

Curriculum Framework

Bachelor in Prosthetics and Orthotics- Condensed Course Norms, Regulations & Course Content

Effective from Academic Session 2019-20
Two Years Duration (Annual)



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Bachelor in Prosthetics and Orthotics- Condensed Course

I. PREAMBLE

Prosthetics and Orthotics is a specialized health care profession, which combines a unique blend of clinical and technological skills. The Prosthetic and Orthotic 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 are the persons with disabilities. This work requires substantial clinical and technical judgment. Prosthetic and Orthotic Professional does not only provide service to persons with neuro- musculoskeletal 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 , aesthetic restoration etc.. Prosthetics and Orthotics Professionals play an important role in the comprehensive pre and post-surgical management of amputee and other neuromusculoskeletal disorders. Prosthetics and Orthotics Professionals makes the patient independent, confident and useful member of the society through comprehensive prosthetic and orthotic management

II. OBJECTIVES

At the end of the BPO Condensed Course, the learner shall be able :

1. To 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.
2. Be competent to take preventive, supportive, corrective and rehabilitative steps in respect to the commonly encountered problems related to prosthetics and orthotics.
3. To carry out Evidence Based Practice in prosthetics and orthotics
4. 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
5. Be familiar with the various National policies and acts related to empowerment of Persons with Disabilities.
6. Acquire basic management & administrative skills in the areas of materials, financial and human resources related to prosthetics and orthotics
7. Develop the communication skills to establish effective communication with the stake holders

8. Practice prosthetics & orthotics ethics in patient care, service delivery, and research.

9. Develop attitude for self-learning and acquire necessary skills including the use of appropriate technologies.

III. NOMENCLATURE

Bachelor in Prosthetics and Orthotics- Condensed Course

IV. PROGRAMME STRUCTURE

Mode of conduct of programme is as under :-

1st Year:

- a. Theory : 460 working hours
- b. Practical : 360 (Computer Science 120 hours , Orthotics-III 120 hours & Prosthetics 120 hours)

Note: Student has to submit the certificate from the I/C of P&O Centre for completion of remaining Practical Hours i.e. 400 hours.

2nd Year :

- a. Theory : 220 working hours
- b. Practical : 320 hours at training institution

Note: Student has to submit the certificate from the I/C of P&O Centre for completion of remaining Practical Hours i.e. 680 hours.

FIRST YEAR

Course	Subjects	Theory Hrs	Practical Hrs	Total Hrs	Marks Theory	Marks Practical	Total Marks
1	Computer Science & graphical communication	80	120	200	100	100	200
2	Bio-Mechanics-III	80		80	100	--	100
3	Assistive Technology	80		80	100	-	100
4	Research Methodology & Bio Statistics	60	---	60	100	---	100
5	*Prosthetic Science-III	80	320	400	100	100	200
6	*Orthotic Science-III	80	320	400	100	100	200
	Total	460	760	1220	600	300	900

SECOND YEAR

Course Code	Subjects	Theory Hrs	Practical Hrs	Total Hrs	Marks Theory	Marks Practical	Total Marks
1	*Prosthetics Science-IV	60	160	220	100	100	200
2	*Orthotic Science-IV	80	160	240	100	100	200
3	Management & Administration	80	--	80	100	--	100
4	*Prosthetics Clinical Practice	--	250	250	-	200	200
5	*Orthotics Clinical Practice	---	250	250	-	200	200
	Project Work**	--	180	180	---	100	100
	Total	220	1000	1220	300	700	1000

**Joint projects may also be undertaken.

Note:- *All theory & Practical examinations in the discipline of Prosthetics and Orthotics shall be conducted only by the regular appointed Prosthetic and Orthotic Faculty / Teachers from a teaching institution.

V. DURATION OF THE PROGRAMME

The duration of the programme is of two years (excluding of 6 months of internship), which can be completed in a maximum of 4 years from the date of admission to the programme.

VI. ADEQUACY OF THE SYLLABUS

The syllabus prescribed for the B.P.O. Condensed Course is on the basis of minimum requirements for regular B.P.O. programme as one time measure.

VII. WORKING DAYS & ATTENDANCE

The programme will be conducted for **at least 200 working** days each year exclusive of the period of examination and admission. The institution shall work for a minimum of thirty six hours in a week (five or six days), during which physical presence in the institution of all the teachers and student clinician is necessary to ensure their availability for advice, guidance, dialogue and consultation as and when needed.

No student will be allowed to appear in the examination unless she/he has attended at least 75% of total number of classes in theory and 80 % in practical.

