OPT 104 Lower Extremity Orthotics III

Instructor Name: Michael Brncick  
Email Address: mbrncick@jjc.edu  
Office Location: T1061  
Office Telephone: 815-280-2219  
Office Hours: M-R 8:00 – 9:00 AM

Course Description:  
The course is designed to provide students with the knowledge and skills necessary to fabricate plastic and metal knee-ankle-foot orthoses. Foot, ankle and knee skeletal structures and biomechanical principles of knee-ankle foot orthoses are also integrated throughout the course. Interpretation and application of knee-ankle-foot orthometry will be covered. Variations of knee-ankle-foot orthoses will also be covered.  
IAI number: N/A

Credit and Contact Hours  
* Credit Hours 4  
* Lecture/Demonstration 2  
* Lab/Studio/Clinical 4

Prerequisites:  
OPT 100

Books, Supplies, and Supplementary Materials  
- **Required Textbooks/Reading list**  
  No text required. Materials provided by program director  
- **Supplementary texts/materials**  
  All supplementary materials developed and provided by program director  
- **Other resources utilized:**  
  Curriculum from Northwestern University’s Prosthetic Orthotic Center

Methods of Instruction:  
Lecture  
Laboratory  
Clinical Rotations

Student Learning Outcomes  
1. Gather the necessary tools, instruments and materials to fabricate various knee-ankle-foot orthoses  
2. Select proper materials for a given knee-ankle-foot orthosis intervention  
3. Fabricate various types of knee-ankle-foot orthoses with skill and accuracy  
4. Identify anatomical landmarks necessary to fabricate knee-ankle-foot orthoses  
5. Modify knee-ankle-foot orthosis casts for proper contours, alignment and biomechanical effect  
6. Describe and discuss various trim line options for knee-ankle-foot orthoses  
7. Take an impression for a basic knee-ankle-foot orthosis  
8. Take measurements and a delineation for a knee-ankle-foot orthosis  
9. Identify various gait deficiencies involved with lower extremity paralysis  
10. Fit and adjust basic knee ankle foot orthoses
General Education Student Learning Outcomes
Students must be able to:
Math: Calculate percentages, perform metric to English conversions, apply linear measurements with respect to human anatomy, perform basic geometric right angle lay out.
English and language skills: Communicate verbal and written concepts in a clinical and laboratory environment.

Graded Assignments and Policies
Graded Assignments:
Laboratory projects are separated into technical and clinical sections. Each project is graded according to category. Quizzes and exams are given throughout the course. Attendance is taken and counted as part of the grade.

The following schedule is an estimate of the work that will be included in the final point total; should items be eliminated the same percentages will stand for the adjusted point total. The student’s grade is based on the individuals completed and corrected work.

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Number</th>
<th>Points</th>
<th>Total</th>
<th>Grading</th>
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<tr>
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<td>77%-70%</td>
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<td></td>
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<td>Below 70%</td>
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Grading Policy

Major Tests and Quizzes:
Student performance will be evaluated throughout the semester through the use of section quizzes; project evaluation check lists; midterm and final exams.

Classroom Policies and Procedures

A. General Information
Students must become familiar with the lab safety rules and abide by those rules. Students who are unable to follow the safety rules will not be allowed to continue in the program.

Complete all assignments and projects in a timely manner.

Wear proper clothing for surface anatomy sessions.

Homework assignments are required to be completed prior to the next class session. Homework assignments consist primarily of iCampus video presentations that are essential to understanding and preparing for laboratory projects for the next class meeting.

Open laboratory times are available each semester. The instructor will provide students with the open lab times at the beginning of each semester. Every effort should be made to complete projects during the allotted class time.

Since orthotics and prosthetics is a medical field, a clean and neat appearance is essential. Sleeveless shirts, short pants, or clothing of questionable taste, etc. are not acceptable in the O/P lab.

B. Attendance Policy:
Attendance is essential for the student to develop the sequentially presented skills. If absence is unavoidable, notify the instructor prior to a scheduled class. Because many of the projects build from
what was done in previous class work, it is advisable to attend each class. Attendance is taken and class participation is counted as part of the grade.

Attend all classes. Do not make appointments during scheduled class times (doctors, dentist, personal, business, etc.).

An excused absence may be allowed in the case of personal illness, family emergency, transportation difficulties or as previously arranged with the instructor.

C. Make-up Policy

All work assigned will be due by the assigned date; late work may be accepted at a penalty to the student. The penalty is one-half (1/2) credit for the late assignment. The grade will be on a total point system with points assigned to each activity assigned to the class.

D. Extra-credit Policy

Students have the opportunity to gain extra credit through special projects, assistance in lab set up and other fabrication projects as determined by the department head. All extra credit must be scheduled and approved by the department head. Students may apply the agreed upon credit to projects, quizzes or exams.

