

SUBJECT DESCRIPTION FORM

SUBJECT CODE: HTI4233

SUBJECT TITLE: Lower Limb Prosthetics I

CREDITS: 3

PRE-REQUISITES: HTI2121 Introduction to Biomechanics
HTI2122 Mechanics of Tissues & Biomaterials

CO- REQUISITES HTI3141 Orthopaedics, Traumatology and Rehabilitation

RESPONSIBLE DEPARTMENT: Health Technology and Informatics

RESPONSIBLE MEMBER OF THE ACADEMIC STAFF:
Dr. Aaron Leung

CONTACT HOURS:

Lecture	28 hours
Demonstration / Assessment	<u>42 hours</u>
Total Contact	70 hours

RATIONALE:

This course is part of the Prosthetics and Orthotics electives, which provides students with the principles in the design, fabrication, prescription, fitting and evaluation of prosthetic devices for the lower limb. The series progressively integrate the health and engineering studies, which the students will have taken as part of their earlier BME studies. Those academic studies will form the basis for the derivation of the scientific principles used in the practice of prosthetics.

LEARNING OUTCOMES:

Students will be able to:

- 1) apply detailed knowledge of the anatomy and pathology relevant to the disabilities involving all levels of lower limb amputations.
- 2) integrate principles and practical training in functional assessment of lower limb amputees,
- 3) apply clinical principles for prescribing lower limb prostheses,
- 4) utilize principles for the biomechanical design of lower limb prostheses.
- 5) treat patients on the basis of principles of the dynamic function, alignment and gait deviations of lower limb amputees.
- 6) exploit clinical and technical knowledge in the design, subject measurement, moulding, cast rectification, fabrication, CAD/CAM, fitting, evaluation, adjustment of lower limb prostheses for amputations below the knee disarticulation level, and
- 7) employ clinical techniques in patient education and training.

SYLLABUS:

Detailed review of the relevant anatomy; lower limb amputations, stump management; introduction to lower limb prosthetics; clinical assessment of lower limb amputees; and materials & components of lower limb prosthetics; biomechanics of lower limb prosthetics; prosthetic component options, syme prostheses, patella-tendon-bearing prostheses, through-knee prostheses; above knee prostheses measurement, moulding, cast rectification, and fabrication of lower limb prostheses; fitting and checkout of lower limb prostheses; CAD/CAM application.

TEACHING AND LEARNING ACTIVITIES:

The subject integrates theoretical knowledge and technical skills in a way that is important to patient care and management. In this course, students will have ample opportunities to interact directly with persons with amputations. Students will need to go through the step by step clinical process of patient assessment, patient measurement, casting, cast rectification,

fabrication, patient fitting, and patient evaluation. Emphasis is placed on the development of clinical judgement and the process of clinical problem solving. Organization of a student mock clinic further connects the teaching and learning activities to a broader experience of organization, management and interpersonal communication. Detailed review of the relevant anatomy; lower limb amputations, stump management; introduction to lower limb prosthetics; clinical assessment of lower limb amputees; and materials & components of lower limb prosthetics; biomechanics of lower limb prosthetics; prosthetic component options, syme prostheses, patella-tendon-bearing prostheses, through-knee prostheses; above knee prostheses measurement, moulding, cast rectification, and fabrication of lower limb prostheses; fitting and checkout of lower limb prostheses and CAD/CAM applications will provide the student with the knowledge base required. The 28 hours of lectures and tutorials will be supported by 42 hours of demonstrations, interaction with patient models and assessment of individual prosthetics projects.

ASSESSMENT:

Each of the individual learning outcomes will be assessed as part of the integrated outcome demonstrated by the student in patient care. Individual prosthetic design and fitting projects will be assessed with direct feedback from the model patients/subjects at various stages, as well as from the instructors throughout the process. In the process, students will also learn how to interact with the patients. At the completion of assigned individual projects, students will be guided to critique the work of other fellow students under the facilitation of the instructor. This is done to maximize the learning experience by learning not only from one’s own mistakes but also from those of the fellow students.

A final examination will be used to establish that the student has understood and can integrate the factual materials required to design, fabricate, fit and assess prostheses.

Continuous Assessment	50%
Final Examination	50%

REFERENCE MATERIALS:

1. Boone DA Computerized Prosthetics Alignment Training, The Hong Kong Polytechnic University, 2004
2. Stewart CP Prescribing a Lower Limb Prosthesis, British Society of Rehabilitation Medicine, 2000
3. Gage J Normal Walking, Gillette Children’s Hospital, 1995
4. Banerjee S.N. (ed.) Rehabilitation Management of Amputees. Williams and Wilkins, 1982.
5. Hoppenfeld S. Physical Examination of the Spine and Extremities.
6. Murdoch G., Donovan R.G. (eds.) Amputation Surgery and Lower Limb Prosthetics. Blackwell Scientific Publications, 1988.
7. Sanders G.T. Lower Limb Amputations - A guide to Rehabilitation. F.A. Davis, 1986.
8. May B.J. Amputations and Prosthetics: A Case Study Approach, F.A. Davis, 1996.
9. Weber D. Clinical Aspects of Lower Extremity Prosthetics: Trans-Tibial, Symes and Partial Foot Amputations, CAPO, Ontario, 1991.
10. Esquenazi A. Prosthetics, *Physical Medicine and Rehabilitation, Vol. 8, No. 1*, Hanley and Belfus, Inc., Philadelphia, 1994.
11. Donald S.G. Prosthetics & Orthotics, Appleton & Lange, Norwalk, Conn., 1990.
12. Wilson A.B. Limb Prosthetics, 6th ed., Demos, New York, 1989.