



**Standards and Guidelines
for the Accreditation of Educational Programs for
Orthotic & Prosthetic Technicians**

Standards initially adopted in 2011; revised in 2018, 20xx; and effective xx/xx/xxxx

**Developed by
National Commission on Orthotic and Prosthetic Education**

**Endorsed by
American Academy of Orthotists and Prosthetists
American Board for Certification in Orthotics, Prosthetics and Pedorthics**

and

**Approved by the
Commission on Accreditation of Allied Health Education Programs**

The Commission on Accreditation of Allied Health Education Programs (CAAHEP) accredits programs upon the recommendation of the National Commission on Orthotic and Prosthetic Education (NCOPE).

These accreditation **Standards** are the minimum standards of quality used in accrediting programs that prepare individuals to enter the Orthotic & Prosthetic Technician profession. Standards are the minimum requirements to which an accredited program is held accountable. Guidelines are descriptions, examples, or recommendations that elaborate on the Standards. Guidelines are not required but can assist with interpretation of the Standards.

Standards are printed in regular typeface in outline form. *Guidelines are printed in italic typeface.*

Preamble

The Commission on Accreditation of Allied Health Education Programs (CAAHEP) and National Commission on Orthotic and Prosthetic Education, the American Academy of Orthotists and Prosthetists, and the American Board for Certification in Orthotics, Prosthetics and Pedorthics cooperate to establish, maintain and promote appropriate standards of quality for orthotic & prosthetic technician education programs and to provide recognition for educational programs that meet or exceed the minimum standards outlined in these accreditation **Standards and Guidelines for the Accreditation of Educational Programs**. CAAHEP encourages innovation and quality education programs throughout the CAAHEP accreditation process, consistent with the CAAHEP policy on institutional autonomy. These **Standards and Guidelines** are designed to ensure the integrity of the CAAHEP accreditation process. Directories of accredited programs are published for the information of students, employers, educational institutions and organizations, credentialing bodies, and the public.

These **Standards and Guidelines** are to be used for the development, evaluation, and self-analysis of orthotic & prosthetic technician programs. Site visit teams assist in the evaluation of a program's compliance with the accreditation standards.

Description of the Profession

Technicians support the credentialed orthotist and/or prosthetist and other credentialed practitioners by providing the implementation of technical tasks and services associated with the support of patient care. Utilizing specialized knowledge of materials, fabrication techniques, and mechanical design, the technician fabricates, repairs and maintains orthoses and prostheses to provide optimal fit, function and cosmesis with appropriate consultation and direction of the credentialed orthotist and/or prosthetist and other credentialed professionals.

I. Sponsorship

A. Program Sponsor

A program sponsor must be a post-secondary academic institution accredited by an institutional accrediting agency that is recognized by the U.S. Department of Education and must be authorized under applicable law or other acceptable authority to provide a post-secondary program, which awards a minimum of a certificate at the completion of the program.

B. Responsibilities of Program Sponsor

The program sponsor must

1. Ensure that the program meets the Standards;
2. Award academic credit for the program or have an articulation agreement with an accredited post-secondary institution; and
3. Have a preparedness plan in place that assures continuity of education services in the event of an unanticipated interruption.

Examples of unanticipated interruptions may include unexpected departure of key personnel, natural disaster, public health crisis, fire, flood, power failure, failure of information technology services, or other events that may lead to inaccessibility of educational services.

II. Program Goals

A. Program Goals and Minimum Expectations

The program must have the following minimum expectations statement: "To prepare orthotic & prosthetic technicians who are competent in the cognitive (knowledge), psychomotor (skills), and affective (behavior) learning domains to enter the profession."

Programs that adopt educational goals beyond the minimum expectations statement must provide evidence that all students have achieved those goals prior to entry into the field.

Program goals must be compatible with the mission of the sponsoring institution(s), the expectations of the communities of interest, and accepted standards of roles and functions of an orthotic & prosthetic technician. Goals are based upon the substantiated needs of health care providers and employers, and the educational needs of the students served by the educational program. Program goals must be written referencing one or more of the learning domains.

The program must assess its goals at least annually and respond to changes in the needs and expectations of its communities of interest.

B. Program Advisory Committee

The program advisory committee must include at least one representative of each of the community of interest and must meet annually. Communities of interest served by the program include, but are not limited to, students, graduates, faculty members, practicing technicians, sponsor administrators, employers, orthotist/prosthetist, and the public.

The program advisory committee advises the program regarding revisions to curriculum and program goals based on the changing needs and expectations of the program's communities of interest, and an assessment of program effectiveness, including the outcomes specified in these Standards.

Program advisory committee meetings may be conducted using synchronous electronic means.

