

Program Structure

Total No of Credit Hours	35
Semester Duration	
Course Duration	2 Semesters (1 Year)
Course Load per Semester (Regular full-time Students)	17-18 Credit Hours

Course Layout for t-BS Prosthetics and Orthotics

S. No	Code	Title	Credits	Semester
1	RSC-606	Introduction to computer	3 (2+1)	I
2	PO-602	Introduction to Physical Therapy	3 (2+1)	I
3	PO-623	Electro-technology	3 (2+1)	I
4	RSC-621	English -III (Technical)	3 (3+0)	I
5	RSC-681	Scientific Inquiry & Research Methodology	3 (2+1)	I
6	PO-603	Communication Skills	2 (2+0)	I
Total			17	
7	PO-609	Clinical Assessment	3 (0+3)	II
8	PO-611	Research Methodology -II	3 (1+2)	II
9	PO-602	Psychological Counselling of PWD	3 (2+1)	II
10	PO-606	Community Based Rehabilitation	3 (2+1)	II
11	PO-607	Research Project / Dissertation	6	II
Total			18	

Semester 1

INTRODUCTION TO COMPUTER

Course Description:

This is an introductory course on Information and Communication Technologies. Topics include ICT terminologies, hardware and software components, the internet and world wide web, and ICT based applications.

: Basic Definitions & Concepts

: Hardware: Computer Systems & Components

: Storage Devices , Number Systems

: Software: Operating Systems, Programming and Application Software

: Introduction to Programming, Databases and Information Systems

: Networks

: Data Communication

: The Internet, Browsers and Search Engines

: The Internet: Email, Collaborative Computing and Social Networking

: The Internet: E-Commerce

: IT Security and other issues

: Project Week

: Review Week

Text Books/Reference Books:

- Introduction to Computers by Peter Norton, 6th International Edition (McGraw HILL)
- Using Information Technology: A Practical Introduction to Computer & Communications by Williams Sawyer, 6th Edition (McGraw HILL)
- Computers, Communications & information: A user's introduction by Sarah E. Hutchinson, Stacey C. Swayer
- Fundamentals of Information Technology by Alexis Leon, Mathewsleon Leon press

Introduction to Physiotherapy

Credit 3(2-1)

Course Description

Physiotherapy is an important aspect of physical rehabilitation. This course of study is added to prosthetic and Orthotic curriculum to provide basic concept of physiotherapy to P&O students.

To enable the student to perform basic physiotherapy exercises in rehabilitation of physical disabled people the graduate will be able to

- Learn basic principle of Physical Therapy
- Apply these principles when physiotherapist is not available

Course Contents:

Introduction to physiotherapy

Definition

Aim

Role of P&O technician in physiotherapy

Role of physiotherapy in P&O

Patient assessment and treatment

Physiotherapy for Orthotic patients

Physiotherapy in

Deformities of lower limb with physiotherapy management

Genu Varum/Valgum

CTEV

Pws Plaanus

Deformities of the upper limb with physiotherapy management

Deformities and other conditions of the spine

Diseases with physiotherapy management

Amputees and physiotherapy

Pre-prosthetic treatment

Muscle strengthening (static and Dynamic)

Contracture prevention and reduction

Post prosthetic treatment

Gait training

Weight bearing

Balance exercise

Prosthetic Gait training

Training with walking aids (crites, canes, waling frames)

Text Books/Reference Books:

1. Engstorm B. and Van de Ven C. *Therapy for Amputees*. 3rd Edition. Churchill. 1999.
2. Hsu JM. & Fisk J. *AAOS Atlas of Orthoses and Assistive Devices*. 4th Edition. Elsevier. 2008
3. Lusardi M, Jorge M and Nielsen C. *Orthotics and Prosthetics Rehabilitation*. 3rd Edition. Saunders, Elsevier. 2013.

ELECTROTECHNOLOGY

COURSE DESCRIPTION:

With advancement in technology, electronics are being used more and more in P&O. For students to have a better understanding how electronics can be used in P&O today. This course aims at offering students an insight into their uses as well as providing a general outline of the principals behind electro-technology. These principals form the essential building blocks of all electrical interfaces used in P&O applications.

