

Master in Prosthetics and Orthotics (MPO)

REGULATIONS AND CURRICULUM

2018



Rajiv Gandhi University of Health Sciences Karnataka
4th T Block Jayanagar Bangalore 560041

Rajiv Gandhi University of Health Sciences, Karnataka, Bangalore

THE EMBLEM



The emblem of the Rajiv Gandhi University of Health Sciences is a symbolic expression of the confluence of both eastern and western health sciences. A central wand with entwined snakes symbolizes Greek and roman gods of health called Hermis and Mercury is adopted as symbol of modern Medical sciences. The pot above depicts Amrutha Kalasham of Dhanvanthri the father of all health sciences. The wing above it depicts human soul called Hamsa (Swan) in Indian philosophy. The rising sun at the top symbolizes olive branches, which is an expression of peace, love and harmony. In Hindu philosophy it depicts the vanaspathi (also called as oushadi) held in the hands of Dhanvanthri, which is an expression of peace, love and Harmony. In Hindu Philosophy it depicts the Vanaspati (also called as Oushadi) held in the hands of Dhanvantri which are the source of all medicine. The lamp depicts human energy (Kundali). Does script “Devahitham Yadayahu” Inside the lamp taken from Upanishath Shanti Manthram (Bhadram Karnebhi Shrunuyanadev...) which says **“May we live the full span of our lives allotted by god in perfect health”** which is the motto of the Rajiv Gandhi University of Health Sciences.

Rajiv Gandhi University of Health Sciences, Karnataka, Bangalore

VISION STATEMENT

The Rajiv Gandhi University of Health Sciences, Karnataka, aims at bringing about a confluence of both Eastern and Western Health Sciences to enable the humankind “Live the full span of our lives allotted by God in Perfect Health.”

It would strive for achievement of academic excellence by Educating and Training Health Professionals who

- ❖ Shall recognize health needs of community,
- ❖ Carry out professional obligations Ethically and Equitably and in keeping with National Health Policy,

It would promote development of scientific temper and Health Sciences Research.

It would encourage inculcation of Social Accountability amongst students, teachers and institutions.

It would Support Quality Assurance for all its educational programmes

Motto

“Right for Rightful Health Sciences Education”

(Schedule annexed to University Notification No. ACA / DCD / MISC / 321 / 2017-18
dated 5th May 2017)

Ordinance Governing Regulation and Curriculum of Master in Prosthetics and Orthotics (2 Years)

2017-18

(As per Rehabilitation Council of India, Effective from Academic Session 2017-18)

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Regulations and Curriculum 2018

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SECTION I

I. PREAMBLE

The prime concern of the Council is to develop patterns of teaching in undergraduate and postgraduate prosthetics and orthotics education so as to demonstrate a high standard of prosthetics and orthotics education to all colleges / institutions in India. This educational experience is imparted in an atmosphere of research. Prosthetics and Orthotics is a specialized health care profession, which combines a unique blend of clinical and technical skills. The Prosthetics and Orthotics Professionals assess and evaluate patients, prescribe, custom design, fabricate, and fit the orthoses and prostheses. Rehabilitation of persons with locomotor disabilities or neuromuscular disorder is a team work, where Centre of attention is the person with disabilities. This work requires substantial clinical and technical judgment. Prosthetics and Orthotics Professional does not only provide service to persons with neuromusculoskeletal disorder and persons with disability, but also it provides service to general health and work related disorder such as foot disorders, fracture, sports injuries, disorders due to aging, tendinitis, muscular pain etc.. Prosthetics and Orthotics Professionals play an important role in the comprehensive post-surgical management of amputee and other neuromusculoskeletal disorders. Prosthetics and Orthotics Professionals make the patient independent, confident and useful member of the society through comprehensive prosthetic and orthotic management

II. OBJECTIVES

1. Patient Care

At the end of the MPO Course, the candidates shall be able to

- a. Assess, prescribe and provide comprehensive prosthetic and orthotic management to the individual and the community appropriate to his/her position as a member of the health care team.
- b. Be competent to take preventive, supportive, corrective and rehabilitative steps in respect to the commonly encountered problems related to prosthetics and orthotics.
- c. To carry out Evidence Based Practice in prosthetics and orthotics.
- d. Appreciate the psycho-social, cultural, economic, and environmental factors affecting health, and develop humane attitude towards the patients/relatives, in discharging one's professional responsibilities.
- e. Be familiar with the various National policies and Acts related to Persons with Disabilities.
- f. Acquire basic management & administrative skills in the areas of materials, financial and human resources related to prosthetics and orthotics.
- g. Develop the communication skills to establish effective communication with the

stake holders.

- h. Practice prosthetics & orthotics ethics in patient care, service delivery, and research.
- i. Develop attitude for self-learning and acquire necessary skills including the use of appropriate technologies.

2. Research

The candidate should be able to

- a. Recognize a research problem.
- b. State the objectives in terms of what is expected to be achieved in the end.
- c. Plan a rational approach with full awareness of the statistical validity.
- d. Spell out the methodology and carry out most of the technical procedures required for the study.
- e. Accurately and objectively record on systematic lines the results and observations made.
- f. Analyze the data using appropriate statistical approach.
- g. Interpret the observations in the light of existing knowledge and highlight in what ways the study has advanced existing knowledge on the subject and what remains to be done.
- h. Draw conclusions which should be reached by logical deduction and he / she should be able to assess evidence both as to its reliability and its relevance.
- i. Write a dissertation in accordance with the prescribed instructions.
- j. Be familiar with the ethical aspects of research.

3. Teaching

He/ she should be able to plan educational programs in Prosthetics and Orthotics in association with his senior colleagues and be familiar with the modern methods of teaching and evaluation.

The candidate should be able to

- a. Deliver lectures to undergraduates and hold clinical demonstrations for them.
- b. Write and discuss a seminar or a symposium and critically discuss it with his colleagues and juniors.
- c. Methodically summarize internationally published articles according to prescribed instructions and critically evaluate and discuss each selected article.
- d. Present cases at clinical conference, discuss them with his colleagues and guide his juniors in groups in evaluation and discussion of these cases.

4. Clinical Practicum

The student should be able to meet the following learning objectives:

- a. Assess the medical condition of a patient related to their orthotic or prosthetic management using appropriate investigative techniques which include patient history taking and clinical testing.
- b. Formulate an optimal prosthetic and orthotic solution using information from the patient assessment, other members of the health care team, medical charts, etc.
- c. Communicate and discuss patient goals and expectations and discuss and debate the prosthetic management with the patient, co-workers and other members of the health care team.
- d. Reliably measure and capture a positive cast or image of patient / clients' appendage while correctly positioning the body part and if appropriate apply the necessary corrective force system.
- e. Identify, prescribe and justify selection of appropriate materials and componentry in the fabrication of the prostheses or orthoses.
- f. Construct the prostheses or orthoses using appropriate fabrication techniques in preparation for the initial fitting.
- g. Fit the prostheses or orthoses to the patient using static and dynamic functional criteria established from the original assessment.
- h. Evaluate the quality of the prostheses or orthoses fit to ensure the appropriate interface contouring, force application and trim lines.
- i. Identify problems related to device fit and/or alignment and be able to suggest and implement appropriate correction.
- j. Assess and solve prosthetic or orthotic problems as part of long term patient care.
- k. Maintain accurate records of patient treatment and follow up as well as confidentiality of such information.
- l. Communicate effectively with patient, co-workers, and other health care professionals in such a manner that will ensure the highest quality of service and reflect a professional attitude on the part of the student.
- m. Educate the patient /client and/or caregiver on use, care and function of the prostheses or orthoses.
- n. Understand the methodology of problem identification, problem solving in a process that includes all stake holders, with the patient at the centre.

SECTION II

I. NOMENCLATURE

Master In Prosthetics & Orthotics (MPO)

II. MEDIUM OF INSTRUCTION

English shall be the medium for the course as well as for the examination.

III. DURATION OF THE COURSE

Two Academic Years

IV. ELIGIBILITY CRITERIA

Candidates who have passed minimum 3 ½ years/4 ½ years duration Bachelor degree in Prosthetics and Orthotics (BPO) or B.Sc. in Prosthetics and Orthotics with not less than 50% of marks in aggregate from this university or any other universities in India or abroad as equivalent is eligible for admission to Master in Prosthetics and Orthotics (MPO) Course.

OR

Candidates who have passed Bachelor in Prosthetics and Orthotics (BPO) or B.Sc in Prosthetics and Orthotics through Bridge course/Condensed Course or through Lateral Entry after completing their Diploma in Prosthetics and Orthotics from any institutions/ Universities in India recognised by Rehabilitation Council of India (RCI), New Delhi with not less than 50% of marks in aggregate is eligible for admission to Master in Prosthetics and Orthotics (MPO) Course.

V. SELECTION

Selection shall be based on merit in the qualifying examination.

VI. FACULTY-STUDENT RATIO

The faculty-student ratio in the area of MPO should be 1:6.

VII. ATTENDANCE

Each year shall be taken as a unit for purpose of calculating attendance and a student shall be considered to have put in required attendance for the year, if he/she has

attended not less than 80% of the number of working periods (lectures, seminars) and 90% of clinics during each year. Failure to put in / meet the required attendance by any student render him / her disqualified to appear in the university examination. The candidate who will not be able to take the examination for want of attendance will be declared as failed and will have to repeat the exam subsequently by putting in required attendance. Shortage of attendance can be condoned in genuine cases of absenteeism as per rules and guidelines of respective universities.

VIII. COURSE CONTENT & STRUCTURE

Student to pursue the course as given in the enclosed course curriculum

MPO – 1st Year

Course Code	Title	Theory Hours	Practical Hours	Total Hours
MPO 101	Advance Lower Extremity Prosthetics & Clinical Gait Analysis	60	350	410
MPO 102	Advanced Lower Extremity Orthotics & Clinical Gait Analysis	60	350	410
MPO 103	Research Methodology & Biostatistics	60	-	60
MPO 104	Mechatronics	60	-	60
MPO 105	Applied Biomechanics & Kinesiology	60	-	60
	Dissertation		220	220
	Total	300	920	1220

Note:

- Minimum Two Seminar Presentation, Two Journal Club, and Five Case Study presentation per candidate is mandatory.
- There will no examination for dissertation in first year. The candidate will make research proposal as per the guidance of supervisor and get it approved by Research Review and Ethical Committee.

MPO – 2nd Year

Course Code	Title	Theory hours	Practical hours	Total hours
MPO 201	Advanced Upper Extremity Prosthetics	60	200	260
MPO 202	Advanced Upper Extremity Orthotics	60	160	220
MPO 203	Advance Spinal Orthotics	60	200	260
MPO 204	Pedagogy in P&O Education & Administration, Management & Ethical Issues	80	-	80
MPO 205	Dissertation	-	400	400
	Total	260	960	1220

Note: Minimum Two Seminar Presentation, Two Journal Club, and Five Case Study presentation per Candidate is mandatory.

IX. METHODS OF TRAINING

The training of postgraduate for MPO degree shall be on a full time pattern with graded responsibilities in the management and treatment of patients entrusted to his / her care. The participation of all the students in all facets of educational process is essential. Every candidate should take part in seminars, group discussions, clinical placement, journal review meetings & CRE. Every candidate should be required to participate in the teaching and training programs of undergraduate students. Training should include involvement in clinical experience and research studies.

X. MONITORING PROCESS OF STUDIES (INTERNAL MONITORING)

It is essential to monitor the learning progress of each candidate through continuous appraisal and regular assessment. It not only helps teachers to evaluate students, but also students to evaluate themselves. The monitoring is done by the staff of the

department based on participation of students in various teaching / learning activities. It may be structured and assessment be done using checklists that assess various aspects.

Work diary: Every students shall maintain a work diary and record of his/her participation in the training programmers conducted by the department such as journal reviews, seminars etc.

Special mention may be made of the presentations by the students as well as details of clinical placement by the students. The work diary shall be scrutinized and certified by the Head of the Department and Head of the Institution and presented in the university examination.

Periodic tests: The institute may conduct periodic tests. The test may include written theory papers, practical, viva voce and clinical in the pattern of university examination. Records and marks obtained in such tests will be maintained by the Head of Department and sent to the University, when called for.

XI. DISSERTATION

The dissertation is aimed to train a graduate student in research methods and techniques. It includes identification of a problem, formulation of a hypothesis search and review of literature getting acquainted with recent advances, designing of a research study, collection of data, critical analysis, and comparison of results and drawing conclusions.

In the first year students shall submit to the Registrar of university in the prescribed proforma a synopsis containing particulars of proposed dissertation work within six months from the date of commencement of the course on or before the dates notified by the university. The synopsis shall be sent through the proper channel. Such synopsis will be reviewed and the university will register the dissertation topic.

No change in the dissertation topic or guide shall be made without prior approval of the university. Guide will be only a facilitator, advisor of the concept and hold

responsible in correctly directing the candidate in the methodology and not responsible for the outcome and results.

In the 2nd year, student will work on a selected topic of dissertation prepared under supervision and guidance of recognized faculty and will submit the same at the end of the year.

The dissertation should be written under the following headings.

1. Introduction
2. Aims or objectives of study
3. Review of literature
4. Material and methods
5. Results
6. Discussion
7. Conclusion
8. References
9. Appendices

The written text of dissertation shall not be less than 50 pages and shall not exceed 100 pages excluding references, tables, questionnaires and other annexure. It should be neatly typed in double line spacing on one side of paper (A4 size, 8.27" x 11.69") and bound properly. Spiral binding should be avoided. The guide, head of the department and head of the institution shall certify the dissertation.