III. Resources

A. Type and Amount

Program resources must be sufficient to ensure the achievement of the program's goals and outcomes. Resources must include, but are not limited to

1. Faculty;
2. Administrative and support staff;
3. Curriculum;
4. Finances;
5. Faculty and staff workspace;
6. Space for confidential interactions;
7. Classroom and laboratory (physical or virtual);
8. Ancillary student facilities;
9. Supervised practice experiences;
10. Equipment;
11. Supplies;
12. Information technology;
13. Instructional materials; and
14. Support for faculty professional education.

B. Personnel

The sponsor must appoint sufficient faculty and staff with the necessary qualifications to perform the functions identified in documented job descriptions and to achieve the program's stated goals and outcomes.

At a minimum, the following positions are required.

1. Program Director

a. Responsibilities

The program director must be responsible for all aspects of the program, including but not limited to

- 1) Administration, organization, and supervision of the program;
- 2) Continuous quality review and improvement of the program; and;
- 3) Academic oversight, including curriculum planning and development.

b. Qualifications

The program director must

- 1) Possess a minimum of a bachelor's degree or the equivalent;
- 2) Be credentialed in the profession of orthotics and/or prosthetics by a national credentialing organization or hold a professional license in the orthotics & prosthetics profession as is required by the state in which he/she is employed; and
- 3) Have documented education or experience in instructional methodology.

The program director should possess an advanced degree.

2. Faculty/Instructional Staff

a. Responsibilities

For all didactic, laboratory and clinical instruction or supervised practice to which a student is assigned, there must be (a) qualified individual(s) designated to provide instruction, supervision, and timely assessments of the students' progress in achieving program requirements.

b. Qualifications

Faculty/instructional staff must be effective in teaching and knowledgeable in subject matter as documented by appropriate professional credential(s)/certification(s), education, and experience in the designated content area.

C. Curriculum

The curriculum must ensure that program goals are achieved. Instruction must be based on clearly written course syllabi that include course description, course objectives, methods of evaluation, topic outline, and competencies required for graduation. Instruction must be delivered in an appropriate sequence of classroom, laboratory, and supervised practice experiences.

The program must demonstrate that the curriculum offered meets or exceeds the competencies listed in Appendix B of these **Standards**.

CAAHEP supports and encourages innovation in the development and delivery of the curriculum.

D. Resource Assessment

The program must, at least annually, assess the appropriateness and effectiveness of the resources described in these **Standards**. The results of resource assessment must be the basis for ongoing planning and change. An action plan must be developed when needed improvements are identified in the program resources. Implementation of the action plan must be documented, and results measured by ongoing resource assessment.

IV. Student and Graduate Evaluation/Assessment

A. Student Evaluation

1. Frequency and purpose

Evaluation of students must be conducted on a recurrent basis and with sufficient frequency to provide both the students and program faculty with valid and timely indications of the students' progress toward and achievement of the curriculum competencies in the required learning domains.

Validity means that the evaluation methods chosen are consistent with the learning and performance objectives being tested.

2. Documentation

Student evaluations must be maintained in sufficient detail to document learning progress and achievements.

B. Outcomes

The program must meet the established outcomes thresholds.

1. Assessment

The program must periodically assess its effectiveness in achieving established outcomes. The results of this assessment must be reflected in the review and timely revision of the program.

Outcomes assessments must include but are not limited to national credentialing examination(s) performance, programmatic retention, graduate satisfaction, employer satisfaction, and placement in full or part-time employment in the profession or in a related profession.

A related profession is one in which the individual is using cognitive, psychomotor, and affective competencies acquired in the educational program.

Graduates pursuing academic education related to progressing in health professions or serving in the military are counted as placed.

A national certification examination program should be accredited by the National Commission for Certifying Agencies (NCCA), American National Standards Institute (ANSI), or under International Organization for Standardization (ISO).

2. Reporting

At least annually, the program must submit to the NCOPE the program goal(s), outcomes assessment results, and an analysis of the results.

If established outcomes thresholds are not met, the program must participate in a dialogue with and submit an action plan to the NCOPE that responds to the identified deficiency(ies). The action plan must include an analysis of any deficiencies, corrective steps, and timeline for implementation. The program must assess the effectiveness of the corrective steps.

