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### PT 569.01: Physical Therapy Interventions III - Prosthetics and Orthotics Unit

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**PT 569 – PT Interventions III: PROSTHETICS AND ORTHOTICS UNIT**  
**Spring semester 2003**

- March 31 Introduction to LE Amputation
- April 2 Components of LE Prosthesis by Doug Turner, Prosthetist  
10-12 \* Reading: O'Sullivan, Chapter 20
- April 2 1 hour: Doug Turner, cont.  
**2-3 PM** **fac mtg**
- April 4 Lab: prosthetic devices
- April 7 Lecture: Examination, Gait Abnormalities, & intervention of the LE Amputee  
\* Reading: O'Sullivan, Chapter 19,  
\* Optional - Videos on gait training on your own
- April 9 Continue Gait Abnormalities and intervention  
10-12 \* Review the Prosthetic Gait Training book
- April 9 Continue intervention  
**2-4 PM**
- April 11 Case study
- April 14 UE Prosthetics - Doug Turner
- EVENING CLASS: Amputee Lab 6:40 to 8:30 PM**
- April 16 Intro to Orthotics  
10-12 \* Reading: O'Sullivan, Chapter 30
- April 16** Lower extremity orthotics  
**2-4 PM** Lab: orthotics
- April 18 Knee & ankle orthotics for impairments of musculoskeletal origin:  
B.Mahlum, PT
- April 21 1 hour: Lab B.Mahlum, PT  
1 hour: Lecture - orthotics for gait impairments of neuromuscular origin
- April 23 Orthotics for gait impairments of neuromuscular origin
- April 25 1 hour: Lecture contracture management  
1 hour: Lab contracture management
- April 28 Foot orthotics: Joy McKay, PT

April 30      Foot orthotics: Joy McKay, PT

May 2         Foot orthotics: Joy McKay, PT

May 5         Upper Extremity Orthotics: Dawn Christian, PT

May 7         Upper Extremity Orthotics: Dawn Christian, PT

May 9         Upper Extremity Orthotics: Dawn Christian, PT

Final during finals week

PRACTICAL EXAMS:      Week of May 5

PT 575: PT INTERVENTIONS III  
PROSTHETICS AND ORTHOTICS UNIT  
Spring Semester

Professor: Carrie Gajdosik MS, PT

Class Times: Monday 8:10 - 10:00 AM  
Wednesday & Friday 10:10-12:00  
And sometimes Wednesday afternoons

Course Description: This course covers two topic areas, 1) prosthetics and amputees, and 2) orthotics. Students will receive in-depth information on the etiology of and surgical procedures for LE amputations, components of LE prostheses, and assessment and treatment of individuals with amputations, as it applies to physical therapy. Students will have an introduction to UE prosthetics. The unit on orthotics will include in-depth information on application of upper and lower extremity bracing for pain, contractures, and function. They will have opportunities to make orthotics with various types of materials

Evaluation Procedures

Comprehensive Test: 100 points

Practical: P/F

Class and lab participation

Attendance to the night class is required. Unexcused absence for this class will result in an incomplete for the class until the student makes up the class on his or her own time.

Grades from this class will be added to the other unit in this course. Grades for each unit are weighted according the number of class hours per unit.

Required Textbooks:

1. O'Sullivan, Schmitz: Physical Rehabilitation: Assessment and Treatment
2. Student Packet (UC book store)
3. Gailey books Prosthetic Gait Training Program for Lower Extremity Amputees and Balance, Agility, Coordination, and Endurance for Lower Extremity Amputees. 1994, Advanced Rehabilitation Therapy Incorporated (UC book store)

Additional Readings: (In Mansfield Library)

1. 617.58 K18L Karacoloff: LE Amputations: Functional Outcome
2. 617.58 S215L Sanders: Lower Limb Amputation
3. 617.58 R345 Ranerjee: Rehabilitation Management of Amputations

Practical exam:

Students will be expected to 1) identify the components of LE prostheses and LE orthotics and 2) answer questions regarding the function and care of the devices. See course objectives.