100% attendance in internship is compulsory.

VIII. ELIGIBILITY FOR ADMISSION

- 10+2 with 50% marks in PCBE/PCME Stream from any approved Board of the State /Central Govt.
- Diploma in P & O from RCI's approved Institutions with valid CRR No.
- 05 years of post qualification experience in the field of P & O.
- Candidates who have completed DPO /DPOE prior to 31.12.2010 will be eligible for admission to BPO Condensed Course.

The reservation and relaxation for SC/ST/OBC/PWD and other categories shall be as per the rules of the Central Government/ State Government, whichever is applicable.

IX. Intake

Maximum intake will be 20 candidates per batch per institute

X. Duration

Course will be of 02 academic years (excluding 06 months of internship).

XI. PROGRAMME PATTERN

The programme has been developed on Annual basis.

XII. EXAMINATIONS

As per the respective University norms. Minimum passing marks for every subject will be 50% both in theory and practical. Each candidate will be given maximum n+ 2 attempts to clear the examination.

XIII. NATURE OF EVALUATION

Internal assessment for theory Courses will not exceed 20% and 25% in the practicum wherever applicable or as per respective University norms. Internal Assessment should be calculated by conducting minimum two class tests, two assignments, examination/practical examination and any other activities implemented by the parent organizations/university. Marks of Internal Assessment should be informed to the Students prior to commencement of university examinations.

XIV. ELIGIBILITY OF INSTITUTIONS TO OFFER THIS COURSE

NIs/Govt. Institutions conducting RCI's approved BPO Course (face to face) will only be eligible to conduct the BPO Condensed Course, one institute can be permitted to conduct maximum of three batches of BPO Condensed Course, subject to fulfilment of all pre-requisite norms prescribed by RCI.

AFFILIATING UNIVERSITY

Only Govt. Universities will be considered for affiliation.

XV. BPO CONDESE COURSE 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 BPO program. He/she should hold qualification as laid down by RCI.

XVI. STAFF REQUIREMENT

The faculty of the BPO Regular Course will be responsible for supervising and conducting practicals of the BPO Condensed Course

XVII. CERTIFICATION AS A REGISTERED PROFESSIONAL

The successful students will be registered as Prosthetist and Orthotist(Professional). The training institution/organization should take appropriate action to ensure that all passed out students are registered with the Council.

XVIII. AWARD OF DEGREE

After successful completion of all examinations and internship candidate will be awarded with the degree of Bachelor in Prosthetics and Orthotics (B.P.O.). Condense Course.

XIX. CLINICAL PRACTICUM-

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

- 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.
- Formulate an optimal prosthetic and orthotic solution using information from the patient assessment, other members of the health care team, medical charts, etc.
- 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.
- 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.

- Identify, prescribe and justify selection of appropriate materials and componentry in the fabrication of the prostheses or orthoses.
- Construct the prostheses or orthoses using appropriate fabrication techniques in preparation for the initial fitting.
- Fit the prostheses or orthoses to the patient using static and dynamic functional criteria established from the original assessment.
- Evaluate the quality of the prostheses or orthoses fit to ensure the appropriate interface contouring, force application and trim lines.
- Identify problems related to device fit and/or alignment and be able to suggest and implement appropriate correction.
- Assess and solve prosthetic or orthotic problems as part of short and long term patient care.
- Maintain accurate records of patient treatment and follow up as well as confidentiality of such information.
- 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.
- Educate the patient /client and/or caregiver on use, care and function of the prostheses or orthoses.
- Understand the methodology of problem identification, problem solving in a process that includes all stake holders, with the patient at the centre.

XX. INTERNSHIP

1. Internship is compulsory.

2. Duration: 6 months

3. Eligibility: Internship will start immediately after the declaration of result of final year/ semester & candidate is declared pass in all four years / eight semesters

4. Structure and duration of the postings:

i) The place of postings of the students for internship will be decided by the respective institute conducting the course.

ii) Students should spend minimum of 50% period of internship at parent institute and upto 50% period outside the parent institute like hospital set ups, educational set ups, special clinical facilities. Exposure should be for those areas where limited exposure was provided in the parent institute.

5. Mode of supervision during internship: Supervision should be provided by a Qualified Prosthetics and Orthotics Professional.

6. Maintenance of records by students: Every student should maintain records of the number of hours of clinical work in different areas and institutions. This should be certified by the head of the department/organisation/ institution or his/her nominee where the student is undergoing internship.

