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TITLE: Program Evaluation of Outcomes Based Orthotic and Prosthetic Education

PRINCIPAL INVESTIGATOR: Scott Hornbeak

CONTRACTING ORGANIZATION: California State University Dominguez Hills Foundation
Carson, CA 90747-0005

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14. ABSTRACT
Major Accomplishments for Year 2: Trained 33 new Prosthetic graduates and 16 new Orthotic graduates (total 49), thus achieving full capacity in expanded O&P education program. Recruited Mark Muller, CPO, as Prosthetics and Orthotics Instructor; writing of new Biomechanics and Gait curricula and syllabi; implementation of online learning strategies through the use of Blackboard online learning platform for all lecture materials, quizzes, and term tests; purchase of expendable supplies for laboratories; Achieved full NCOPE and CAAHEP Accreditation through 2009 for Orthotics and Prosthetics Programs. Outcome Tools developed in Year 2: development of comprehensive list of program assessment criteria across cognitive, psychomotor, and afferent learning categories; creation of new rubric for Professional behavior in patient interactions; development/revision of checkout criteria for all Orthotic and Prosthetic patient fittings; development of Practical (summative) Exams for each clinical course; transition of all grading to online Blackboard platform; implemented group focus meetings for respective classes to provide criticism of ongoing teaching and learning; implementation of end of semester Student Survey to provide feedback on quality of teaching content.

15. SUBJECT TERMS
Prosthetics, Orthotics, Prosthesis, Orthosis, Amputation, Outcomes Based Evaluation

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Program Evaluation of Outcomes Based Orthotic and Prosthetic Education

Award Number: W81XWH-06-1-0144

INTRODUCTION:

There are not enough qualified Prosthetic and Orthotic practitioners to provide services needed by thousands of military amputees, U.S. Veterans, and other Americans living with disabilities. With Department of Defense funding (2005-2008) the university has significantly increased enrollment in both its Prosthetics and Orthotics programs. The goal to enlarge training capacity from 28 students to 48 students per year has been achieved in Year 2. Historically, U.S. Prosthetic and Orthotic training programs have conducted small classes with intensive hands-on laboratories that are very vocational in nature. Therefore, now that the program has been completed, the evaluation component becomes the new priority. In Year 2 the program focused on moving from vocational and knowledge based accreditation standards to competence based standards that are focused on outcomes assessment.

A Program Evaluation is being conducted, asking the question "What are the effects of additional resources and increased training capacity on an Orthotic and Prosthetic training program and its clients? The purpose of the Program Evaluation is to assess the effects of increasing practitioner training capacity by 71% on program inputs, activities, outputs, and outcomes. The final evaluation will examine impacts/benefits/changes to students and orthopedic clients as a result of program growth and curriculum changes during and/or after their participation in this 3 year study. Outcomes evaluation will examine these changes in the short-term, intermediate term and long-term.

BODY:

Program Evaluation of an Outcomes-Based Orthotic and Prosthetic Education Program

(Background): The investment in remodeling, supplies and equipment in 2006 provided an increased capacity to train O&P students. The new capacity is 32 students in Prosthetics per year, and a completely new class capacity of 16 students in Orthotics per year. Total capacity is now 48 graduates per year. Kate Muller, CPO, was recruited to become the Lead Orthotic Instructor. A new, 1000 square foot teaching laboratory and 900 square foot "smart" classroom were developed in existing space. A remodel of the Prosthetics Gait room, two additional offices, and installation of a wheelchair lift and addition of a cafeteria privacy curtain were also completed.

Year 2 highlights have included recruiting a new faculty member, Mark Muller CPO, who teaches both Prosthetics and Orthotics, and most Biomechanics and Gait courses. The expanded O&P project also recruited a new part time instructor, Paul Kanzawa, who is an ABC certified Orthotist with 20 years of patient care experience. Glenn Ham-Rosebrock, CO, with over 38 years patient care experience was also re-appointed as a part time instructor. Kate Muller, CPO continues in the position of Lead Orthotic Instructor. After obtaining feedback during the first Orthotic Certificate (Jan-June, 2006), she has revised the Orthotics curricula, including Upper Extremity Orthotics, Spinal Orthotics, Lower Extremity Orthotics, Biomechanics, and Research.

Mark Muller, CPO has been an excellent addition to the faculty, where he has made significant improvements to the Prosthetic curriculum including the update of all Power Point lectures and testing materials. He also led the faculty effort to put all Orthotic and Prosthetic Power Point lectures, videos, and, quizzes, and term tests online, utilizing the Blackboard platform available at CSUDH.

TBC Contractors, under the direction of Ossur and California State University, has completed an installation of a new plaster room that has improved the efficiency of both O&P classes. The cost of this room included custom plumbing and bench fixtures (approx. cost $9,700), and the cost has been encumbered, but not yet charged to the project. Clear Vision, our audio-visual installer was called in to provide LCD presentation and AV equipment in the Orthotics Laboratory. We also reconfigured the benches in the Orthotics Laboratory to make more room for faculty lab instruction and student work. The remodeled Orthotics Laboratory is working very well, and now accommodates 16 students.

New students were recruited to start instruction in the Prosthetics and the new Orthotics Program. 16 new students were placed in the second Orthotics Certificate Program, and 16 students entered the Prosthetics Certificate Program. Both programs started on January 22, 2007. Expendable supplies and materials were purchased to support the laboratory requirements for each course. One student dropped out in early in the program due to financial reasons, but 31 students successfully graduated by August 1, 2007.

Another cohort of 18 Prosthetic students started instruction in August, 2007, graduating from the program in late December 2007.

33 prosthetic practitioners and 16 orthotic practitioners (49 total) graduated in 2007. This exceeded the capacity in the original objective to expand the program capacity from 28 graduates to 48 graduates per year.

January – August 2007 was highlighted by teaching activities in the both the Orthotics (16 students) and Prosthetics (15 students) Certficate programs. Our team completed remodeling the Orthotics Laboratory, installed a new plaster room, and ordered sufficient expendable supplies for each Certificate program, while our faculty has accomplished the teaching mission with a high level of expertise.

Both programs have engaged in student assessment in the areas of cognitive abilities (knowledge) and psychomotor abilities (hand skills) through extensive written and oral testing, as well as project assignment to evaluate and fit prostheses and orthoses for patient models in the respective classes.

Professional behavior is being assessed through evaluation of dress, demeanor with patient models, communication with staff and faculty, and written and oral presentation skills. A new Patient Survey has been added to assess the professional patient's opinion of their student practitioner's performance in the following areas: Introduction/Explanation, Evaluation/Measurements, Casting Procedure, Fitting Procedure, and Alignment Procedure. So far, the program has used this survey feedback to advise student where their weaknesses are, and how to better communicate with their clients.

In March 2007 the program sent 29 students to San Francisco to attend three days of the 33rd Academy Annual Meeting of the American Academy of Orthotists and Prosthetists. In addition to attending 24 hours of focused, state of the art education, the students also participated in a high school recruiting and outreach program for over 80 Bay area high students interested in the O&P profession. We arranged for the CSUDH students to attend at the nominal price of $55 each, and they stated that the educational experience was a great success. Faculty members Scott Hornbeak, Mark Muller, and Dean Rabbitt also attended.

The CSUDH O&P Program has also begun to conduct exit interviews with each Certificate class. These Group Focus Meetings give the students who have just completed a Certificate course a chance to provide positive and feedback about teaching methods, time devoted to subjects, testing, grading,

and overall teacher and program effectiveness. It is also during these sessions that faculty members have begun to elicit responses that indicate whether the graduates have acquired desired professional behavior expected of an entry level practitioner.

August – November 2007 was highlighted by teaching activities in the second Prosthetics (18 students) Certificate of the year. Additional expendable laboratory and office supplies were purchased. A recruiting effort also was undertaken to recruit and admit new Orthotics (15 students) and new Prosthetics (15 students) Certificate students who will begin their respective program in January 2008.

The CSUDH O&P Program contacted Mr. Peter Harsch, CP and Commander Kathy Goldberg, RPT at the Naval Medical Center San Diego, in order to offer support of the returning amputee veterans from Iraq and Afghanistan. Our program hosted visits by Mr. Harsch (Balboa Naval Hospital – Chief Prosthetist) with eleven of the wounded veterans to our site in July 2007. Several of the wounded soldiers have an interest in pursuing O&P as a career, and received career counseling on how to enter this field. We also are in discussions to place some of our prosthetic students into clinical rotations (approximately 60 miles from our location) at the NMCSD O&P and Physical Therapy Service in 2008.

During Year 2, Kate Muller and Scott Hornbeak started the process of identifying the specific skills and knowledge expected as outcomes in our Orthotic and Prosthetic Programs. We developed a matrix by utilizing the American Board for Certification *Domains of the Practice Analysis of the Disciplines of Orthotics and Prosthetics*, which identifies key areas of practice (Domains), and cross references them to cognitive, psychomotor, and afferent behaviors expected in an Orthotic and Prosthetic graduate.

It has become apparent that two types of matrices will be developed to address the Program Evaluation that is the goal of this project; first we will develop a matrix on skills and knowledge cross referenced to the specific Domains, which states the **content or "What"** of our program teaching efforts. Second, we will develop a matrix of "H**ow"** the skills and knowledge are measured in our expanded O&P program, utilizing the tools developed during this program expansion.

A result of Year 2 efforts, the draft of the program content or **"What We Assess"** Assessment matrix, which sorts skills and knowledge into cognitive, psychomotor, and afferent categories is attached. We will follow this format with a finalized version, and create the **"How"** the skills and knowledge are measured (matrix) using our newly developed outcome assessment tools. Completing these outcome matrices and reporting the results of these finding to other O&P education programs and the Department of Defense is the major goal for Year 3.

Orthotics Certificate Progress: In January 2007, we started our second cohort of Orthotic students in the newly remodeled Orthotics Laboratory, consisting of 17 training stations, new tools, power machinery, and a new LCD projection system.

The following courses were successfully completed in the Orthotic Certificate program, ending August 1, 2007:

HEA 345	Biomechanics for Orthotics and Prosthetics
HEA 355	Material Science and Applied Anatomy for O&P
HEA 335	Practice Management for O&P
HEA 440	Upper Extemity Orthotics
HEA 344	Spinal Orthotics I

HEA 444	Spinal Orthotics II
HEA 317	Pathophysiology for O&P (in progress)
HEA 342	Lower Limb Orthotics I
HEA 492	Research and Seminar in O&P
HEA 250	Normal and Pathological Gait-Orthotics
HSC 498	Directed Research in O&P (manufacturer's presentations/visits)

Prosthetic Certificate Progress: We can now accommodate up to 18 students in our Prosthetics Certificate Program, which also began in January, 2007. We heavily used the new gait training area built completed in 2006 for patient evaluation and gait observation.

The following courses were successfully completed in the Prosthetics Certificate through August 1, 2007, and a repeat (Fall-Winter) of these courses is currently underway, with anticipated completion of the current students by February 2008.

HEA 345	Biomechanics for Orthotics and Prosthetics
HEA 355	Material Science and Applied Anatomy for O&P
HEA 335	Practice Management for O&P
HEA 350	Below Knee Prosthetics I
HEA 352	Below Knee Prosthetics II
HEA 354	Above Knee Prosthetics I
HEA 452	Above Knee Proshetics II
HEA 450	Upper Extremity Prosthetics (in progress)
HEA 492	Research and Seminar in O&P (in progress)
HEA 250	Normal and Pathological Gait - Prosthetics
HSC 498	Directed Research in O&P (manufacturer's presentations/visits)

In summary, program expansion and changes have been implemented in year 1, followed by a focus in year 2 on program assessment and development of outcome assessment tools in the expanded program.

Table 1. summarizes the objectives in the Statement of Work, the anticipated Timeline during the 3 year project, and the Accomplishments for Year 1.