V. Fair Practices

A. Publications and Disclosure

1. Announcements, catalogs, publications, advertising, and websites must accurately reflect the program offered.

2. At least the following must be made known to all applicants and students
 - a. Sponsor's institutional and programmatic accreditation status;
 - b. Name and web site address of CAAHEP;
 - c. Admissions policies and practices;
 - d. Technical standards;
 - e. Occupational risks;
 - f. Policies on advanced placement, transfer of credits, and credits for experiential learning;
 - g. Number of credits required for completion of the program;
 - h. Availability of articulation agreements for transfer of credits;
 - i. Tuition/fees and other costs required to complete the program;
 - j. Policies and processes for withdrawal and for refunds of tuition/fees; and
 - k. Policies and processes for assignment of orthotic and/or prosthetic supervised practice experiences.
3. At least the following must be made known to all students
 - a. Academic calendar;
 - b. Student grievance procedure;
 - c. Appeals process;
 - d. Criteria for successful completion of each segment of the curriculum and for graduation; and
 - e. Policies by which students may perform supervised practice experiences while enrolled in the program.
4. The sponsor must maintain, and make accessible to the public on its website a current and consistent summary of student/graduate achievement that includes one or more of these program outcomes: national credentialing examination(s), programmatic retention, and placement in full or part-time employment in the profession or a related profession as established by the NCOPE.

B. Lawful and Non-discriminatory Practices

All activities associated with the program, including student and faculty recruitment, student admission, and faculty employment practices, must be non-discriminatory and in accord with federal and state statutes, rules, and regulations. There must be a faculty grievance procedure made known to all paid faculty.

C. Safeguards

The health and safety of patients/clients, students, faculty, and other participants associated with the educational activities of the students must be adequately safeguarded. Orthotic & prosthetic technician students must be readily identifiable as students.

All activities required in the program must be educational and students must not be substituted for staff.

D. Student Records

Grades and credits for courses must be recorded on the student transcript and permanently maintained by the program sponsor in an accessible and secure location. Students and graduates must be given directions on how to access their records. Records must be maintained for student admission, advisement, and counseling while the student is enrolled in the program.

E. Substantive Change

The sponsor must report substantive change(s) as described in Appendix A to NCOPE in a timely manner.

Additional substantive changes to be reported to NCOPE within the time limits prescribed include:

1. Change in institutional accreditation;
2. Significant reduction in resources for the institution or program;
3. Change/addition/deletion of courses that represent significant departure in curriculum content;
4. Change in method of curriculum delivery
5. Substantive change in the number of students admitted to the program;
6. Significant change in faculty composition or size;
7. Change or additional program locations; and
8. Change in degree awarded.

F. Agreements

There must be a formal affiliation agreement or memorandum of understanding between the program sponsor and all other entities that participate in the education of the students describing the relationship, roles, and responsibilities of the program sponsor and that entity.

APPENDIX B

Core Curriculum Competencies for Educational Programs for Orthotic and Prosthetic Technicians

1. Curriculum Requisites

- a. The following curriculum requisites must either be met prior to the orthotic and prosthetic technical education program or be presented as course work; they must include but are not limited to college level content in the following:
 - 1) Medical terminology
 - 2) Anatomy and physiology
 - 3) Written and oral communication
 - 4) Biomechanics
 - 5) Material science

2. Competencies

- a. Professional and technical competencies must include evaluation and documentation of six (6) domains:
 - 1) Professionalism, 2) Communication, 3) Knowledge, 4) Decision Making, 5) Technical Practice, 6) Professional Development and Wellbeing.

b. Learning Competencies Common to All Disciplines

- 1) **Professionalism** - Build and cultivate a sustainable professional identity, including accountability, ethical principles, and responsibility to the profession and patients. (Domains: Cognitive, Affective)
 - a) Demonstrates ethical behavior and professional integrity.
 - b) Practices within the technician's scope of practice and within the limits of their personal abilities.
 - c) Demonstrates care and concern for patients, their families, and the caregivers of people who require O&P care.
 - d) Respects the personal and cultural values of colleagues, collaborators, patients, and other communities of interest engaged in orthotic and prosthetic care.
- 2) **Communication** - Effectively exchange information with members of the patient care team to enable appropriate technical services and establish mutual trust. (Domains: Cognitive, Affective)
 - a) Demonstrates appropriate communication practices within patient care and technical manufacturing settings.
 - b) Communicates effectively with O&P colleagues and other healthcare professionals using oral and written techniques.
 - c) Comprehends work orders, written instructions, and verbal instruction to enable appropriate O&P technical fabrication.
- 3) **Knowledge** - Recall, organize, and synthesize technical, clinical, and fabrication sciences information to inform orthotic & prosthetic technical services. (Domains: Cognitive)
 - a) Demonstrates an understanding of medical terminology and relevant terminology associated with orthotic and prosthetic technical services. Demonstrates knowledge of relevant surface anatomy and anatomical structures associated with orthotic and prosthetic technical services.