7. Extension of internship: Internship shall be extended by the number of days the student remains absent.

8. Stipend: As per the norms of the parent Institute.

9. Grading and evaluation of student: Grading and evaluation should be done by the institute where the candidate is doing internship. The student will be required to repeat those postings in which his/her performance is found unsatisfactory.
10. Certification: The parent institute/affiliating University will award a certificate after successful completion of the internship.
11. The University shall award the degree certificate only after the successful completion of the internship.

FIRST YEAR

TITLE----- COMPUTER SCIENCE & GRAPHICAL COMMUNICATION
TEACHING HOURS----- 80 (Practical -120)

Course description: Student will acquire computer knowledge to design the prosthetics and orthotics components and apply in research and development in prosthetics and orthotics field.

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

Describe the advanced application of computer in prosthetics and orthotics field.

Design various components for prosthetics and orthotics use.

Make use of computer knowledge in the statistics data analysis and documentation.

Describe the principles of computer aided design(CAD) & computer aided manufacture(CAM)

DETAILED CONTENTS

Dimension on technical drawing , indication of linear and angular tolerance, methods of dimensing and toleracing, cone methods of indicating surface texture on technical metal work

Orthographic projections, points, line and simple objects, Orthographic and isometric projection of P & O components

Introduction to computers and Components of computers: Physical Composition, Central Processing Unit, Main Memory, Input and Output units and alsoall kinds of common types of computer peripherals.

Hardware: Various Configurations, Specification of peripherals and computer system. Various types of storage facilities and its advantages and disadvantages.

Computing environments: Introduction to types of computers- Personal computers, Main frame and super computers, Networks, E-Mail, Internet. Introduction to operating systems, e.g. DOS, Windows, Linux, Unix, commands and introduction to General file systems.

Software: The current operating software's, Word Processor, spreadsheet, data base and presentation software, e.g. Windows XP or Windows 2000 Professional, Microsoft Office XP or 2000 Professional etc., upgraded as used currently, Anti Virus.

Basic Engineering Drawing:

Computer Aided Design & Manufacturing (CAD & CAM)

Basics of CAD: Introduction, Definition, History, Current status, Product Cycle, Automation, Designing, Application and Benefits. Computer Graphics: Introduction of software, Function of graphic package, Application Software. AutoCad updated version: Introduction, Foundation of AutoCad Commands, Execution of Simple 2D Drawings, Understanding 3D commands, Executing 3D Commands, Creating 3D objects Rendering and Image attach to an object Starting New Projects, Creating, Editing, Saving Drawing, Annotation, Dimension, Plotting, Customisation, Auto Lisp.

Introduction to CNC, History of CNC, Advantages and disadvantages of N/C, CNC, DNC, Major part of CNC.

Basics of CAM: Introduction of CNC machine, basics of Computer Aided Designing and Manufacturing (CAD/CAM) and its use in P&O. Other kinds of Computer use in Prosthetics and Orthotics. CAD/CAM Technology in socket making and also making of different kinds of orthosis and prosthesis.

CAD/CAM in Prosthetics & Orthotics: types of digitizers used, concept of different types of modifying software, CNC carver and its specification, step wise fabrication procedure of sockets, shells and spinal orthoses, its advantages and disadvantages

RECOMMENDED BOOKS & JOURNALS

Sl. No.	Author	Title	Publisher	Year/Vol.
1.	Mc Mohan, Chris	CAD, CAM		
2.	Zeid Ibrahim	CAD/CAM theory and practice	B. I. Publications P New Delhi	
3.	Satish Jain	Computer course	Pub: BPB New Delhi	
4.	Satish Jain	Computer Organisation & system Software	Pub: BPB New Delhi	
6.	Hammandlu	Computer graphics	Pub: BPB New Delhi	
7.	BPB	Operating systems	Pub: BPB New Delhi	
8.	C.D	Auto CAD 2007 for engineers & designers		
9.	C.D	Sensor technology handbook		

TITLE-----BIO-MECHANICS-III
TEACHING HOURS-----70

DETAILED CONTENTS

Biomechanics of Hand, wrist complex, elbow complex & shoulder complex.

Upper Limb: Grasp patterns, grasp forces, mechanical replacement of hand function, augmentation of deficient hand function, upper limb prosthetic socket biomechanics – all types, Orthoses biomechanics, application of external power, myoelectric control of external power and usage of devices.

Control systems: Introduction to control theory. Application in Prosthetics and Orthotics of functional electrical stimulation (FES), hybrid orthoses, myoelectrics and bio-feedback.