TABLE 1. ACCOMPLISHMENT OF OBJECTIVES IN STATEMENT OF WORK

Objectives/Tasks	**Timeline**	**11/15/06 – 11/14/07**
Task 1. To increase the training capacity of a university based Orthotics and Prosthetics practitioner training program from 28 students to 48 students per year.	Month 1-36	16 students completed Orthotics; 33 students completed Prosthetics during 2007. (49 total)
1.a. Recruit and hire lead Orthotics instructor.	Months 1-3	Kate Muller, CPO, actively teaches/leads Orthotics Certificate
1.b. rewrite existing orthotics curriculum to meet outcomes based evaluation standards mandated by National Commission on Orthotics and Prosthetics Education (NCOPE)	Months 1-3	Orthotics curriculum updated. Curriculum submitted to NCOPE in May 2006.
1.c. Design and install new Orthotics teaching laboratory.	Month 1-6	Completed.
1.d. Purchase equipment for Orthotics teaching laboratory.	Month 1- 6	Completed.
1.e. Recruit and select first Orthotics certificate class.	Months 1-6	Completed

1.f. Purchase expendable supplies for orthotics and prosthetics expansion.	Months 1-12	Approximately 92% of expendable supplies have been purchased.
1.g. Add 4 prosthetic students per year.	Months 1- 12	Completed
1.h. Teach 32 prosthetic certificate students per year; And 16 orthotic certificate students per year.	Months 13-36	Program met capacity of 32 Prosthetic And 16 Orthotic students in Jan. 2007
Task 2. To perform program evaluation on the effects of increasing program capacity from 28 graduates to 48 graduates per year.	Months 1-36	Program has expanded from 28 graduates to 48 graduates. Program Evaluation of inputs has started.
Objectives/Tasks	**Timeline**	**11/15/05 – 11/14/06**
2.a. Assess changes in program inputs; faculty, staff, facilities, equipment, expendable supplies, and budget.	Months 1-12	Paul Kanzawa, CO hired part time. Glenn Ham-Rosebrock, CO hired. Mar Muller, CPO, hired. Hornbeak and Ramirez contribute 20% time each to Orthotics Program.
2.b Assess changes in activities and processes; teaching methods, patient models, curriculum changes, student-teacher ratios, advising, and placement. (Months 7-36)	Months 7-36	Practice Management, Anatomy, Materials Science, Gait, Biomechanics and Research have doubled in capacity Orthotic patient models (with polio) now utilized in Lower Extremity Orthotics I&II. Student-teacher ratios have increased to 16 per 2.5 teachers In all (P) and (O)laboratory courses. Placement into Residency is 100%.
2.c. Assess changes in program outputs; number of people taught, number of graduates, and estimates of orthopedic clients affected.	Months 13-36	Expanded from 28 graduates in 2005 to 48 graduates in 2007. (71% increase meets objective).
2.d. Assess student outcomes: 1. Knowledge (congnitive) and Skills (psychomotor) 2. Behavior (afferent). 3. Values	 Months 7-36 Months 13-36 Months 23-36	Normal cognitive and psychomotor testing and rubrics in place; new Practical exams in each clinical course written. New Professional Behavior Rubric is being piloted.
2.e Assess outcome targets and indicators; percent who graduate, percent who achieve "B" or above in cognitive and psychomotor domains; percent who achieve 80% or above in professional behavior, percent who achieve 80% or above on demonstrated core values, percent placed in Residency, and percent who pass ABC certification.	Months 24-36	98% of accepted students in O or P Certificates graduated. All scored at "B" or better in cognitive and psychomotor domains. Students scorin above 80% on Professional behavior as measured in Critiques and Patient Surveys. 100% placed in Residency or returning to school for other discipline. Nothing to report on ABC exams.
Task 3. To write, review, and present Program Evaluation to stakeholders. (Months 24-36)	Months 24-36	Year 2 Quarterly and Annual reports completed and submitted to TATRC.

Additional Accomplishments:

1. The O&P Program reached a full capacity to teach 48 students per year, who are fully prepared to enter Residency practitioner positions anywhere in the United States.

2. A new Plaster Room was planned, built, and 48 students utilized it to make both Orthotic and Prosthetic Programs more efficient in 2007. 9 students were recruited and took the first Certificate at least 6 months ahead of schedule.

3. Since October 2006, both the Orthotic and Prosthetic Certificate programs have held full accreditation status from the Commission on Accreditation of Allied Healthcare Educational Programs (CAAHEP). This nationally recognized CAAHEP accreditation is a powerful form of external validation of program quality, which is only achieved through diligent program assessment and a commitment to continuous improvement.

KEY RESEARCH ACCOMPLISHMENTS:

- New Orthotics Laboratory, O&P classroom, and Gait room completed.
- New faculty recruited to teach Orthotics and Prosthetic Programs; Mark Muller, CPO, and Paul Kanzawa, CO.
- New Orthotics curriculum developed and taught 2 times.
- Expendable supplies for O&P instruction ordered.
- 16 students recruited into second Orthotics Certificate; Prosthetic Certificate expanded to 16 students and offered 2 times in 2007.
- All Midterm and Final Examinations in (O) and (P) rewritten (Cognitive assessment).
- Development of "Check-out" Sheets for all major projects in Orthotics and Prosthetics (Psychomotor assessment).
- Development of new Professional Assessment Rubric for patient presentation (Afferent assessment)
- New Practical Exams written and instituted in each clinical (O) and (P) clinical course.
- Student Exit Survey on effectiveness of Certificate content developed in both O&P.
- Patient Model Survey developed for patient models to assess professional behavior of students.
- Assessment Matrix developed to reference Domains and required skills and knowledge required of an Orthotic or Prosthetic Practitioner across Cognitive, Pychomotor, and Afferent categories.

REPORTABLE OUTCOMES:

The purpose of this project is to assess the changes in program inputs, activities and processes, and outputs when an Orthotic and Prosthetic Practitioner training program grows from 28 to 48 graduates per year. Most of Year 1 activities focused on expanding the program. But a key aspect of this program evaluation is the development of assessment tools that report student outcomes in Cognitive, Psychomotor, and Behavioral domains. California State University Dominguez Hills anticipates sharing these tools with other Orthotic and Prosthetic Education Programs via presentations at conferences and in written manuscripts. We anticipate presenting the assessment tools to the other O&P educational institutions after the outcome tools are used and improved during Year 2 and 3 of the project.

The following are reportable outcomes in Year 2 of this project:

Appendix I: GANNT Chart – Accomplishment of Objectives.

Appendix II: Pictures of New Orthotics Laboratory, New Gait Room, Expanded Prosthetics Laboratory and 31 Spring 2007 graduates and 18 Fall 2007 graduates. Pictures of Wounded Warriors visit to O&P Program in July 2007. (Location at host building Ossur North America in Aliso Viejo, CA.)

Appendix III: N/A

Appendix IV: Sample of new Biomechanics Syllabus.

Appendix V: Sample of new Biomechanics Final Examination. raft of new Assessment Matrix: "What We Assess" Matrix for O&P

Appendix VI: Samples of Teacher Effectiveness Surveys given at close of each course.

Appendix VII: Sample Student Exit Survey given at close of Certificate Program.

Appendix VIII: Sample of scoring Rubric for Professional Behavior in presentation to peers. Sample of Rubric for Transtibial Fabrication and Critique.

Appendix IX: "What We Assess" Matrix sorted by Cognitive, Pychomotor, and Afferent Domains.

Appendix X: Evidence of Accreditation; CAAHEP Accreditation of Orthotic and Prosthetic Certificate Education Programs.

CONCLUSION:

There are not enough qualified Prosthetic and Orthotic practitioners to provide services needed by thousands of military amputees, U.S. Veterans, and other Americans living with disabilities. With Department of Defense funding (2005-2008) the California State University Dominguez Hills has significantly increase enrollment in its Prosthetic and Orthotic programs. While only nine institutions nationwide currently offer O&P education, the demand for provider services is expected to increase by 25% for orthotic care and 47% for prosthetic care by 2020 (Nielson, 2000). The Department of Defense and the Veterans Administration will directly benefit from greater numbers of qualified prosthetic and orthotic practitioners who work at regional Army and Veterans Administration practices or in private practices that serve Veterans. Currently, there is an average of 200 graduates per year in all O&P practitioner programs in the United States. This project has added 20 graduates per year to this pool, therefore expanding practitioner output by a full 10%.

During Year 2 of this project, several Outcome Assessment Tools were either developed or revised to help assess the students' learning in the cognitive, psychomotor, and behavioral domains. The tools developed include Written Examinations, Practical Examinations, Check-out sheets, end of Certificate Student Surveys, Group Focus Meetings, and Patient Model Surveys, and Professional Behavior Rubrics. These tools are important new tools that will be shared with other Orthotic and Prosthetic Education programs nationwide. During Year 2 the CSUDH O&P Program also implemented the use of its university Blackboard software, which is an internet access software program where students may view syllabi, course lecture notes, Power Point presentations, drawings, and the like. With

Blackboard access, we have been able to assign Power Point lectures and films ahead of time, so that a student is fully prepared for live lecture when they arrive in class. Also, the provision of quizzes, term tests, and grading has been improved by the use of Blackboard. In particular, a student is able to access their score on a particular assignment or test and learn where they could improve from the privacy of their home.

SO WHAT?

This modest investment of approximately $500,000 has expanded the number of Orthotic and Prosthetic graduates (by 10%) available to serve military amputees, older U.S. Veterans, and other Americans living with disabilities. If distance learning strategies are implemented in the future, even greater numbers of practitioner graduates are feasible. With the new Outcome Assessment Tools developed at CSUDH, other O&P schools should be able to more easily assess their students. These outcome assessment tools are useful in programs that train higher numbers of practitioners, in comparison with the older style programs that train only 12-14 students per year in laboratory intensive settings.

REFERENCES:

Program Evaluation:

Davidson, Jane E., *"Evaluation Methodology Basics"*, 2005.

Fink, Arlene, *"Evaluation Fundamentals; Insights into the Outcomes, Effectiveness, and Quality of Health Programs"*, (2nd Ed.), 2005.

MacNamara, Carter, *"Basic Guide to Outcomes-Based Evaluation for Nonprofit Institutions with very limited Resources"*, Available online: http://www.mapnp.org/library/evaluatn/outcomes.htm

MacNamara, Carter, *"Basic Guide to Program Evaluation"*, Available online: http://www.mapnp.org/library/evaluatn/fnl_eval.htm#anchor1586742

Patton, Michael Quinn, *"Utilization Focused Evaluation"*, (3rd Ed.), 2005.

Outcomes Assessment:

Anderson, Lorin W., and Krathwohl, David R., "*A Taxonomy for Learning, Teaching, and Assessing, A Revision of Bloom's Taxonomy of Educational Objectives*", 2001.

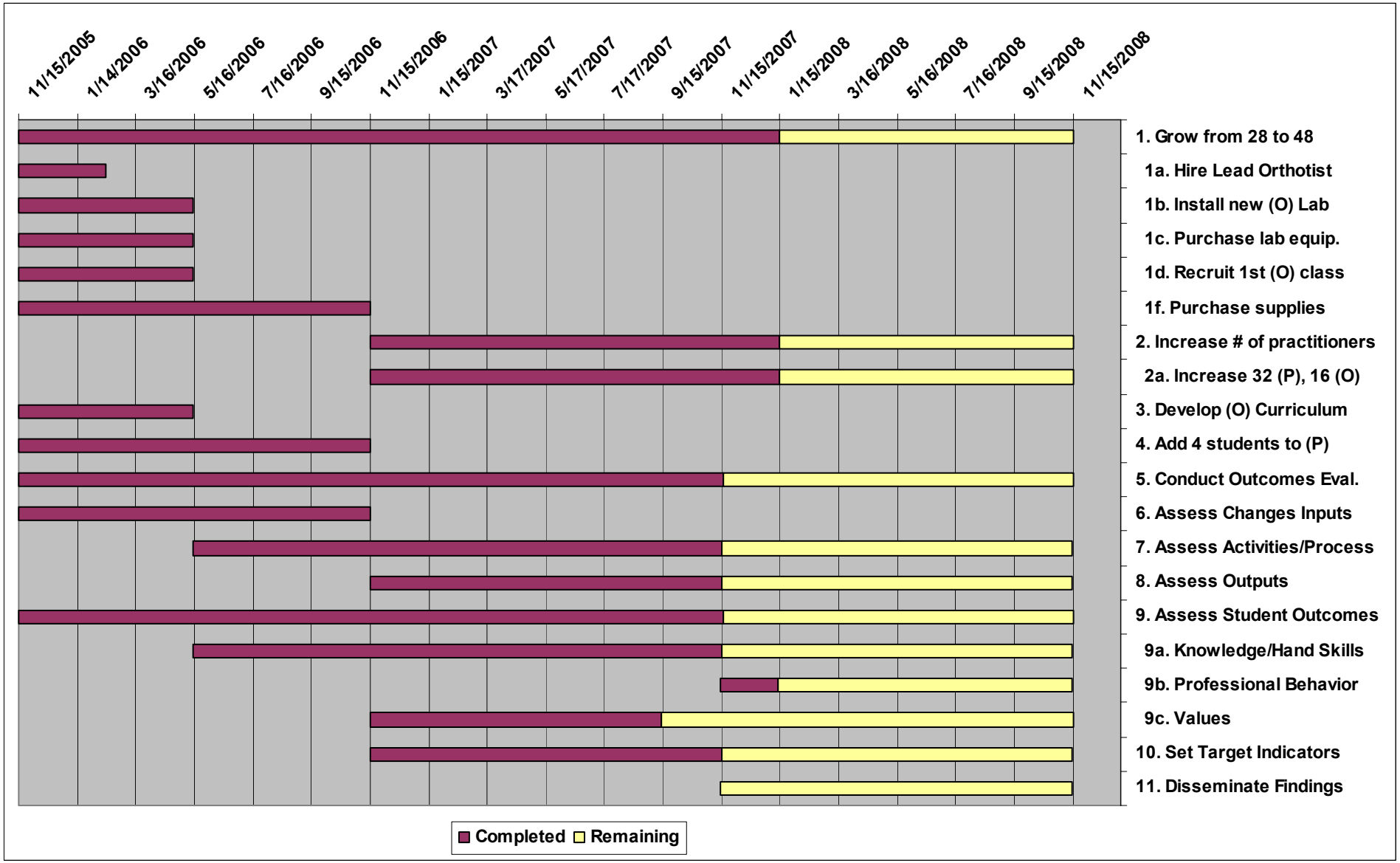
Kane, Robert L., MD, "*Understanding Health Care Outcomes Research*", 2004.