- b) Demonstrates knowledge of material characteristics and applications relevant for orthotic/prosthetic fabrication: Strength, Density, Durability, Hardness, Stiffness, Corrosion Resistance, Malleability, Strain, and Ductility.
- c) Demonstrates knowledge of extrinsic factors that affect material performance including temperatures, vacuum performance, and cooling rates.
- d) Demonstrates knowledge of materials commonly used to fabricate orthoses/prostheses including:
 - i. High temperature thermoplastic
 - ii. Low temperature thermoplastics
 - iii. Thermosets
 - iv. Foams
 - v. Alloys (Metals)
 - vi. Organic Materials (e.g., cork, leather)
 - vii. Synthetic strap and interface materials
 - viii. Gel materials
 - ix. Adhesives
 - x. Surface treatments including thread lockers and non-corrosive finishes
 - xi. Solvents
 - xii. Lubricants
 - xiii. Textiles – leather, velcro, woven and knitted materials (including lamination lay-up materials e.g., carbon fiber, and Dacron reinforcement, and fabrication materials such as stockinet)
- e) Demonstrates knowledge of laboratory safety and proper use, maintenance, and selection of tools, equipment, and materials, including:
 - i. Understanding of Safety Data Sheets (SDS), Globally Harmonized System (GHS) labeling, and chemical safety symbols
 - ii. Use of appropriate personal protective equipment (e.g., safety glasses, gloves, respirators)
 - iii. Evacuation plans and emergency response planning
 - iv. Safe handling, storage, and disposal of chemicals and materials. Material management to minimize waste.
 - v. Measuring tools, hand tools, power tools, and lab equipment listed in the table below:

Measuring tools	Hand Tools	Power Tools	Laboratory Equipment / Other
i) Tape measures	viii) Hammers (Ball peen, tack, mallet)	xviii) Floor Routers	xxvii) Oven
ii) Inside and outside calipers	ix) Screwdrivers	xix) Sanders (Drum, Belt, Disc)	xxviii) Thermoforming station
iii) M/L gauges	x) Hex wrenches/keys (torque)	xx) Hand drills/drill drivers	xxix) Vacuum forming tray/press
iv) Combination and/or carpenter squares	xi) Pliers (Slip jaw, needle nose)	xxi) Oscillating saw (Pneumatic or Electric)	xxx) Blister forming station
v) Laser levels	xii) Chisels, Punches (drift and tapered)	xxii) Handheld rotary tool (ex: Dremel)	xxxi) Exhaust hoods

vi) Plumb bob	xiii) Rasps	xxiii) Heat gun	xxxii) Particulate (dust) collectors
vii) Goniometer	xiv) Metal files	xxiv) Torch	xxxiii) Air compressor and quick-disconnects
	xv) Rivet punch and set	xxv) Band saw	xxxiv) Sewing machine and patcher
	xvi) Cutting Tools (Scissors, razor knives, rotary cutter)	xxvi) Drill Press	xxxv) Alignment/transfer fixtures
	xvii) Side cutters, end nippers, snips		xxxvi) Bending irons, forks, band benders

- f) Demonstrates knowledge of the three categories of positive model (physical or digital) modifications used in fabricating prostheses and orthoses.
- i. Category I – Artifact modifications
 - i) Removal of surface imperfections caused by the shape capture process
 - ii) Filling of voids produced by air in the plaster mixture and parting agent
 - iii) Removal of extraneous surface irregularities resulting from cast seams, leaks, etc.
 - iv) Any other surface modifications and smoothing procedures that do not substantially alter the surface topography or biomechanical attributes of the model
 - ii. Category II - Accommodative modifications
 - i) Standardized buildups/reliefs over well-identified common areas of concern such as malleoli, bony prominences on foot, knee joint prominences, etc.
 - iii. Category III - Biomechanical modifications
 - i) Modifications to positive model resulting in significant changes to the volumetric/weight-distribution characteristics of the ensuing orthotic/prosthetic device.
 - ii) Any changes to the positive model which would alter its pre-existing biomechanical properties.
- g) Demonstrates understanding of manufacturing techniques used in the fabrication of orthoses and prostheses.
- i. Creation of a positive model
 - i) Material options, including plaster and rigid foam
 - ii) Creating a digital model using scanner and/or anthropometric measurements
 - iii) Creating a positive model using a carver or other CNC machinery (ex: Carving foam blank)
 - iv) Assessing the quality of a positive model and techniques to rectify model to achieve desired manufacturing outcome.
 - v) Techniques to reinforce negative plaster and fiberglass wraps
 - ii. Thermoforming techniques
 - i) Measurements and techniques to determine an appropriate amount of material to create minimal waste and achieve the desired manufacturing outcome.
 - ii) Appropriate vacuum levels and heating procedures for common materials
 - iii) Drape forming