Spinal Biomechanics: Motions of the spine, Biomechanics of different region in spinal column, Biomechanics Inter vertebral disk, Lumbar Spine loading during normal activities and effects of Orthoses on this loads, Biomechanical Principles of spinal orthoses, Biomechanics of Corsets, Cervical/ thoraco/lumbar/sacral spinal orthoses. Biomechanics of scoliosis correction using different technologies and especially using Spinal orthosis.

Design concept part-I: Buckling, theories in failure/ fatigue/stress concentrations, connections, fluid mechanics and beam deflection.

Design concept part-II: Shear force and bending moment diagrams, centroids, 2nd moment of area and mass, theorem of parallel axes, bending stress, torsional stress of circular shafts, combined axial and bending stresses. Combined and torsional stresses, combined axial bending torsional stresses. Open and closed helical springs, beam deflection. Design test standards/materials/Philadelphia Loads/ISO. Design calculations for P&O devices. Practical: Different ways of design tests, use of FES and myoelectric control system in P&O devices.

Combined and torsional stresses, combined axial bending torsional stresses. Open and closed helical springs, beam deflection. Design test standards/materials/Philadelphia Loads/ISO. Design calculations for P&O devices/BIS. Column of the spine, biomechanics of spinal injuries, follower load, Euler's theory of buckling

RECOMMENDED BOOKS & JOURNALS

BIOMECHANICS

Sl. No.	Author	Title	Publisher	Year/Vol.
1.	P. Bowker, D.N. Conde, D.L. Bader, D.J.PRATT	Bio-mechanical basis of Orthotics Management	Butter worth-Heinemann Ltd. Linacre House, Jordon Hill, Oxford OX2 BDP	
2.	Humphrey, Jay D.	Introduction to biomechanics		
3.	Hamill, Joseph	Biomechanical Basis of human movement		2 nd ed.
4.	Rose, Jessicaed.	Human walking		
5.	Soderberg, L.ed.	Kinesiology		
6.	Hoffoman shirt J. ed.	Introduction of Kinesiology		2 nd ed.
7.	Tyldesley, Barbara	Muscles, nerves &movement		3 rd ed.
8.	Perry, Jacuelin	Gait analysis		
9.	Tozeren, Aydin	Humanbody dynamics		
10.	Harries, G.F.ed	Humanmotion analysis		
11.	Dvir, Zeevi	Clinical biomechanics		
12.	Hall Susan J	Basic Biomechanics	McGraw-Hill	
13.	Hausdorff, Alexander Jeffrey M, Neil B	Gait disorders	B. I. Publications P	
14.	Duane Knudson	Fundamentals of Bio- Mechanics		2nd ed.
15.	StanleyBell P Frank	Principles of mechanics and biomechanics	B. I. Publications uk	
16.	Black Jonathan	Clinical Biomechanics		
17.	Donatelli, R.A.	Biomechanics of the Foot and Ankle	Davis, Philadelphia	
18.	Kapandgi, I.A.	Physiology of Joints	Churchill- Livingstone	Vol. I, II & III

TITLE----- ASSISTIVE TECHNOLOGY
TEACHING HOURS-----80

Course description: Students would learn about the use of various types of mobility aids required by PWDs and related analysis of the gait pattern.

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

- Explain the prescription of commonly used mobility aids like crutches, walking stick, and walkers. Assess and prescribe the best possible mobility solution for a wheelchair user
- Carry out repair and maintenance of wheelchair
- Describe the correct use of the wheelchairs, transfers and various modifications of wheel chairs
- Train users to make the best use of their wheelchair.
- Assess, prescribe and fabricate different types of developmental aids
- Describe the analysis of gait with the related mobility aids.

DETAILED CONTENTS

Mobility and Walking aids: Canes, walking sticks, Crutches - auxiliary, elbow and forearm support. Different types of Walking Frame, Walker and their attachments. Para podium etc

Developmental aids: Biomechanics of various kinds of developmental aids, Normal milestone and delayed milestone, prescription, design and materials used, measurement techniques, fabrication of Box seat, Special Chair with or without table/tray, Standing/ tilting frame, Low-level cart, Prone board and various developmental and educational toys. Maximum use of Appropriate Technology while making developmental aids.

Molded seats: Biomechanics of various kinds of molded seats, prescription criteria, cast and measurement techniques, Cast modifications, fabrication of molded seats with inside or outside posting, use of different materials and technologies to fabricate the same, suspension or right kinds of strapping.

Wheelchair: Manual wheelchair: Benefits of appropriate wheelchair for a wheelchair user, Features and benefits of 'sitting upright' in wheelchair, Types of wheelchair, cushion and its components and its safe handling, pressure relief techniques, user assessment, prescription, measurement, fitting, Transfer techniques, Wheelchair mobility skills, customized wheelchair, Care & Maintenance of Wheelchairs and importance of wheelchair user instructions.