Marzano, Robert J., ET. Al, "*Assessing Student Outcomes*", 1993.

Nolan, Marie T., Mock, Victoria, "*Measuring Patient Outcomes*", 2000.

Palomba, Catherine A., Banta, Trudy W., "*Assessing Student Competence in Accredited Disciplines*", 2001.

APPENDIX I.
GANNT Chart: Accomplishment of Objectives



APPENDIX II.

Photographs of Orthotics Laboratory, Prosthetics Laboratory, new Gait Room, Wounded Warriors visit, and (49) Spring, Summer, and Fall 2007 graduates.

New Orthotics Laboratory

Expanded Prosthetics Laboratory

New Gait Room

Revised Gait Courses

Wounded Warriors Visit from
Balboa Naval Hospital, San Diego

Wounded Iraq Veterans – July, 2007

CSUDH Produces
31 Graduates: Spring-Summer, 2007

Prosthetics Certificate Class – Spring 2007

Orthotics Certificate Class – Spring 2007

CSUDH Produces
18 Graduates: Fall 2007

Prosthetic Certificate Class – Fall 2007

APPENDIX IV.

Sample of New Biomechanics Syllabus

HEA 345-Kinesiology & Biomechanics of Orthotics and Prosthetics

Course Description: Normal and pathological motion as it applies to the theory of Prosthetic and Orthotic application will be discussed and examined. Primary areas of study will include applied anatomy, anthropometry, kinematics, and kinetics, gait, force vectors and component design. The course is structured to create solutions for real world clinical situations with emphasis on the interpretations of the results.

Unit value: 2

Pre- and/or Co-requisites: College algebra, physics, and anatomy

Course Instructor:

- Mark Muller, CPO Clinical Instructor
  mmuller@csudh.edu
  CHHS California State University Dominguez Hills
  27402 Aliso Viejo Pkwy
  Aliso Viejo, CA 92656
  (949) 643 5374 ext 205
  (949) 643 5337 fax

- Scott Hornbeak, CPO, FAAOP, Director, Clinical Instructor
  shornbeak@csudh.edu
  CHHS California State University Dominguez Hills
  27402 Aliso Viejo Pkwy
  Aliso Viejo, CA 92656
  (949) 643 5374 ext 206
  (949) 643 5337 fax

Office Hours: Immediately after class or by an appointment. Weekly discussion time on Blackboard from 8:00 pm to 9:00 pm Tuesdays.

Course Objectives/Learning Outcomes: Upon completion of this course, the student will be able to:

- Introduction and understanding on normal human locomotion and determinants of gait
- Define and appropriately use anatomical, directional and movement terminology.
- Demonstrate the ability to locate palpable anatomic landmarks.
- Demonstrate the ability to complete a full Range of Motion and Manual Muscle Test on an individual.
- Demonstrate the ability to identify and correct gait deviations in Prosthetics and/or Orthotics
- Understand statics and dynamics and identify internal and external forces associated with such problems.
- Set-up and solve quantitative kinetics problems, specifically force vector acting on human body
- Understand the center of gravity and know how to locate the center of gravity on human body.
- Understand the lever system and torque that causes the angular motion of the lever system

Required Text, Readings and Materials:

Smith, L.K., Weiss, E.L., & Lehmkuhl, L.D. (1996). **Brunnstrom's Clinical Kinesiology (5th Ed.)**. Philadelphia: F.A. Davis.

Smith, **Atlas of Amputations and Limb Deficiencies (3rd Ed.)** American Academy of Orthopedic Surgeons, Rosemont, IL, 2004

Daniels, **Muscle Testing Techniques of Manual Examination (7th Ed.),** Suanders, Philadelphia, 2004

Recommended Text and Readings:

Blandine Calais-Germain**.** ***Anatomy of Movement*****,** Eastland Press, Seattle, 1993

Clinical Aspects of Lower Limb Prosthetics, CAPO, Elgan, Ontario, Canada, 1991

Bowker, **Biomechanical Basis of Orthotic Management**, Butterworth, Oxford, England, 1993

Additional Requirements: Calculator; Access to Excel and Power Point.

Course Materials: The course syllabus, PP lecture presentation, and assignments are posted on the Blackboard of CSUDH website. You are encouraged to use this tool in facilitating your learning.

Websites: CSUDH.edu / Blackboard

Course Evaluation Strategies:

A minimum of C (≥72%) letter grade is required to pass this course.

- ***Expectations:*** You are expected to read the material and complete assignment prior to the class meeting. Two-hour homework is expected after each lecture.
- ***Due Dates/Make Up Policy:*** Assignments are due at the beginning of class on the published date. Points will be deducted for a late work. No more than 50% of the original points will be earned for work submitted late. **A work submitted late more than one week will be not accepted.**

Grading:

Four Assignments:	40%
Mid Term Exam:	20%
Final Exam	40%

Overall average

93-100	A
90-92.9	A-
87-89.9	B+
83-86.9	B
80-82.9	B-
77-77.9	C+
73-76.9	C
70-72.9	F

Description of Assignments:

Assignment 1:	Review of Math and Vector Calculation
Assignment 2:	Measurement of ROM and Joint movements.
Assignment 3:	Manual Muscle testing & Description of Human Motion and Terminology.
Assignment 4:	Center of Gravity, Force and Torque calculations.

Attendance Policy:
You are expected to attend all classes and be present for the entire time. If you will be absent you must let the instructor know prior to your absence. Please turn off all pagers and cell phones during class.

Academic Integrity:
All instances of cheating, plagiarism, copyright infringement, unethical or other inappropriate behavior will be brought to the attention of the Chair or Coordinator of your program. Plagiarism is defined as the act of taking ideas, writing, etc. from another source and passing them off as one's own. Following procedures consonant with due process pursuant to the State Administrative Code, A student may be expelled, suspended, placed on probation or given a lesser sanction (refer to your CSUDH *University Catalog*). Students may be required to submit their papers to www.turnin.com for analysis and evaluation of their original content.

Students with Disabilities:

Students with disabilities should contact the University Disabled Students Office for information regarding special accommodations at www.csudh.edu/dss/main.html.

Course Schedule Outline/Due Dates:

Date	Lecture Topic	Readings	Assignments Due:
08/16/07	Introduction to Normal Gait	Manual Intro Gait Atlas Sec 111, chapt 29, Perry, Normal Gait, Pg 353 -366	
08/24/07 *bring shorts**	Course Intro, terminology description of fundamental human motion. Palpation of human landmarks	Manual Biom #1 Lec Anatomy of Movement pg 1 -30, 98-98,176-177	
08/29/07	Normal Human Locomotion and 6 Determinants of Gait	Perry, Normal Gait, Pg 353 -366	
08/31/07 *bring shorts**	Joints, Levers, and Lab: ROM for lower and upper extremity. Types of motion, measurement of ROM, and Arthrokinematics, Levers	Manual: Biom #2 Lec Brunnstrom Chapter 1 Pg 1 -18	
09/04/07	Force convention, Newton's laws of motion, and lever systems	Manual: Biom #3 Lec Brunsstrom Chapt. 2 pg 20 – 34	Assignment 1 *Math review*
09/07/07 *bring shorts**	Manual Muscle Testing	Manual: Biom #4 Lec Daniels, Muscle Testing Techniques Pg 1 -11, 61 - 140, 179 - 240	Assignment 2 *R.O.M & joints*
09/11/07 **Mid term Exam** *R.O.M., MMT planes, joints*	Torque, composition and resolution of forces, calculation of muscle and joint forces	Manual: Biom #5 Lec Brunsstrom Chapt. 2 pg 35 – 68	Assignment 3 *M.M.T, motion & terms*
09/19/07 **Final Exam (Take Home)**	Application of orthotics and prosthetics component design, and Trans Tibial Biomechanics	Manual: Biom #6 Lec CAPO pg 59 -68 Bowkers Chapt 2 & 3	Assignment 4
09/25/07	**Final Exam (Take Home) Due**		

Other Biomechanics Lectures given in Prosthetics			
	Partial Foot Biomechanics	Symes notebook: CAPO pg 201-208	
	Symes Biomechanics and Rx	Symes notebook: Radcliff pg 76 -85 CAPO pg 175 178	
	TT Gait Deviations and Biomechanics	BKII Reader: CSUDH Gait Sheets	
	Hip Flexion and adduction TF	AK Notebook: UCLA "Hip flex Analysis" pg 1-5	
	TF Gait Deviations and Biomechanics	AK Reader: CSUDH Gait Sheets	
	TF Biomechanics frontal plane	AK Notebook: Anderson pg 129-146	
	TF Zone of Stability	AK Notebook: Knud Jansen Lec pg 146-160	
	Hip and Bilateral Biomechanics Trans Femoral Exam	-AK II Notebook: Radcliff pg 29-38 -Atlas Chapt 49	
	Upper Ext Biomechanics	Upper Reader: Atlas chap 8 Taylor JPO p 7-28 Taylor Chap 7 pg 169-221 Basic Biomechanics pg 1-5 Harness Biomechanics pg 1-18 UEP Biomechanics pg 1-8	
	Shoulder Disartic Biomechanics	Atlas Chap 21	

APPENDIX V.

Sample of Final Examination - Biomechanics

CALIFORNIA STATE UNIVERSITY DOMINGUEZ HILLS
College of Health and Human Services
HEA 345 – Kinesiology and Biomechanics of Orthotics and Prosthetics

Final Exam 41 pts

Name_____ Date_____

---

1) How would test for a grade 2 Hip Flexor? _____
   A) Sitting up with leg off the table
   B) Side lying supporting leg at thigh and knee
   C) Side lying supporting contra-lateral leg
   D) Prone

2) What is the difference between Passive ROM and Active ROM?
   A) Active ROM is the ability of the tester to range the joint
   B) Active ROM is done with gravity minimized
   C) Active ROM is the ability of the patient to range the joint
   D) Active ROM is done against gravity with a full ROM

3) What is the definition of a Grade 3, Manual Muscle Test (MMT)?
   A) Good, Full ROM, against gravity, maximal effort to break hold
   B) Fair, Full ROM, against gravity, maximal effort to break hold
   C) Fair, Full ROM, against gravity, minimal effort to break hold
   D) Poor, Full ROM, gravity minimized

4) What is the normal ROM of Flexion for the Knee joint?
   A) 0° to 160°
   B) 0° to 90°
   C) 0° to 180°
   D) -20° to 90°

5) Arm abduction occurs in the _____ plane and about the _____ axis
   A) Sagital : Sagital
   B) Transverse : Sagital
   C) Coronal : Coronal
   D) Coronal : Sagital

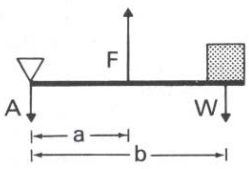
6) The thigh moves in the _____ plane during hip flexion and extension
   A) Sagital
   B) Frontal
   C) Coronal

D) Transverse

7) The study of the causes of a motion is defined as _____ _.
   A) Kinetics
   B) Kinematics
   C) Inertia
   D) Statics

8) _____ is known as a study in the description of motion in terms of displacement, velocity and acceleration
   A) Kinetics
   B) Kinematics
   C) Inertia
   D) Statics

9) The lever shown is a _____ lever. An example would be :
   A) First Class : A door hinge
   B) Second Class : A See-Saw
   C) Third Class : Holding a weight supported by the Bicep Brachii
   D) First Class : Holding a weight supported by the Bicep Brachii



10) The Study of bodies in equilibrium, resting with the sum of all the forces acting upon it is zero is know as:
   A) Statics
   B) Dynamics
   C) Inertia
   D) Segmental Method

11) The Study of moving bodies and forces that change in motion:
   A) Statics
   B) Dynamics
   C) Inertia
   D) Segmental Method

12) In a Closed Kinematic Chain
   A) Distal segments move & proximal parts are fixed
   B) Distal segments are fixed & proximal parts are fixed
   C) Distal segments are fixed & proximal parts move
   D) Distal segments move & proximal parts move

13) While performing a Range of Motion exam, if the resistance for further moving one segment limited by bone on bone contact it would be classified as
   A) Hard
   B) Firm
   C) Soft
   D) Regular

14) A Thomas Test measures
    A) Hip Extension Contracture
    B) Hip Flexor muscle strength
    C) Hip Extensor muscle strength
    D) Hip Flexion contracture

15) Concentric muscle contracture produces a _____ contraction while Eccentric muscle contracture produce a _____ contraction
    A) Shortening : Lengthening
    B) Lengthening : Shortening
    C) Antagonist : Synergist
    D) Isotonic : Isometric

16) An Eccentric Contracture decelerates the body segment, provide shock absorption
    A) True
    B) False

17) In MMT Break test is Examiner attempt to break the muscle hold with resistance applied at end range or completion of movement in line of pull.
    A) True
    B) False

