimal quality of life throughout the patient's lifespan

- C.2.5 Consult with other caregivers and other relevant healthcare professionals as necessary. Professionally communicate using written, oral, and nonverbal methods with patients, colleagues, and other healthcare providers.
- C.2.6 Demonstrate a basic understanding of surgical processes and procedures related to orthotic and prosthetic care and how these and their sequelae impact orthotic and prosthetic design and function.
- i. Surgical Procedures: Amputation Surgery and Revision, Rotationplasty, Joint Replacement, Tendon Lengthening, Ligament Repairs / Reconstruction, Spinal Stabilization, Joint Fusions, Osseointegration, Targeted Muscle Reinnervation, Limb Lengthening, Limb Salvage
 - ii. Surgical Processes: Perioperative O&P services, Post-operative Complications
- C.2.7 Demonstrate a basic understanding of pathologies as it relates to O&P management, the professional curriculum includes content and learning experiences of the following diseases and diagnoses commonly seen by orthotists / prosthetists in clinical practice.
- C.2.7.1 Musculoskeletal disorders of the Lower Limb:
- i. Ankle / Foot Disorders: Abnormal Alignment: (i.e., Pronation / Supination, Rearfoot Varus / Valgus, Forefoot Varus / Valgus, Hallux Valgus, Hallux Rigidus, Plantarflexed 1st Ray, Metatarsus Adductus), Talipes Calcaneovarus / Calcaneovalgus/Equinovarus, Plantar fasciitis, Metatarsalgia, Tarsal Coalition, Posterior Tibial Tendon Dysfunction, Morton's neuroma, Charcot Arthropathy
 - ii. Knee Disorders: Sprains, strains, Ligament injuries, Cartilage/meniscus injuries, Osteoarthritis, Dislocation/subluxation, Angulation osteotomy, Osgood Schlatter
 - iii. Hip Disorders: hip dislocation, Legg-Calve-Perthes, Hip dysplasia, Developmental Dislocating Hip
- C.2.7.2 Musculoskeletal disorders of the Upper Limb
- i. Injuries, disorders and deformities: finger, wrist, elbow, and shoulder
 - ii. Shoulder Conditions: Rotator Cuff, Adhesive Capsulitis
 - iii. Dislocations
- C.2.7.3 Musculoskeletal disorders of the spine
- i. Spinal deformities: Scoliosis (Congenital and Idiopathic), Scheuermann's Kyphosis
 - ii. Spondylolysis / Spondylolisthesis
 - iii. Degenerative disorders: Spinal stenosis, Osteoporosis, Disc Herniation
 - iv. Spine Trauma: Spinal Fracture, Spinal Dislocation
 - v. Vertebral osteomyelitis
- C.2.7.4 General Musculoskeletal conditions
- i. Contractures
 - ii. Fractures
 - iii. Repetitive stress injuries
 - iv. Ligamentous injuries
 - v. Articular cartilage disorders
 - vi. Rheumatoid Arthritis
 - vii. Osteoarthritis
 - viii. Skin condition
- C.2.7.5 Limb Loss

- i. Upper Limb: Partial Hand, Transradial, Transhumeral, Shoulder Complex, Joint Disarticulations
- ii. Lower Limb: Partial Foot / Transmetatarsal, Ankle Disarticulation, Transtibial, Transfemoral, Joint Disarticulations, Hemi-Pelvectomy
- iii. Bilateral / Multiple Limb Loss
- iv. Congenital Limb Deficiencies: Tibial / Fibular Deficiency, Radial deficiency, Proximal Femoral Focal Deficiency

C.2.7.6 Neurologic Disorders

- i. Stroke
- ii. Guillain-Barre syndrome
- iii. Amyotrophic Lateral Sclerosis
- iv. Hereditary motor and sensory disorders
- v. Multiple sclerosis
- vi. Peripheral nerve injuries
- vii. Peripheral neuropathies
- viii. Poliomyelitis and Post-Polio Syndrome
- ix. Spinal cord injuries
 - x. Brachial Plexus injury
 - xi. Transverse myelitis
 - xii. Traumatic brain injuries
 - xiii. Charcot-Marie-Tooth
 - xiv. Spasticity general

C.2.7.7 Pediatric Neurologic Conditions

- i. Cerebral Palsy
- ii. Spina Bifida
- iii. Spinal Cord / Traumatic Brain Injuries
- iv. Cranial Disproportional
- v. Spinal Muscular Atrophy