Cushions and its fabrication technique & wheelchair modification.

Other types: Introduction: Motorized wheelchair, tricycle and motorized tricycle, modified two wheeler for mobility. Robotics Arms,

Gait Training with various walking aids, Installation/ fabrication of Parallel bars.

Self help devices: Special gadgets to assist in activities of daily living (A.D.L.) – assistive device for SCI patients, stroke patients etc.

RECOMMENDED BOOKS & JOURNALS

TITLE----- RESEARCH METHODOLOGY&BIostatISTICS
TEACHING HOURS-----60

Course description: The student would acquire the knowledge of the research problem, design, Sampling, data collection, analysis of data, Testing hypotheses, interpretation and report writing to prosthetics and Orthotics

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

- Explain the process, types, design, needs, principles of research
- Formulate an appropriate research plan in order to solve a clinical problem
- Examine the concepts of estimation and hypothesis testing with applications to population proportions, means, variances
- Describe the sampling, data collection and processing of data
- Examine the data by using different measures
- Perform effective descriptive statistical analysis as well as statistical inference for a variety of mainstream applications
- Use appropriate empirical and probability distributions to model data.
- Conduct a basic research study in order to solve a clinical problem

DETAILED CONTENTS

Introduction to Biostatistics

1. Definition – Statistics, Biostatistics
2. Applications of Biostatistics
3. Data collection from experiments & surveys.
4. Variable – Qualitative & Quantitative, Discrete and continuous.
5. Presentation of Data: -
 - a) Tabular Presentation of Data – Statistical Table, Format of a Table.
 - b) Frequency Distribution – construction of Frequency Distribution, cumulative and relative frequency distribution, Exclusive and inclusive method of classification of Data.
 - c) Diagrammatic Presentation of Data: - Bar diagrams, Pie Diagram, Line Diagram, Pictogram, Cartogram or Statistical map.
 - d) Graphical representation of a Frequency distribution – Histogram, Frequency Polygon, Frequency curve, ogives or cumulative frequency curves.

Research methodology:

1. Introduction to Research methodology: Meaning of research, objectives of research, Types of research & research approaches,
2. Research problem: Statement of research problem Statement of purpose and objectives of research problem, Necessity of defining the problem

3. Research design: Meaning of research design, Need for research design,
4. Sampling Design: Criteria for selecting sampling procedure
5. Measurement & scaling techniques: Measurement in research- Measurement scales, sources of error in measurement,
6. Methods of data collection: collection of primary data.
7. Sampling fundamentals, need for sampling
8. Analysis of data:, Types of analysis.
9. Testing of hypothesis: What is hypothesis? Basic concepts concerning testing of hypothesis.

RECOMMENDED BOOKS & JOURNALS

Sl. No.	Author	Title	Publisher	Year/Vol.
1.	Armstrong H.B.	Critical Moments in Quantitative Research	Butter worth- Heine Oxford	
2.	R.M. Scot	Orthotic system& research		

TITLE----- PROSTHETICS SCIENCE- III
TEACHING HOURS----- 90

DETAILED CONTENTS

Upper Limb: Grasp patterns, grasp forces, mechanical replacement of hand function, augmentation of deficient hand function, upper limb prosthetic socket biomechanics – all types.

Control systems: Introduction to control theory, application in Prosthetics of functional electrical stimulation (FES), myoelectric and bio-feedback.

Upper limb prosthetics: Historical development in Upper Limb Prostheses – India and abroad, Upper Extremity Prosthetics Components - Terminal devices, Wrist units, Elbow units, Shoulder units, Harnessing systems in Upper extremity prosthesis.

Partial Hand: passive, cosmetics and functional types which also includes silicon prostheses. Cosmetic hand gloves and fingers. Devices for augmentation of function and cosmesis for partial hand amputation and finger amputation.

Wrist Disarticulation: Prescription Criteria, Types of prosthesis – Components, Socket Shape, Clinical Considerations, Casting and measurement techniques, Cast modifications, Fabrication techniques, alignment techniques, Harnessing and suspension mechanisms, Fitting, donning and doffing techniques. Checkout procedures, Testing and Training.

Trans Radial: Prescription Criteria, Types of Trans Radial prosthesis – Components, Types of Socket which includes Self suspending, flexible/rigid socket or combination of both, Clinical Considerations, Casting and measurement techniques, Cast modifications, Fabrication techniques – single wall and double wall, alignment techniques, Harnessing and suspension mechanisms, Control system – body powered and externally powered, Fitting, donning and doffing techniques. Checkout procedures, Testing and Training.