18) In a lever, the Mechanical Efficiency (ME) is equal to the Effort Force (EF) divided by the Resistive Force (RF). The higher the number the _____ resulting in _____ energy consumption
    A) Lower the ME, Lower
    B) Lower the ME, Higher
    C) Greater the ME. Higher
    D) Greater the ME, Lower

19) Ground Reaction Force anterior to the joint in the lower limb will?
    A) Ext Knee, Dorsiflex Ankle, Flex Hip
    B) Ext Knee, Plantarflex Ankle, Flex Hip
    C) Flex Knee, Dorsiflex Ankle, Extend Hip
    D) Flex Knee, Dorsiflex Ankle, Flex Hip

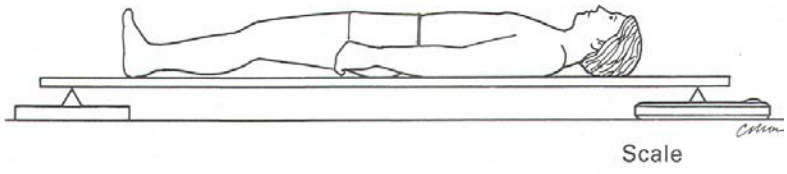
20) A Force acting on a joint multiplied by the perpendicular distance away from that just will produce all of the following except
    A) Torque
    B) Moment
    C) Rotation
    D) Inertia

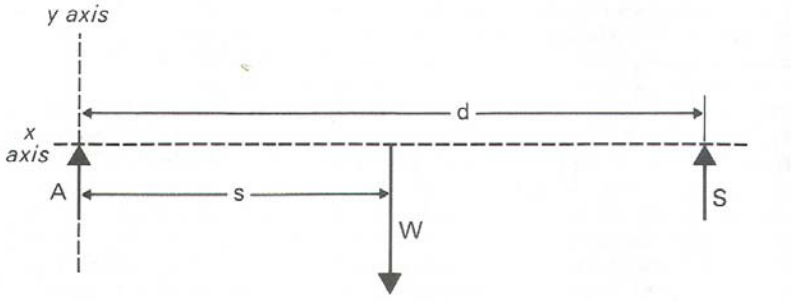
21) Degree of stability an object depends on
   A) Size and shape of the base
   B) The line of the C.G. to the base
   C) The height of the C.G.
   D) The weight of the body
   E) All of the above

22) The biomechanics of a Total Contact will produce all of the following except:
   A) Better venous return
   B) Helps to prevent edema
   C) Increased area for specific weight bearing
   D) Better load distribution
   E) Better sensory feedback

23) One of the best ways to distribution a load and reduce focused forces in a prosthetic socket is to distribute the Force over a larger Area.
   A) True
   B) False

24) Please find the distance of the Center of Gravity from the Y axis (s) using Newton's Law of static equilibrium. 2 pts





Cover in Student Copy

A = axis
W = body weight (150 lbs.)
S = scale reading (80 lbs.)
d = distance between supports (76 in.)
s = distance of center of gravity from axis

$$\Sigma\tau = 0$$
$$+Ws - Sd = 0$$
$$s = \frac{Sd}{W}$$
$$s = \frac{80 \text{ lbs.} \times 76 \text{ in}}{150 \text{ lbs.}}$$
$$s = 40.5 \text{ in.}$$

25) For the Free Body Diagram of Initial Contact, please compute:

a) The resultant force from the X and Y forces given — 2 pts

b) The direction and magnitude of the Ground Reaction Force. — 2 pts

c) The angle of the GRF off the Y axis, — 2 pts

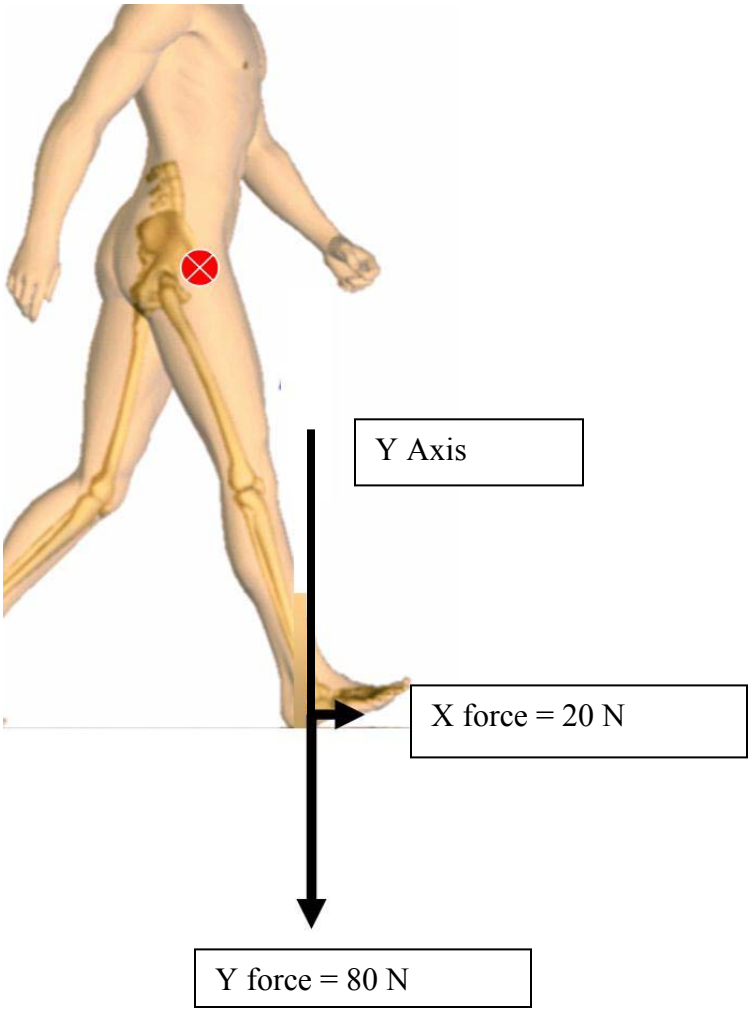
The answer can be left in a Sin θ or Cos θ

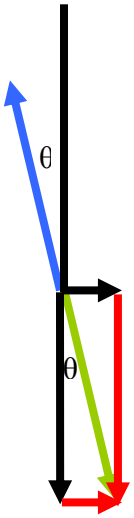
Hint: *Use the Law of Right Triangles*

The Drawing is to Scale

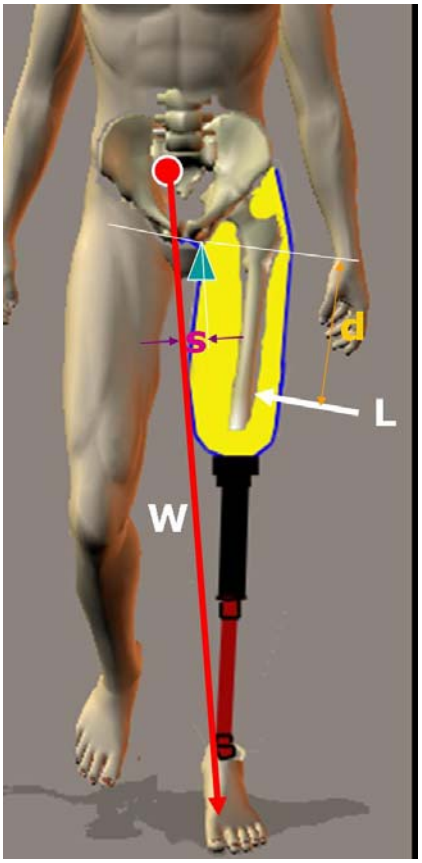
Value = $\sqrt{20^2 + 80^2} = 82.46$,

Sin θ = Opp/ Hyp = 20 / 82.46 = .242 , θ = 14.03 °





***Prosthetist Please Answer #26) & #27) only.
***Orthotist Complete to #28 - #32 only



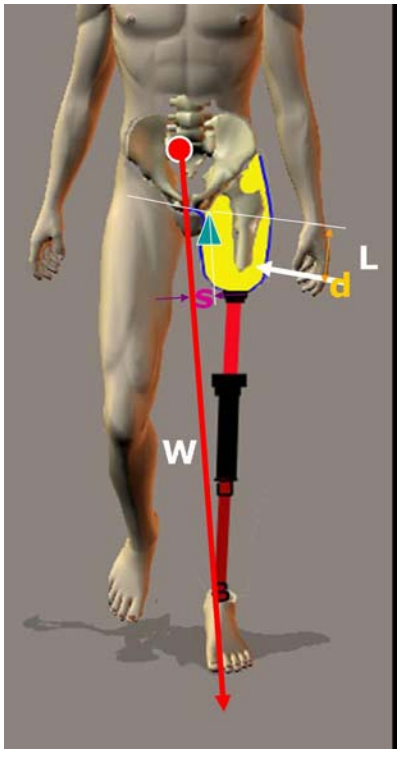
26) In this socket design the lateral femur is not well supported and all of the pressure is loaded on the distal tip of the femur at point L. Solve for L using the Law of Equilibrium
Show all equations **3 pts**

Weight (W) 250 lbs
Distance to Axis (s)= 3”
Distance to L (d) = 10”
L = ?

∑T=0 = -Ws + Ld
L = Ws / d
L = 75 lbs,

b)If the socket were now redesigned so that the load on the femur is spread throughout the entire lateral shaft what would the force per square inch be? **2 pts**

75 lbs / 10” = per square inch = 7.5 lbs



27) Now the femur is shorter. (d) = 5”. Please compute the new load on L? **5 pts**

Weight (W) 250 lbs
Distance to Axis (s)= 3”
Distance to L (d) = 5”
L = ?

L = Ws/d = 250 (3)/ 5 = 750 / 5
L = 150 lbs

<u>Orthotist Please Complete this section:</u>

Show All Work on answer sheet…….

Given: (W) weight = 200 lbs
(s) distance from KC to weight line =1”
d1 = 10 in
d2 = 10 in

28) What is the biomechanical system called that this orthosis uses to control genuvarus? _____3 – point pressure system_____
29) Does F1 = F2 in the system? ____Yes_____

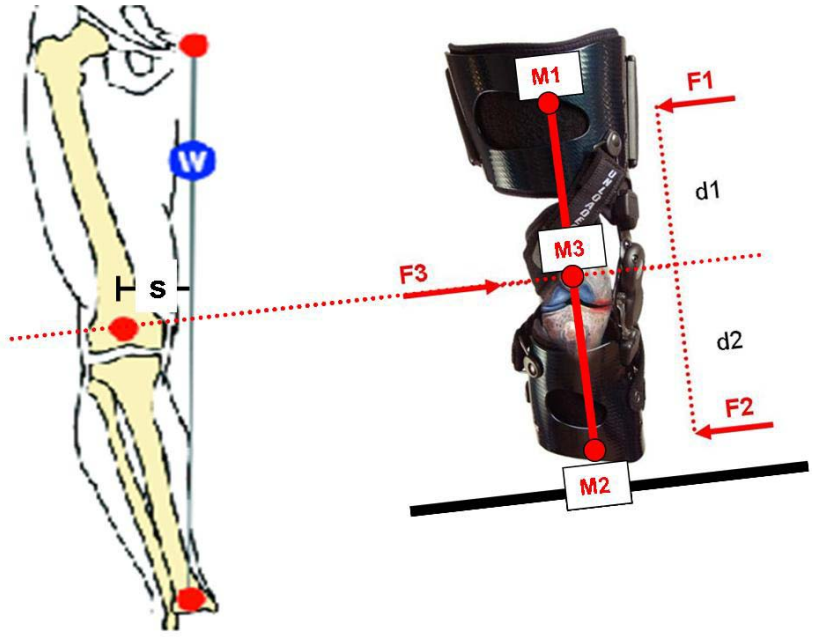
30) What would the Forces F1, F2, F3, produce from the Unloader type orthosis (Fig 2) have to be to statically hold the knee?

31) What would the Moments at M1 & M2 if the system was concentrated at the Knee Center.