Four copies of dissertation thus prepared shall be submitted to the Registrar (Evaluation), three months before final examination on or before the dates notified by the university. Candidates who fail to submit their dissertation on or before the stipulated date shall not be permitted to appear for the final year examination.

This shall be assessed by one internal and one external examiners for 100 marks in which event the average of marks assigned by both the examiner shall be awarded to the candidate or it shall be assessed as accepted or as rejected with no marks carried there of as per concerned University norms.

Approval of dissertation work is an essential precondition for a candidate to appear in the university examination.

XII. REGULATIONS FOR EXAMINATION

1. There shall be two university examinations, one at the end of the first year and the other at the end of second year respectively.
2. The university conducts two supplementary in year at an interval of not less than four to six months
3. A candidate who satisfies the requirement of attendance & progress as stipulated by the university shall be eligible to appear for the university examination.
4. A candidate has to pass in theory and practical exam separately in each of the paper.
5. A failed candidate needs to appear for both theory and practical examination in the failed subject/s.
6. Candidate, who fails in any two subjects, shall be permitted to continue the studies into the second year. However the candidate shall not be allowed to appear for the second year examination till such time that he/she passes all subjects of the first year of MPO examination.
7. The maximum period to complete the course successfully should not exceed three (3) years.
8. The duration of the university theory examination shall be 3 hours.
9. All practical examinations must be held in the respective clinical areas.
10. In case of theory papers the Internal Assessment (IA) will be for 20 marks (20%). This covers a maximum of 5 marks for attendance & 15 marks for tests, seminars, assignments etc. or as per University norms.
11. For clinical practicum, Internal Assessment (IA) will be for 20 marks (20%) based on performance of the candidate during the year.
12. Final Clinical Practicum examination will be held along with theory papers by the university.
13. The statement of Internal Assessment (IA) shall be sent to the Registrar (Evaluation) for both theory and clinical practicum as per notification before commencement of the particular year examination.

XIII. SCHEME OF EXAMINATION**MPO – 1st Year**

Code no.	Subject	University Examination				Grand Total
		Theory		Practical		
		Int exam	University exam	Int exam	University exam	
MPO/101	Advance Lower Extremity Prosthetics & Clinical Gait Analysis	20	80	20	80	200
MPO/102	Advanced Lower Extremity Orthotics & Clinical Gait Analysis	20	80	20	80	200
MPO/103	Research Methodology & Biostatistics	20	80	-	-	100
MPO/104	Mechatronics	20	80	-	-	100
MPO/105	Applied Biomechanics & Kinesiology	20	80	-	-	100
Total marks		100	400	40	160	700

Note: There will no examination for dissertation in first year. The candidate will make research proposal as per the guidance of supervisor and get it approved as per university norms.

MPO – 2nd Year

Code no.	Subject	University Examination		Grand Total
		Theory	Practical	

		Int exam	University exam	Int exam	University exam	
MPO/201	Advanced Upper Extremity Prosthetics	20	80	20	80	200
MPO/202	Advanced Upper Extremity Orthotics	20	80	20	80	200
MPO/203	Advance Spinal Orthotics	20	80	20	80	200
MPO/204	Pedagogy in P&O Education & Administration, Management & Ethical Issues	20	80	-	-	100
MPO/205	Dissertation	-	-	-	200	200
Total marks		80	320	60	440	900

1. Pattern of Model Theory Question Paper

Maximum Marks: 100		Duration: 3 Hours
TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS FOR EACH QUESTION
LONG ESSAY TYPE (2 question)	3 (2X20)	40
SHORT ESSAY TYPE(6 question)	7 (6X10)	60

Maximum Marks: 80		Duration: 3 Hours
TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS FOR EACH QUESTION
LONG ESSAY TYPE (1 question)	2 (1X20)	20
SHORT ESSAY TYPE (6 question)	7 (6X10)	60

2. Structure of practical examination

Maximum Marks: 80		Duration: 1 – 2 days	
PARTICULAR		MARKS	
PRACTICAL		60	
VIVA-VOCE		20	

3. Structure of dissertation examination

Mode of examination will be individual dissertation presentation by students and viva –voce by the examiners. Duration per student will be around 40 minutes. The examination shall be precede as per University norms.

XIV. CRITERIA OF PASSING

A candidate shall be declared pass if he / she secures minimum 50% of maximum marks in theory aggregate and secures a 50% of marks in practical/clinical aggregate.

XV. DECLARATION OF CLASS

- **First class with distinction** – 75% & above in aggregate provided the candidate passes the examination in **1st attempt**.
- **First class** – 60% & above in aggregate provided the candidate pass the examination in **1st attempt**.
- **Pass** – 50% of maximum marks separately in theory aggregate and 50% of maximum marks in clinical and Viva-Voce aggregates.

Note: For declaring the rank aggregate of 2 years marks to be considered.

XVI. DEGREE AWARD

After successful completion of all examinations, candidate will be awarded with the **“Degree of Master in Prosthetics and Orthotics (MPO)”**. The said degree will be classified by its class such as “First Division, Second Division’ or ‘Pass’ according to the University norms.

SECTION III

COURSE DESCRIPTION

MPO 101 Advanced Lower Extremity Prosthetics & Clinical Gait Analysis

THEORY

Placement: 1st Year

Hours of Instruction

Theory : 60 Hours.

COURSE DESCRIPTION:

This subject is delivered in a coordinated manner with the practical part of the prosthetic course. The student will be required to comprehend the evidence based management of various amputation levels along with the efficacy of different treatment approaches and its utility in clinical scenario.

OBJECTIVES:

At the end of the course, students will be able to:

- Carry out Evidence Based Practice for various condition requiring lower limb prosthetic management.
- Analyze patient/client condition as a whole i.e. assessing in all aspects including physical, environmental, economical, psycho-social, cultural, and educational and others.
- Formulate appropriate orthotic prescriptions for wide range clinical situations using holistic approach.
- Describe the effectiveness of different components pertaining to clinical condition and considering other factors.
- Categorize different parameters of clinical gait analysis and its importance to research point of view.
- Demonstrate gait analysis of patient with and without prosthesis and analyse its relevance to clinical condition and prosthesis.
- Discuss and consider biomechanics while evaluating clinical condition/prosthesis and also while formulating appropriate prescriptions.
- Recognize various ergonomic principles in lower extremity prosthetic and demonstrate the use of appropriate ISO terminology.

COURSE CONTENT:

Unit	Time (Hrs)	Learning Objectives	Content and Teaching learning Method
1	3	- Describe different types of prosthetic foot along with its biomechanics and its gait analysis. - Explain selection criteria of prosthetic foot. - Describe programming of microprocessor prosthetic foot.	Prosthetic Foot: Advancement in the prosthetic foot, Energy expenditure of the amputee gait and comparison of different prosthetic feet, Biomechanics of prosthetic feet, Programming of microprocessor prosthetic foot.
2	3	- Describe and explore the advancement of prosthetic hip joints. - Understand & learn the biomechanics and criteria of prosthetic hip joint. - Describe programming of microprocessor prosthetic knee. - Explain biomechanics of advanced prosthetic knee joint in detail and hydraulic fluid and MRF fluid.	Prosthetic Knee Joint : Advancement in prosthetic knee joint, Biomechanics of prosthetic knee joint, Criteria for prosthetic knee joint, Programming of microprocessor prosthetic knee joint, Biomechanics of hydraulic fluid, Biomechanics of MRF fluid.
3	3	- Describe and explore the advancement of prosthetic hip joints. - Understand & learn the biomechanics and criteria of prosthetic hip joint. - Describe programming of microprocessor prosthetic knee.	Prosthetic Hip joint: Advancement in prosthetic Hip joint, Biomechanics of prosthetic Hip joint, Criteria for prosthetic Hip joint, Programming of microprocessor prosthetic Hip joint, Biomechanics of hydraulic fluid.

		► Explain biomechanics of advanced prosthetic hip joint in detail and hydraulic fluid.	
4	3	► Explore the advancement in socket technology. ► Explain prosthetic management of partial foot amputation. ► Learn the comprehensive assessment and evaluation procedure of partial foot amputation. ► Describe biomechanics and gait analysis using partial foot prosthesis. ► Explain evidence based management of partial foot amputation.	Prosthetic Management of Partial Foot Amputation: Medical Consideration, Advancement in socket technology, Biomechanics of Prosthetic gait, Gait analysis of Prosthetic gait, Current trends in prosthetic management Partial foot amputation.
5	3	► Explore the advancement in socket technology. ► Explain prosthetic management of Syme's prosthesis. ► Learn the comprehensive assessment and evaluation procedure of Syme's prosthesis. ► Describe biomechanics and gait analysis using Syme's prosthesis.	Prosthetic Management of Syme's Amputation: Medical Consideration, Advancement in socket technology, Biomechanics of Prosthetic gait, Gait analysis of Prosthetic gait, Current trends in prosthetic management of Syme's Amputation.

		▶ Explain evidence based management of Syme's prosthesis.	
6	3	▶ Explore the advancement in socket technology. ▶ Explain prosthetic management of TT prosthesis. ▶ Learn the comprehensive assessment and evaluation procedure of TT prosthesis. ▶ Describe biomechanics and gait analysis using TT prosthesis. ▶ Explain evidence based management of TT prosthesis.	Prosthetic Management Transtibial Amputation: Medical Consideration, Advancement in socket technology, Biomechanics of Prosthetic gait, Gait analysis of Prosthetic gait, Current trends in Transtibial prosthetic management.
7	3	▶ Explore the advancement in socket technology. ▶ Explain prosthetic management of TK prosthesis. ▶ Learn the comprehensive assessment and evaluation procedure of TK prosthesis. ▶ Describe biomechanics and gait analysis using TK prosthesis. ▶ Explain evidence based management of TK prosthesis.	Prosthetic Management of Through knee Disarticulation : Medical Consideration, Advancement in socket technology, Biomechanics of Prosthetic gait, Gait analysis of Prosthetic gait, Current trends in prosthetic, management of through knee disarticulation.
8	6	▶ Explain prosthetic management of TF amputation	Prosthetic Management of Transfemoral Amputation:

		▶ Assessment and evaluation procedure of TF amputation. ▶ Describe biomechanics of prosthetic gait and prosthesis. ▶ Explain evidence based management of TF amputation.	Medical Consideration, Advancement in socket technology, Biomechanics of Prosthetic gait, Gait analysis of Prosthetic gait, Current trends in prosthetic management Transfemoral amputation.
9	6	▶ Explain prosthetic management of HD & TP amputation. ▶ Assessment and evaluation procedure of HD & TP amputation. ▶ Describe biomechanics of prosthetic gait and prosthesis. ▶ Explain evidence based management of HD & TP amputation.	Prosthetic Management of Hip Disarticulation & Transpelvic Amputation: Medical Consideration, Advancement in socket technology, Biomechanics of Prosthetic gait, Gait analysis of Prosthetic gait, Current trends in prosthetic management of Hip Disarticulation & Transpelvic amputation.
10	3	▶ Explain prosthetic management of translumbar amputation. ▶ Assessment and evaluation procedure of translumbar amputation. ▶ Describe biomechanics of prosthetic gait and prosthesis. ▶ Explain evidence based management of translumbar amputation.	Prosthetic management of translumbar amputation (hemicorporectomy): Medical Consideration, Advancement in socket technology, Biomechanics of Prosthetic gait, Gait analysis of Prosthetic gait, Current trends in prosthetic management of translumbar amputation.
11	6	▶ Explain prosthetic management of	Prosthetic Management of congenital deficiency:

		congenital deficiency. ▶ Assessment and evaluation procedure of congenital deficiency. ▶ Explain ISO and other classification system of congenital deficiency. ▶ Describe biomechanics of prosthetic gait and prosthesis. ▶ Explain evidence based management of congenital deficiency.	Medical Consideration, Advancement in socket technology, Biomechanics of Prosthetic gait, Gait analysis of Prosthetic gait, Current trends in prosthetic management of congenital deficiency.
12	3	▶ Explain prosthetic management of multiple limb deficient child. ▶ Assessment and evaluation procedure of multiple limb deficient child. ▶ Explain ISO and other classification system of multiple limb deficient child. ▶ Describe biomechanics of prosthetic gait and prosthesis. ▶ Explain evidence based management of multiple limb deficient child.	Prosthetic management of multiple limb deficient child. Medical Consideration, Advancement in socket technology, Biomechanics of Prosthetic gait, Gait analysis of Prosthetic gait, Current trends in prosthetic management of multiple deficiency.
13	3	▶ Explain prosthetic management for sports and recreation. ▶ Describe and demonstrate	Lower -Limb Prosthetic Adaptations for Sports and Recreation.

		assessment and evaluation procedure. ▶ Mention and explain different components used.	
14	3	▶ Able to apply recent advancement in practical scenario. ▶ Able to critically evaluate the finding of research and development.	Emerging trends in lower limb prosthetics: research and development.
15	3	▶ Assessment and evaluation procedure of bilateral lower limb amputees. ▶ Able to take measurement for bilateral amputees using different methods. ▶ Describe and demonstrate fabrication procedure involved. ▶ Mention and explain different components and its utility and advantage in bilateral amputees.	Fitting and training the bilateral lower limb amputee.
16	3	▶ Describe Osseo integration technique and its application in P&O.	Osseo integration technique and its application.
17	3	▶ Explain CAD-CAM sockets.	CAD-CAM Sockets.

TEACHING & LEARNING METHOD:

- Lecture cum discussion
- Seminar/ Presentations
- Journal Club
- Class room teaching

- Demonstration/Return demonstration
- Clinical practice
- Clinical discussion
- Clinical case presentation
- Field visits
- Participation in workshops & conferences
- Educational visits
- Library

MPO 101 Clinical Practice in Lower Extremity Prosthetics PRACTICAL

Placement: 1st Year

Hours of Instruction

Practical: 350 Hours.