CONTENT:

LECTURES

BASIC CONCEPTS

- The SI System of units
- Charge, current, resistance, potential difference, electromotive force (EMF)
- The relationship between resistance, voltage and current (Ohms Law)
- AC and DC circuits
- Sine waves
- Induction and capacitance
- Power

AC & DC Circuits

- Kirchhoff's Law
- Resistors in series and parallel
- Measurement of resistance
- Resistivity and conductivity
- Temperature coefficient of resistance
- Sine wave (frequency, period, phase, min/peak/mean values, RMS)
- Impedance
- Circuit diagrams

COMPONENTS

- Resistors and capacitors
- Transformers
- Semi-conductors (transistors)
- Amplifiers
- Motors

MEASUREMENT

- Electronic measuring instruments
- Recoding instruments
- Concepts of resolution and accuracy
- Transducers: analogue to digital and digital to analogue

FEEDBACK

- The feedback equation

- A feedback loop
- Feedback loop control
- Feedback loop gain
- Noise and bandwidth of noise
- Positive and negative feedback
- Instability and self-oscillation in amplifiers

ELECTRICAL SAFETY

- Fuses
- Miniature Circuit Breaker (MCB)
- Earth circuits
- Lightning conductors
- Voltage regulation

ELECTRO-TECHNOLOGY IN P&O

- Biological potentials (muscle action potential)
- Electro-myography and myo-electricity
- Metal paste electrodes
- Electrode stability
- Micro switches
- Lower limb control
- Electrical component fabrication

RECOMMENDED TEXT BOOKS:

1. *Basic Electronics* by B.L. Thereja
2. *Biological & Medical Electronics* by Ralph W. Stach Ph.D.

ENGLISH III (Technical Writing and Presentation Skills)

CREDIT 3(3-0)

Objectives: Enhance language skills and develop critical thinking

Presentation skills

Essay writing

Descriptive, narrative, discursive, argumentative

Academic writing

How to write a proposal for research paper/term paper

How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency)

Technical Report writing

Progress report writing

Note: Extensive reading is required for vocabulary building

Recommended books:

Technical Writing and Presentation Skills

a) Essay Writing and Academic Writing

1. Writing. Advanced by Ron White. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 435407 3 (particularly suitable for discursive, descriptive, argumentative and report writing).
2. College Writing Skills by John Langan. Mc=Graw-Hill Higher Education. 2004.

3. Patterns of College Writing (4th edition) by Laurie G. Kirszner and Stephen R. Mandell. St. Martin's Press.
- b) Presentation Skills
- c) Reading
- The Mercury Reader. A Custom Publication. Compiled by norther Illinois University. General Editors: Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharon. (A reader which will give students exposure to the best of twentieth century literature, without taxing the taste of engineering students).

Scientific Inquiry & Research Methodology

Credit 3(2-1)

Course Description:

This course includes discussion on basic quantitative methods and designs, including concepts of reliability and validity, interpretation of inferential statistics related to research designs, co relational statistic & designs, interclass correlation coefficients, and critical appraisal of the literature.

Course Contents:

Research Fundamentals:

- Rehabilitation Research
- Theory in Rehabilitation Research
- Research Ethics

Research Design:

- Research Problems, Questions, and Hypotheses
- Research Paradigms
- Design Overview
- Research Validity

Experimental Designs:

- Group Designs
- Single-System Design

Non experimental Research:

- Overview of Non experimental Research

- Clinical Case Reports
- Qualitative Research
- Epidemiology
- Outcomes Research
- Survey Research

Measurement:

- Measurement Theory
- Methodological Research

Data Analysis:

- Statistical Reasoning
- Statistical Analysis of Differences; The basics
- Statistical Analysis of Differences; Advanced and special Techniques
- Statistical Analysis of Relationships; The basics
- Statistical Analysis of Relationships; Advanced and special Techniques

Being a Consumer

- Locating the Literature
- Evaluating Evidence One Article at a time
- Synthesizing Bodies of Evidence

Implementing Research:

- Implementing a Research Project
- Publishing and Presenting Research

PRACTICAL

- Literature review
- Preparation, presentation and defence of research proposal
- Poster presentation