C.2.7.8 Pediatric Musculoskeletal disorders

- i. Hip disorders: Developmental Dysplasia of the Hip
- ii. Arthrogyrosis Multiplex Congenita
- iii. Osteogenesis Imperfecta
- iv. Muscular Dystrophies

C.2.7.9 Neuropathic Disorders

- i. Buerger's Disease
- ii. Diabetes Mellitus
- iii. Vascular Disease

C.2.7.10 Other Disorders

- i. Osteogenic Sarcoma
- ii. Metastatic Disease of the Bone
- iii. Complex Regional Pain Syndrome
- iv. Genetic Syndromes: Marfan Syndrome, Down's Syndrome, Ehlers-Danlos Syndrome

C.2.7.11 Skin Conditions

C.3.0 Formulation of a Treatment Plan

The graduate must demonstrate the ability to integrate and apply foundational knowledge and patient information to perform and direct potential orthotic or prosthetic management, including the following:

- C.3.1 Synthesize and integrate foundational knowledge and best available evidence with findings from the assessment of a patient.
- C.3.2 Analyze impairments, functional limitations, and patient goals to identify health status and determine the related biomechanical objectives.
 - C.3.2.1 Evaluate findings to determine the patient-specific healthcare need and/or biomechanical need.
 - C.3.2.2 Identify and explain abnormal biomechanics to determine a necessary intervention and apply principles of biomechanics to predict long-term outcomes.
 - C.3.2.3 Identify specific and measurable orthotic / prosthetic treatment goals.
 - C.3.2.4 Identify and appropriately recommend orthotic and prosthetic care conducive to age, functional status, cognitive function, and physiological changes, across the continuum of care from pediatric to geriatric.
- C.3.3 Formulate Device Design:
 - C.3.3.1 Formulate a patient-specific orthotic/prosthetic treatment plan that integrates physical evaluation findings, activity/participation needs, environmental/personal factors and patient concerns or goals.
 - C.3.3.2 Select components, materials, suspension and fabrication methods to match patient specific needs.
- C.3.4 Communicate treatment plan:
 - C.3.4.1 Communicate with the health care team to corroborate findings, and ensure orthotic / prosthetic treatment goals fit into the overall rehabilitation/medical plan.
 - C.3.4.2 Communicate with the patient and caregiver to develop the recommended treatment plan and disclose the potential risks and benefits of O&P care.

C.4.0 Implementation of a Treatment Plan

The graduate must demonstrate the necessary clinical skills to provide comprehensive orthotic / prosthetic care enhancing the patient's quality of life, including the following:

- C.4.1 Clinical Decisions and Interactions: Demonstrate procedures and processes to implement prosthetic / orthotic interventions by using appropriate techniques, tools, equipment, and safety considerations in clinical contexts.
 - C.4.1.1 Perform proper patient handling techniques and initial gait and mobility training.
 - i. Patient transfers
 - ii. Sit-to-stand, Stand-to-sit
 - iii. Gait belt application and use
 - iv. Bed mobility

- C.4.1.2 Locate and indicate anatomical structures needed to capture proper alignment.
 - C.4.1.3 Capture two-dimensional anatomical structures needed to represent shape and alignment.
 - C.4.1.4 Capture three-dimensional anatomical shapes utilizing plaster of Paris and synthetic materials and computer aided technology to create a positive model.
 - C.4.1.5 Modify/rectify three-dimensional models to achieve biomechanical principles and address the defined treatment goals.
 - C.4.1.6 Identify EMG signals and place electrodes to operate electric components.
 - C.4.1.7 Compare body-powered and external-powered orthotic/prosthetic control principles.
 - C.4.1.8 Apply principles of biomechanics, anatomy, and physiology to evaluate the fit, alignment, and function of orthoses / prostheses making adjustments as necessary to optimize patient outcomes. Evaluation includes analysis of the following criteria:
 - i. Anatomical congruency
 - ii. Appropriate trim lines
 - iii. Appropriate static and dynamic alignment
 - iv. Suspension and control
 - v. Volume management
 - vi. Patient-specific activity/function to include corrective and/or accommodative objectives
 - vii. Prescription criteria
 - viii. Suitable patient preferences and limitations
 - C.4.1.9 Assess the quality and structural stability of the orthosis or prosthesis to conform to patient-specific needs.
 - C.4.1.10 Provide effective, culturally appropriate education to patients, family members and caregivers on the care, use and maintenance of the orthosis or prosthesis, including skin care information and wearing schedules.
- C.4.2 Technical Decisions and Competencies: Apply material and mechanical principles to explain, design, and fabricate patient-specific devices. Implementation of mechanical concepts should address the safety, alignment, and durability needs of the user.
- C.4.2.1 Distinguish characteristics of thermoformable plastics, thermoset resins, foams, metals and other materials used in orthotics and prosthetics.
 - C.4.2.2 Perform thermoforming procedures.
 - C.4.2.3 Perform lamination procedures.
 - C.4.2.4 Contour metals to include squaring of joints.
 - C.4.2.5 Align prosthesis and orthosis to initial specifications of the patient and components.
 - C.4.2.6 Establish mechanical / anatomical joint alignment.