E. Final Exam Information

Final exams are given during final exam week. Exams consist of a written exam and a laboratory practical.

F. Academic Honor Code

The objective of the academic honor code is to sustain a learning-centered environment in which all students are expected to demonstrate integrity, honor, and responsibility, and recognize the importance of being accountable for one’s academic behavior. Students who are found in violation of the academic honor code will be required to meet with the program director to determine the severity of the penalty. This may include dismissal from the program, remediation in the form of specific assignments or other measures that are determined by the department head.

G. College Statement about grades of “F” and withdrawal from class.

- Students may withdraw from a course by processing an add/drop form during regular office hours through the Registration and Records Office at Main Campus or Romeoville Campus, or by phone at 815-744-2200. Please note the withdrawal dates listed on your bill or student schedule. Every course has its own withdrawal date. Failure to withdraw properly may result in a failing grade of “F” in the course.

- At any time prior to the deadline dates established, an instructor may withdraw a student from class because of poor attendance, poor academic performance or inappropriate academic behavior, such as, but not limited to, cheating or plagiarism.

H. Intellectual Property

Students own and hold the copyright to the original work they produce in class. It is a widely accepted practice to use student work as part of the college’s internal self-evaluation, assessment procedures, or other efforts to improve teaching and learning and in promoting programs and recruiting new students. If you do not wish your work to be used in this manner, please inform the instructor.

I. Student Code of Conduct

Each student is responsible for reading and adhering to the Student Code of Conduct as stated in the college catalog.

J. Sexual Harassment

Joliet Junior College seeks to foster a community environment in which all members respect and trust each other. In a community in which persons respect and trust each other, there is no place for sexual
harassment. JJC has a strong policy prohibiting the sexual harassment of one member of the college community by another. See Catalog or Student Handbook.

K. **Student Support** [http://jjc.edu/services-for-students/pages/default.aspx](http://jjc.edu/services-for-students/pages/default.aspx)
   a. Disability Services: [http://jjc.edu/services-for-students/disability-services/Pages/default.aspx](http://jjc.edu/services-for-students/disability-services/Pages/default.aspx).
   b. Tutoring: [http://jjc.edu/services-for-students](http://jjc.edu/services-for-students)
   c. Counseling and Advising: [http://jjc.edu/services-for-students/counseling-advising](http://jjc.edu/services-for-students/counseling-advising)
   d. Academic Resources: [http://jjc.edu/services-for-students/academic-resources](http://jjc.edu/services-for-students/academic-resources)
   e. Support Programs: [http://jjc.edu/services-for-students/support-programs-services](http://jjc.edu/services-for-students/support-programs-services)
   f. Technology Support: [http://jjc.edu/services-for-students/Pages/technology-support.aspx](http://jjc.edu/services-for-students/Pages/technology-support.aspx)

L. **Safety**
   Students with an impaired ability to concentrate may jeopardize safety in this classroom for themselves, their classmates and their instructor. If your ability to concentrate is impaired you should discuss this matter with your instructor prior to operating equipment or performing a laboratory procedure. Students are responsible for reporting to their instructor any condition that would impair the ability to concentrate. Failure to notify your instructor of this issue may be a violation of the Student Code of Conduct.

   For safety purposes, students are required to wear closed shoes at all times.

   Safety glasses must be worn in all designated areas.