Trans Humeral: Prescription Criteria, Types of Trans Humeral prosthesis which also includes Elbow Disarticulation prostheses – Components, Different types of Elbow Mechanisms. Types of Socket which includes Self suspending, flexible/rigid socket or combination of both, Clinical Considerations, Casting and measurement techniques, Cast modifications, Fabrication techniques – single wall and double wall, alignment techniques, Harnessing and suspension mechanisms, Control system – body powered and externally powered, Fitting, donning and doffing techniques. Checkout procedures, Testing and Training.

Shoulder Disarticulation: Prescription Criteria, Types of prosthesis both cosmetics and functional, Components, Different types of Elbow and Shoulder Mechanisms. Types of Socket, Clinical Considerations, Casting and measurement techniques, Cast modifications, Fabrication techniques, alignment techniques, Harnessing and suspension mechanisms, Control system – body powered and externally powered, Fitting, donning and doffing techniques. Checkout procedures, Testing and Training.

TITLE----- ORTHOTIC SCIENCE-III
TEACHING HOURS----- 80

DETAILED CONTENTS

Control systems: Introduction to control theory, application of Functional Electrical Stimulation (FES) in Orthotics, hybrid Orthosis.

Upper Limb Orthotics: Objectives of splinting and principles. Types & classification of Orthoses. Biomechanical principal of all types of upper limb Orthotics. Material used and its advantages and disadvantages. All types of Hand Orthoses, Wrist Hand Orthoses, Elbow Orthoses, Shoulder Elbow Wrist Hand Orthoses & Pelvic Shoulder Elbow Wrist Hand Orthosis. Measurement/casting and Fabrication of P.S.E.W.H.O, S.E.W.H.O, Elbow Orthoses, Elbow Wrist and Hand Orthoses, Elbow braces etc. Orthotic management of rheumatic arthritis and burns etc.

Immobilization/ mobilization, Appliances for flail elbows: Measurement/casting and Fabrication of Shoulder Orthoses, The shoulder joint braces and splints, Abduction splints and braces, Traction splint of Humerus, All types of Shoulder Elbow Wrist and Hand Orthoses which also includes both body powered and externally powered. All types of fracture Orthoses, Temporary splinting, Feeder and other assistive appliances.

Upper Limb: Orthosis biomechanics, application of external power, myoelectric control of external power and usage of devices.

RECOMMENDED BOOKS & JOURNALS

Sl. No.	Title	Author	Publisher	Year/Vol.
1.	Prosthetics & Orthotics	Shurr. G. Donald&J.W.Michel		2 nd ed.
2.	Atlasfor prosthetic rehabilitation, Surgeryandlimb deficiency.	AmericanAcademy of Orthopaedic Surgeons	Mosby publications/ or N.Y.U. St.Louice, London, Chickago	3 rd
3.	Orthotics	Edestein, Joan E.	Jaypee Publisher New Delhi	
4.	AAOS atlas of Orthosis and assistive devices,	Hsu, John D.	Mosby publications/ or N.Y.U. St.Louice, London, Chickago	4 th ed.
5.	Maintenanceandcare of the prosthesis	C.A.Hannesseg		
6.	Manualfor Upper Extremity Prosthesis	William R.SANTASHI Edn		
7.	Orthotics and Prosthetics in Rehabilitation	Michelle M. Lusardi PhD PT andCaroline C. Nielsen PhD		
8.	Guidelines for Prescribing Foot	Mark A. Reiley		

	Orthotics			
9.	Orthotics in Functional Rehabilitation of the Lower Limb	Deborah A. Nawocze		
10.	Hand and Upper Extremity Splinting : principles and methods	Fess, Gettle, Philips Elaine Ewing, Karan S, Cynthia A	Elsevier Mosby St. Luis B. I. Publications P	
11.	Powered upper limb prosthesis	American Academy of Prosthetists & Orthotists		
12.	Upper Extremity Orthotics	Anderson, Miles H.	Jaypee Publisher New Delhi	
13.	New Advances in Prosthetics and Orthotics	Mark H Bussell		
14.	Prosthetic & patient management	Kevin Croll		1st

TITLE----- PRACTICAL PROSTHETICS SCIENCE-III
TEACHING HOURS----340

Prosthetics Practical: Fabrication of prosthesis for partial hand amputation or congenital absence, through wrist prosthesis, Below Elbow prosthesis, Above Elbow prosthesis, Shoulder Disarticulation prosthesis, Elbow Disarticulation prosthesis – preferably using various available technologies.