PT 575: PT INTERVENTIONS III  
PROSTHETICS AND ORTHOTICS UNIT

COURSE OBJECTIVES

This course covers two topic areas 1) prosthetics and amputees and 2) orthotics. Students will receive in-depth information on the etiology of and surgical procedures for amputations, components of LE prostheses, and assessment and treatment of amputees, as it applies to physical therapists. Students will have an introduction to UE prostheses. The unit on orthotics will include in-depth information on application of upper and lower extremity bracing for impairments of the musculoskeletal and neuromuscular systems. They will have opportunities to make orthotics with various types of materials

- 1 Knowledge and Comprehension
- 2 Application
- 3 Psychomotor
- 4 Analysis, Synthesis, & Evaluation
- 5 Affective

A. Background information on lower extremity amputations

- 1.1 Identify the causes of amputations.
- 1.2 Identify the common levels of amputations.
- 1.3 Identify the basic surgical procedures for amputations.
- 2.1 Explain the rationale for amputating at a specific level.
- 4.1 Compare and contrast the issues related to amputation due to peripheral vascular disease and trauma

B. Components of LE prosthesis (Sockets, Joints, Suspension, systems, Feet)

- 1.1 When given a prosthetic device, describe components of LE prosthesis and demonstrate donning and doffing procedures.
- 1.2 When given a prosthetic device, describe the weight bearing surfaces.
- 4.1 When given a case scenario, prescribe the appropriate prosthetic components.
- 4.2 Compare and contrast the quadrilateral socket and ischial containment sockets.
- 4.3 Compare and contrast the various LE prosthetic components for the knee.
- 4.5 Compare and contrast the various LE prosthetic components for the ankle/foot.
- 4.4 Compare and contrast endoskeletal and exoskeletal support.

C. Examination and Assessment of LE Amputations

- 1.1 Describe the components of a pre operative PT assessment.
- 2.1 Identify possible causes of gait deviations that can occur when wearing a LE prosthetic device.
- 3.1 Demonstrate the process of assessing the fit of a prosthesis.
- 4.1 Given a case study, identify possible prosthetic and amputee causes for each gait deviation.
- 4.2 When given a gait deviation, differentiate between the possible patient and component causes.
- 4.3 Analyze how a deficit in the prosthesis can cause a specific gait deviation.
- 4.4 Analyze how a patient impairment (ex: strength, muscle length, sensation) can

cause a specific gait deviation.

4.5 Formulate the components of a post prosthetic PT examination and state the rationale for each component.

4.6 Formulate the components of a pre prosthetic PT examination and state the rationale for each component.

#### D. Patient Education

1.1 Describe methods of controlling edema.

2.1 Apply the principles of the effects of pressure on edema when wrapping the residual limb of a person with a lower extremity amputation.

3.1 Correctly wrap an AK or BK residual limb of a person with a lower extremity amputation.

4.1 Given a case history, develop a patient education program for care of the residual, intact, and prosthetic limbs.

4.2 Given a case history, design an appropriate home exercise program written in layperson terms.

#### E. Physical Therapy Intervention

2.1 Describe therapeutic exercises for strengthening and stretching.

2.2 Apply the principles of gait training to the patient with an amputation.

2.3 Describe the possible components of a patient education program.

3.2 Demonstrate treatment intervention appropriate for LE amputee.

4.1 Given a case history and results of assessment, identify the patient problems, and write appropriate, measurable treatment objectives.

4.2 Given a case history and results of assessment, develop the treatment intervention and formulate the methods to progress the patient.

4.3 Given a case history and results of assessment, delegate appropriate responsibilities to the PTA.

4.4 Given a case history and results of assessment, identify the patient causes of gait deviations

4.5 Given a case history and results of assessment, design an intervention program to address these deviations.

4.6 Given a case history and results of assessment, design an intervention program for

4.7 During the patient lab, the student will take a history and examine the residual limb.

#### F. Introduction to upper extremity prosthetics

1.1 Describe how an UE prosthesis functions, including the suspension system.

1.2 Describe the primary components.

#### G. LE Orthotics

1.1 Identify the function of UE and LE orthoses.

1.2 Identify the signs and symptoms of improper bracing.

4.1 Formulate the components of a pre-LE orthotic PT examination and state the rationale for each component.

#### H. Components of lower extremity orthotics

1.1 When give an orthotic device, identify the components and state why the device

is prescribed.