32) Would there be a moment create at M3 from the orthosis? ____No_____

30) F1 = ? ___10 lbs_____
F2 = ?___10 lbs_____
F3 = ? __20 lbs_____

31) M1 = ?____100 inlbs_____
M2 = ?____100 inlbs_____

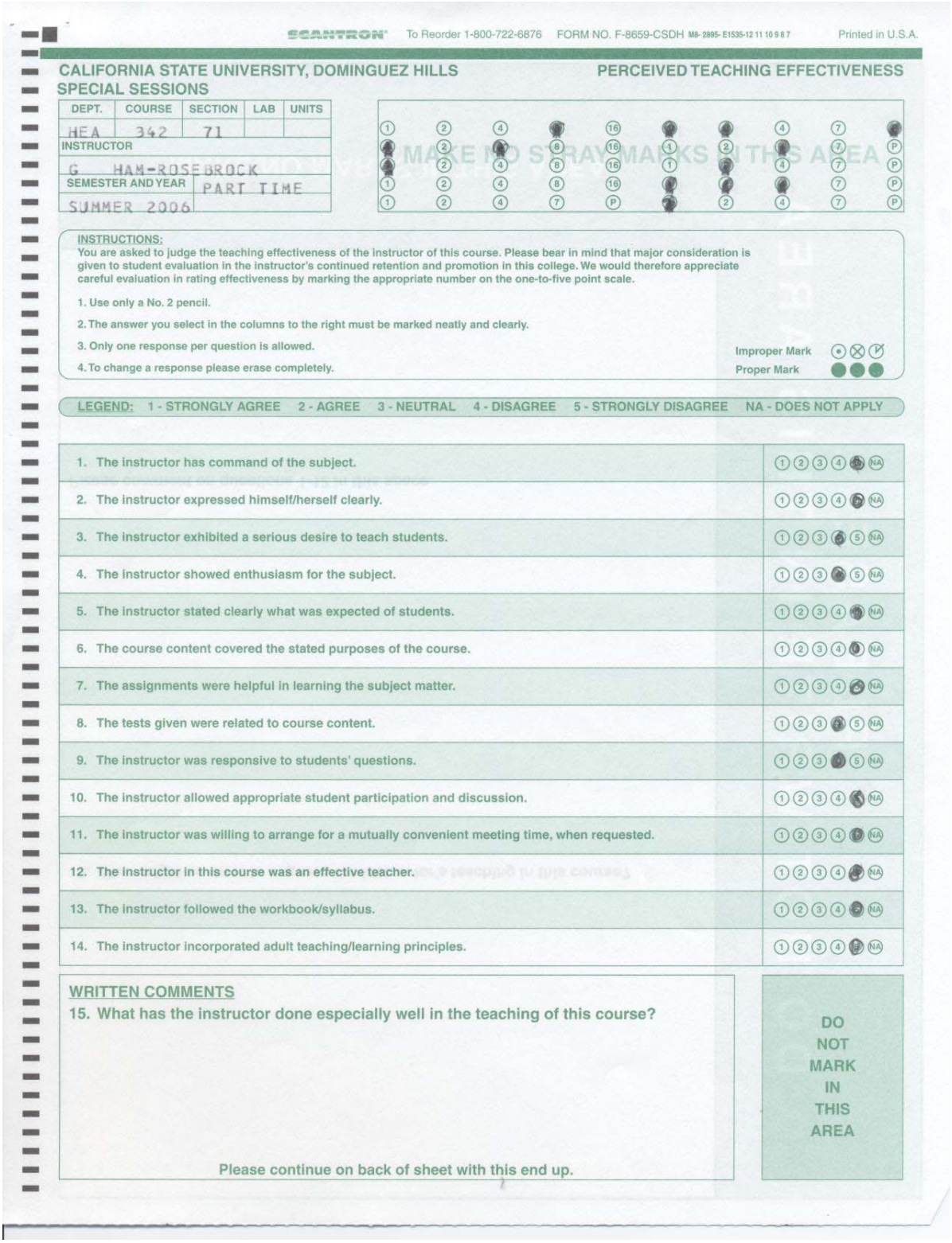


∑F = 0 = F1 + F2 – F3
F3 = F1 + F2
&
F1= F2 (3 point p.s.)
20 = 2(F1)
10 = F1

∑ M = 0 = -Ws + F1d1 + F2d2
(F1d1) + (F2d2) = Ws
(F1 x 10) + (F2 x 10) 200 x 1
10 (F1+F2) = 200
(F1+F2) = F3 =20

APPENDIX VI.

Perceived Teaching Effectiveness Forms



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CALIFORNIA STATE UNIVERSITY, DOMINGUEZ HILLS
SPECIAL SESSIONS

PERCEIVED TEACHING EFFECTIVENESS

DEPT.	COURSE	SECTION	LAB	UNITS
HEA	342	71		

INSTRUCTOR: G HAM-ROSEBROCK

SEMESTER AND YEAR: PART TIME SUMMER 2006

DO NOT MAKE ANY STRAY MARKS IN THIS AREA

INSTRUCTIONS:
You are asked to judge the teaching effectiveness of the instructor of this course. Please bear in mind that major consideration is given to student evaluation in the instructor's continued retention and promotion in this college. We would therefore appreciate careful evaluation in rating effectiveness by marking the appropriate number on the one-to-five point scale.

1. Use only a No. 2 pencil.
2. The answer you select in the columns to the right must be marked neatly and clearly.
3. Only one response per question is allowed.
4. To change a response please erase completely.

Improper Mark ⊘ ⊗ ⊘
Proper Mark ● ● ●

LEGEND: 1 - STRONGLY AGREE 2 - AGREE 3 - NEUTRAL 4 - DISAGREE 5 - STRONGLY DISAGREE NA - DOES NOT APPLY

1. The instructor has command of the subject.	1 2 3 4 5 NA
2. The instructor expressed himself/herself clearly.	1 2 3 4 5 NA
3. The instructor exhibited a serious desire to teach students.	1 2 3 4 5 NA
4. The instructor showed enthusiasm for the subject.	1 2 3 4 5 NA
5. The instructor stated clearly what was expected of students.	1 2 3 4 5 NA
6. The course content covered the stated purposes of the course.	1 2 3 4 5 NA
7. The assignments were helpful in learning the subject matter.	1 2 3 4 5 NA
8. The tests given were related to course content.	1 2 3 4 5 NA
9. The instructor was responsive to students' questions.	1 2 3 4 5 NA
10. The instructor allowed appropriate student participation and discussion.	1 2 3 4 5 NA
11. The instructor was willing to arrange for a mutually convenient meeting time, when requested.	1 2 3 4 5 NA
12. The instructor in this course was an effective teacher.	1 2 3 4 5 NA
13. The instructor followed the workbook/syllabus.	1 2 3 4 5 NA
14. The instructor incorporated adult teaching/learning principles.	1 2 3 4 5 NA

WRITTEN COMMENTS

15. What has the instructor done especially well in the teaching of this course?

Please continue on back of sheet with this end up.

DO NOT MARK IN THIS AREA

APPENDIX VII.
CSUDH ORTHOTIC CERTIFICATE GRADUATE QUESTIONNAIRE

Month & Year completed CSUDH course work: _____ Today's date: _____

Please rate the statements according to the following scale:

5=strongly agree 4=agree 3=neutral 2=disagree 1=strongly disagree NA=not applicable to my practice

The following courses and content areas were adequately covered for me to function as an **entry level resident**.

1. Upper Limb Orthotics, as a complete course:	5	4	3	2	1	N/A
Specific topics:						
- Metal systems	5	4	3	2	1	N/A
- Plastic devices	5	4	3	2	1	N/A
- Fracture Management	5	4	3	2	1	N/A
- Mobile Arm Supports	5	4	3	2	1	N/A
- Off-the-Shelf devices	5	4	3	2	1	N/A
2. Spinal Orthotics, as a complete course:	5	4	3	2	1	N/A
Specific topics:						
- Metal systems	5	4	3	2	1	N/A
- Post-op TLSO/LSO systems	5	4	3	2	1	N/A
- Cervical orthoses	5	4	3	2	1	N/A
- Scoliosis	5	4	3	2	1	N/A
- Cranial Remolding Helmets	5	4	3	2	1	N/A
- HALO systems	5	4	3	2	1	N/A
- Off-the-Shelf devices	5	4	3	2	1	N/A
3. Lower Limb Orthotics, as a complete course:	5	4	3	2	1	N/A
Specific topics:						
- Foot Orthoses	5	4	3	2	1	N/A
- UCBLs	5	4	3	2	1	N/A
- Metal AFO systems	5	4	3	2	1	N/A
- Plastic AFO systems	5	4	3	2	1	N/A
- Off-the-Shelf devices	5	4	3	2	1	N/A
- Metal KAFO systems	5	4	3	2	1	N/A
- Plastic/Hybrid systems	5	4	3	2	1	N/A
- HKAFOs and RGOs	5	4	3	2	1	N/A
- Componentry	5	4	3	2	1	N/A
<u>FORMAL INSTRUCTION</u>						
4. Materials Science	5	4	3	2	1	N/A
5. Anatomy and Physiology	5	4	3	2	1	N/A
6. Biomechanics and Kinesiology	5	4	3	2	1	N/A
7. Normal and pathological gait	5	4	3	2	1	N/A
8. Research methods	5	4	3	2	1	N/A
9. Disease entities, etiology & treatment	5	4	3	2	1	N/A
10. Diagnostic imaging	5	4	3	2	1	N/A
<u>CONTENT AREAS</u>						
11. Billing and reimbursement	5	4	3	2	1	N/A
12. Documentation	5	4	3	2	1	N/A
13. Rehabilitation team practices	5	4	3	2	1	N/A
14. Patient assessment (ROM, MMT, etc)	5	4	3	2	1	N/A
15. Patient management and education	5	4	3	2	1	N/A
16. Legal and ethical practices	5	4	3	2	1	N/A
17. Interaction with other health professionals	5	4	3	2	1	N/A

CSUDH GRADUATE QUESTIONNAIRE

1. Please comment below on any survey responses from the previous page of '2 = Disagree' or '1 = Strongly Disagree':

2. If you could make three changes to improve the quality of the CSUDH Orthotic Program, they would be:

3. In which specific areas of Orthotics were you least prepared?

4. Which content areas or topics need more time or attention in our curriculum? Was there a topic which could be removed from the curriculum?

5. Do you feel you were allowed enough time with the patient/student models in each section to maximize your learning? If not, please elaborate.

6. Do you feel the tests, quizzes, practicals and critiques were adequate in content and frequency?

APPENDIX VIII.
Rubrics for Oral Communication
and Sample Trans-tibial Checkout

ORAL PRESENTATION ASSESSMENT

HEA 440
Upper Extremity Orthotics

Name: _____ Date: _____

Project Title: _____

Patient Model: _____

	Target 10	**Acceptable 7.5**	**Emergent 5**	**Unacceptable 2.5**	**Score**
Organization	Information was organized in a logical sequence that was easy to follow throughout.	Student presented information in organized manner.	Student presented information in a random sequence that was difficult to follow.	Student presented information in an unorganized & confusing manner.	
Delivery	Student projected a professional demeanor. The delivery was well rehearsed. Important information was emphasized.	The delivery was appropriate.	The delivery was spotty with awkward moments.	Student was not prepared. The delivery was awkward throughout.	
Eye Contact	Student maintained eye contact with the audience, only occasionally refers to notes.	Student maintained eye contact most of the time but frequently returned to notes.	Student mostly read from notes. Occasional eye contact with the audience.	Student read from notes. Little to no eye contact with the audience.	
Elocation	Student used a clear voice, precise pronunciation of terms & indicated enthusiasm through verbal & nonverbal energy.	Student used a clear voice, pronounced most terms correctly & could be heard by most of the audience.	Student used a low voice, incorrectly pronounced terms & was difficult to hear during portions of the presentation.	Student mumbled, incorrectly pronounced terms & spoke to quietly for the audience to hear.	
Content Knowledge	Student demonstrated full knowledge of the information with explanations & elaborations.	Student at ease with the information but seldom elaborated.	Student uncomfortable with information & answered only rudimentary questions.	Student did not understand the information & could not answer questions.	

Comments:

Critique Form

Course: **BK** **Project:** **# 2: PTB Socket**

Student:		**Burcham, Robert**	**Forrester, Scott**	**Hendley, Elizabeth**	**Kanallakan, Tim**	**Kingsley, Aileen**	**Koch, Benjamin**	**Lee, Clifton**	**McDonald,Tony**
Impression:	Possible Pts.								
Pt. Management	1								
Pt. History	1								
Org of Impression material	1								
Measurement form complete	1								
Apply stockinet interface	1								
Landmarks:									
Patella	1								
Patella tendon	1								
Tib Tubercle	1								
Fib head	1								
Tib Shaft	1								
Negative Impression:									
Appearance	1								
Coverage	1								
AP + 3/4"	1								
ML + 1/4"	1								
Length on	1								
Modification:									
Pipe placement	1								
Relief Areas:									

Fib head	1									
Tib tubercle	1									
Patella	1									
Hamstrings	1									
Posterior shelf 3/4"	1									
Pressure Areas:										
Patella tendon	1									
Ant Compartment	1									
Medial Flare	1									
lateral Shaft Fib	1									
Popilteal	1									
Gastroc Bulge	1									
Positive Model:										
Smooth Surface Finish	1									
Smooth Contours / Anatomical	1									
Total	29	0	0	0	0	0	0	0	0	

Critique Form

Course: **BK** **Project # 2:**

Student:	**Burcham, Robert**	**Forrester, Scott**	**Hendley, Elizabeth**	**Kanallakan, Tim**	**Kingsley, Aileen**	**Koch, Benjamin**	**Lee, Clifton**	**McDonald,Tony**
Fitting: Possible pts.								