- iv) Blister forming
- v) Thermoforming over plaster positive models
- vi) Thermoforming over foam positive models
- vii) Thermoforming with dummies for production components (ex: Bulldog dummies, Tamarack dummies)
- viii) Cosmetic enhancements (ex: Transfer paper)
- ix) Reinforcement strategies
- x) How to achieve appropriate vacuum and troubleshoot issues with thermoforming
- iii. Thermoset manufacturing
 - i) Layup techniques
 - ii) Finishing options (ex: pigmentation or personalized fabric)
 - iii) Integration of components (ex: endoskeletal connectors, locking mechanisms) and dummies/tooling
 - iv) Wet-bag laminations
 - v) Pre-preg composite fabrication
- iv. Finishing techniques
 - i) Setting initial trimlines
 - ii) Trimming and removal from positive model that enables the re-use of tooling and dummies when possible
 - iii) Beveling and smoothing common materials
 - iv) Application of non-corrosive/protective coatings
 - v) Applying lubricants or other surface treatments as indicated
 - vi) Strap application
 - vii) Riveting
 - viii) Final assembly
- h) Demonstrates understanding of quality assurance principles and practices in orthotic and prosthetic technical settings.
 - i. Integrating manufacturer provided guidance
 - ii. Inspecting prostheses/orthoses to ensure mechanical, functional, and aesthetic specifications were achieved as defined by the treating clinician
- i) Demonstrates understanding of facility management principles relevant to orthotic and prosthetic technical operations.
 - i. Adherence to policies and procedures
 - ii. The physical environment
 - iii. Equipment maintenance
 - iv. Regulatory bodies
 - v. Inventory
 - vi. Cost containment
 - vii. Documentation
- j) Demonstrates an understanding of relevant financial factors associated with orthotic & prosthetic technical practice.
 - i. Material costs
 - ii. Component costs
 - iii. Labor Costs
 - iv. Reimbursement for O&P clinical services

Additional knowledge unique to orthotic or prosthetic technical practice are listed under section 2.c. and 2.d.

- 4) **Decision Making** - Applies critical thinking and sound rationale to make informed decisions regarding technical design and fabrication processes. (Domains: Affective, Cognitive)
 - a) Incorporates appropriate materials/components based on orthotist and/or prosthetist defined criteria, physical characteristics of the patient including height, weight, and activity level, and resources available for fabrication.
 - b) Chooses fabrication techniques that enable timely, cost-effective, and high-quality fabrication of orthoses and prostheses.
 - c) Evaluates the safety, quality of manufacturing, and functionality of orthoses and prostheses to ensure patient safety and the clinical outcomes defined by the treating clinician.
 - d) Recognizes when a decision should be elevated to the treating clinician or outside the scope of an O&P technician.
- 5) **Technical Services** - Provides safe, appropriate, and effective entry-level orthotic and prosthetic technical services. (Domains: Psychomotor, Affective, Cognitive)
 - a) Safely performs technical services and related activities in compliance with industry guidelines and regulations.
 - i. Identifies the location of SDS sheets and adheres to the guidance provided
 - ii. Identifies the location of safety equipment including first aid kits, automatic external defibrillators, emergency call buttons, eye wash stations, and fire extinguishers
 - iii. Selects and correctly uses appropriate protective equipment
 - iv. Handles and stores materials in an appropriate and safe manner
 - v. Ensures appropriate venting and dust/particulate collection are operating prior to beginning a technical procedure.
 - vi. Uses all tools and machinery in a safe and appropriate manner (Starting/stopping the machine, identifying and replacing worn components).
 - b) Performs technical services with appropriate tools and methods for the fabrication of orthoses and prostheses.
 - i. Hands Tools
 - ii. Measuring Tools: Tape measures, linear tools (M/L gauge, outside calipers)
 - iii. Power Tools: Handheld drill, drill press, router (Trautman), drum/belt/disc sander, Miter/Chop Saw, Cast/Oscillating Saw, band saw, jig saw
 - iv. Ovens/Thermoforming equipment
 - v. Alignment and transfer fixtures
 - c) Confirms appropriate materials are selected to fabricate orthoses and prostheses based on the data provided on the work order.
 - d) Performs orthotic and prosthetic technical skills to meet the defined specifications of the treating clinician, address patient needs, and comply with industry standards.
 - i. Assesses negative model and creates a positive model for fabrication
 - i) Assessing the quality of a negative or positive model
 - ii) Correcting negative wraps/models prior to creating a physical positive model
 - iii) Creating positive model using appropriate parting agents