Practical: Different ways of design tests, use of FES and myoelectric control system in P&O devices.

TITLE----- PRACTICAL ORTHOTICS SCIENCE-III
TEACHING HOURS----300

Orthotics Practical: Fabrication of at least 5 types of splints belonging to each group on model / mannequins

TITLE----- PRACTICAL COMPUTER SCIENCE
TEACHING HOURS---- 120

Practical:

1. Student has to be thorough in all branches of MS Office especially WORD and POWERPOINT. In addition to that it would be better if Student also learn one additional drawing and imaging software among e.g. Corel Draw, PageMaker, Photoshop or similar kind of softwares.

2. Student has to be thorough in all branches CAD-CAM especially AUTOCAD. Student should make design of all common types of P&O components which are regularly in use by using AutoCAD software.

SECOND YEAR

TITLE----- PROSTHETICS SCIENCE-IV
TEACHING HOURS-----60

DETAILED CONTENTS

Hip Disarticulation Prosthesis: Various types of through hip Prosthesis. Prescription principles, Materials and components to be used, Casting and measurement techniques, Cast modification, alignment, suspension, Fitting, donning and doffing techniques. Check out procedures, Testing and Training. Through hip Gait analysis and deviations.

Prosthetics: Bilateral Stubbies. Bilateral Prosthesis. Trans Lumbar Prosthesis (Sitting and Standing), Prosthesis for Child Amputee, Prosthesis for Congenital anomalies, Prosthesis adaptation for sports and recreation, Immediate post surgical fittings, Check-out Procedures.

TITLE----- ORTHOTICS SCIENCE-IV
TEACHING HOURS-----80

Spinal Orthoses: Historical development of spinal orthoses. Anatomical and Physiological Principles of construction and fitting of spinal Orthoses. Biomechanical principle and Functions of spinal Orthoses. Indications and contraindications for spinal orthosis

Cervical Orthoses: Principle, material, measurement/ casting, fabrication of all types of Cervical Orthoses especially different types of cervical collar, semi-rigid/rigid cervical orthoses both temporary and permanent. Cervical Traction, HALO traction and various types.

Thoraco-Lumbo-Sacral Orthoses: Flexible spinal Orthoses. Rigid spinal orthoses. Principle, material, measurement/ casting, fabrication of all types of Thoraco Lumbo sacral orthoses (TLSO) especially all types of orthoses for scoliosis& Kyphosis. All types of under arm orthoses and variants. Various types of Immobilisers, Fitting, donning and doffing techniques. Checkout procedures, Testing and Training. Lumbo sacral Orthoses: Principle, material, measurement/ casting, fabrication of all types of Lumbo sacral orthoses (LSO) especially Corsets and all types of orthoses for Lordosis and scoliosis. Pelvic traction and its uses. Cranial Orthoses Orthotic management of spinal deformities / injuries. Orthotic management of Pott's spine

RECOMMENDED BOOKS & JOURNALS

Sl. No.	Author	Title	Publisher	Year/Vol.
1.	Shurr. G. Donald&J.W.Michel	Prosthetics & Orthotics		2 nd ed.
2.	Seymour, Ron	Prosthetics & Orthotics LowerLimb& Spine		
3.	AmericanAcademy of Orthopaedic Surgeons	Atlasfor prosthetic rehabilitation, Surgeryandlimb deficiency.	Mosby publications/ or N.Y.U. St.Louice, London, Chickago	3 rd
4.	Hsu, John D.	AAOS atlas of Orthosis and assistive devices,	Mosby publications/ or N.Y.U. St.Louice, London, Chickago	4 th ed.
5.	C.A.Melancik	Hip disarticulation Prosthesis		
6.	KentonD.Leatherman Rober A. Dickson	The Management of Spinal deformities	Butter worth- Heinemann Ltd. Linacre House, Jordon Hill,Oxford OX2 BDP	
7.	E.F.Murphy	Principal in Prosthetic managementforMultiple		

		handicapped		
8.	Jan Bruckner and Joan Edelstein	Orthotics: Individual: A Comprehensive Interactive Tutorial CD-ROM		
9.	D.N. Condie and S. Turner	An Atlas of Lower Limb Orthotic Practice		
10.	Michelle M. Lusardi PhD PT and Caroline C. Nielsen PhD	Orthotics and Prosthetics in Rehabilitation		
11.	Deborah A. Nawocze	Orthotics in Functional Rehabilitation of the Lower Limb		
12.	American Academy of Prosthetists & Orthotists	Orthology: Pathomechanics of Lower-Limb Orthotic Design		