RECOMMENDED TEXTBOOK:

- *Essentials of clinical research* By Stephan P. Glasser
- *Rehabilitation Research (Principles and Applications)* 3rd Edition By Elizabeth Domholdt

Communication Skill

2(2+0)

Course Description

Graduates of this course will be among the first in the country and as such will be called upon for their ideas / or to defend their ideas. They must be able to effectively communicate with all members of the health care team. Designed to make students aware of the need of effective communication, it should identify the modes of communication as well as the people with whom the students should be communicating with. Students should also gain the basic skills needed for making effective presentations.

The subject will cover modes of communication ranging from letters, reports, spoken word and formal presentations.

Course content:

Introduction to communication

- Communication process

- Model of Communication process

- Communication as a mean of information

Effective communication, 7'C of effective communication

Importance, Methods and Types of communication

Written communication

- Reports

- Letters

- Clinical notes

- Technical information

- Clinical papers

Interpersonal Communication

Verbal communication

- Public speaking
- Listening and understanding in class
- Giving instructions

Non-verbal communication

Attitude

Listening Capacity

Strategies for effective non verbal delivery

Barriers to communication

- Overcoming barriers to communication
- Process of communication

Strategies to improve

- Oral presentation/communication,
- Reducing stage fright
- Listening skills
- Successful interpersonal communication

Resolution of conflicts

- Communicative characteristics for conflict resolution

P&O- Patient communication

- How to improve P&O- Patient communication
- Shifts in P&O- Patient communication
- P&O- Patient relationship

Making presentations

Technologies:

- Telephones / fax / e-mail
- Mass media
- Voice-over -internet -protocol

Recommended Books

1. Essentials of Business Communication: Mary Ellen Guffey&Dana Loewy (2012)
2. Business Communication, Amy Newman and Scot Ober (2012)
1. Report writing skills training course. How to write a report and executive summary, And plan, design and present.MargaretGreenhall(2010)

Semester II

BPO-309

Clinical Assessment

2(2+0)

Rationales:

Physical assessment of the patient is the import aspect of P&O practice . Clinics is included in B.S curriculum to make students familiarize with patients assessment and Evaluation
The aim is to make the students competent in the area of patient's clinical assessment by initially practice on each other and then in clinical environment in clinical placement

Learning Objectives:

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 aim is to develop skills in:

Where the clinical practice takes place in centres other than the main teaching institution such clinical placement centres must satisfy specified standards of the teaching institution and the student's work must be supervised by a Category I professional.

At the end of the course the students would be able to

- Examination methods
- Evaluation of Range of Movement
- Evaluation of muscle strength

- Stability of joint
- Evaluation of deformity
- Length discrepancy
- Demonstrate professional skills
- Explain the professional ethics
- Completely assess the patient with physical disorders
- Perform clinical evaluation of different region of human body
- Develop treatment plan for client/patient

Course contents of Clinical Practice/ clinics:

Assessment and prescription;

Detailed Clinical assessment of individual patients,
 Prosthetic prescription and Evaluation
 Orthotic prescription and Evaluation
 Clinical provision of prostheses and orthoses;
 Health systems
 Ethical consideration

Examination methods of lower limb

Evaluation Form
 Joint stability, testing methods and recording
 Range of movement, evaluation methods and recording
 Muscle Strength, evaluation methods and recording
 Sensibility testing methods and recording
 Deformity Evaluation method
 Leg length discrepancy measurement
 Trendelenberg Test

Examination methods of Upper limb

Evaluation Form
 Joint stability, testing methods and recording
 Range of movement, evaluation methods and recording
 Muscle Strength, evaluation methods and recording
 Sensibility testing methods and recording
 Deformity Evaluation method

Examination methods of Trunk

Evaluation Form
 Range of movement, evaluation methods and recording
 Muscle Strength, evaluation methods and recording
 Sensibility testing methods and recording
 Deformity Evaluation method
 Cobb's angle measurement

Recommended books:

1. Physical Examination of the Spine and Extremities by Stanley Hoppenfeld, Richard Hutton
2. Fundamentals of Musculoskeletal Assessment Techniques Second Edition by M. Lynn Palmer PhD PT (Author), Marcia Epler PhD PT ATC (Author)
3. Clinical orthopaedic examination Textbook by Ronald McRae

BPO-311

Research Methodology -II

2(2+0)

Rational:

Research is getting more importance in education of P&O. It also provides basis evidence bases learning. Addition of research methods will enable students to produce research proposal and projects at undergraduate level. It is designed to teach the students of Prosthetics and Orthotics at the entry-level the fundamentals of reading and understanding research methods, design, and statistics.