- iv) Removing negative molds in a manner that preserves them when possible.
- ii. Modifies positive models for the manufacture of orthoses and prostheses using level I, II, and III cast modifications based on defined specifications and desired outcomes.
- e) Thermoforming
 - i. Determining appropriate heating temperature for selected materials
 - ii. Prepping the positive model for thermoforming
 - iii. Selects and procures the appropriate amount of thermoplastic material needed to fabricate an orthosis or prosthesis
 - iv. Sets a vacuum level appropriate for the material, thermoforming technique, and other relevant factors (ex: altitude)
 - v. Performs drape forming
 - vi. Performs blister forming
 - vii. Identifies when vacuum can be removed without negatively altering the finished orthosis or prosthesis
- f) Laminating
 - i. Selects and applies appropriate PVA bags to positive models.
 - ii. Selects and applies appropriate textiles for lamination (i.e. carbon fiber, fiberglass, nylon, etc.), and reinforcing as directed or indicated (i.e. as for socket brims, posterior AFO struts, etc.).
 - iii. Selects an appropriate quantity of resin components and mixes them to achieve the optimal ratio based on manufacturer defined specifications (ex: weight) and other relevant factors (ex: temperature and humidity).
- g) Heats material appropriately to achieve a desired shape and function.
- h) Bonds materials together using appropriate techniques needed to achieve a desired function.
- i) Performs finishing techniques to materials using appropriate tools and techniques to achieve a desired function and patient safety/comfort.
 - i. Trims
 - ii. Contours
 - iii. Bevels
 - iv. Smooths
 - v. Polishes
- j) Sews cloth, fibers, straps, and other common materials to achieve a desired function
- k) Contours metal components for the fabrication of prosthesis and orthoses including sidebars and bands
 - i. Squares mechanical joints to ensure congruency and proper mechanical function
 - ii. Rivet installation (copper, speedy, and “pop” of different sizes)
 - iii. Use of internal or external alignment fixtures to aid in fabrication
- l) Digital Workflow
 - i. Converts negative or positive physical models to digital files using scanner
 - ii. Assesses the quality of digital file (ex: artifacts or gaps in the MESH)
 - iii. Imports scans or other digital files into O&P specific CAD platforms
 - iv. Sends rectified digital file to CNC machinery or additive MFR hardware (3D printer)
 - v. Selects appropriate material for fabrication using additive manufacturing
- m) Adjustment/Repair/Maintenance
 - i. Creates reliefs / voids using appropriate tools and techniques to achieve a desired goal

- ii. Creates or removes volume from an orthosis/prosthesis using appropriate tools and techniques to achieve a desired goal
 - iii. Assesses functionality of strapping and replaces/repairs worn materials as appropriate
 - iv. Assesses the mechanical function of components and replaces or services (ex: application of lubricants) as appropriate.
 - v. Swaps out components that require servicing with temporary or loan components without altering prosthetic height or alignment.
 - n) Quality Assurance / Best Practices
 - a) Reviews and integrates manufacturer and practitioner provided guidance.
 - b) Performs mechanical testing of the orthosis/prosthesis before delivering to the treating clinician.
- 6) **Professional Development and Well Being**
 - a) Demonstrates a commitment to personal and professional growth that promotes life-long learning, resilience, and well-being to allow for meaningful contributions to the profession.
 - b) Recognizes the value of continuing education and lifelong learning.
 - c) Facilitates self-directed learning to define and achieve personal development goals.
 - d) Stays abreast of contemporary manufacturing techniques, components, and materials used in practice.
 - e) Accepts constructive feedback and integrates it in an effective manner to inform their learning and professional development.
 - f) Recognizes and addresses their personal needs and participates in self-care to achieve and maintain well-being.
- c. **Learning Competencies for Orthotic Technical Practice**
 - 1) Knowledge of: (Cognitive)
 - a) Lower limb biomechanical principles
 - i. Hindfoot/forefoot alignment
 - ii. Genu valgum, varum, recurvatum
 - iii. Accommodating fixed deformities
 - iv. Strategies for addressing flexible deformities
 - v. Integrating footwear characteristics into the alignment of a lower limb orthosis (ex: shank to vertical angle)
 - b) Relevant component characteristics
 - i. Placement and clearances (Joints, bars)
 - ii. Component placement relative to surface anatomy (ankle joint = distal tip medial malleolus)
 - iii. Anatomical factors that influence alignment including swelling, alignment, and deformity
 - c) Shoe modifications
 - i. Stretching uppers
 - ii. Applying a lateral flare/buttness
 - iii. Installation of a shank
 - iv. Installation of a stirrup or caliper
 - d) Ankle foot orthosis design characteristics including trimlines, material options, initial/typical alignment, and suspension options:

- 598 i. Supramalleolar orthoses
- 599 ii. Posterior leaf spring/flexible ankle
- 600 iii. Plastic solid ankle
- 601 iv. Axial resisting
- 602 v. CROW/neuropathic walker
- 603 vi. Conventional / Metal designs
- 604 vii. Articulated ankle
- 605 viii. Ground reaction
- 606 ix. Molded leather gauntlets
- 607 e) Ankle joint options for thermoplastic and conventional/metal lower limb orthoses
- 608 i. Dorsiflexion assist
- 609 ii. Dorsiflexion stop
- 610 iii. Plantarflexion resist
- 611 iv. Plantarflexion stop
- 612 v. Limited motion
- 613 vi. Double action and other adjustable joints
- 614 f) Knee orthosis design characteristics including trimlines, material options, initial alignment, and
- 615 suspension options.
- 616 g) Knee ankle foot orthosis design characteristics including trimlines, material options, initial
- 617 alignment, and suspension options:
- 618 i. Thermoplastic KAFO
- 619 ii. Conventional (Metal) KAFO
- 620 h) Knee joint options
- 621 i. Straight knee joints with and without ring locks
- 622 ii. CAM / Swiss / French Locks
- 623 iii. Bail assembly
- 624 iv. Trigger lock
- 625 v. Ratcheting knee joints
- 626 vi. Dial lock knee joints
- 627 vii. Posterior offset knee joints
- 628 viii. Flexion and extension stops
- 629 i) Hip orthosis and hip knee ankle foot orthosis design characteristics including trimlines, material
- 630 options, initial alignment, and suspension options:
- 631 i. Thermoplastic HKAFO
- 632 ii. Conventional (Metal) HKAFO
- 633 j) Spinal orthoses
- 634 i. Cervical and cervicothoracic orthosis
- 635 ii. Lumbar and Lumbosacral orthosis
- 636 iii. Thoracolumbosacral orthosis and cervicothoracic lumbosacral orthosis
- 637 iv. Scoliosis orthosis
- 638 k) Upper limb orthoses
- 639 i. Hand orthosis
- 640 ii. Wrist hand orthosis
- 641 iii. Elbow orthosis
- 642 iv. Shoulder elbow wrist hand orthosis

- v. Humeral fracture orthoses
- 2) Performance of: (Psychomotor, Cognitive)
 - a) Fitting the orthoses that contact the plantar aspect of the foot into shoes.
 - b) Creation of a positive model of the wrist, hand, and fingers using plaster or dental stone.
 - c) Placement of an internal or external knee joint alignment fixture.
 - d) Identification of ankle, hindfoot, and forefoot alignment in a negative mold and cast correction to achieve the desired alignment.
 - e) Correcting a tracing/delineation (schema) to match defined anthropometric data and reversal for the fabrication of a conventional/metal lower limb orthosis.
 - f) Plaster mold rectification including category I, II, and III modifications for the following lower limb orthoses:
 - i. Foot orthoses
 - ii. Supramalleolar orthoses
 - iii. Ankle foot orthoses
 - iv. Knee ankle foot orthoses
 - g) Plaster mold rectification including category I and II modifications for the following spinal orthoses:
 - i. Lumbosacral or thoracolumbosacral orthoses

The skills listed in 2.c.2) may be integrated into a comprehensive fabrication project identified in 3.d. or they may be taught independently.

d. Learning Competencies for Prosthetic Technical Practice

- 1) Knowledge of: (Cognitive)
 - a) Lower limb prosthetic design variations
 - i. Structural options including endoskeletal and exoskeletal.
 - ii. Suspension options
 - i) Suspension sleeve
 - ii) Anatomical (supracondylar, medial door for partial foot/symes)
 - iii) Suction
 - iv) Elevated vacuum
 - v) Locking liner variations including pin and lanyard
 - vi) Supracondylar cuff
 - iii. Partial foot prostheses
 - i) Toe fillers
 - ii) Supramalleolar (Ex: Chicago boot)
 - iii) Tubercle height including integration into an AFO and clamshell designs
 - iv. Prosthetic foot categories
 - i) SACH
 - ii) Flexible keel
 - iii) Single-axis
 - iv) Multi-axial
 - v) Dynamic response
 - vi) Direct mount
 - vii) Activity Specific