C.4.2.7 Demonstrate ability to finish materials: Thermoplastic, Metals, Foams, and Composites.

C.4.2.8 Demonstrate proper use of fasteners: Rivets, Adhesives, and Straps.

C.4.3 Safety in Clinical and Technical Contexts: Comply with personal and environmental safety practices through proper use and care of tools and equipment including the following:

- i. Hand tools
- ii. Measurement tools
- iii. Machine tools
- iv. Personal protective equipment (e.g., gloves, dustmasks, eye protection)
- v. Safety Data Sheets (SDS) for commonly used adhesives, solvents and materials
- vi. Proper Flammable materials handling and storage
- vii. Safe evacuation principles for staff and patients in case of emergency
- viii. General equipment: ovens, compressors, vacuum pumps, fume and dust extraction apparatus

C.5.0 Follow-Up

The graduate must demonstrate the ability to develop and implement an effective follow-up plan to assure optimal fit and function of the orthosis or prosthesis and monitor the outcome of the treatment plan; including the following:

C.5.1 Describe continuing care and periodic re-evaluation of the patient and intervention to assure, maintain, and document comprehensive orthotic / prosthetic care.

C.5.2 Create and evaluate a long-term follow-up plan for comprehensive orthotic / prosthetic care based upon patient initial evaluation results.

C.5.3 Describe wear & care, prognosis, volume fluctuations, and anticipated changes with age, growth, or time in order to assure understanding among patients and caregivers and their role in comprehensive orthotic / prosthetic care.

C.6.0 Practice Management

The graduate must demonstrate the ability to identify and observe policies and procedures relating to practice management, including the following:

C.6.1 Demonstrate knowledge of billing and coding procedures.

C.6.2 Describe Federal, state, and third party regulations associated with orthotic / prosthetic care.

C.6.3 Document in accordance with professional standards and in compliance with legal and payer policies. Document all interactions with the patient and caregiver

C.6.4 Describe how orthotists / prosthetists comply with ethical and legal responsibilities related to comprehensive orthotic and prosthetic care.

C.6.5 Describe potential roles that the clinician plays within O&P business hierarchy.

C.6.6 Use terminology specific to Medicare, with an understanding of L-coding history and usage, ICD 10 codes, state regulations and third-party payer reimbursements.

C.7.0 Professional / Personal Development

The graduate must be able to articulate the importance of personal and professional development in relation to each of the following areas:

- C.7.1 The importance of lifelong learning with the goal of maintaining knowledge and skills at the most current level.
- C.7.2 The role of community service, patient advocacy and outreach.
- C.7.3 The areas for participation in service to and development of the profession.
- C.7.4 Self-awareness, and identification of the mechanisms to maintain personal physical and mental well-being.
- C.7.5 Professional empathy, responsibility, and ethics.
- C.7.6 The international orthotic / prosthetic community and patient populations.

C.8.0 Experience in a Patient Care Setting

Practice expectations are a description of behaviors, skills, or knowledge that defines the expected performance of the Orthotist and Prosthetist upon entry into clinical practice. These include the graduate's ability to participate in and demonstrate entry-level competencies learned in didactic and clinical curriculum within the following domains. The curriculum plan includes clinical education experiences that provide exposure to:

- C.8.1 A comprehensive evaluation of a patient, including functional baseline assessment, to understand the patient's orthotic / prosthetic needs, goals, and expectations.
- C.8.2 Analysis and integration of information from a patient assessment to create a comprehensive orthotic / prosthetic treatment care plan to appropriately meet the needs, goals, and expectations of the patient.
- C.8.3 Fabrication, fitting, and maintenance of orthoses / prostheses in order to provide comprehensive orthotic / prosthetic care.
- C.8.4 Continued patient care through periodic evaluation to ensure, maintain, and document optimal fit and function of the orthoses / prostheses.
- C.8.5 Interprofessional communication among practitioners, patients, caregivers and others encountered in the clinical environment.
- C.8.6 Business management functions within the orthotic/prosthetic practice.