COURSE DESCRIPTION:

This should include the manufacture and fitting of all devices and exposure to the range of devices not routinely seen in clinical practices.

OBJECTIVES:

At the end of the course, students will be able to:

- The candidate should be able to assess, diagnose, plan and execute the prosthetic treatment for children and adults with various amputation (congenital and acquired).
- Assessment of minimum 20 patients with various amputation (congenital and acquired).
- Use of instrumentation in minimum 10 patients with amputation (congenital and acquired).
- Plan and execute in minimum 5 patients with amputation (congenital and acquired).
- Maintain clinical records.

TEACHING & LEARNING METHOD:

- Demonstration/Return demonstration.
- Assessment.
- Clinical practice.
- Clinical discussion.
- Clinical case presentation / Case study.
- Field visits.
- Participation in workshops & conferences.

RGUHS Notification No. ACA/ DCD/ MISC/ 321/ 2017-18 dated 5th May 2017 **Master in Prosthetics and Orthotics (MPO)**
Regulations and Curriculum 2018

- Educational visits.
- Workshop.

MPO 102 Advance Lower Extremity Orthotics & Clinical Gait Analysis THEORY

Placement: 1st Year

Hours of Instruction

Theory : 60 Hours

COURSE DESCRIPTION:

This subject is delivered in a coordinated manner with the practical part of the orthotic course. The student will be required to comprehend the evidence based management of various conditions along with the efficacy of different treatment approaches and its utility in clinical scenario.

OBJECTIVES:

At the end of the course, students will be able to:

- Carry out Evidence Based Practice for various condition requiring lower limb orthotic management using appropriate technology and materials.
- Analyze patient/client condition as a whole i.e. assessing in all aspects including physical, environmental, economical, psycho-social, cultural, and educational and others.
- Formulate appropriate orthotic prescriptions for wide range of clinical situations using holistic approach.
- Describe the effectiveness of different orthosis pertaining to clinical condition and considering other factors.
- Categorize different parameters of clinical gait analysis and its importance to research point of view.
- Demonstrate gait analysis of patient with and without orthosis and analyse its relevance to clinical condition and orthosis.
- Discuss and consider biomechanics while evaluating clinical condition/orthosis and also while formulating appropriate prescriptions.
- Recognize various ergonomic principles in lower extremity orthotics and demonstrate use of appropriate ISO terminology.

COURSE CONTENT:

Unit	Time (Hrs)	Learning Objectives	Content and Teaching learning Method
1	3	▶ Able to discuss and consider normal kinesiology and ergonomic principles used. ▶ Analyse biomechanical principles and its effect on an orthosis. ▶ Acquainted with ISO terminology. ▶ Able to learn to prescribe the orthosis based on EBP and using appropriate materials & Technology.	Anatomy & kinesiology of lower extremity, Ergonomic principles in lower extremity orthotics, International Organization for Standardization (ISO) terminology, Evidence based approach to lower limb orthotics rehabilitation, Material and technologies used in lower limb orthotics, Biomechanical principles influencing orthosis & direct and indirect biomechanical effect.
2	2	▶ Explore & learn the evidence based management of various foot conditions.	Evidence based management of Metatarsalgia, Sesamoidities, Morton's syndrome, Morton's neuroma, Hallux rigidus, Hallux valgus, Hammer toes, Claw toes and Mallet toes, Pes planus, Pes equines, Pes cavus, Planter fasciitis, Arthrodesis, Achilles tendinitis.
3	3	▶ Able to perform comprehensive assessment and set the orthotic goal based on foot condition. ▶ Able to explain different types of foot orthosis and fabrication process. ▶ Able to select the appropriate materials and components based on assessment.	Functional foot orthosis : Assessment and evaluation of foot, Non weight bearing and Weight bearing examination, Goal of orthotic intervention, Type of foot orthosis, Casting techniques, Material used in fabrication of foot orthosis, Component of foot orthosis, UCBL, SMO.

4	3	▶ Explain different types of ankle foot orthosis along with various biomechanical principles used and its fabrication process including selection of components and materials. ▶ Analyse gait and rockers of foot.	Ankle foot orthosis : Prerequisites of functional gait, Rockers of gait, Biomechanical principle of ankle foot orthoses, Material and methods, Orthotic ankle joint & various ankle foot orthosis, Neurophysiological ankle foot orthosis, FRO & it's Application.
5	2	▶ Describe normal anatomy of knee joint and its biomechanics. ▶ Explain different types of knee orthosis with its application.	Orthotic Management of Knee : Anatomy of knee joint, Biomechanics of knee motion, Classification, Biomechanical consideration, Knee orthosis & its application.
6	2	▶ Explain orthosis for OA knee and patellofemoral dysfunction and its effectiveness. ▶ Describe classification of orthotic knee joints and mention its indications.	Knee orthosis for osteoarthritis: Efficacy of knee orthoses, Effect of insoles, Orthoses for patellofemoral dysfunction & Orthotic knee joints & its Classification.
7	3	▶ Explain about KAFO along with its evaluation, biomechanics, different types, prescription criteria and its effectiveness.	Knee ankle foot orthosis: Classification, Biomechanical consideration, Indication of knee ankle foot orthosis, Evaluation and prescription, Various Knee ankle foot orthosis design, Conventional Knee ankle foot orthosis, Thermoplastic Knee ankle foot orthosis.
8	3	▶ Explain anatomy and biomechanics of hip joint. ▶ Describe different hip	Orthotic management of Hip: Anatomy of Hip joint, Biomechanics of Hip motion, Classification, Biomechanical consideration. Hip orthosis & its

		orthosis and hip joints.	application, orthotic Hip joints & its classifications.
9	2	► Explain about HKAFO along with its biomechanics, different types, prescription criteria and its effectiveness.	Hip knee ankle orthosis: Classification, Biomechanical consideration, Indication of Hip knee ankle foot orthosis, Evaluation and prescription, Various Hip knee ankle foot orthosis design.
10	3	► Explain evidence based orthotic management of neuropathic and/or dysvascular patient with its examination and effectiveness of treatment.	Orthotic management of the neuropathic and or dysvascular patient: Peripheral neuropathy, Causes of Peripheral neuropathy, Charcot neuropathy (Charcot joint), Assessment and examination, Toe deformities, Complication of neuropathic foot, Examination of neuropathic foot, Venous static ulcers, Grading of ulcers, Management of foot ulcers, Orthotic treatment, Various type of orthotic devices, Various shoe modification, Peripheral vascular disease, Utility of pressure garment.
11	3	► Explain evidence based orthotic management of neuromuscular disorders with its examination and effectiveness of treatment.	Orthotic management for persons with neuromuscular disorders: Pathophysiology, Epidemiology, Pathological type, Current issue and research outcome, Treatment consideration, Assessment and evaluation, Non operative management and modalities, Orthotic consideration.
12	3	► Explain evidence based orthotic management of knee for sports related disorders with its examination and effectiveness of treatment.	Orthotic management of Knee for sports related disorders: Various knee ligament injuries, various design consideration, Clinical relevance for orthotic management, Current researches, Epidemiological studies and Clinical performance of orthotic braces.

13	2	► Explain evidence based orthotic management of THR and TKR with its examination and effectiveness of treatment.	Orthotic management in total hip and knee replacement: Historical background, Dislocation and classification, Pathophysiology of dislocation, Orthotic management of dislocation, Neurological complications, Orthotic consideration for treatment, Orthotic management after knee replacement.
14	3	► Explain evidence based orthotic management of PPRP with its examination and effectiveness of treatment.	Orthotic management for person with post-polio syndrome: Pathophysiology, Historical perspective, Current issues and research outcome, Treatment consideration, Orthotic management; Ankle foot orthosis, Knee ankle foot orthosis, Orthoses for person with post-polio squeal, Difference between post-polio syndrome and post-polio squeal, Current issue and research finding, Treatment consideration, Assessment and examination, Various orthotic option, Effect of orthotic management, Biomechanical consideration during fitment of orthotic.
15	3	► Explain evidence based orthotic management of spinal cord injury with its examination and effectiveness of treatment.	Orthotic management for person with spinal cord injury: Pathophysiology, Level of injury, Various issues related to spinal cord injury, Treatment consideration, Various assessment and diagnostic tools, Operative management, Non-operative management, Importance of orthotic management.
16	2	► Explain evidence based orthotic management of Traumatic brain injury with its examination and	Orthotic management for person with traumatic brain injury: Pathophysiology, Current issue and research finding, Abnormal walking pattern, Kinematic and kinetics

		effectiveness of treatment.	analysis, Assessment and examination, Treatment consideration, Non operative management, Various Orthotic management.
17	3	► Explain evidence based orthotic management of pediatric condition with its examination and effectiveness of treatment.	Pediatric Orthosis: Congenital and acquired disorders: Pathophysiology of disorder, Current issue and research finding, Assessment and evaluation tools, Type of deformity, Treatment consideration, Orthotic management modalities, biomechanical consideration of orthosis, Type of disorders, Congenital foot deformities, Metatarsus adductus, Skew foot, Club foot, Congenital vertical talus, Calcaneovalgus foot, Flat foot, Cavus deformity, Kohler disorder, Bunion , Freiberg infraction, Bow leg, Knock knee, Tibia vara and valga.
18	2	► Explain evidence based orthotic management of paediatric hip condition with its examination and effectiveness of treatment.	Orthotic management of Paediatric hip: Pathophysiology of disorder, Current issue and research finding, Assessment and evaluation tools, Type of deformity, Treatment consideration, Orthotic management.
19	2	► Explain evidence based orthotic management of muscle disease with its examination and effectiveness of treatment.	Orthotic management for muscle disease patient: Pathophysiology, Current issues and research outcome, Assessment and evaluation tools, Treatment modalities, Effect of team approach, Orthotic consideration.
20	3	► Explain evidence based orthotic management of cerebral palsy with its examination and	Orthotic management for cerebral palsy: Pathophysiology, Biomechanical dysfunction, Effect of GRF, Direct and indirect control mechanism, Historical

		effectiveness of treatment.	perspective, Current issues and research outcome, Assessment and evaluation tool, Orthotic Consideration.
21	2	► Explain evidence based orthotic management of spina bifida with its examination and effectiveness of treatment.	Orthotic management for myelomeningocele: Pathophysiology, Historical perspective, Assessment and evaluation tool, Level of involvement, Current issues and research outcome, Orthotic Consideration.
22	6	► Explain abnormal gait ► Demonstrate and describe various gait analysis techniques. ► Mention and explain different parameters used to analyse gait and outcome of treatment in clinical condition. ► Able to perform gait analysis of patients using various orthosis.	Clinical Gait Analysis: Abnormal gait, pathological Gait & Observational Gait Analysis, 3D Kinetic & kinematic Analysis, motion analysis & force plate analysis. Temporal & Spatial Gait Parameter, stride measurement system & energy expenditure. Measurement of Energy Expenditure, pathological gait with emphasis on polio, cerebral palsy, dystrophies, hemi paresis, Para paresis. Gait analysis of patients using FO, AFO, KO, KAFO, Hip Orthosis, & HKAFO.

TEACHING & LEARNING METHOD:

- Lecture cum discussion
- Seminar/ Presentations
- Journal Club
- Class room teaching
- Demonstration/Return demonstration
- Clinical practice
- Clinical discussion
- Clinical case presentation
- Field visit
- Participation in workshops & conferences
- Educational visits
- Library

MPO 102 Clinical Practice in Lower Extremity Orthotics PRACTICAL

Placement: 1st Year

Hours of Instruction

Practical: 350 Hours.

COURSE DESCRIPTION:

This should include the assessment, fabrication and fitting of all devices and exposure to the range of devices not routinely seen in clinical practices.

OBJECTIVES:

At the end of the course, students will be able to:

- The candidate should be able to assess, diagnose, plan and execute the orthotic treatment for children and adults with various neuromusculoskeletal disorder.
- To maintain clinical record.
- Assessment of minimum 20 patients with various disorders.
- Use of instrumentation in minimum 10 patients with disorders.
- Plan and execute in minimum 5 patients with disorders.
- Maintain clinical records.

TEACHING & LEARNING METHOD:

- Demonstration/Return demonstration
- Assessment
- Clinical practice
- Clinical discussion
- Clinical case presentation / Case study
- Field visits
- Participation in workshops & conferences
- Educational visits
- Workshop

MPO 103 Research Methodology & Biostatistics

Placement: 1st Year**Hours of Instruction**

Theory : 60 Hours.

COURSE DESCRIPTION:

The student would acquire the knowledge of the research problem, design, sampling, data collection, analysis of data, testing of hypotheses, bio statistical test, interpretation and dissertation writing in prosthetics and orthotics.

OBJECTIVES:

At the end of the course, students will be able to:

- Explain different research designs and its applicability.
- Demonstrate the flow or steps involved while conducting research.
- Able to find out research problem and formulate hypothesis.
- Able to demonstrate the different data collection technique and demonstrate it.
- Perform and interpret testing of hypothesis.
- Demonstrate the writing of dissertation relevant to prosthetics and orthotics.
- Able to critically evaluated research study.