- v. Prosthetic knee categories
 - i) Multiaxial and single axis linkage
 - ii) Control mechanisms
 - (i) Mechanical friction
 - (ii) Fluid friction (hydraulic and pneumatic)
 - (iii) Weight-activated stance brake
 - (iv) Locking knees
 - (v) Microprocessor control
- vi. Transtibial socket design
 - i) Patellar tendon (specific) weight-bearing (PTB)
 - ii) Total surface bearing (TSB)
- vii. Transfemoral socket design
 - i) Quadrilateral
 - ii) Ischial containment (IC)
 - iii) Subischial
- viii. General components
 - i) Soft protective covers
 - ii) Protective hose and skins
 - iii) Flexible inner sockets
 - iv) Volume adjustment components (ex: Boa)
 - v) Growth accommodating sockets (ex: onion skin)
- b) Upper limb prosthetic design variations
 - i. Structural options including endoskeletal and exoskeletal.
 - ii. Power sources
 - i) Body-powered
 - ii) External power
 - iii) Hybrid power
 - iii. Passive Prostheses
 - iv. Transradial socket variations
 - i) Wrist disarticulation (distal to the condyles)
 - ii) Distal to the condyles with harness suspension
 - iii) Self-suspending
 - (i) NYU-Muenster
 - (ii) Otto Bock
 - (iii) Northwestern
 - v. Harnessing
 - i) Transradial
 - (i) Figure of 8
 - (ii) Figure of 9
 - ii) Transhumeral
 - (i) Harness options for positive locking elbow with body power
 - vi. Cosmetic finishing options, self-suspending socket options for TR, harness options depending on level and function
 - vii. Endoskeletal and exoskeletal prosthesis designs
- c) Common alignment principles and anatomical references

- i. Alignment preservation and transfer using a vertical alignment fixture.
- ii. Alignment preservation of the prosthesis when changing or replacing the socket, foot or endoskeletal components

2) Performance of: (Psychomotor, Cognitive)

- a) Appropriate selection of tube clamps, pylons, and adapters to achieve a pre-defined build height to achieve manufacturer defined bench alignment.
- b) Alignment transfer of a transtibial prosthesis using a vertical alignment fixture
- c) Linear, angular, and rotational adjustments using lower limb endoskeletal components
- d) Closed-cell foam liner fabrication for a transtibial socket with or without a supracondylar wedge
- e) Pretibial, popliteal pads fabrication and installation for correcting the fit of a prosthesis
- f) Pin-lock mechanism in a lower limb socket installation
- g) Suction valve in a lower limb socket installation
- h) Existing test or definitive socket duplication for the creation of a positive model for fabrication
- i) Soft foam protective/cosmetic cover shaping for the lower limb
- j) Protective hose or skin application
- k) Rigid mold rectification including category I and II modifications for the following prostheses:
 - i) Transtibial prostheses
 - ii) Transfemoral prostheses
 - iii) Transradial prostheses

The skills listed in 2.d.2) may be integrated into a comprehensive fabrication project identified 3.e. or they may be taught independently.

3. Fabrication of Orthoses and Prostheses

- a. Comprehensive fabrication must align with the enrolled discipline.
- b. To complete orthotic technical training, all projects listed under C.1 must be completed; for prosthetic technical training, all projects listed under C.2 must be completed.
- c. Projects must be fabricated using contemporary materials and methods and must demonstrate:
 - 1) absence of surface defects
 - 2) structural soundness
 - 3) adherence to the specifications defined prior to fabrication.
- d. Demonstrate achievement of orthotic technical competency through the performance of comprehensive fabrication of each of the following: (Psychomotor, Cognitive)
 - 1) Lower Limb Orthoses
 - a) Accommodative foot orthosis
 - b) Supramalleolar orthosis
 - c) Shoe lift with rocker sole
 - d) Thermoplastic articulated AFO
 - e) Conventional (Metal) AFO with stirrup or caliper plate
 - f) Thermoplastic KAFO with mechanical knee joints and alloy sidebars
 - 2) Spinal Orthoses

a) Thermoplastic LSO or TLSO with bivalve (clamshell) opening

e. Demonstrate achievement of prosthetic technical competency through the performance of comprehensive fabrication of each of the following: (Psychomotor, Cognitive)

1) Lower Limb Prostheses

a) Clear diagnostic test socket à Minimum of 2

b) Transtibial or Transfemoral Rigid Frame with Flexible Inner (ex: Carbon with Proflex)

c) Transtibial Endoskeletal Prostheses (At least 2 out of the 4 options below)

i. PTB with custom closed cell foam (ex: Pe-Lite) liner

ii. TSB with suction suspension and valve

iii. TSB with pin lock

iv. TSB with elevated vacuum

d) Transfemoral Endoskeletal prosthesis (any suspension)

2) Upper Limb Prostheses

a) Upper Limb Body Powered TR/WD exoskeletal prosthesis with figure 8 harness, Bowden cable system, and flexible or rigid hinges

4. Technical Practicum

a. The curriculum must include technical education experiences which provide students with real-world opportunities to develop and demonstrate competencies in the following areas, integrating psychomotor, affective and cognitive skills:

1) Fabrication of custom orthoses and/or prostheses

2) Application of quality assurance practices

3) Routine maintenance of orthoses and/or prostheses

4) Repair of orthoses and/or prostheses

5) Principles and practices of facility management

It is recommended that participating facilities comply with facility accreditation standards as outlined by American Board for Certification in Orthotics, Prosthetics and Pedorthics.