Flex to 90°	5								
Px comfortable	5								
Adequate Sock ply	5								
Lateral Trim Accptable	5								
Anterior Trim Acceptable	5								
Fit acceptable	10								
Did not hurt pt.	5								
Sub Total:	40	0	0	0	0	0	0	0	0
Alignment:									
Pelvis Level	1								
Pylon ⊥ to floor	1								
A- P Foot placement 1"	5								
M-L Foot Placement 1/2"	5								
Suspension	5								
Smooth Gait	20								
Sub Total:	37								
Cosmetics:									
Smooth edges	1								
Smooth lines	1								
Appearance	1								
Sub Total:	3	0	0	0	0	0	0	0	0
Overall:									
Presentation/demeanor:	10								
Participation:	5								
Extra:	5								
Sub Total:	20	0	0	0	0	0	0	0	0
Total:	100	0	0	0	0	0	0	0	0

APPENDIX IX: "What We Assess Matrix"
Sorted by Cognitive, Pyschomotor, and Afferent Skills and Knowledge for 3 ABC Domains

"*Domains of Practice for Certified Practitioners of Orthotics and Prosthetics*" (By ABC)	**Cognitive** (Knowledge)	**Psychomotor** (Hand Skills)	**Afferent** (Professional Behavior, Ethics, Psychosocial Awareness)
Domain 1. Patient Assessment			
1. Review patient's prescription/referral	- Knowledge of pathologies (i.e. muscular, neurological, skeletal, vascular) - Knowledge of basic pharmacology - Knowledge of medical terminology - Knowledge of referral documents - Knowledge of policies & procedures regarding privileged information. - Knowledge of roles & responsibilities associated with other healthcare professions	- Skill in interpreting referral document, e.g. prescriptions, orders - Skill in interpreting radiological images - Skill in communicating with patient/family/caregiver - Skill in managing patients relative to their diagnosis or condition	- Knowledge of policies & procedures regarding privileged information. - Knowledge of roles & responsibilities associated with other healthcare professions - Knowledge of ethical standards regarding proper patient management, including ABC Code of Profession Responsibility - Knowledge of scope of practice related to orthotic/prosthetic credentials - Knowledge of boundaries of the scope of practice (i.e. when to refer a patient to other health care providers/care givers) - Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of the psychology of the disabled - Skill in communicating with patient/family/caregiver - Skill in managing patients relative to their diagnosis or condition
2. Take comprehensive patient history: demographic characteristics, family dynamics, previous use of orthosis/prosthesis, diagnosis, work history, avocational activities, signs & symptoms, medical history (allergies, current medications), reimbursement status, patient expectations, patient compliance with ancillary care, results of diagnostic valuations.	- Knowledge of procedures to record data - Knowledge of policies & procedures regarding privileged information - Knowledge of reimbursement protocols (i.e. CMS, DMERC) - Knowledge of ethical standards regarding proper patient management, including ABC Code of Profession Responsibility - Knowledge of boundaries of the scope of practice (i.e. when to refer a patient to other health care providers/care givers) - Knowledge of the psychology of the disabled	- Skill in interpreting radiological images - Skill in communicating with patient/family/caregiver - Skill in managing patients relative to their diagnosis or condition - Skill in solving patient's problems related to ADLs - Skill in documentation	- Knowledge of policies & procedures regarding privileged information. - Knowledge of ethical standards regarding proper patient management, including ABC Code of Profession Responsibility - Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of the psychology of the disabled - Skill in managing patients relative to their diagnosis or condition - Skill in communicating with patient/family/caregiver

3. Perform a diagnosis-specific functional clinical & cognitive ability exam: MMT, ROM, Sensory testing, Joint stability, Observational gait analysis, Postural evaluation, Balance evaluation, Motor control, Cognitive ability, Skin integrity, Measurements, Diagnostic imaging	- Knowledge of musculoskeletal anatomy, including upper limb, lower limb & spinal - Knowledge of neuroanatomy & neurophysiology - Knowledge of anatomical landmarks - Knowledge of kinesiology, including upper limb, lower limb & spinal - Knowledge of normal human locomotion - Knowledge of pathological gait - Knowledge of tissue characteristics/management - Knowledge of volumetric control - Knowledge of pathologies (i.e. muscular, neurologic, skeletal, vascular) - Knowledge of basic pharmacology - Knowledge of medical terminology - Knowledge of procedures to record data - Knowledge of policies & procedures regarding privileged information. - Knowledge of universal precautions, including sterile techniques & infection control - Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of clinical examination techniques (i.e. ROM, MMT, Sensation, Proprioception) - Knowledge of measurement tools & techniques - Knowledge of orthotic/prosthetic forms (i.e. assessment, orthometry, measurement, evaluation outcomes) - Knowledge of human development & aging, ranging from pediatric to geriatric, as they relate to orthotic & prosthetic treatment - Knowledge of the psychology of the disabled	- Skill in communicating with patient/family/caregiver - Skill in performing physical examinations - Skill in identifying gross surface anatomy - Skill in interpretation of physical findings (e.g. recognizing skin pressures, dermatological conditions) - Skill in analysis of normal & pathological gait/motion - Skill in analysis of orthotic/prosthetic gait/motion - Skill in managing patients relative to their diagnosis or condition - Skill in using mechanical measuring devices - Skill in using electronic measuring devices - Skill in using computer-based measuring devices - Skill in use of safety equipment - Skill in documentation	- Knowledge of policies & procedures regarding privileged information. - Knowledge of universal precautions, including sterile techniques & infection control - Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility
4. Consult with other health care providers & caregivers about patient's condition in order to formulate a treatment plan	- Knowledge of musculoskeletal anatomy, including upper limb, lower limb & spinal - Knowledge of neuroanatomy & neurophysiology - Knowledge of anatomical landmarks - Knowledge of kinesiology, including upper limb, lower limb & spinal - Knowledge of normal human locomotion - Knowledge of gait training - Knowledge of pathological gait - Knowledge of tissue characteristics/management - Knowledge of volumetric control -Knowledge of planes of motion - Knowledge of biomechanics - Knowledge of pathologies (i.e. muscular,	- Skill in communicating with referral sources & appropriately licensed healthcare providers - Skill in managing patients relative to their diagnosis or condition - Skill in solving patient's problems related to ADLs - Skill in documentation	- Knowledge of policies & procedures regarding privileged information. - Knowledge of roles & responsibilities associated with other healthcare professions - Knowledge of ethical standards regarding proper patient management, including ABC Code of Profession Responsibility - Knowledge of scope of practice related to orthotic/prosthetic credentials - Knowledge of boundaries of the scope of practice (i.e. when to refer a patient to other health care providers/care givers)

	neurologic, skeletal, vascular) - Knowledge of basic pharmacology - Knowledge of medical terminology - Knowledge of referral documents - Knowledge of procedures to record data - Knowledge of policies & procedures regarding privileged information - Knowledge of roles & responsibilities associated with other healthcare professionals. - Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of scope of practice related to orthotic/prosthetic credentials - Knowledge of boundaries of the scope of practice (i.e. when to refer a patient to other healthcare providers/care givers) - Knowledge of orthotic/prosthetic design - Knowledge of human development & aging, ranging from pediatric to geriatric, as they relate to orthotic & prosthetic treatment - Knowledge of the psychology of the disabled		
5. Verify patient care by documenting history, ongoing care, and follow-up, using established record-keeping techniques	- Knowledge of procedures to record data - Knowledge of pathologies (i.e. muscular, neurologic, skeletal, vascular) - Knowledge of basic pharmacology - Knowledge of medical terminology - Knowledge of policies & procedures regarding privileged information - Knowledge of care & maintenance of orthoses/prostheses	- Skill in managing patients relative to their diagnosis or condition - Skill in solving patient's problems related to ADLs - Skill in interpretation of physical findings (i.e. recognizing skin pressures, dermatological conditions) - Skill in documentation	- Knowledge of policies & procedures regarding privileged information - Skill in documentation
6. Refer patient to other healthcare providers, if appropriate, for intervention beyond orthotic/prosthetic scope of practice	- Knowledge of policies and procedures regarding privileged information - Knowledge of roles and responsibilities associated with other healthcare professions - Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of scope of practice related to orthotic/prosthetic credentials - Knowledge of boundaries of the scope of practice (i.e. when to refer a patient to other health care providers/care givers)	- Skill in communicating with patient/family/caregiver - Skill in communicating with referral sources & appropriately licensed health care providers - Skill in interpretation of physical findings (i.e. recognizing skin pressures, dermatological conditions) - Skill in managing patients relative to their diagnosis or condition - Skill in solving patient's problems related to ADLs -Skill in documentation	- Knowledge of scope of practice related to orthotic/prosthetic credentials - Knowledge of boundaries of the scope of practice (i.e. when to refer a patient to other health care providers/care givers) - Skill in communicating with referral sources & appropriately licensed health care providers -Skill in documentation

Domain 2. Formulation of a Treatment Plan	**Cognitive** (Knowledge)	**Psychomotor** (Hand Skills)	**Afferent** (Professional Behavior, Ethics, Psychological awareness)
1. Evaluate findings to determine an O/P treatment plan.	- Knowledge of orthotic/prosthetic design - Knowledge of orthotic/prosthetic fitting criteria - Knowledge of musculoskeletal anatomy, including upper limb, lower limb & spinal - Knowledge of neuroanatomy & neurophysiology - Knowledge of normal human locomotion - Knowledge of pathological gait - Knowledge of planes of motion - Knowledge of biomechanics - Knowledge of pathologies (i.e. muscular, neurologic, skeletal, vascular) - Knowledge of referral documents - Knowledge of procedures to record data - Knowledge of scope of practice related to orthotic/prosthetic credentials - Knowledge of clinical examination techniques (i.e. ROM, MMT, sensation, proprioception)	- Skill in interpretation of physical findings (i.e. recognizing skin pressures, dermatological conditions) - Skill in analysis of normal & pathological gait/motion - Skill in managing patients relative to their diagnosis or condition - Skill in use of materials and components - Skill in solving patient's problems related to ADLs - Skill in documentation	
2. Formulate treatment goals & expected outcomes to reduce pain, increase comfort, provide stability, prevent deformity, address aesthetic factors, &/or promote healing to enhance function & independence.	- Knowledge of normal human locomotion - Knowledge of gait training - Knowledge of pathological gait - Knowledge of planes of motion - Knowledge of biomechanics - Knowledge of pathologies (i.e. muscular, neurologic, skeletal, vascular) -Knowledge of orthotic/prosthetic design - Knowledge of orthotic/prosthetic fitting criteria - Knowledge of orthotic/prosthetic forms (i.e. assessment, orthometry, measurement, evaluation, outcomes) - Knowledge of materials science - Knowledge of componentry - Knowledge of alignment devices and techniques - Knowledge of mechanics (i.e. levers and force systems) - Knowledge of the psychology or the disabled	- Skill in communicating with the patient/family/care giver - Skill in the analysis of normal & pathological gait/motion - Skill in analysis of orthotic/prosthetic gait/motion - Skill in managing patients relative to their diagnosis or condition - Skill in use of materials and components - Skill in aesthetic finishing - Skill in evaluating fit and function of an orthosis/prosthesis - Skill in restoring optimal fit & function of orthoses/prostheses - Skill in solving patient's problems related to ADLs - Skill in documentation	
3. Consult with physician/referral source/appropriately licensed healthcare provider to modify, if necessary, the original prescription &/or treatment plan	- Knowledge of musculoskeletal anatomy, including upper limb, lower limb & spinal - Knowledge of neuroanatomy & neurophysiology - Knowledge of anatomical landmarks - Knowledge of kinesiology, including upper limb, lower limb & spinal - Knowledge of normal human locomotion - Knowledge of gait training	- Skill in interpreting referral document (e.g. prescriptions, orders) - Skill in communicating with referral sources & appropriately licensed healthcare providers - Skill in interpretation of physical findings (i.e. recognizing skin pressures, dermatological conditions) - Skill in analysis of normal & pathological	