COURSE CONTENT:

Unit	Time (Hrs)	Learning Objectives	Content and Teaching learning Method
Section A: Research Methodology			
1	3	► Explain different types of research designs and its application.	Methods of research in behavioural sciences – research design – measuring purpose – principles – needs – applications between group designs and single subject research designs.
2	6	► Describe fundamentals of research i.e. variables, finding research problem, formulate hypothesis.	Basic of research – science scientific approach – problems – hypothesis – constructs – variables. Types of research- empirical rationale-experimental and export-factor research laboratory experiments - field studies – survey research - fundamental research epidemiology-clinical and applied research.
3	9	► Explain different types of sampling	Technique of sampling – sampling and randomness-principles of

		techniques like probability and non-probability sampling techniques. - Describe reliability and validity - Explain variance and its control. - Describe technique to match subjects in two different groups.	randomization – random assignment – methods – random sampling-stratified sampling, incidental sampling – purposive samples of one to tone matched sampling – size of sample. Measurement – foundations – types – reliability – validity. Variance – implication to research – variance control. Techniques of equation – experimental and control groups – matching and randomization – advantages, disadvantages and limitations.
4	3	Explain various types of research design.	Research designs – various types of group designs – various types of single subject research designs.
5	3	- Explain various analysis techniques. - Demonstrate the interpretation.	Analysis and interpretation – principles, indices – cross breaks – factor analysis – multivariate statistics – time series analysis.
6	6	- Explain research report writing including blueprint/synopsis and dissertation writing. - Able to follow institutional guidelines to carryout research in P&O. - Able to understand the ethics involved in conducting research.	The research report – cardinal characteristics – purpose – structure presentation and writing style. Institutional guidelines to carryout research in P & O.

Section B: Biostatistics			
7	6	Explain statistics approach like measures of central tendency, dispersion, and variability.	Statistics – purpose – approach – methods – measures of central tendency – Dependability of these measures – research applications. Measures of variability – types and meaning of various measures – research applications. Standard score – normal distribution deviations – skewness and Kurtosis – conditions of applications – limitations in interpretation.
8	3	- Explain theory of probability like normal distribution, probability curve. - Explain reasons for deviation from normal forms.	Theory of probability – principles and properties of normal distribution – binominal distribution – interpretation of data using the normal probability curve – causes of distribution – deviations from the normal forms.
9	3	Explain correlation and its various tests.	Correlation – meaning – coefficient of correlation – linear correlation – product moment correlation – rank correlation, biserial correlation, tetracoric correlation partial and multiple correlations – regression equation.
10	6	Explain various statistical test for testing of hypothesis.	Variance – concept – foundations – assumptions – one way classification. ANOVA MANOVA, ANCOVA, MANCOVA.
11	3	Explain item analysis.	Item analysis – item pool – its selection – item difficulty item variance – item conduction – time validity – difficulty index.
12	6	Explain different non-parametric statistical test and its applicability and its interpretation.	Non – parametric statistics – its nature and condition and application – non parametric analysis of variance and measures of association – tests of difference with correlated and uncorrelated data – tests of similarity.

13	3	▶ Demonstrate selection of appropriate statistical methods in research.	Selection appropriate statistics methods in the research, receivers operating characteristics.
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TEACHING & LEARNING METHOD:

- Lecture cum discussion
- Seminar/ Presentations
- Journal Club
- Class room Teaching
- Participation in workshops & conferences
- Educational visits
- Library

MPO 104 Mechatronics**Placement: 1st Year****Hours of Instruction**

Theory : 60 Hours.

COURSE DESCRIPTION:

The course focus on developing sufficient knowledge in CAD-CAM techniques, the importance of various electronic and electro-mechanical systems; their application in Robotics and prepares the students to incorporate these techniques in Prosthetics & Orthotics.

OBJECTIVES:

At the end of the course, students will:

- Have sufficient knowledge of CAD-CAM and will be able to apply CAD-CAM techniques in applications related to the field of prosthetics and orthotics.
- Able to understand the role of Robotics and associated electro-mechanical systems and their applications in Prosthetics and Orthotics.

COURSE CONTENTS:

Unit	Time (Hrs)	Learning Objectives	Content and Teaching learning Method
1. CAD-CAM			
1	8	▶ Able to understand application of CAD in Prosthetics & Orthotics.	Introduction to CAD, CAD application in Prosthetics and Orthotics, Graphical representation, Graphical representation of solid model,

		▶ Able to create two and three dimensional solid models. ▶ Get familiarized with the use of MATLAB.	Geometric modeling, Solid modeling concept, Process of solid modeling, Geometric transformation, Vector and matrix algebra, Geometric transformation, Two dimensional transformation, Three dimensional transformation, Two and three dimensional transformation and projection, Projection, Prospective projection, Plane curve and cones, Cubes, Bezier curve, Solid modeling, Solid modeling concept, Half spaces, Boundary representation (B- rep), Constructive solid geometry (CSG), Other solid modeling schemes, Visibility concepts- Clipping, Visibility concepts- 3D Clipping, Visible lines and surface, MATLAB Tutorial.
1.1 CAM			
2	6	▶ Able to understand the application of CAD-CAM in Prosthetics & Orthotics. ▶ Able to understand the construction and operation of CNC machines.	Introduction of CAM, Classification of CNC and NC system, Types of CNC machines , Purpose of CNC and NC system, Process of CNC, Advantage of CAM system, Application of CAD- CAM in P&O field, Advantage of CAD- CAM in P&O field, Latest development in application of CAD-CAM in P&O field.
2. Electronics			
3	8	▶ Get familiarised with fundamentals of Electronic circuits. ▶ Able to describe the different types of circuits and understand the behaviour of components.	A. Introduction: D.C. Circuits, Ohm's Law, Kirchoff's Laws, D.C. Circuits, Nodal and Loop methods of, analysis, A.C. CIRCUITS, Sinusoidal signal, Instantaneous and peak values, RMS and average values, Behaviors of components in A.C. circuits, Series and parallel a.c. circuits, Series and parallel A.C. circuits, Series and parallel resonance , Q factor, Cut-off frequencies and bandwidth, Magnetic circuit concepts: Self-inductance ,Magnetic coupling analysis

			of single tuned & double tuned, Circuit involving mutual inductance.
4	6	▶ Able to analyse different electronic circuits and concepts of resonance. ▶ Describe principles of electronic measurements.	B. Introduction to transformer: Circuit analysis, Sinusoidal steady state circuit analysis, Voltage, current, sinusoidal & phaser presentation single phase AC circuit, Behavior of resistance, Inductance & capacitance & their combination, Impedance concept of power, Power factor, Series & parallel resonance, Band width & quality factor, Measurement of R, L, and C.
5	6	▶ Able to explain different network theorems. ▶ Demonstrate the use of transformers in electrical systems.	C. Network theorems: Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power transfer theorem, Star to Delta & Delta to Star transformation. Transformers: Principle, construction & working of transformer, efficiency and regulation.
6	4	▶ Able to apply the concepts of electronics in Prosthetics and Orthotics.	D. Application of electronic in Prosthetics and Orthotics field.
3. Robotics			
7	6	▶ Able to describe the concepts, technology and application of robotics in Prosthetics and Orthotics.	A. Introduction: Types, classification and usage, Science and Technology of robot, Utility of robotics in field of Prosthetics and Orthotics.
8	10	▶ Get familiarized with the different sensors and other elements of Robots and their applications	B. Elements of robots – links, joints, actuators, and sensors, purpose of sensors, internal and external sensors, common sensors, encoders, tachometers, strain gauge based force-torque sensors, proximity and distance measuring sensors.

9	6	▶ Able to describe the kinematics as applied to robots.	C. Kinematics of serial robots: Introduction, direct and inverse kinematics problems, examples of kinematics of common serial manipulators, workspace of a serial robot, inverse kinematics of constrained and redundant robots.
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TEACHING & LEARNING METHOD:

- Lecture cum discussion
- Seminar/ Presentations
- Journal Club
- Class room teaching
- Participation in Workshops & Conferences
- Educational visits
- Library

MPO 105 Applied Biomechanics & Kinesiology

Placement: 1st Year**Hours of Instruction**

Theory : 60 Hours.

COURSE DESCRIPTION:

The understanding of bio-mechanical principles in Prosthetics and Orthotics are foundation of the prescription and design of the various devices. It is essential to have a sound theoretical knowledge of the subject and students are able to demonstrate the rigorous application of these principles during the practical of P&O devices.

OBJECTIVES:

At the end of the course, students will be able to:

- Apply biomechanical principles to generate optimal solutions to clinical problems in prosthetics and orthotics.
- Demonstrate the ability to analyse forces and moments applied to the body by prosthetic and orthotic devices.
- Explain the mechanics and pathomechanics of all joints.
- Analyze the forces and moments acting on different joints during various activities like sitting, standing, walking, lifting objects, etc.
- Explain mechanics of tissue and its application in P&O.
- Demonstrate normal posture and analyse effects on pathomechanics.

COURSE CONTENTS:

Unit	Time (Hrs)	Learning Objectives	Content and Teaching learning Method
1	6	▶ Demonstrate Application of general biomechanical principles in human and prosthesis and orthosis.	a. General Biomechanics: • Force & its component • Lever & mechanical Advantage • Torque or Moment of force • Ground reaction force • Introduction of Kinetics & Kinematics
	9	▶ Explain tissue biomechanics and its application in P&O.	b. Tissue Biomechanics: • Histology & nourishment of connective tissues. • Joint mechanics & consideration of positioning of joints. • Application of tissue biomechanics in P&O.
2	6	▶ Explain mechanics & pathomechanics of ankle & foot complex. ▶ Analyze the forces and moments acting during various activity.	a. Biomechanics of Ankle & foot complex: • Mechanics & pathomechanics of muscle activity at the ankle & foot. • Analysis of the forces on the ankle & foot during activity.
	6	▶ Explain mechanics & pathomechanics of Knee joints. ▶ Analyze the forces and moments acting during various activity.	b. Biomechanics of knee: • Mechanics & pathomechanics of muscle activity at the knee. • Analysis of the forces on the knee during activity.
3	6	▶ Explain mechanics & pathomechanics of hip joint. ▶ Analyze the forces and moments acting during various activity.	a. Biomechanics of Hip: • Mechanics & pathomechanics of muscle activity at the hip. • Analysis of the forces on the Hip during activity.
	6	▶ Explain structure & function of spine ▶ Explain mechanics &	a. Biomechanics of Spine: • Mechanics & pathomechanics of the cervical musculature.

		pathomechanics of spine. ► Analyze the forces and moments acting during various activity.	• Analysis of the forces on the cervical spine during activity. • Structure & function of the bones & joints of the thoracic spine. • Mechanics & pathomechanics of the thoracic musculature. • Analysis of the forces on the thoracic spine during activity. • Structure & function of the bones & joints of the lumbar spine. • Mechanics & pathomechanics of the lumbar musculature. • Analysis of the forces on the lumbar spine during activity. • Structure & function of the bones & joints of the pelvis. • Mechanics & pathomechanics of the muscle activity in the pelvis. • Analysis of the forces on the pelvis during activity.
4	6	► Explain mechanics & pathomechanics of shoulder joint. ► Analyze the forces and moments acting during various activity.	a. Biomechanics of Shoulder: • Mechanics & pathomechanics of the muscle activity in the Shoulder complex. • Analysis of the forces on the Shoulder complex during activity.
	6	► Explain mechanics & pathomechanics of elbow joint. ► Analyze the forces and moments acting during various activity.	b. Biomechanics of Elbow: • Mechanics & pathomechanics of muscle activity at the elbow. • Analysis of the forces on the elbow during activity.
5	6	► Explain mechanics & pathomechanics of wrist & hand complex. ► Analyze the forces and moments acting	a. Biomechanics of Wrist & Hand: • Mechanics & pathomechanics of the muscle activity in the wrist & hand. • Analysis of the forces on the wrist during activity.

		during various activity. ▶ Explain pathomechanics of specific connective tissue. ▶ Explain prehension and its mechanics and pathomechanics.	• Mechanics & pathomechanics of the Special connective tissue in the hand. • Mechanics & pathomechanics of the intrinsic muscles of the hand. • Mechanics & pathomechanics of the pinch & grasp.
	3	▶ Describe normal posture. ▶ Explain mechanics and pathomechanics related to posture. ▶ Explain effect of improper posture.	b. Posture: Mechanics & pathomechanics related to posture.

TEACHING & LEARNING METHOD:

- Lecture cum discussion
- Seminar/ Presentations
- Journal Club
- Class room teaching
- Demonstration/Return demonstration
- Participation in workshops & conferences
- Educational visits
- Library

MPO 201 Advanced Upper Extremity Prosthetics

THEORY

Placement: 2nd Year

Hours of Instruction

Theory : 60 Hours.

COURSE DESCRIPTION:

This subject is delivered in a coordinated manner with the practical part of the prosthetic course. The student will be required to comprehend the evidence based management of various amputation levels and congenital deficiencies along with the efficacy of different treatment approaches and its utility in clinical scenario.

OBJECTIVES:

At the end of the course, students will be able to:

- Carry out Evidence Based Practice for various condition requiring upper limb prosthetic management.
- Analyze patient/client condition as a whole i.e. assessing in all aspects including physical, environmental, economical, psycho-social, cultural, and educational and others.
- Formulate appropriate prosthetic prescriptions for wide range clinical situations using holistic approach.
- Describe the effectiveness of different components pertaining to clinical condition and considering other factors.
- Discuss and consider biomechanics while evaluating clinical condition/prosthesis and also while formulating appropriate prescriptions.
- Recognize various ergonomic principles in upper extremity prosthetic and demonstrate use of appropriate ISO terminology.
- Explain advancement in the management of upper limb prosthetic management.