TITLE----- MANAGEMENT & ADMINISTRATION
TEACHING HOURS-----80

Course description: Students would have an understanding of the planning, construction, human management, store management and safety of the workshop

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

- Explain techniques related to the design, planning, control and improvement of service and manufacturing operations.
- Demonstrate basic knowledge of financial management practices such as cost calculations and accounting processes.
- Address issues related to clinic management including, appointment systems and record keeping.
- Discuss the importance of quality control and workflow management.
- Apply appropriate inventory management protocols
- Understand and discuss the benefits associate with the use of quality assurance systems
- Understand the organization of the workplace environment.

DETAILED CONTENTS

Introduction: Principles of Administrative and Management structure, Industrial Management, Definition of Organization. Principles of good organisation, type of Organisational setup Workshop Administration and management.

Management: Introduction, Discipline, Security, distribution of work, Work sheet, Time sheet and staff Welfare. Material Management: Store and store organization. Inventory Control. Purchase organization. Introduction to cost accounting. Use of computer for effective store management.

Safety: Industrial accidents, safety and hazards Planning: Planning of Prosthetics and Orthotics Departments at various levels, all types of various scales. Layout, plant Layout. Costing, billing, documentation especially development of recording system to manage individual's records. Leadership. Human resource management & Environmental Science: Hospital waste disposal. Role of the International Health Agencies

Economics: Business management practices such as cost calculations, accounting process and budgeting address issues related to clinic management including, appointment systems and record keeping, Quality control and the use of quality assurance system Appropriate code of ethical behaviour of P & O Professionals

Introduction of administration, Nature and scope of administration, How to be an effective administrator, Principles of administration and its applications to Prosthetics and orthotics setup. Rules of Professional Conduct.

TITLE----- PROSTHETICS SCIENCE-IV
TEACHING HOURS----- 160

Practical: Fabrication of Prosthesis for through hip, double or multiple amputees on model/ mannequins, Fitting of Prosthesis in cases and developing and/or adapting new designs.

TITLE----- ORTHOTICS SCIENCE-IV
TEACHING HOURS----- 160

Practical: Fabrication of all types of orthoses on model / mannequins

TITLE----- PROSTHETICS CLINICAL PRACTICE
TEACHING HOURS-----250

Course description: The student will have experience in the clinical environment of supplying prostheses and orthoses to patients undergoing treatment. This experience should cover as wide a range as possible but with emphasis on the major levels of provision.

The student will develop skills in the:

- communication
- assessment and prescription;
- clinical provision of prostheses and orthoses;
- manufacture of prostheses and orthoses;
- interpersonal relationships;
- organisation and management;
- Clinical research.
- Contributing too and learning from the clinic team.

PROSTHETICS CLINICAL PRACTICE

Direct Service: In this period each trainee will be in touch directly with the persons with disabilities under supervision of the Instructor/Demonstrator. She/he would do all the necessary work from start to the finish for fittings of suitable prostheses. Each person fitted with prostheses has to be documented/ recorded well and to be presented in the clinics in front of health care team and other trainees. Besides fitting, trainee would also work with other rehabilitation team members to understand "Total Rehabilitation".

TITLE----- ORTHOTICS CLINICAL PRACTICE
TEACHING HOURS-----250

Course description: The student will have experience in the clinical environment of supplying prostheses and orthoses to patients undergoing treatment. This experience should cover as wide a range as possible but with emphasis on the major levels of provision.

The student will develop skills in the:

- communication
- assessment and prescription;
- clinical provision of prostheses and orthoses;
- manufacture of prostheses and orthoses;
- interpersonal relationships;
- organisation and management;
- Clinical research.
- Contributing too and learning from the clinic team.

ORTHOTICS CLINICAL PRACTICE

Direct Service: In this period each trainee will be in touch directly with the persons with disabilities under supervision of the Instructor/Demonstrator. She/he would do all the necessary work from start to the finish for fittings of suitable prostheses. Each person fitted with prostheses has to be documented/ recorded well and to be presented in the clinics in front of health care team and other trainees. Besides fitting, trainee would also work with other rehabilitation team members to understand "Total Rehabilitation".

TITLE----- PROJECT WORK
TEACHING HOURS----- 180

Each Trainee shall take a project work under supervision of a guide. Project work has to be well documented and presented in essay form. The major focus will be trainee's original work which she or he has to present prior to final examination. The subject and the guide should be chosen within four weeks from the day of admission to the fourth year.