	- Knowledge of pathological gait - Knowledge of tissue characteristics/management - Knowledge of volumetric control -Knowledge of planes of motion - Knowledge of biomechanics - Knowledge of pathologies (i.e. muscular, neurologic, skeletal, vascular) - Knowledge of basic pharmacology - Knowledge of medical terminology - Knowledge of referral documents - Knowledge of procedures to record data - Knowledge of policies & procedures regarding privileged information - Knowledge of roles & responsibilities associated with other healthcare professionals. - Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of scope of practice related to orthotic/prosthetic credentials - Knowledge of boundaries of the scope of practice (i.e. when to refer a patient to other healthcare providers/care givers) - Knowledge of orthotic/prosthetic design - Knowledge of orthotic/prosthetic fitting criteria - Knowledge of clinical examination techniques (i.e. ROM, MMT, sensation, proprioception) - - Knowledge of materials science - Knowledge of componentry - Knowledge of alignment devices & techniques - Knowledge of mechanics (i.e. levers & force systems) - Knowledge of human development & aging, ranging from pediatric to geriatric, as they relate to orthotic & prosthetic treatment - Knowledge of the psychology of the disabled	gait/motion - Skill in analysis of orthotic/prosthetic gait/motion - Skill in managing patients relative to their diagnosis or condition - Skill in use of materials and components - Skill in solving patient's problems related to ADLs - Skill in documentation	
4. Identify design, materials and components to support treatment plan	- Knowledge of biomechanics - Knowledge of material safety procedures and standards (i.e. OSHA, MSDS) - Knowledge of orthotic/prosthetic design - Knowledge of orthotic/prosthetic fitting criteria - Knowledge of impression-taking techniques, materials, devices & equipment - Knowledge of materials science - Knowledge of componentry - Knowledge of alignment devices & techniques - Knowledge of mechanics (i.e. levers and force	- Skill in orthotic/prosthetic fabrication - Skill in use of safety equipment - Skill in use of materials and components - Skill in use of alignment devices - Skill in aesthetic finishing - Skill in solving patient's problems related to ADLs - Skill in documentation	

	systems) - Knowledge of item warranty & warranty limitations		
5. Develop treatment plan based on patients needs, education & follow-up	- Knowledge of pathologies (i.e. muscular, neurology, skeletal, vascular) - Knowledge of procedures to record data - Knowledge of policies and procedures regarding privileged information -- Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of boundaries of the scope of practice (i.e when to refer a patient to other healthcare providers/care givers) - Knowledge of orthotic/prosthetic design - Knowledge of orthotic./prosthetic fitting criteria - Knowledge of care and maintenance of orthosis/prosthesis - Knowledge of human development & aging, ranging from pediatric to geriatric, as they relate to orthotic & prosthetic treatment - Knowledge of the psychology of the disabled - Knowledge of patient educational materials	- Skill in communicating with patient/family/care giver - Skill in interpretation of physical findings (i.e. recognizing skin pressures, dermatological conditions) - Skill in analysis of normal & pathological gait/motion - Skill in analysis of orthotic/prosthetic gait/motion - Skill in managing patients relative to their diagnosis or condition - Skill in aesthetic finishing - Skill in maintaining & repairing orthoses/prostheses - Skill in solving patient's problems related to ADLs - Skill in documentation	
6. Communicate with patient and caregivers treatment plan and any optional plans, including disclosure of potential risks/benefits in orthotic or prosthetic care.	- Knowledge of policies & procedures regarding privileged information - Knowledge of roles & responsibilities associated with other healthcare professions - Knowledge of reimbursement protocols (i.e. CMS, DMERC) - Knowledge of material safety procedures & standards (i.e. OSHA, MSDS) - Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of scope of practice (i.e. when to refer a patient to other healthcare providers/care givers) - Knowledge of orthotic/prosthetic design - Knowledge of orthotic/prosthetic fitting criteria - Knowledge of human development & aging, ranging from pediatric to geriatric, as they relate to orthotic & prosthetic treatment. - Knowledge of the psychology of the disabled - Knowledge of patient education materials	- Skill in communicating with patient/family/caregiver - Skill in communicating with referral sources & appropriately licensed health care providers - Skill in managing patients relative to their diagnosis or condition - Skill in solving patient's problems related to ADLs - Skill in documentation	
7. Document treatment plan	- Knowledge of procedures to record data - Knowledge of policies & procedures regarding privileged information	- Skill in managing patients relative to their diagnosis or condition - Skill in documentation	

	- Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of orthotic/prosthetic forms (i.e. assessment, orthometry, measurement, evaluation, outcomes)		
8. Inform responsible parties of financial responsibilities (i.e. insurance verification/authorization, deductibles, co-pays) as they pertain to proposed treatment plan.	- Knowledge of policies & procedures regarding privileged information - Knowledge of reimbursement protocols (i.e. CMS, DMERC) - Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility	- Skill in communicating with patient/family/care giver - Skill in managing patients relative to their diagnosis or condition - Skill in documentation	

	Cognitive (Knowledge)	**Psychomotor** (Hand Skills)	**Afferent** (Professional Behavior, Ethics, Psychological awareness)
Domain 3. Implementation of a Treatment Plan			
1. Inform patient of possible risks & time involved in O/P procedure	- Knowledge of policies & procedures regarding privileged information - Knowledge of material safety procedures & standards (i.e. OSHA, MSDS) - Knowledge of orthotic/prosthetic design - Knowledge of item warranty & warranty limitations	- Skill in interpreting referral documents, (i.e. prescriptions, orders) - Skill in communicating with patient/family/caregiver - Skill in managing patients relative to their diagnosis or condition - Skill in orthotic/prosthetic fabrication - Skill in use of safety equipment - Skill in use of materials and components - Skill in solving patient's problems related to ADLs - Skill in documentation	
2. Provide patient with preparatory care (i.e. diagnostic splint, compression garment)	- Knowledge of tissue characteristics/management - Knowledge of volumetric control - Knowledge of pathologies (i.e. muscular, neurology, skeletal, vascular) - Knowledge of procedures to record data - Knowledge of policies & procedures regarding privileged information - Knowledge of universal precautions, including sterile techniques & infection control - Knowledge of ethical standards regarding proper patient management, including ABC Code of	- Skill in communicating with patient/family/care giver - Skill in managing patients relative to their diagnosis or condition - Skill in impression-taking/measuring for orthoses/prostheses - Skill in using mechanical measuring devices - Skill in using electrical measuring devices - Skill in using computer-based measuring devices - Skill in orthotic/prosthetic fabrication	

	Professional Responsibility - Knowledge of orthotic/prosthetic design - Knowledge of measurement tools & techniques - Knowledge of orthotic/prosthetic forms (i.e. assessment, orthometry, measurement, evaluation, outcomes) - Knowledge of componentry - Knowledge of the psychology of the disabled - Knowledge of patient educational materials	- Skill in use of materials & components - Skill in use of safety equipment - Skill in solving patient's problems related to ADLs - Skill in documentation	
3. Select appropriate materials/techniques to obtain patient model/image	- Knowledge of tissue characteristics /management - Knowledge of volume control - Knowledge of pathologies (i.e. muscular, neurologic, skeletal, vascular) - Knowledge of procedures to record data - Knowledge of policies & procedures regarding privileged information - Knowledge of universal precautions, including sterile techniques and infection control - Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of orthotic/prosthetic design - Knowledge of impression-taking techniques, materials, devices & equipment - Knowledge of measurement tools and techniques - Knowledge of orthotic/prosthetic forms (i.e. assessment, orthometry, measurement, evaluation, outcomes) - Knowledge of computer-aided design and manufacturing (CAD/CAM)	- Skill in communicating with patient/family/ care giver - Skill in managing patients relative to their diagnosis or condition - Skill in impression-taking/measuring for orthoses/prostheses - Skill in using mechanical measuring devices - Skill in using electrical measuring devices - Skill in using computer-based measuring devices - Skill in patient delineation rectification and/or patient model modification - Skill in orthotic/prosthetic fabrication - Skill in use of safety equipment - Skill in use of materials and components - Skill in solving patient's problems related to ADLs - Skill in documentation	
4. Prepare patient for procedure to initiate treatment (i.e. measure, take impression, delineate, scan, digitize)	- Knowledge of anatomical landmarks (surface anatomy) - Knowledge of tissue characteristics /management - Knowledge of volume control - Knowledge of pathologies (i.e. muscular, neurologic, skeletal, vascular) - Knowledge of policies & procedures regarding privileged information - Knowledge of universal precautions, including sterile techniques and infection control - Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of impression-taking techniques, materials, devices & equipment - Knowledge of measurement tools and techniques - Knowledge of orthotic/prosthetic forms (i.e.	- Skill in identifying gross surface anatomy - Skill in managing patients relative to their diagnosis or condition - Skill in impression-taking/measuring for orthoses/prostheses - Skill in using mechanical measuring devices - Skill in using electrical measuring devices - Skill in using computer-based measuring devices - Skill in patient delineation rectification and/or patient model modification - Skill in use of safety equipment	

	assessment, orthometry, measurement, evaluation, outcomes) - Knowledge of computer-aided design and manufacturing (CAD/CAM)		
5. Perform procedure (i.e. measure, take impression, delineate, scan, digitize)	- Knowledge of anatomical landmarks (surface anatomy) - Knowledge of tissue characteristics /management - Knowledge of volume control - Knowledge of pathologies (i.e. muscular, neurologic, skeletal, vascular) - Knowledge of policies & procedures regarding privileged information - Knowledge of universal precautions, including sterile techniques and infection control - Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of impression-taking techniques, materials, devices & equipment - Knowledge of measurement tools and techniques - Knowledge of orthotic/prosthetic forms (i.e. assessment, orthometry, measurement, evaluation, outcomes) - Knowledge of computer-aided design and manufacturing (CAD/CAM)	- Skill in identifying gross surface anatomy - Skill in managing patients relative to their diagnosis or condition - Skill in impression-taking/measuring for orthoses/prostheses - Skill in using mechanical measuring devices - Skill in using electrical measuring devices - Skill in using computer-based measuring devices - Skill in orthotic/prosthetic fabrication - Skill in use of safety equipment	
6. Refer to manufacturer's &other technical specifications regarding materials/components	- Knowledge of material safety procedures and standards (i.e. OSHA, MSDS) - Knowledge of orthotic/prosthetic design - Knowledge of material science - Knowledge of componentry - Knowledge of item warranty and warranty limitations	- Skill in orthotic/prosthetic fabrication - Skill in use of safety equipment - Skill in use of materials and components - Skill in use of alignment devices - Skill in solving patient's problems related to ADLs	
7. Select appropriate materials for optimum strength, durability, & function (i.e. ankle or knee joints, feet, knee units, lamination lay ups)	- Knowledge of planes of motion - Knowledge of biomechanics - Knowledge of material safety procedures and standards (i.e. OSHA, MSDS) - Knowledge of orthotic/prosthetic design - Knowledge of orthotic/prosthetic criteria - Knowledge of material science - Knowledge of componentry - Knowledge of alignment devices and techniques - Knowledge of mechanics (i.e. levers and force systems) - Knowledge of item warranty and warranty limitations	- Skill in analysis of orthotic/prosthetic gait/motion - Skill in managing patients relative to their diagnosis or condition - Skill in orthotic/prosthetic fabrication - Skill in use of safety equipment - Skill in use of materials and components - Skill in use of alignment devices - Skill in solving patient's problems related to ADLs - Skill in documentation	
8. Prepare delineation/impression/template	- Knowledge of impression-taking techniques, materials, devices and equipment	- Skill in using mechanical measuring devices - Skill in using electrical measuring devices	

for modification/fabrication (i.e. prepare impression/reverse delineation, digitize)	- Knowledge of measurement tools and techniques - Knowledge of alignment devices and techniques - Knowledge of computer-aided design and manufacturing (CAD/CAM) - *Knowledge of material safety procedures and standards (i.e. OSHA, MSDS)*	- Skill in using computer-based measuring devices - Skill in patient delineation rectification and/or patient model modification - Skill in orthotic/prosthetic fabrication - Skill is use of safety equipment	
9. Rectify and prepare patient model/image for fabrication.	- Knowledge of musculoskeletal anatomy, including upper limb, lower limb & spinal - Knowledge of anatomical landmarks (surface anatomy) - Knowledge of material safety procedures and standards (i.e. OSHA, MSDS) - Knowledge of impression-taking techniques, materials, devices and equipment - Knowledge of rectification/modification procedures as they relate to specific orthotic/prosthetic designs - Knowledge of measurement tools and techniques - Knowledge of orthotic/prosthetic forms (i.e. assessment, orthometry, measurement, evaluation, outcomes) - Knowledge of material science - Knowledge of computer-aided design and manufacturing (CAD/CAM)	- Skill in identifying gross surface anatomy - Skill in impression-taking/measuring for orthoses/prostheses - Skill in using mechanical measuring devices - Skill in using electrical measuring devices - Skill in using computer-based measuring devices - Skill in patient delineation rectification and/or patient model modification - Skill in orthotic/prosthetic fabrication - Skill in use of safety equipment - Skill in use of materials and components	
10. Fabricate/assemble device in order to prepare for initial fitting and/or delivery	- Knowledge of normal human locomotion - Knowledge of pathological gait - Knowledge of planes of motion - Knowledge of biomechanics - Knowledge of pathologies (i.e. muscular, neurologic, skeletal, vascular) - Knowledge of material safety procedures and standards (i.e. OSHA, MSDS) - Knowledge of orthotic/prosthetic design - Knowledge of orthotic/prosthetic fitting criteria - Knowledge of measurement tools and techniques - Knowledge of orthotic/prosthetic forms (i.e. assessment, orthometry, measurement, evaluation, outcomes) - Knowledge of material science - Knowledge of componentry - Knowledge of alignment devices and techniques - Knowledge of mechanics (i.e. levers and force systems) - Knowledge of computer-aided design and manufacturing (CAD/CAM)	- Skill in analysis of normal and pathological gait/motion - Skill in analysis of orthotic/prosthetic gait/motion - Skill in using mechanical measuring devices - Skill in using electrical measuring devices - Skill in using computer-based measuring devices - Skill in orthotic/prosthetic fabrication - Skill in use of safety equipment - Skill in using hand & power tools - Skill in use of materials and components - Skill in use of alignment devices - Skill in evaluating fit and function of an orthosis/prosthesis	
11. Assess device for structural safety and ensure that manufacturers guidelines have	- Knowledge of material safety procedures and standards (i.e. OSHA, MSDS) - Knowledge of orthotic/prosthetic design	- Skill in using mechanical measuring devices - Skill in using electrical measuring devices - Skill in using computer-based measuring devices	