COURSE CONTENT:

Unit	Time (Hrs)	Learning Objectives	Content and Teaching learning Method
1	3	▶ Describe biomechanics of all upper extremity joints. ▶ Application of anthropometry. ▶ Explain components of upper extremity prosthesis based on evidence based practice. ▶ Analyze and evaluated condition using different measures and all aspects.	1. General consideration: • Anatomy & Biomechanics of Upper extremity. • Evidence based practice in Upper extremity Prosthetics. • Assessment for patients with upper extremity amputations. • Upper extremity Prosthesis & its components.
2	6	▶ Describe advancement in prosthetic components. ▶ Explain functioning and mechanism about myoelectric, neuroelectric, myoacoustic and others prosthetics and its applicability.	2. Advancement in the upper extremity prosthetic components: • Myoelectric prosthetics. • Neuroelectric Prosthetics. • Myoacoustic Prosthetics. • And other latest developments.
3	6	▶ Able to evaluate and analyse partial hand amputation. ▶ Explain prosthetic management and advancement in technology including socket design and components. ▶ Explain biomechanics of prosthesis.	3. Prosthetic Management of Partial Hand Amputation: Medical Consideration, Advancement in socket technology, Biomechanics of Prosthesis, Current trends in prosthetic management for Partial Hand amputation.
4	6	▶ Able to evaluate and analyse wrist	4. Prosthetic Management of Wrist disarticulation:

		disarticulation. ▶ Explain prosthetic management and advancement in technology including socket design and components. ▶ Explain biomechanics of prosthesis.	Medical Consideration, Advancement in socket technology, Biomechanics of Prosthesis, Current trends in prosthetic management Wrist disarticulation.
5	6	▶ Able to evaluate and analyse transradial amputation. ▶ Explain prosthetic management and advancement in technology including socket design and components. ▶ Explain biomechanics of prosthesis.	5.Prosthetic Management of Transradial Amputation: Medical Consideration, Advancement in socket technology, Biomechanics of Prosthesis, Current trends in prosthetic management transradial amputation.
6	6	▶ Able to evaluate and analyse elbow disarticulation. ▶ Explain prosthetic management and advancement in technology including socket design and components. ▶ Explain biomechanics of prosthesis.	6. Prosthetic Management of Elbow Disarticulation: Medical Consideration, Advancement in socket technology, Biomechanics of Prosthesis, Current trends in prosthetic management elbow disarticulation.
7	6	▶ Able to evaluate and analyse transhumeral amputation. ▶ Explain prosthetic management and advancement in technology including socket design and components. ▶ Explain biomechanics	7. Prosthetic Management of Transhumeral amputation: Medical Consideration, Advancement in socket technology, Biomechanics of Prosthesis, Current trends in prosthetic management Transhumeral amputation.

		of prosthesis.	
8	6	▶ Able to evaluate and analyse shoulder disarticulation. ▶ Explain prosthetic management and advancement in technology including socket design and components. ▶ Explain biomechanics of prosthesis.	8. Prosthetic Management of Shoulder Disarticulation: Medical Consideration, Advancement in socket technology, Biomechanics of Prosthesis, Current trends in prosthetic management Shoulder Disarticulation.
9	3	▶ Describe classification system of upper limb deficiency. ▶ Evaluate and analyse the condition. ▶ Explain management of upper limb deficiency using holistic approach.	9. Prosthetic and orthotic management of Upper limb deficiency.
10	3	▶ Describe advancement and research in upper limb prosthetics related to socket technology, interface, components, and materials.	10. Emerging trends in Upper limb prosthetics: research and development.
11	3	▶ Analyse the fitment of bilateral upper limb amputees. ▶ Able to provide training for the use of prosthesis.	11. Fitting and training the bilateral Upper limb amputee.
12	3	▶ Able to evaluate and analyze the multiple limb deficient child and formulate goals and prescription.	12. Prosthetic management of multiple limb deficient child.

		Describe the prosthetic management of multiple limb deficient child.	
13	3	- Analyze different sports condition pertaining to prosthetic adaptation. - Explain different prosthetic adaptation.	13. Upper -Limb Prosthetic Adaptations for Sports and Recreation.

TEACHING & LEARNING METHOD:

- Lecture cum discussion
- Seminar/ Presentations
- Journal Club
- Class room Teaching
- Demonstration/Return demonstration
- Clinical practice
- Clinical discussion
- Clinical case presentation
- Field visits
- Participation in workshops & conferences
- Educational visits
- Library

MPO 201 Clinical Practice in Upper Extremity Prosthetics

PRACTICAL

Placement: 2nd Year

Hours of Instruction

Practical: 200 Hours.

COURSE DESCRIPTION:

This should include the manufacture and fitting of all devices and exposure to the range of devices not routinely seen in clinical practices.

OBJECTIVES:

At the end of the course, students will be able to:

- Assess, diagnose, plan and execute the prosthetic treatment for children and adults with various amputation (congenital and acquired).
- Maintain clinical records.
- Do the assessment of minimum 20 patients with various amputation (congenital and acquired).
- Use of instrumentation in minimum 10 patients with amputation (congenital and acquired).
- Plan and execute in minimum 5 patients with amputation (congenital and acquired).

TEACHING & LEARNING METHOD:

- Demonstration/Return demonstration
- Assessment
- Clinical practice
- Clinical discussion
- Clinical case presentation / Case study
- Field visits
- Participation in workshops & conferences
- Educational visits
- Workshop

MPO 202 Advanced Upper Extremity Orthotics THEORY

Placement: 2nd Year

Hours of Instruction

Theory : 60 Hours.

COURSE DESCRIPTION:

This subject is delivered in a coordinated manner with the practical part of the orthotic course. The student will be required to comprehend the evidence based management of various conditions along with the efficacy of different treatment approaches and its utility in clinical scenario.

OBJECTIVES:

At the end of the course, students will be able to:

- Carry out Evidence Based Practice for various condition requiring upper limb orthotic management.
- Analyze patient/client condition as a whole i.e. assessing in all aspects including physical, environmental, economical, psycho-social, cultural, and educational and others.
- Formulate appropriate orthotic prescriptions for wide range clinical situations using holistic approach.
- Describe the effectiveness of different orthosis pertaining to clinical condition and considering other factors.
- Discuss and consider biomechanics while evaluating clinical condition/orthosis and also while formulating appropriate prescriptions.
- Explain biomechanics of upper extremity and pathophysiology of various condition.
- Describe various classification system and its utilization in clinical practice.

COURSE CONTENT:

Unit	Time (Hrs)	Learning Objectives	Content and Teaching learning Method
1	3	▶ Explain biomechanics of upper extremity. ▶ Analyze and explain various principle used in upper extremity	General Consideration: Functional Anatomy of Hand. Bio-mechanical consideration in upper extremity orthotics. Design &

		orthotics like design and fit principles, construction principles, outrigger and mobilization assist principles, mechanical principles, tissue mechanics.	fabrication principles.
2	3	▶ Demonstrate assessment of various upper extremity condition and able to formulate prescription.	Assessment & analysis of upper extremity specific to orthotic intervention.
3	3	▶ Describe different classification system of upper extremity orthosis.	Upper extremity orthotics & its classification.
4	3	▶ Explain orthosis for shoulder & elbow including its indications, contraindications, materials used, biomechanics, and fabrication technique.	Orthosis for Shoulder & Elbow.
5	3	▶ Explain forearm based orthosis including its indications, contraindications, materials used, biomechanics, and fabrication technique.	Forearm based orthosis.
6	3	▶ Explain hand, finger, and thumb based orthosis including its indications, contraindications, materials used, biomechanics, and fabrication technique.	Hand, Finger, Thumb based orthosis.

7	6	▶ Demonstrate Assessment and evaluation of patient with stroke and brain injured patient and formulate prescription. ▶ Describe pathophysiology of the condition and relate it with clinical scenario. ▶ Explain different orthotic treatment considering evidence based practice. ▶ Describe ergonomic consideration based on patient/client condition.	Orthotic management of stroke and brain injured patient: General principle, Pathophysiology, Various treatment option, Orthotic treatment, Ergonomic consideration.
8	6	▶ Demonstrate Assessment and evaluation of patient with spinal cord injury and formulate prescription. ▶ Describe pathophysiology of the condition and relate it with clinical scenario. ▶ Explain different orthotic treatment considering evidence based practice. ▶ Describe different treatment options like surgical, physiotherapy. ▶ Analyze treatment outcome using different outcome measures.	Orthotic management of spinal cord injury: Pathophysiology, Historical perspective, Assessment and diagnostic tool, Level of injury, Treatment consideration and recommendation, Surgical management, Orthotic management, Research studies and outcome measures.

9	6	▶ Demonstrate Assessment and evaluation of patient with burned hand and formulate prescription. ▶ Describe pathophysiology of the condition and relate it with clinical scenario. ▶ Explain different orthotic treatment considering evidence based practice. ▶ Describe different treatment options like physiotherapy, surgical. ▶ Analyze treatment outcome using different outcome measures.	Orthotic management of burned hand: Pathophysiology, Historical perspective, Rehabilitation intervention, Assessment and diagnostic tool, Treatment consideration and recommendation, Therapeutic management, Orthotic management, Splinting outcome, Research studies and outcome measures.
10	6	▶ Demonstrate Assessment and evaluation of patient with arthritic hand and wrist and formulate prescription. ▶ Describe pathophysiology of the condition and relate it with clinical scenario. ▶ Explain different orthotic treatment considering evidence based practice. ▶ Explain different orthosis including its biomechanics ▶ Describe different	Orthotic management of the arthritic hand and wrist: Pathophysiology, Treatment recommendation, Surgical management, Non-surgical management, Orthotic management and principles, Mechanism of action, Ulnar deviation orthoses in rheumatoid arthritis, Post-operative care, Post-operative orthotic management, Research studies and outcome measures.

		treatment options like physiotherapy, surgical. ▶ Analyze treatment outcome using different outcome measures.	
11	6	▶ Demonstrate Assessment and evaluation of patient with brachial plexus injuries and formulate prescription. ▶ Describe pathophysiology of the condition and relate it with clinical scenario. ▶ Explain different orthotic treatment considering evidence based practice. ▶ Describe different treatment options like physiotherapy, surgical. ▶ Analyze treatment outcome using different outcome measures.	Orthotic management of brachial plexus injuries: Pathophysiology, Role of medical treatment, Treatment consideration, Role of orthosis and various principle, Research studies and outcome measures.
12	6	▶ Demonstrate Assessment and evaluation of patient with upper limb fracture and formulate prescription. ▶ Describe fracture types, its complications, orthotic management along with its principles and	Orthotic management of upper limb fracture: Type of fracture, Complication related fracture, Role of orthotic management, Rational for functional bracing, Functional bracing of diaphyseal humerus fractures, Functional bracing of diaphyseal ulnar fractures, Functional bracing of Colles

		materials used. ▶ Describe functional bracing for long bones of upper limb. ▶ Explain orthotic for protective equipment to the sports. ▶ Explain different orthotic treatment considering evidence based practice. ▶ Describe different treatment options like physiotherapy, surgical. ▶ Analyze treatment outcome using different outcome measures.	fractures, Orthoses for protective equipment to the sports, Material used in orthotics, Orthotic consideration, Mechanism of action, Applied biomechanical principle, Open - cell and closed-cell splint, Pneumatic device, Research studies and outcome measures
13.	6	▶ Assessment and evaluation of patient with overuse disorders of the upper limb and formulate prescription. ▶ Describe pathophysiology of the condition and relate it with clinical scenario. ▶ Explain different treatments considering evidence based practice.	Orthotic management of overuse disorders of the upper limb: Pathophysiology, Treatment plan, Biomechanical consideration, Orthotic management, Lateral epicondylitis, Capital tunnel syndrome, Carpal tunnel syndrome, De Quervain tenosynovitis, Trigger finger (stenosing tenosynovitis), CMC arthritis, Operative management, Post-operative orthotic management

TEACHING & LEARNING METHOD:

- Lecture cum discussion
- Seminar/ Presentations
- Journal Club
- Class room teaching
- Demonstration/Return demonstration

- Clinical practice
- Clinical discussion
- Clinical Case Presentation
- Field visits
- Participation in workshops & conferences
- Educational visits
- Library

MPO 202 Clinical Practice in Upper Extremity Orthotics

PRACTICAL

Placement: 2nd Year

Hours of Instruction

Practical: 160 Hours.

COURSE DESCRIPTION:

This should include the manufacture and fitting of all devices and exposure to the range of devices not routinely seen in clinical practices.

OBJECTIVES:

At the end of the course, students will be able to:

- Assess, diagnose, plan and execute the orthotic treatment for children and adults with various disorders/deformity.
- To maintain clinical record.
- Assessment of minimum 20 patients with various disorders/deformity.
- Use of instrumentation in minimum 20 patients with disorders/deformity.
- Plan and execute in minimum 5 patients in each category.

TEACHING & LEARNING METHOD:

- Demonstration/Return demonstration
- Assessment
- Clinical practice
- Clinical Discussion
- Clinical Case Presentation / Case study
- Field visits

- Participation in Workshops & Conferences
- Educational visits
- Workshop

MPO 203 Advanced Spinal Orthotics

THEORY

Placement: 2nd Year

Hours of Instruction

Theory : 60 Hours.

COURSE DESCRIPTION:

This subject is delivered in a coordinated manner with the practical part of the orthotic course. The student will be required to comprehend the evidence based management of various conditions along with the efficacy of different treatment approaches and its utility in clinical scenario.

OBJECTIVES:

At the end of the course, students will be able to:

- Carry out Evidence Based Practice for various condition requiring spinal orthotic management.
- Analyze patient/client condition as a whole i.e. assessing in all aspects including physical, environmental, economical, psycho-social, cultural, and educational and others.
- Formulate appropriate orthotic prescriptions for wide range clinical situations using holistic approach.
- Describe the effectiveness of different orthosis pertaining to clinical condition and considering other factors.
- Discuss and consider biomechanics while evaluating clinical condition/orthosis and also while formulating appropriate prescriptions.
- Explain biomechanics of spine and pathophysiology of various condition.
- Describe various classification system and its utilization in clinical practice.