C.9.0 Orthotic / Prosthetic Clinical Practices

The required content and interventions below integrate many of the competencies described in Section C.2 – C.4. and they must be included in the O&P curriculum. They reflect the demands of the patient population and the profession. At a minimum, each graduate must demonstrate competence in the following essential orthotic/prosthetic clinical practices.

- C.9.1 Comprehension and Evaluation: Graduates will demonstrate understanding of foundational knowledge in prescription recommendation, orthotic and prosthetic design, material selection, biomechanical principles, fitting, evaluation, adjustment and patient specific outcomes for the following:
- i. LOWER LIMB ORTHOSES
 1. Footwear
 - a. Orthopedic, diabetic and custom shoes
 - b. Shoe modifications
 2. Foot orthoses (FO)
 3. UCBL foot orthoses
 4. Supramalleolar orthoses (SMO)
 5. Ankle-foot orthoses (AFO)
 - a. Posterior leaf spring
 - b. Solid ankle
 - c. Floor reaction
 - d. Articulated
 - e. Composite
 - f. Ankle gauntlet
 - g. Metal and leather
 6. Knee orthoses (KO)
 7. Knee-ankle-foot orthoses (KAFO) including stance control
 8. Hip orthoses (HO)
 9. Hip-knee-ankle-foot orthoses (HKAFO) including reciprocating gait orthosis (RGO)
 10. Neuromuscular electrical simulation (NMES)/Functional electrical stimulation (FES)
 11. Components
 - a. Biomechanical control strategies: stops, assists, stance control
 - b. Ankle joints
 - c. Knee joints
 - d. Hip joints
 - ii. UPPER LIMB ORTHOSES
 1. Finger orthoses (FO)
 2. Thermoplastic and metal hand orthoses (HO)
 3. Thermoplastic and metal wrist-hand orthoses (WHO)
 4. Additions and outriggers to HO's and WHO's
 5. Prehension orthoses (WHFO)
 6. Elbow orthoses (EO)
 7. Elbow-wrist-hand orthoses (EWHO)
 8. Shoulder-elbow-wrist hand orthoses (SEWHO)
 - iii. SPINAL and CRANIAL ORTHOSES
 1. Cranial remodeling orthoses
 2. Facial fracture & facial burn orthoses
 3. Cervical orthoses (CO)
 4. Cervico-thoracic orthoses (CTO) including HALO

5. Cervico-thoraco-lumbo-sacral orthoses (CTLSO)
 6. Thoraco-lumbo-sacral orthoses (TLSO)
 7. Lumbo-sacral orthoses (LSO)
 8. Scoliosis orthotic management, including pad placement, angle measurement, blueprinting, curve management, wearing schedule, orthotic design variants
- iv. UPPER LIMB PROSTHESES
1. Socket designs for all amputation levels including partial hand, wrist disarticulation, transradial, elbow disarticulation, transhumeral, shoulder disarticulation, and interscapular thoracic, bilateral, and congenital limb differences. Socket design variations: flexible inner liner with rigid frame, including silicone
 2. Suspension methods and variants for upper limb prostheses
 - a. Anatomical suspension
 - b. Roll-on Liners (locking pin, vacuum, and custom liner options)
 - c. Harness variations for different levels
 3. Components (i.e., passive, body-powered, electric, and activity specific)
 - a. Passive, mechanical, and powered digits
 - b. Terminal devices (voluntary opening, voluntary closing, external powered and activity specific)
 - c. Wrists
 - d. Elbows
 - e. Shoulders
 - f. Gloves and coverings (OTS, Semicustom, High Definition Silicone Restorations)
 - g. Edoskeletal and exoskeletal
 4. Control principles
 - a. Body-powered control systems and strategies
 - b. External-powered control systems and strategies
 - Surface EMG Electrodes evaluation and troubleshooting (powered terminal device, wrist and elbow functions)
 - Alternate input devices
- v. LOWER LIMB PROSTHESES
1. Socket designs for all lower limb amputation levels and congenital limb differences including transpelvic and translumbar levels. Socket design variations: flexible inner liner with rigid frame, joint and corset, femoral deficiency and rotationplasty
 2. Suspension methods for lower limb prostheses
 - a. Anatomical suspension
 - b. Roll-on liners (suction, lanyard, and locking pin)
 - c. Waist belt
 - d. Hip joint and pelvic band
 - e. Suction, vacuum
 - f. Silesian belt
 3. Components
 - a. Feet
 - b. Ankles
 - c. Knees
 - d. Hips
 - e. Shock, torque absorbers, rotators
 - f. Cosmetic/protective covers
 4. Post-operative prostheses
 5. Compression therapy (shrinker or elastic wrap)