### Topical Outline

<table>
<thead>
<tr>
<th>Week</th>
<th>OPT 104 Lower Extremity Orthotics III</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Anatomy Review</td>
<td>Review of functional anatomy of the thigh and hip. Terminology specific to the knee-ankle-foot orthosis. Review surface anatomy of lower extremity. Review patient assessment techniques Laboratory Project; Measurements and orthometry. <strong>Objectives:</strong> 1. Identify skeletal anatomy specific to KAFO intervention 2. Identify and palpate surface landmarks specific to KAFO interventions 3. Identify basic muscle groups of the lower extremity 4. Identify the basic phases of normal walking 5. Relate normal standing alignment to KAFO fabrication principles 6. Perform basic patient assessment 7. Utilize the orthometry form for interpretation of measurement data</td>
</tr>
</tbody>
</table>
| Week 2 | KAFO Schema Preparation  
Knee Ankle Foot Orthosis Components  
**Objectives:**  
1. Identify various knee mechanisms and components utilized in KAFO interventions  
2. Identify stance control knee mechanisms as well as be familiar with their fabrication processes  
3. Delineate a schema for a metal KAFO system  
4. Correct and align an ankle joint with a fixed deformity on the schema  
5. Identify and delineate the tibial torsion value for a metal KAFO system |
| --- | --- |
| Week 3 | KAFO Fabrication  
Knee Ankle Foot Orthosis Biomechanics | Lecture/Demonstration of KAFO, knee joints, thigh component, tibial component preparation. Sagittal bars, calf band, thigh bands and solid stirrup. Laboratory project; sagittal fabrication.  
**Objectives:**  
1. Prepare side bars and bands for fabrication of metal KAFO  
2. Explain TKA with respect to side bar alignment  
3. Contour side bar for TKA alignment |
| Week 4 | KAFO Fabrication Coronal Plane  
Gait Deviations | Lecture/Demonstration of coronal plane fabrication. Laboratory project.  
**Objectives:**  
1. Contour side bars for KAFO  
2. Shape bands according to schema  
3. Tilt and attach bands according to schema |
| Week 5 | KAFO Shoe, Stirrup, Padding | Lecture/Demonstration shoe preparation, stirrup attachment. Laboratory fabrication project.  
**Objectives:**  
1. Attach shoe to stirrup  
2. Align according to toe out and tibial torsion |
| Week 6 | KAFO leather work | Lecture-demonstration fabrication techniques for leather work of metal AFO laboratory fabrication project.  
**Objectives:**  
1. Prepare pattern for proximal thigh section for KAFO  
2. Sew and apply proximal leather work for KAFO |
| Week 7 | Metal KAFO Finish and Critique | Review of KAFO metal system, finish fabrication fit and critique. Laboratory fitting and critique.  
**Objectives:**  
1. Differentiate levels of fit and function through observing various KAFO’s  
2. Modify the fit of a KAFO to meet biomechanical function  
3. Recognize proper joint alignment and fit of a KAFO |
| Week 8 | Impression and Measurements for Polymer KAFO | Lecture/Demonstration: Theory and principles of polymer KAFO’s. Rationale. Seal impression. Laboratory fabrication project.  
**Objectives:**  
1. Perform impression procedure for a KAFO  
2. Align lower extremity for impression procedure |
| Week 9 | Fill Impression and Modify Cast  
Polymer KAFO Design Overview | Lecture and laboratory practice of KAFO modifications. Variations on modification processes. Laboratory |
| Week 10 | Modify KAFO Cast (continue) | Laboratory fabrication project. Lecture covering polymer KAFO systems, alignment and fabrication Objectives; 1. Modify a KAFO cast and apply a supracondylar medial modification 2. Apply alignment principles to locate knee joint center and ankle location when modifying a KAFO cast 3. Identify various modifications of polymer or hybrid KAFO’s 4. List various proximal trim line modifications utilized in the fabrication of KAFO’s |
| Week 11 | KAFO Vacuum Form and Trim Lines | Lecture and laboratory on vacuum forming KAFO. Trim line modifications and function. Laboratory fabrication project Objectives; 1. Vacuum form a polymer KAFO 2. Delineate trim lines for a standard polymer KAFO 3. Identify various trim line and modification procedures utilized in managing genu varum, valgum and knee hyperextension 4. Apply biomechanical principles to KAFO control |
| Week 12 | Complete fabrication process of KAFO | Lecture/Laboratory finishing of KAFO Objectives; 1. Delineate final trim lines for a KAFO 2. Perform side bar attachment 3. Align knee and ankle joints 4. Correctly align and lace straps and perform final assembly of KAFO |
| Week 13 | Fitting and Critique | Lecture/Lab; fitting, modifications and adjustments to KAFO. Laboratory fitting and critique. Objectives; 1. Identify and apply fitting criteria for fitting a polymer KAFO 2. Modify a KAFO to meet biomechanical objectives |
| Week 14 | Pre-fabricated Knee and Knee Ankle Foot Systems | Lecture/Lab; Measurement, selection and application of various off the shelf KO and KAFO systems Objectives; 1. Identify various pre-fabricated KO and KAFO systems 2. Select the appropriate orthosis for a given pathology 3. Identify fitting parameters of KO and KAFO pre-fabricated systems |
| Week 15 | Modification Procedures | Lecture/Demonstration; Modification techniques of custom and pre-fabricated KO and KAFO systems Objectives; 1. Identify and apply modification techniques in fitting KAFO and KO systems 2. Modify KO and KAFO systems to meet biomechanical objectives |
| Week 16 | Course Review Hip orthoses and Delineation for HKAFO | Completion of final projects Objectives; 1. Delineate a schema for a HKAFO 2. Identify various Hip orthoses |
3. Explain the use of standing frames

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<tr>
<th>Finals Week</th>
<th>Final Exam</th>
<th>Final Exam: Problem solving (Lab Practical)</th>
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**Effective Date:** 1-16-2012