COURSE CONTENT:

Unit	Time (Hrs)	Learning Objectives	Content and Teaching learning Method
1.	3	▶ Explain biomechanics of spine. ▶ Analyze force application and its resolution. ▶ Explain creep and	Biomechanics of spine: Physical characteristics of the spine The transmitting problem, Other limiting factor Normal kinematics

		relaxation.	Application of force and its resolution Creep and biomechanical adaptation.
2.	3	Describe classification of splint orthosis.	Spinal orthosis & its Classification: Soft spinal orthosis Semi rigid spinal orthosis Rigid spinal orthosis.
3.	3	Explain and analyze principles & components of spinal orthosis.	Principles & Components of spinal Orthosis
4.	3	Explain and analyze various technological aspects required for spinal orthosis fitment and fabrication like visceral organ alignment, center of pressure and others.	Technological guidelines for spinal Orthosis: Equilibrium condition, body segment dynamics, 3D effect on spine, visceral organ alignment, progression factors, Centre of Pressure.
5.	6	- Describe pathophysiology of cervical and lumbar pain. - Explain various lumbar and cervical orthosis along with its biomechanics, indications, contraindications, fabrication. - Demonstrate use of outcome measure to find effectiveness of orthoses. - Demonstrate assessment and evaluation of spinal pain. - Explain treatment recommendation considering evidence based practice.	Orthosis for Spinal pain: Pathophysiology, Treatment recommendations Cervical pain: Mechanism of action of lumbar orthosis, Motion restriction, Unloading of spinal column, Side effect and other consideration, Outcome studies and effectiveness of lumbar orthosis. Lumbar pain: Mechanism of action of lumbar orthosis, Motion restriction, Unloading of spinal column, Side effect and other consideration, Outcome studies and effectiveness of lumbar orthosis, Orthosis for spinal deformities

6.	6	▶ Explain pathophysiology of scoliosis. ▶ Demonstrate assessment and evaluation of scoliosis and formulate prescription. ▶ Explain various treatment options including surgical and non-surgical. ▶ Describe orthotic management including biomechanics, indications, contraindications and fabrications.	Orthotic management of Scoliosis: Anatomical consideration, Pathophysiology, Biomechanical consideration involved in treatment, Terminology and Classification of scoliosis, Test and measures used in the clinical examination, Treatment consideration, Use of Radiograph in Diagnosis, digital measurement techniques, Surgical intervention for scoliosis, Nonsurgical intervention for scoliosis, Orthotic management
7.	3	▶ Describe pathophysiology of kyphosis. ▶ Describe treatment options. ▶ Explain orthotic management based on condition. ▶ Demonstrate assessment of kyphosis and formulate prescription.	Kyphosis: Pathophysiology, Biomechanical consideration, Treatment consideration, Orthotic management, Scheuermann's kyphosis , post traumatic kyphosis.
8.	3	▶ Describe pathophysiology of spondylosis, spondylolisthesis, spondylolysis. ▶ Describe treatment options. ▶ Explain orthotic management based on condition.	Spondylosis, spondylolisthesis & spondylolysis: Pathophysiology, Biomechanical consideration, Classification, Treatment consideration, Orthotic management.

		▶ Demonstrate assessment procedure and formulate prescription.	
9.	9	▶ Explain pathophysiology of fracture. ▶ Describe different types of spinal fracture. ▶ Explain treatment options based on condition like operative and post-operative. ▶ Explain post-operative orthotic management for spinal trauma. ▶ Demonstrate assessment and evaluation of spinal trauma and fracture and able to formulate prescription.	Orthosis for spinal fracture and trauma: Pathophysiology of fracture, Mechanism of injury, Classification of fracture, effects and complications of spinal fractures, Cervical spine fracture, Facet joint dislocation, Thoracic and thoraco-lumbar spine fracture, Lumbar spine fracture, Post-operative care, Important consideration for orthotic postoperative management, Orthotic treatment in spinal fracture, Compression fracture, Burst fracture, Seat belt fracture, Chance fracture, Hangman fracture, Odontoid fracture, Jefferson fracture, Current issues and research
10.	6	▶ Explain pathophysiology of spinal cord injury (SCI). ▶ Describe complications of SCI. ▶ Explain treatment options based on condition like operative and post-operative. ▶ Explain post-operative orthotic management for SCI. ▶ Demonstrate assessment and evaluation of SCI and	Orthosis for spinal cord injured patient: Level of injury, Pathophysiology, problem in spinal cord injury, Biomechanical consideration, Treatment consideration, Impact of orthotic management in SCI patient, Type of orthotic device used in SCI patient, Current issue and researches

		able to formulate prescription.	
11.	6	▶ Explain pathophysiology of osteoporosis. ▶ Demonstrate assessment and evaluation and able to formulate prescription. ▶ Describe different types of orthotic management based on condition considering evidence.	Orthosis for Osteoporosis: Pathophysiology, Biomechanical consideration, Clinical assessment and Orthotic management, Treatment consideration, Posture training support, Lumbosacral corset and dorsolumbosacral corset, TLSO-sagittal plane control, Posterior shell TLSO, Management of acute and chronic pain, Current issues and research
12.	9	▶ Explain pathophysiology of spinal instability. ▶ Demonstrate assessment and evaluation and able to formulate prescription. ▶ Describe different types of orthotic management based on condition considering evidence. ▶ Explain effects of body alignment, balance and compensation.	Orthosis in spinal instability: Biomechanics, Pathophysiology in spinal instability, Role of Orthotic treatment, Type of spinal orthosis, Cervical orthosis, Cervicothoracic orthosis, Sternooccipitomandibular immobilizers, Yale cervicothoracic orthosis, Minerva cervicothoracic orthosis, Halo orthosis, WISS orthosis and other cervicothoracic orthosis. Effects of body alignment, balance and compensation

TEACHING & LEARNING METHOD:

- Lecture cum discussion
- Seminar/ Presentations
- Journal Club
- Class room Teaching
- Demonstration/Return demonstration
- Clinical practice
- Clinical Discussion

- Clinical Case Presentation
- Field visits
- Participation in Workshops & Conferences
- Educational visits
- Library

MPO 203 Clinical Practice in Spinal Orthotics
PRACTICAL

Placement: 2nd Year

Hours of Instruction

Practical: 200 Hours.

COURSE DESCRIPTION:

This should include the manufacture and fitting of all devices and exposure to the range of devices not routinely seen in clinical practices.

OBJECTIVES:

At the end of the course, students will be able to:

- Assess, diagnose, plan and execute the treatment for children and adults with various disorders/deformity of spine.
- Maintain clinical records.
- Assessment of minimum 20 patients with various disorders/deformity.
- Use of instrumentation in minimum 20 patients with disorders/deformity.
- Plan and execute in minimum 5 patients in each category.

TEACHING & LEARNING METHOD:

- Demonstration/Return demonstration
- Assessment
- Clinical practice
- Clinical discussion
- Clinical case presentation / Case study
- Field visits
- Participation in workshops & conferences
- Educational visits
- Workshop

**MPO 204 Pedagogy in P&O Education & Administration, Legal, Ethical
Issues
THEORY**

Placement: 2nd Year

Hours of Instruction

Theory : 60 Hours.

COURSE DESCRIPTION:

This subject is intended to equipped students with the ability to work in education/administration for dissemination of knowledge and development and to work in clinical practice in different sector at various positions with appropriate knowledge and responsibility.

OBJECTIVES:

At the end of the course, students will be able to:

- Understand Pedagogy in P&O Education.
- Understand the concept & meaning of teaching and learning.
- Learn the process of development of curriculum.
- Learn the different method, Lesson plan and preparation for teaching.
- Learn the formulation and implementation of various evaluation mechanism.
- Understand the Meaning & concepts of guidance and counselling
- Understand the roles of Prosthetist & Orthotist in different hierarchy/ work set up
- Know the Professional Conducts, Legal responsibility & Code of conduct.
- Know the different national & International health agencies, Scheme, Law relevant to P&O professionals.

COURSE CONTENT:

Unit	Time (Hrs)	Learning Objectives	Content and Teaching learning Method
Part- I: Pedagogy in P&O Education			
1	6	▶ Describe educational philosophy. ▶ Explain aims, functions of different types of education. ▶ Analyze the issues in	Education: Introduction-Educational Philosophy - Idealism Naturalism, Pragmatism, Aims of Education, Functions of Education, Formal, informal and non-formal Education, Agencies of Education,

		education system.	Current issues and Trends in Higher Education, Issue of quality in Higher Education, Autonomy and Accountability, Privatization of Education.
2	6	- Understand the concept & meaning of teaching and learning. - Understand the dynamics behaviour.	Concept of Teaching and Learning: Meaning and scope of Educational Psychology, Meaning and Relationship between teaching and learning, Learning Theories, Dynamics of behaviour, Individual differences.
3	6	To learn the process of development of curriculum.	Curriculum: Meaning and concept, Basis of curriculum formulation, Framing objectives for curriculum, Process of curriculum development and factors involved, Evaluation of curriculum.
4	6	- Demonstrate different methods of teaching. - Differentiate the importance and utility of teaching method employed like benefits, advantages, disadvantages, strength.	Method and techniques of teaching: Lecture, Demonstration, Discussion, Seminar, Assignment, Project, Case Study.
5	3	- Explain process of preparation for planning for teaching involved. - Demonstrate writing of instructional objectives.	Planning for teaching: Bloom's taxonomy of instructional objectives, Writing instructional objectives in behavioural terms, Unit planning, Lesson planning.
6	3	- Describe types of teaching aids. - Demonstrate selection of teaching aid based on topic and cultivated in unit/lesson planning. - Demonstrate preparation and use	Teaching aids: Types of teaching aids, Principles of selection, preparation and use of audio-visual aides.

		of audio-visual aids.	
7	6	- Describe different evaluation method. - Demonstrate the construction of an achievement.	Measurement and Evaluation: Nature of educational measurement: meaning, process, types of tests, Construction of an achievement test and its analysis, Standardized test, Introduction of some standardized tools, important tests of intelligence, Aptitude and personality, Continuous and comprehensive evaluation.
8	3	Explain about guidance and counselling.	Guidance and counselling: Meaning & concepts of guidance and counselling, Principles of guidance and counselling.
9	3	Describe awareness programme in terms of organizing, risks and benefits involved and others.	Awareness Programme: Awareness and guidance to the common people about health and disease.
Part-II: Administration, Legal, Ethical Issues			
1	1	- Describe functioning of hospital and rehabilitation organization. - Explain types of setup for disability management.	Hospital and rehab organization - Functions and types.
2	2	Explain roles and responsibilities of P&O at various positions in different sectors.	Roles of Prosthetist & Orthotist in different hierarchy/ work set up.
3	1	Describe rules of professional conduct	Rules of Professional Conduct.
4	2	Describe Legal responsibility	Legal responsibility.
5	1	Explain appropriate code of conduct	Code of conduct.
6	2	Describe functioning of P&O set up in different sectors	Functions of P&O associations.

7	2	► Explain role of International Health Agencies towards disabilities	Role of the International Health Agencies.
8	2	► Describe medical legal action	Liability and obligations in the case of medical legal action.
9	2	► Describe law of disability and maintaining patient/client confidentiality	Law of disability & discrimination confidentiality of the Patient's status.
10	3	► Explain various National and International policies/act/scheme	National and International policies/ acts /scheme as relevant to P&O profession (Consumer protection law, health law, MCI, RCI and others).

TEACHING & LEARNING METHOD:

- Lecture cum discussion
- Seminar/ Presentations
- Journal Club
- Class room Teaching
- Participation in Workshops & Conferences
- Educational visits
- Library

MPO 205 Dissertation

Placement: 1st & 2nd Year**Hours of Instruction**

Practical: 640 hours (220 Hours in 1st year & 420 Hours in 2nd year)

OBJECTIVES:

At the end of the course, students will be able to:

Student will select a topic in his/her area of interest, in consultation with a supervisor/Guide, qualified for the purpose as recommended by the council/University for and carry out an independent dissertation, which will involve making research proposal, conduct of the work as per the documented methodology, statistical analysis, dissertation writing. The work will build on the knowledge acquired through study of research methodology and Biostatistics. Each candidate shall submit three copies of a dissertation well in advance before the commencement of 2nd Year Examination.

Evaluation of the dissertation will be done by the examiner (s) appointed by the University.

The approved guide for the dissertation will be allocated to the candidate immediately after the admission in the MPO Programme.