Aim:

1. To provide the students with the necessary concepts of statistics to enable them to realize a research project in the field of Prosthetics and Orthotics.
2. To provide an introduction to basic of research methodology , research types to undergraduate students
3. To provide basics data collection, statistic analysis, and interpretation of results

Learning Objectives:

At the end of this course, the students should be able to:

- Understand some basic concepts of research and its methodologies

- Identify appropriate research topics
- Select and define appropriate research problem and parameters
- Prepare a project proposal (to undertake a project)
- Organize and conduct research (advanced project) in a more appropriate manner
- Write a research report and thesis
- Write a research proposal (grants)
- It involves selection of appropriate statistical techniques to address questions of medical relevance;
- Select and apply appropriate statistical techniques for managing common types of medical data;
- Use various software packages for statistical analysis and data management; interpret the results of statistical analyses and critically evaluate the use of statistics in the medical literature;
- Communicate effectively with statisticians and the wider medical community, in writing and orally through presentation of results of statistical analyses;
- Explore current and anticipated developments in medical statistics.

Course Contents:

Introduction to Research Methods

Overview of Research and its Methodologies

Concepts of research

The need for research

Types of research

Steps in conducting research

Literature review

What is literature review?

Why the need for literature review?

How to carry out a literature review?

Selecting and defining a research problem

Problem formulation – why the need for this?

What are the criteria for selecting a problem?

Identifying variables

Evaluating problems

Functions of a hypothesis

Research strategies and design

Descriptive epidemiological studies and clinical trials

Experimental studies and clinical trials

Quantitative Research Methods

Qualitative Research

Dissertation

Analysis of Relationships

Hypothesis Testing:

Introduction,

Statistical problem,

Null and alternative hypothesis,

Type-I and Type-II errors, level of significance,

Test statistics,

Acceptance and rejection regions,

General procedure for testing of hypothesis

Testing Of Hypothesis- Single Population:

Introduction,

Testing of hypothesis and confidence interval about the population mean and proportion for small and large samples,

Exercises

Testing Of Hypotheses-Two Or More Populations:

Introduction,

Testing of hypothesis and confidence intervals about the difference of population means and proportions for small and large samples,

Analysis of Variance and ANOVA Table.

Exercises.

Testing Of Hypothesis-Independence Of Attributes:

Introduction,

Contingency Tables,

Testing of hypothesis about the Independence of attributes.

Exercises.

Data Analysis

Association and causation

- Quantitative Data Analysis

- Qualitative Data Analysis

- Applied Longitudinal Data Analysis

Regression And Correlation:

Introduction,

Cause and effect relationships,

Examples,

Simple linear regression,

Estimation of parameters and their interpretation r and R ,

Correlation

Coefficient of linear correlation, its estimation and interpretation

Multiple regression and interpretation of its parameters

Conducting the research

- Research activities

- Preparations before conducting your research

Construction of a research proposal

Writing Research Reports and Thesis

- Why the need to write papers and reports?

- Writing a research report

- Writing a technical paper

- Contents of a thesis

Writing Research Proposals

- Why do we need to write research proposals?

- Research Grants in Pakistan

- How to write Good Research Proposals?