C.9.2 Prefabricated and Custom Fit: Graduates will demonstrate entry-level competence and experience with the evaluation, recommendation, implementation, material selection, application of biomechanical principles, fitting, adjustment, troubleshooting, and identification of patient specific outcomes for the following custom-fit orthoses:

- i. LOWER LIMB ORTHOSES
 1. Knee Orthosis (KO)
 2. Hip Orthosis (HO)
 3. Ankle Foot Orthosis (AFO) – Thermoplastic and composite
 4. Fracture Orthosis

- ii. SPINAL ORTHOSES
 1. Cervical Orthosis (CO)
 2. Cervical Thoracic Orthosis (CTO)
 3. HALO and ring (simulation)
 4. Rigid anterior control thoraco-lumbo-sacral orthosis (TLSO)
 5. Flexible and rigid thoraco-lumbo-sacral orthosis (TLSO)
 6. Flexible and rigid lumbo-sacral (LSO)

- iii. UPPER LIMB ORTHOSES
 1. Prehension orthosis
 2. Shoulder-elbow-wrist-hand orthosis (SEWHO)
 3. Fracture orthosis

C.9.3 Custom Fabricate and Fit: Each graduate of the program will demonstrate skill and experience in the evaluation, recommendation, implementation, material selection, application of biomechanical principles, fitting, adjustment, troubleshooting and evaluation of patient outcomes with the following custom-fabricated orthoses and prostheses:

- i. LOWER LIMB ORTHOSES
 1. Foot Orthoses (FO) -a minimum of 2 orthoses and must include:
 - a. Functional or accommodative FO
 - b. UCBL (Incl. Carlson Modification)
 2. Shoe Modification - Rocker
 3. Thermoplastic AFO-minimum of 2 orthoses and must include:
 - a. Non-articulating
 - b. Articulating
 - c. Capture a minimum of 3 three-dimensional anatomical shapes utilizing plaster of paris and/or synthetic material
 4. Thermoplastic KAFO-minimum of 1 orthosis and must include:
 - a. Articulated knee joints

- ii. SPINAL ORTHOSES-minimum of 1 orthosis:
 1. LSO or TLSO (Thermoplastic)

- iii. UPPER LIMB ORTHOSES-minimum of 1 orthosis:
 1. WHO or WHFO

- iv. UPPER LIMB PROSTHESES
 - 1. Transradial or wrist disarticulation prostheses-minimum of 2 prostheses and must include:
 - a. Anatomical suspension
 - b. Figure-8 harness suspension
 - 2. Transhumeral prosthesis or prosthetic simulation-minimum of 1 prosthesis with:
 - a. Locking elbow joints and dual-control harness

- v. LOWER LIMB PROSTHESES
 - 1. Transtibial prostheses-minimum of 2 prostheses and must include:
 - a. Patellar tendon bearing socket
 - b. Total surface bearing socket
 - c. Capture a minimum of 3 three-dimensional anatomical shapes utilizing plaster of Paris and/or synthetic material.

 - 2. Transfemoral prosthesis-minimum completion of 2 prostheses and must include:
 - a. Ischial containment socket
 - b. Dynamic alignment with one non-fluid knee and one fluid-controlled knee

Section D RESEARCH CURRICULUM

D.1.0 Research / Capstone Project

The graduate must demonstrate the ability to independently perform critical review of scientific literature and apply best available evidence to salient problems or issues in orthotics & prosthetics. The graduate must also have knowledge of the research process and be able to fulfill the role of an orthotist / prosthetist as a research consumer. Each graduate is expected to develop an original capstone project or significantly contribute to ongoing clinical or academic research as a part of his or her curriculum sequence. The student also must have opportunities to, participate and demonstrate fundamental skills in the following tasks:

- D.1.1 Clearly define a question or problem
- D.1.2 Efficiently and effectively search for relevant evidence
- D.1.3 Critically appraise relevant literature
- D.1.4 Interpret and form recommendations to apply best available evidence to salient problems or issues in orthotics & prosthetics
- D.1.5 Synthesize evidence for project
- D.1.6 Determine methods to evaluate the effectiveness of interventions and interpret results
- D.1.7 Describe the role of orthotist-prosthetist in the consumption, critique, collaboration, and conduction of research