SECTION IV

REFERENCES

Advance Lower Extremity Orthotics, Clinical Gait Analysis, Applied Biomechanics & Kinesiology, Advanced Upper Extremity Orthotics & Advanced Spinal Orthotics

Sl. No.	Title	Author	Publisher	Year/Vol.
1.	Basic biomechanics of musculoskeletal system	Nordin, Margaela		2001
2.	Biomechanical basis of human movement	Hamill, Joseph		2nd ed; 2003
3.	Biomechanics of musculoskeletal system	Nigg, Benno M.ed		3rd ed
4	Clinical Biomechanics	Dvir, Zeevi		2000
5.	Human body	Vigue, Mastin		2004
6	Human Body Dynamics	Tozeren, Aydin		2000
7	Introduction to biomechanics	Humphrey, Jay D		2003
8	Primes of biomechanics	Lucas, George L.		
9	Understanding balance	Roberts, Tristan D.M.		1995
10	Brunnstoms clinical kinesiology	Smith, Lausa K.		5th ed.;1996
11	Clinical kinesiology and anatomy	Lippest, Lynn S.		4th ed.
12	Introduction to kinesiology	Hoffman Shirt J		2nd ed.; 2005
13	Kinesiology	Oatis, Casol A		2004
14	Kinesiology	Muscolino, Joseph E		2006

15	Kinesiology	Soderberg, Gary L.		2nd ed.;1997
16	Kinesiology flash cards	Lippest, Lynn.S		2nd ed;2006
17	Principles of anatomy and physiology	Tortora, Gaseal J.		10th ed.; 2003
18	Joint structure and function	Norkin S.		5th ed.
19	Kinesiology	Brunnstrom s.	F. A. Davis, Philadelphia	1996
20	Biomechanical basis of orthotic and prosthetic management	Butterworth Heinmann		
21	Scientific basis of human movement	Gowitzke,	Williams, Wilkins, Blatimore	1988
22	Textbook of disorder and injuries of musculoskeletal system	Salter, R.B		
23	Human neuroanatomy	Carpurter M.B.	Williams, Wilkins, Blatimore	1983
24	Orthotics in functional rehabilitation of the lower limb	Nowoczenski, Deborah A		1997
25	Orthotics in rehabilitation	Mckee, pat		1998
26	AO manual of fracture management	Wagner, Michael		2006
27	AO Principles of fracture management	Ruedi, Thomas P		2000
28	Functional fracture bracing	A saniento L.L Latta		2003

29	Orthotics in neurological rehabilitation	Aiseu, Dereos	New York	1992
30	Orthotics : clinical practice & rehabilitation technology	Redford , J.B	Churchill Livingston	1993
31	Atlas of limb prosthetics	Bowker ,P & Michace, D. chaps	C.V Mosby	
32	Prosthetics and Orthotics	Shurr & Micheal		
33	Orthotics A Comprehensive Clinical Approach	Edelstein & Brucker		
34	Rehabilitaion of spine	Liebenson, Craid ed		2nd edition
35	Clinical biomechanics of the spine	White, Augustan	Lippincott, Williams	2nd edition
36	Orthotics	Edelstein ,joan E		2002
37	AAOS Atlas of orthosis & assistive devices	John D. HSU		

Advanced Lower Extremity Prosthetics & Clinical Gait Analysis & Advanced Upper Extremity Prosthetics

Sl. No.	Title	Author	Publisher	Year/Vol.
1.	A text book of computer science for prosthetics & orthotic	S.K Panda , A.N Nanda ,R.R Swain		1st edition; 2010
2.	Amputation surgical practice & patient	Murdoch , G		G edition ;1996
3.	Amputation & prosthetics	macy ,bella		2nd edition ; 2002

4	Atlas of amputation & limb deficiencies	smith , Douglass		2004
5.	Biomechanics of foot & ankle	Donatelli , Robert A		2nd edition;1996
6	Clinical skill in treating the foot	Tollafeld, Merriman		edition;1997
7	Essentials of prosthetics & orthotics	Agarwal , AK		2013
8	Foot & ankle disorders	Lippert ,F.G		2003
9	Foot & ankle in sports	Baxler D.E		1995
10	Foot orthosis	WU,Kent		k.ed ; 1990
11	Lower limb amputation	Cristian ,Adrian		2006
12	Orthotics & Prosthetics in rehabilitation	lusaudi ,Michelle M		2nd edition ; 2007
13	Prosthetics & Orthotics	Seymour , Ron		2002
14	Prosthetics & Orthotics	Shurr ,G. Donald		2nd edition ; 2000.
15	Prosthetics & Orthotics patient management	Carroll ,Kevin		2006
16	Therapy for amputee	Engstorm ,Barbare		3rd edition , 1999
17	Ergonomics for therapist	Jacobs ,Karens		3rd edition; 2008
18	Comprehensive management of upper limb amputee	Atkins ,D.J		1989
19	Hand book of diabetes management	Zazworsky, Donna		ed ; 2006
20	Functional restoration of adults & children with upper extremity amputation	Meies, Robert H. ed	demas, NY	2004

21	Upper extremity : Traumatic injuries & conditions	Child, S.		1997
22	Common problems in pain management	Ferrer – Brechtner, T		1990

Research Methodology & Biostatistics

Sl. No.	Title	Author	Publisher	Year/Vol.
1.	Computer analysis and qualitative research	Nigel G. Fielding & Raymond M. Lee		1st edition, 1998
2.	Essential Research Methods	Rubbin, Allen		2nd edition 2010
3.	Research design explained	Mitchell, Mark L		7th edition, 2010
4	Research Methodology	Kothari, C.R		2nd edition, 2011
5.	Research Methodology	Kumar		5th edition, 2006
6	Research Methodology and Biostatics	Bais, Vinod Kumar		2nd edition, 2013
7	Research Method a modular approach	Jackson, sherri L		2nd edition, 2011
8	Foundation of clinical research and application to practice (portney)			
9	Non parametric statistics for the behaviour sciences	sieger, Sydney	Mc graw hill	

10	Research: the validation of clinical practice		FA davis	
11	Clinical Research Survival Guide	Niebauer, Josef		ed, 2002
12	Biostatistics	c Daniel: ww		5th edition 1987
13	Biostatistics: The bare essentials	Norman, Geoffrey R		2nd edition, 2000
14	Introduction to biostatistics	Glover ,Thomas		2002
15	Manual of biostatistics	Baride, JP		2003
16	Methods in biostatistics	Mahajan , B.K		6th edition, 2004
17	Simple biostatistics	Indrayan. A		2nd edition

Mechatronics

Sl. No.	Title	Author	Publisher	Year/Vol.
1.	Carbon materials for advanced technologies	Burchell, T.D		1999
2.	Composites engineering handbook	Mallick, P. ked		1997
3.	Corrosion resistance of elastomers	Schlossberg, D		1990
4	Design with reinforced plastics	Mayer, Rayner M		1993
5.	Engineering materials	Budinski, K.G		1999; 6th edition
6	Engineering materials technology	Jacabs, James A		Jacabs, James A

7	Engineering mechanics dynamics	Soutas-Little, R.W		1999
8	Engineering with fiber-polymer engineering	Powell, Peter C		1994
9	Fundamentals of material science and engineering	Callister, William D		2001
10	History of engineering and technology	garrison. Ervan		1999;2 nd edition
11	Introduction to polymers	Young, R.J		1991;2nd edition
12	Management in engineering	Freeman-Bell, Gail		1996;2nd edition
13	Material Science and engineering	Callister, William D		2006;6th edition
14	Physics of plastics	Birley, A.W		1992
15	Plastics technology handbook	Chanda, Manas		1993;2nd edition
16	Selecting thermoplastics for engineering applications	Macdermott, C.P		1997;2nd edition
17	Text book of fluid mechanics	c Rajput, R.K		2006;3rd edition
18	Text book of polymers	Bhatnagar, M.S		2004;1st , 2nd , 3rd edition
19	Information technology for management	Turban E		2002;3rd edition
20	Fundamentals of computers and I.T	A Jaiswal		2006
21	CAD-CAM principles,practice and manufacturing management	Chris MC Malvan		1998

22	Polymer Engineering Principles	Throne, James L , Preguhoj, Richard C		
23	Plastic Engineering handbook pf one society of the plastic industry	Berins Michael L		5th edition
24	International Plastics Handbook	Sacchtling, H		
25	Injection Moulding: Theory and Practice	Rubin, Irrin I		
26	Introduction to Mechantronics and measurement system	David G Alciatore, Micheal B Histard		
27	Introduction to Robotics:Mechanics and Control,3/E	John J. Craig	Prentice Hall	
28	Principles of Robot Motion	Choset et all		
29	Robotics Toolbox for MATLAB			
30	Robot Building for Beginners			
31	Industrial Robotics-technology, programming and applications	M.P. Groover	Mc Graw Hill	2001
32	Robotics Control, Sensing, Vision and Intelligence	Fu. K.S.Gonzalz.R.c and Lee C.S.G	Mc Graw- Hill Book Co	1987
33	Robotics for engineers	Yoram Koren	Mc Graw- Hill Book Co.	1992
34	Robotics and Image Processing	Janakirama P.A	Tata Mc Graw- Hill	1995

Pedagogy in P&O Education & Administration, Legal, Ethical Issues

Sl. No.	Title	Author	Publisher	Year/Vol.
1.	Questioning	Brown George and E.C. Wragg	Routledge: UK	1993
2.	Explaining	Brown George and E.C. Wragg	Routledge: UK	1993
1.	Talking and Learning in Groups	Elisabeth Dunne and Bennet Neville	Routledge	1990
4.	Learning All the Time	Holt, John	Addison-Wesley Publishing Co: New York	1990
5.	Learning Together and Alone: Cooperative Competitive and individualistic learning	Johnson, D.W. and R.T. Johanson		1999 5 th edition
6.	Reflective Teaching	Allyn & Bacom: Boston Pollard, Andrew	Continuum: London	2002
7.	Planning and Implementing Assessment	Freeman, Richard & Lewis, Roger	Routledge Falmer	Indian reprint, 2005
8.	Inculcating and enhancing the reading habit. Excerpt from a training manual for librarians in the southern region as part of an NCERT workshop in January 2008.	Mukunda Usha		2008
9.	Educational objectives	Stones E		2012
10.	Educational psychology	Tuckman, Bruce W		2011

11.	Educational psychology	C. L. Kundu		6 th edition, 2015
12.	Educational psychology	Woolfolk, Anita		9 th edition, 2011
13.	New dimensions of educational technology	Pathal, R.P		2003
14.	Craft of the Classroom: A Survival Guide	Michael Marland	Heinemann Educational	Indian Edition, 2005
15.	Diwaswapna	Badheka Gijubhai	Montessori Bal Shikshan Samiti: Churu, Rajaldesar.	2006

SECTION V

MPO TEACHING FACULTY NORMS

Senior faculty in the discipline of Prosthetics and Orthotics shall be considered as course coordinator. The coordinator should be the controlling and informant authority for the correspondence related to the MPO program. He/she should hold qualification as laid down by RCI.

I. STAFF REQUIREMENT

Sl. No.	Core Faculty	Column-I Upto 10 seats	Column-II 11-20 seats
1	Professor & Head Department of Prosthetics & Orthotics	01	01
2	Associate Professors (Prosthetics & Orthotics)	01	02
3	Assistant Professor /Lecturer (Prosthetics & Orthotics)	02	03
4	Prosthetist and Orthotist/Demonstrators (Prosthetic & Orthotic)	04	06

II. QUALIFICATION & EXPERIENCE OF THE CORE FACULTY

(Valid until the revision of curriculum)

Sl. No.	DESIGNATION	QUALIFICATION & EXPERIENCE	PUBLICATION	PAY SCALE
1	Professor (Prosthetics & Orthotics)	Master in Prosthetics & Orthotics from an institution with a minimum of 10 years of teaching and research experience as Associate Professor (Prosthetic & Orthotic) Desirable: PhD in Prosthetics & Orthotics	Essential 05 publications	As per UGC norms
2	Associate Professor (Prosthetics &	Master in Prosthetics & Orthotics with 05 years of teaching experience	Essential 03 publications	As per UGC norms

	Orthotics)	as an Assistant Professor / Lecturer (Prosthetics & Orthotics) in any recognized Prosthetic & Orthotic Institution. Desirable: PhD in Prosthetics & Orthotics		
3	Assistant professor (Prosthetics & Orthotics)	Master in Prosthetics & Orthotics with 02 year experience in the field.		As per UGC norms
4	Prosthetist & Orthotist/ Demonstrator (P &O)	Master in Prosthetics & Orthotics or Bachelor in Prosthetics and Orthotics) with 02 year experience in the field		

NOTE:

1. These qualifications are applicable for future recruitment. The case of teachers who are already holding teaching posts and have more 10 years teaching experience will continue to hold their post in their respective institution.
2. Existing experienced teachers having more than 10 years of teaching experience may be considered for promotion to Assistant Professor Subject to fulfilment of essential qualification of Assistant Professor
3. Minimum of 2 teaching faculty members in core areas will be required for giving recognition for the first year.
4. Before the commencement of second academic year one more Faculty member must be appointed.
5. In case of Professor not being available, 2 Readers/Associate Professors (additional) should be appointed to accommodate teaching, research guidance and administrative work.

III. GUEST / PART TIME FACULTY**Lectures in the following disciplines**

- a. Mechatronics
- b. Research Methodology and Biostatistics
- c. Pedagogy in P&O Education &Administration, Management & Ethical Issues

SECTION VI

INFRASTRUCTURAL REQUIREMENTS

I. CLINICAL FACILITIES

Facilities for diagnostic evaluation of locomotor impairment and associated disorders, both functional and organically based. Clients of all age groups with locomotor impairment.

Load and variety of clients should be commensurate with number of courses conducted and also to meet the clinical practicum requirement of each year of the course.

II. PHYSICAL FACILITIES

The Institute / College/ University should have separate department and academic block constructed in about 1000 square meters. Adequate hostel accommodation for students should be available in addition to the above mentioned built up area of the MPO course.