2.1 When give an orthotic device, demonstrate/describe donning and doffing procedures and explain how various impairments might limit the wearer's ability to don and doff.

3.1 Find subtalar neutral on a partner.

3.2 Make a plaster mold for a foot orthotic.

4.1 When given a case scenario, prescribe the appropriate orthotic device.

4.2 When give a used orthotic device, analyze its shape and size to determine the possible pathologic conditions or impairments of the individual who wore it.

4.3 Compare and contrast LE orthotics used to control the ankle.

4.4 Compare and contrast the application of LE orthotics for clients with musculoskeletal impairments to clients with neuromuscular impairments.

I. Introduction to Upper extremity orthotics

1.1 Describe the advantages and disadvantages of materials used to make UE orthoses.

1.2 Know the difference between the functional and resting positions for splinting the hand.

3.1 Make a simple UE splint.

4.1 Apply the goals of splinting to determine the appropriate UE splint.

4.2 Compare and contrast static and dynamic splinting.

4.3 Apply the biomechanical principles of splinting when making a splint.

4.4 Formulate the components of a pre-UE orthotic PT examination and state the rationale for including each component in the examination.

J. Class and lab behavior

5.1 Attend and actively participate during the amputee-client lab.

5.2 Interact with clients with amputations in a professional and sensitive manner.

5.3 Dress professionally when attending the amputee-client lab.

5.4 Participate in class discussion and laboratory sessions.

5.5 Use correct terminology and language.

5.6 Show respect to the guest lecturers.

## GUIDELINES FOR THE NIGHT LAB

- I. Patient history
  - A. Cause of amputation
  - B. Date of amputation
  - C. When received first prosthesis
  - D. Length of time wearing prosthesis each day
  - E. Daily routine of residual limb care (ex. washing, wrapping)
  
- II. Identify
  - A. Type of foot
  - B. Type of knee joint
  - C. Suspension system
  - D. Fit of prosthesis
    1. leg length
    2. pistoning
  
- III. Residual limb (with prosthesis off)
  - A. Skin
    1. scar
    2. areas of redness (cause)
    3. areas of callous (cause)
  - B. Circumference (measure with a tape measure)
  - C. Shape
    1. cylindrical, conical, hour glass, bulbous
    2. dog ears
  - D. Vascularity
    1. pulse - femoral, popliteal
    2. color of skin
    3. temperature (warm, cool, etc)
    4. edema
    5. pain
    6. loss of hair
  - E. Sensation
    1. neuromas (palpate end of residual limb for points of tenderness)
    2. phantom pain/limb
    3. sensitivity to touch
  - F. Range of Motion
  - G. residual limb wrapping: everyone practice wrapping with ace bandage
  
- IV. Observe donning of prosthesis
- VI. Stairs
- VII. On and off floor
- VIII Stepping over objects

## PROSTHETIC LAB

Identify the following on the prostheses available in the PT department

1. Sockets
  - a. Quadrilateral socket
    1. Weight bearing surfaces
    2. Relief areas
    3. Scarpa's bulge
    4. Medial, lateral, anterior and posterior walls
  - b. Ischial containment socket
    1. Weight bearing surfaces
    2. Medial, lateral, anterior and posterior walls
    3. How does the ischial containment socket differ from the quadrilateral socket?
  - c. PTB (Patella Tendon Bearing) socket (BK socket)
    1. Weight bearing surfaces
    2. Relief areas
2. Exoskeleton prosthesis and Endoskeleton prosthesis – compare and contrast
3. Feet
  - a. SACH foot (cushion heel, keel)
  - b. SAFE foot (arch, keel)
  - c. Seattle foot
  - d. Seattle lite foot
  - e. Articulated foot (bumpers, note directions of movement)
  - fd. Flex-foot, Spring-lite foot
5. Suspension devices
  - a. Suction
  - b. Pelvic band (rigid and flexible)
  - c. Sleeve
  - d. PTB strap (know location of patella when worn)
  - e. Silesian bandage
  - f. Ratchet system
6. Knee units and attachments
  - a. Constant friction
  - b. Safety knee
  - c. Extension assist
7. Liner, socks, and shrinker (know when each is worn and not worn)