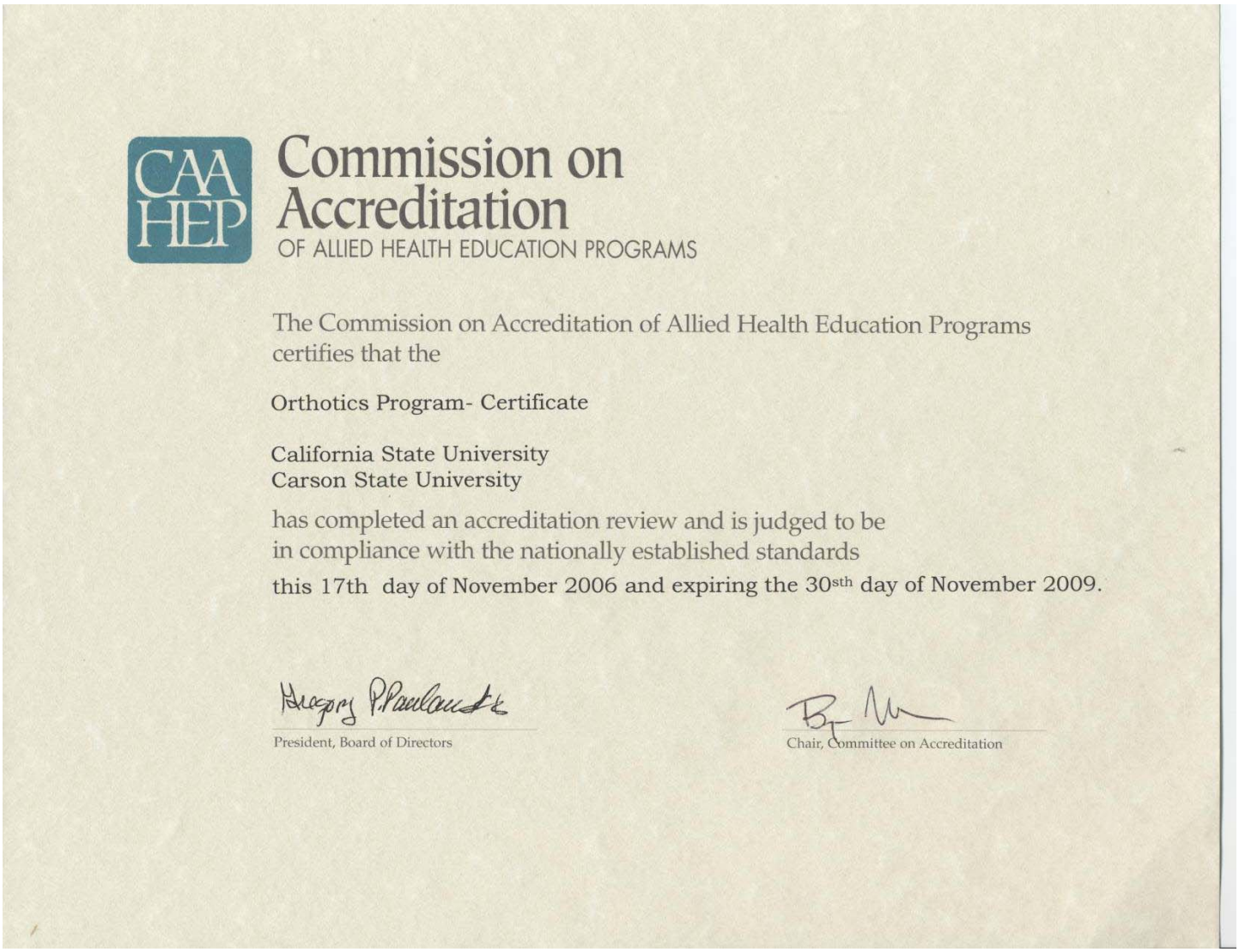
been followed prior to patient fitting/delivery (i.e. torque values, patient weight limits)	- Knowledge of material science - Knowledge of componentry - Knowledge of alignment devices and techniques - Knowledge of mechanics (i.e. levers and force systems) - Knowledge of maintenance of orthoses/prostheses - Knowledge of computer-aided design and manufacturing (CAD/CAM) - Knowledge of item warranty and warranty limitations	- Skill in orthotic/prosthetic fabrication - Skill in use of safety equipment - Skill in using hand & power tools - Skill in use of materials and components - Skill in use of alignment devices	
12. Assess/align device for accuracy in sagittal, coronal and transverse planes in order to provide maximum function/comfort	- Knowledge of musculoskeletal anatomy, including upper limb, lower limb, spinal - Knowledge of anatomical landmarks (surface anatomy) - Knowledge of kinesiology, including upper limb, lower limb, spinal - Knowledge of normal human locomotion - Knowledge of gait training - Knowledge of pathological gait - Knowledge of planes of motion - Knowledge of biomechanics - Knowledge of pathologies (i.e. muscular, neurologic, skeletal, vascular) - Knowledge of orthotic/prosthetic design - Knowledge of orthotic/prosthetic fitting criteria - Knowledge of measurement tools & techniques - Knowledge of material science - Knowledge of componentry - Knowledge of alignment devices and techniques - Knowledge of mechanics (i.e. levers and force systems) - Knowledge of the psychology of the disabled	- Skill in identifying gross surface anatomy - Skill in analysis of normal and pathological gait/motion - Skill in analysis of orthotic/prosthetic gait/motion - Skill in managing patients relative to their diagnosis or condition - Skill in using mechanical measuring devices - Skill in using electrical measuring devices - Skill in using computer-based measuring devices - Skill in patient delineation rectification and/or patient model modification - Skill in orthotic/prosthetic fabrication - Skill in using hand & power tools - Skill in use of materials and components - Skill in use of alignment devices - Skill in evaluating fit and function of an orthosis/prosthesis - Skill in solving patient's problems related to ADLs	
13. Ensure that materials, design and components are provided as specified in the treatment plan	- Knowledge of musculoskeletal anatomy, including upper limb, lower limb, spinal - Knowledge of neuroanatomy and neurophysiology - Knowledge of anatomical landmarks (surface anatomy) - Knowledge of kinesiology, including upper limb, lower limb, spinal - Knowledge of normal human locomotion - Knowledge of gait training - Knowledge of pathological gait - Knowledge of planes of motion - Knowledge of biomechanics - Knowledge of pathologies (i.e. muscular, neurologic, skeletal, vascular) - Knowledge of referral documents	- Skill in interpreting referral documents (i.e. prescriptions, orders) - Skill in interpreting radiological images - Skill in analysis of normal and pathological gait/motion - Skill in analysis of orthotic/prosthetic gait/motion - Skill in managing patients relative to their diagnosis of condition - Skill in orthotic/prosthetic fabrication - Skill in use of materials and components - Skill in use of alignment devices - Skill in evaluating fit and function of orthosis/prosthesis - Skill in solving patient's problems related to ADLs	

	- Knowledge of procedures to record data - Knowledge of policies and procedures regarding privileged information - Knowledge of orthotic/prosthetic design - Knowledge of orthotic/prosthetic fitting criteria - Knowledge of clinical examination techniques (i.e. Range of motion (ROM), manual muscle tests (MMT), sensation, proprioception) - Knowledge of orthotic/prosthetic forms (i.e. assessment, orthometry, measurement, evaluation, outcomes) - Knowledge of measurement tools & techniques - Knowledge of material science - Knowledge of componentry - Knowledge of alignment devices and techniques - Knowledge of mechanics (i.e. levers and force systems) - Knowledge of computer-aided design and manufacturing (CAD/CAM) - Knowledge of item warranty and warranty limitations - Knowledge of the psychology of the disabled	- Skill in documentation	
14. Complete fabrication process after achieving optimal fit and function of orthosis/prosthesis (i.e. convert test socket to definitive orthosis/prosthesis)	- Knowledge of material safety procedures and standards (i.e. OSHA, MSDS) - Knowledge of measurement tools and techniques - Knowledge of orthotic/prosthetic forms (i.e. assessment, orthometry, measurement, evaluation, outcomes) - Knowledge of material science - Knowledge of componentry - Knowledge of alignment device and techniques - Knowledge of hand and power tools - Knowledge of mechanics (i.e. levers and force systems) - Knowledge of computer-aided design and manufacturing (CAD/CAM) - Knowledge of item warranty and warranty limitations	- Skill in using mechanical measuring devices - Skill in using electrical measuring devices - Skill in using computer-based measuring devices - Skill in orthotic/prosthetic fabrication - Skill in use of safety equipment - Skill in using hand and power tools - Skill in use of materials and components - Skill in use of alignment devices - Skill in aesthetic finishing - Skill in solving patient's problems related to ADLs	
15. Educate patient and/or caregiver about use and maintenance of the orthosis/prosthesis (i.e. wearing schedules or other instructions)	- Knowledge of anatomical landmarks (surface anatomy) - Knowledge of gait training - Knowledge of pathologies (i.e. muscular, neurologic, skeletal, vascular) - Knowledge of medical terminology - Knowledge of procedures to record data - Knowledge of policies and procedures regarding privilege information	- Skill in communicating with patient/family/caregiver - Skill in identifying gross surface anatomy - Skill in interpretation of physical findings (e.g. recognizing skin pressures, dermatological conditions) - Skill in analysis of normal & pathological gait/motion - Skill in analysis of orthotic/prosthetic gait/motion	

	- Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of care and maintenance of orthosis/prosthesis - Knowledge of item warranty and warranty limitations - Knowledge of human development and aging, ranging from pediatric to geriatric, as they relate to orthotic and prosthetic treatment - Knowledge of the psychology of the disabled - Knowledge of patient educational materials	- Skill in managing patients relative to their diagnosis or condition - Skill in use of safety equipment - Skill in use of materials and components - Skill in evaluating fit & function of an orthosis/prosthesis - Skill in solving patient's problems related to ADLs - Skill in documentation	
16. Re-assess device for structural safety prior to patient delivery	- Knowledge of planes of motion - Knowledge of biomechanics - Knowledge of procedures to record data - Knowledge of material safety procedures and standards (i.e. OSHA, MSDS) - Knowledge of orthotic/prosthetic design - Knowledge of materials science - Knowledge of componentry - Knowledge of alignment devices and techniques - Knowledge of mechanics (i.e levers and force systems) - Knowledge of maintenance of orthoses/prostheses - Knowledge of computer-aided design and manufacturing (CAD/CAM) - Knowledge of item warranty and warranty limitations	- Skill in using mechanical measuring devices - Skill in using electrical measuring devices - Skill in using computer-based measuring devices - Skill in orthotic/prosthetic fabrication - Skill in use of safety equipment - Skill in using hand and power tools - Skill in use of materials and components - Skill in use of alignment devices - Skill in documentation	
17. Document treatment using established record-keeping techniques to verify implementation of treatment plan	- Knowledge of medical terminology - Knowledge of referral documents - Knowledge of procedures to record data - Knowledge of policies and procedures regarding privileged information - Knowledge of ethical standards regarding proper patient management, including ABC Code of Profession Responsibility - Knowledge of orthotic/prosthetic forms (i.e. assessment, orthometry, measurement, evaluation, outcomes)	- Skill in documentation	
18. Refer patient to necessary healthcare providers (i.e. therapists) for necessary ancillary care.	- Knowledge of gait training - Knowledge of pathologies (i.e. muscular, neurologic, skeletal, vascular) - Knowledge of medical terminology - Knowledge of referral documents - Knowledge of procedures to record data - Knowledge of policies and procedures regarding	- Skill in interpreting referral documents (i.e. prescriptions, orders) - Skill in communicating with patient/family/care giver - Skill in communicating with referral sources and appropriately licensed healthcare providers - Skill in managing patients relative to their	

	privileged information - Knowledge of roles and responsibilities associated with other healthcare professions - Knowledge of ethical standards regarding proper patient management, including ABC Code of Professional Responsibility - Knowledge of boundaries of the scope of practice (i.e. when to refer a patient to other healthcare providers/care givers) - Knowledge of human development and aging, ranging from pediatric to geriatric, as they relate to orthotic and prosthetic treatment - Knowledge of the psychology of the disabled	diagnosis or condition - Skill in solving patient's problems related to ADLs - Skill in documentation	

APPENDIX X.
CAAHEP Accreditation in Orthotics and Prosthetics



Commission on Accreditation
OF ALLIED HEALTH EDUCATION PROGRAMS

The Commission on Accreditation of Allied Health Education Programs certifies that the

Orthotics Program- Certificate

California State University
Carson State University

has completed an accreditation review and is judged to be in compliance with the nationally established standards

this 17th day of November 2006 and expiring the 30sth day of November 2009.

President, Board of Directors

Chair, Committee on Accreditation

Commission on Accreditation
OF ALLIED HEALTH EDUCATION PROGRAMS

The Commission on Accreditation of Allied Health Education Programs certifies that the

Prosthetics Program

California State University
Carson, California

has completed an accreditation review and is judged to be in compliance with the nationally established standards this 20th day of May 2005.

Gregory P. Paulanka
President, Board of Directors

Chair, Committee on Accreditation