Details of the constructed area given below are for the intake capacity up to 20 students:

Sl. No.	Name	Minimum Size in Sq. Ft.
1.	Class rooms (04 numbers)with LCD projector	02 @ 300 = 600
2.	One room for clinical meeting	600
3.	Two trial fitting rooms (One for men & one for women)	02 @ 300 = 600
4.	Two measurement rooms (One for men & one for women)	02@ 200 = 400
5.	Prosthetic Science Lab	1050
6.	One Orthotic Science Lab	1050
7.	Prosthetics & Orthotics faculty rooms (Minimum 06)	06 @ 100 = 600
8.	Two students common room (One for male & one for female students)	1200
9.	One office room	150

10.	One course coordinator room	200
11.	Computer Laboratory room	600
12.	Two Machinery Room	500
13.	One store room	1350
14.	Gait training Laboratory	450
15.	One plaster room	400
16.	Waiting room for the patients	1350
17.	Adequate hostel facility	
18.	Reception & patient registration	40
19.	Common Multi-Purpose Hall (optional)	2000

Note:

1. The above mentioned space shall be used only for Prosthetics & Orthotics training only.

2. Class rooms

There should be two classrooms with the capacity of accommodating the number of students admitted in each class. The rooms should be well ventilated with proper lighting system. There should be built in LCD projector/White Boards. Also there should be a desk/a big table and a chair for the teacher and Racks /cupboards for keeping teaching aids or any other equipment needed for the conduct of classes.

3. Library

There should be a separate library in the Institute / College/ University. It should be easily accessible to the teaching faculty and the students. It should have comfortable seating arrangements for half of the total strength of the students and teachers in the school. There should be separate budget for the library. The library committee should meet regularly for keeping the library updated with current books, journals and other literature. Internet facility should be provided in the library and to the faculty. The library should have proper lighting facilities and it should be well-ventilated. It should have a cabin for librarian with intercom phone

facility. There should be sufficient number of cupboards, books shelves and racks with glass doors for proper and safe storage of books, magazines, journals, newspapers and other literature. There should be provision for catalogue-cabinets, racks for student's bags etc., book display racks, bulletin boards and stationery items like index cards, borrower's cards, labels and registers.

Library should accommodate at least, 30% of the institution's students and staff total strength. Library should have internet and photocopying facilities.

- a. **Reading room:** Two reading rooms should be there
 - i. Reference room with Internet provisions
 - ii. General Reading room
- b. **No. of books:** Books listed for each paper under "essential" should be available.
- c. **No. of Journals:** There should be at least 8 most essential journals.
- d. **Staff:**
 - i. **Library and Information Officer** – One No.
Qualifications: B. Lib with two years of experience in handling technical library using Information Technology.
 - ii. **Library Assistants: One**
Qualifications: SSLC + Diploma in Library Sciences or SSLC + JOC in Library Sciences.

All the facilities may be increased to meet the requirements in a phased manner.

e. Audio-visual Instruments: Appropriate Number of Audio-visual material should be provided as prescribed.

4. Offices Requirements

Coordinator Room:

There should be a separate office for the Coordinator with attached toilet and provision for visitor's room. Independent telephone facility with internet connection is a must for the Coordinator office.

There should be adequate number of office rooms in proportion to the number of teaching faculty with telephone and internet connection.

5. Record Room (Optional)

There should be a separate record room with steel racks, built-in shelves and racks, cupboards and filing cabinets for proper storage of records and other important papers/ documents belonging to the college.

6. Other Facilities

Safe drinking water and adequate sanitary/toilet facilities should be available for both men and women separately in the college. Toilet facility to the students should be there along with hand washing facility.

7. Fire Extinguisher

Adequate provision for extinguishing fire should be available as per the local byelaws.

8. Recreation

There should be facilities for indoor and outdoor games for the students

III. LIST OF TOOLS AND EQUIPMENT REQUIRED FOR THE BPO TRAINING

A. LIST OF COMMON EQUIPMENTS

Sl. No.	Name of Equipment	Minimum Requirement
1.	Hot Air Oven Heating chamber size- (36"W x 24"D x 30"H), with double layer toughened Front visible glass with inside light arrangement, Maximum temperature 350 degree C. 12 kw Rating and 1hp 3 phase Motor for fan with Digital timer thermostat temperature Controller.	01 No
2.	Polisher converted to Cone sanding machine 2 hp 3 phase motor.	01 No.
3.	Infra-Red Oven (optional)	01 No.
4.	Bench Grinder Cum Sander 0.5 hp, single phase motor, Abrasive Wheel size 10 inch x1 inch	01 Nos.
5.	Pillar Drilling Machine Drilling capacity 25 mm, Pillar dia. 87 mm max. Distance spindle to table 600 mm, Table working surface dia. 400 mm with 1 hp 3 phase motor.	01 No.

6.	Bench Drilling Machine with stand, Capacity ½ inch	01 No.
7.	Industrial Leather and Canvas Sewing Machine with ¼ hp motor	01 No.
8.	Adjustable Circular Saw Circular saw dia.18", Working table size 24"x36" Maximum depth of cut 5½" with 3 hp 3 phase motor	01 Nos.
9.	Belt and Disc Sander Disc dia. 10 inches, belt size 6"x 48" with 1 hp 3 phase motor	01 No.
10.	All-purpose saw , temperature range 100-600 degrees c, power input 2000w	01 No.
11.	Hot Air Gun Temperature range 100-600 degrees C, Power input 2000w	01 No.
12.	Jig Saw Machine sawing depth in wood 54 mm, rated input 350w	01 No.
13.	High vacuum machine with ¼" hp motor	01 No.
14.	Removable Mandrills	03 Nos.
15.	Mandrill for air suction mounting and Draping for sockets	03 Nos.
16.	Hot water bath for softening low Temperature thermoplastic sheets	01 No.
17.	Draping frame size (small)	02 Nos.
18.	Draping frame size (large)	02 Nos.
19.	Adjustable / fixed grinding and milling machine with dust collector	01 No.
20.	Sanding roll	02 Nos.
21.	Sanding sleeve	02 Nos.
22.	Sanding drum	02 Nos.
23.	Tool holder	05 Nos.
24.	Deep drawing tool set	02 Nos.

25.	Rasp head	01 No.
26..	Hot sealing iron?	02 Nos.
27.	Staple gun	02 Nos.
28.	Hand Drill machine	04 Nos.
29.	Cord less hand drill machine	02 Nos.
30.	Instrumented GAIT ANALYZER AND TRAINER (optional for BPO program)	01 No.
31.	Shoe finishing machine	01 No.
32.	Working table with peg board (minimum 10 tables are required for 10 students)	10 Nos.
33.	Over locking machine	01 No.
34.	Laser aligner	01 No.
35.	Lathe Machine (optional)	01 No.
36.	Inter locking machine	01 No.
TOTAL		

B. LISTS OF COMMON TOOLS AND MATERIAL

Sl. No.	Name of Equipment / tool	Minimum Requirements
1.	Flat file bastard 2nd cut 10", 2nd cut 12"	10 no. each
2.	Aluminum Flat File 10" & 12"	10 no. each
3.	Round file 6", 8", 2nd cut	10 no. each
4.	Flat file 10" round 2nd cut	10 no each
5.	Triangular file 6", 10" 2nd cut	10 no each
6.	Rasp file half round 10", 12", 8"	10 no. each
7.	Rasp file flat 10", 12"	10 no. each
8.	Rasp file round 6", 10"	10 no. each
9.	Screw driver 150x6mm, 200x8mm, 250x8mm	10 no. each
10.	Flat chisel 12mm, 20mm, 25mm	2no. each

11.	Cold chisel 12mm, 20mm	2no. each
12.	Half round chisel 12mm, 20mm	2 no. each
13.	Ruler steel 600mm, 300mm	2no. each
14.	Steel square with leg 200mm	2 no. each
15.	Caliper inside/outside 200mm	2no. each
16.	Compass/ Driver 200mm Outside/inside caliper	2 no. each
17.	Hammer ball peen 500 gms, 250gms	10 no. each
18.	Mallet hammer with handle	2no. each
19.	Hammer seaming plier (pincer) 10", 12"	4 no. each
20.	Nipper 150mm, 200mm	2 no. each
21.	Plier 200mm	10 no. each
22.	Long nose plier 150 mm	10 no. each
23.	Revolving Hole punch 250gms	10 no. each
24.	Centre punch	10 no. each
25.	Hole punch 2mm, 3mm	3 no. each
26..	Hole punch set	2 no.
27.	Scissor 10" & 12 "	10 no. each
28.	Hacksaw Frame 300mm	10 no.
29.	Hacksaw blades 300mm	1 pkt of 144 pc
30.	Tap set 3, 4,5,6,7,.....mm	2 no. each
31.	Tap handle	2 no. each
32.	Grip plier	10 no.
33.	Die set 3,4,5,6,7,.....mm	2 no. each
34.	Cross pein hammer	10 no.
35.	wire cutter	10 no.
36.	Measuring tape	10 no.
37.	Shoe maker hammer	5 no.
38	Anvil	2no.

39.	Half round leather Knife (Rapi)	5 no.
40.	Nipper shoe maker 8"	5 no.
41.	Leather knife	2 no.
42.	Bender brace 5.5 mm	1 no.
43.	Bender brace 6.5 mm	1no.
44.	cone sander fine, medium, coarse	10 no. each
45.	Plaster knife 150x200mm, 2000x750x350mm	10 no.
46.	Upper Limb Prosthetic Kit (B/E, A/E,S.D) body powered	2 no. each
47.	Externally powered kit (B/E & A/E)	1 each
48.	Vice limb maker (modified)	1 no.
49.	Bending fork (Set of two pieces)	2 no.
50.	Caliper A-P measurement above knee	2 no.
51.	Ear Protector	05 no.
52.	Nut replacement tool 7mm, 9mm	2 no. each
53.	Heat proof gloves	4 pairs
54.	Copper rivets ¼", ½"	1 kg each
55.	Aluminium rivets ¼", ½"	1 kg each
56.	Eyelet punch	10 no.
57.	Rivet head finishing punch	10 no.
58.	Plastic D-rings 1", 1 ½", & 2"	5 pkts each
59.	Buckles 1", 1 ½' & 2"	5 pkts each
60.	Micrometer	2 no.
61.	Ritz scale for M-L diameter/ALIMCO B.K. caliper	2 no.
62.	Allen keys / T-handheld Allen keys (1mm-10mm)	10 set
63.	Press button	5 pkts
64.	Evathene foam 4mm, 6mm, 8mm thickness	5 sheets each

65.	Polypropylene and co polymer sheets (white) 3mm, 4mm & 5mm thickness	5 sheets each
66.	Dendrite solution	5 ltr (5 tin)
67.	Velcro straps (hook & loop) $\frac{3}{4}$ ", 1" and 2"	2 roll each
68.	Nappa leather	5000 d/m
69.	Low temperature thermo plastic sheets 3.2mm/4.2 mm thickness	5 sheets each
70.	Aluminum strips (4mm) thickness	5 kg.
71.	Aluminium sheet (4mm thicknes), 1 mm=18 gauge (BSW)	2 sheet
72.	Drill bits, Full Set Max diameter (7/64", 1/8", 9/64", 5/32", 3/16", 11/64", $\frac{1}{4}$ ", 3/8", $\frac{1}{2}$ ")	1 set
73.	Different modular system for lower limb prostheses	5 set each
74.	Torque wrench	01
75.	Bench Vice	10
76.	Vernier Caliper (adjustable digital)	10
77.	V-BOX	02

C. LIST OF TOOLS AND EQUIPMENT REQUIRED FOR PATIENT EXAMINATION AND CASTING ROOM

Sl. No.	Name of Equipment	Minimum Qty. requirements
1.	Measuring tape	10
2.	Flexible steel rule	10
3.	Aluminium tripod	02
4.	Casting apparatus under Weight bearing	02
5.	Casting apparatus for Above knee amputee	01
6.	Plaster bandage trolley	01
7.	Foot measuring device	01
8.	Oscillating saw – Multimaster	02

9.	Spinal casting apparatus	02
10.	Hook knife	05
11.	Plaster cutting scissors	04
12.	Examination couch	02
13.	X-ray image viewer	02
14.	Goniometer	05
15.	Pedobarography machine	01

D. PLASTER MODIFICATION AREA / ROOM

Sl. No.	Name of Equipment	Minimum Qty. requirements
1.	Plaster work table	02
2.	Plaster cast shelf	01
3.	Pipe vice	05
4.	Plaster bucket	05
5.	Mixing bowl	20
6.	Plaster stirrer	20
7.	Surform file flat	20
8.	Surform file round (blade only)	15
9.	Surform file half round (blade only)	15
10.	Plaster spatula	15
11.	Tape measure	10
12.	Goniometer	05
13.	Special plaster knife	05
14.	Draw knife	02
15.	Plaster cutting scissors	04
16.	Mandrills	20
17.	Plaster separation sink	01

E. PATIENT TRIAL AREA

Sl. No.	Name of Equipment	Minimum requirements
1.	Parallel bar with mirror on Both side	01
2.	Portable heat gun	01
3.	Chordless hand drill machine	01
4.	Revolving centre punch	05

SECTION VIII

CODE OF ETHICS

An appropriate code of ethical behaviour is an essential framework for the activities of any professional responsible for the treatment of patients. All Prosthetics & Orthotics professionals need to follow the code of ethics formulated by Rehabilitation Council of India (RCI).

Ethical code of the Prosthetist / Orthotist

- He/ She shall observe loyal relations with her/his colleagues and with other members of the clinic team without assuming roles outside his/her own profession.
- He/ She shall practice absolute discretion regarding personal matters or knowledge about patients he/she might acquire in her/his professional work.
- He/ She like all other members of the clinic team, should supply service only as a member of that team and respect its conclusions.
- He/ She shall collaborate freely in the necessary exchange of information between colleagues and others in the different but related disciplines.
- He/ She shall strive to perform to the highest possible standard of his/her professional skill.
- He/ She shall provide services to patients/clients in a professional manner personal, financial or commercial interests shall be secondary.
- He/ She shall always honestly represent herself/himself as well as his/her services to the patient and all other concerned.