- Case Study

Ethical aspects of health research

Recommended Text Books:

1. Walpole, R. E. 1982. —Introduction to Statistics||, 3rd Ed., Macmillan Publishing Co., Inc. New York.
2. Muhammad, F. 2005. —Statistical Methods and Data Analysis||, Kitab Markaz, Bhawana Bazar Faisalabad

Psychological Counselling of PWD**3(3+1)****Course Description:**

Persons with disabilities face greater mental challenges as well as physical challenges as a result of their disability. The Psychology course helps students understand these challenges, such as being aware that someone who has suffered an amputation might go through much the same psychological process as someone who has lost a close family member. They will

be taught gender, cultural and religious awareness, ethics and other psycho-social aspects associated with disability. Through role play and other practical exercises, students will be able to practice some of the techniques used to deal with stressful situations. As important as the tools for providing psychological support, is knowing when not to intervene and students will be taught awareness of their professional limits. They will learn how to spot when their patient might need professional psychological help and where they might receive that assistance.

Learning Objectives:

Upon completion of the course students will be able to:

- Psychological concepts
- Discuss the mechanisms by which human needs, memory and emotions are processed.
- Outline the methods of interpersonal communication and demonstrate competence through role-play. .
- Discuss the affects of family and society upon disabled people.

Course contents:

Introduction to psychology –

Definition

Terminologies

Aims and functions

Brief historical background and sub fields of psychology

Human beings

Human needs

Emotions

Memory

Mental health -family problems

Disabled persons

Handicapped persons

Methods of learning:

Classical,

Operant conditioning and cognitive learning

Perception and sensation

The role of human perception in psychological disorders

Psychopathology –

Anxiety and mood disorders

Post Traumatic Stress Disorder (PTSD)

Stress

Major psychological causes of stresses:

Sources of stress

Life changes,

Individual differences such as personality, culture and gender reaction to stress

Stress and psychosomatic disorders

The effect of stress on Immune System

Depression

Definition and generalities

Weak versus acute depression

Personality Theories –

Difference between Psychotherapy and counseling

Communication skills

Psychology applied to people with disability

Self confidence

Society consideration

Motivation and emotions

Different theories and the role of motivation for disable person

 Psychosocial issues

 Quality of life

 Difference between psychologists and psychiatrist

Recommended Books

1. Dowrick C. *Medicine in Society: Behavioural Sciences for Medical Students*. 1st Edition. Christopher Dowrick, CRC Press Arnold Publisher. 2001.
2. Morgan CT. *Introduction to Psychology*. 7th Edition. New Delhi: Tata McGraw-Hill Education. 2001
3. Mowadat H Rana, Sohail Ali and Mansoor Mustafa. *A Handbook of Behavioural Sciences for Medical and Dental Students*. University of Health Sciences, Lahore. 2012
4. Wolf S. and Goodell H. *Behavioural Sciences in Clinical Medicine*. Latest Edition. Thomas Publisher. 1976.

Community Based Rehabilitation

3(3+0)

Course Description:

Community based Rehabilitation is the emerging concept in allied health sciences. It is relatively new concept in prosthetics and orthotics. This subject is included to prepare the graduate to fulfill the requirements of modern allied health system .

In order to ensure that there is an effective relationship between the prosthetics and orthotics services and the rehabilitation activities at community level, it is important for prosthetics and orthotics personnel to be made aware of the role and function of the community rehabilitation services.

Course Contents

- The philosophy of community-based rehabilitation;
- The United Nations Standard Rules on the Equalization of Opportunities for Persons with Disabilities;
- Knowledge on national rules or legislation ensuring equal opportunities and full participation for persons with disabilities;
- The national health service structure, including primary health care and community-based rehabilitation;
- Community-based rehabilitation activities in the country;
- Interaction of prosthetics and orthotics services, primary health care and community-based rehabilitation;
- Problems of persons with disabilities in rural areas especially women or girl child
- Adaptation of prostheses and orthoses to local conditions;
- Need for and benefit of interaction with Disabled Peoples Organizations (DPO)
- Ways of providing advice in a simple and effective manner;
- Basic physical therapy (exercises) before and after fitting prostheses and orthoses which can be carried out at community level prostheses and orthoses sources of funding to access prosthetics and orthotics services;
- Integration of the person with disability into society after successful fitting of prostheses and orthoses.

Course Description:

Putting into practice the knowledge and skills acquired in Research Methodology course, students will now go on to undertake a research project of their own. They will be assigned a supervisor who will provide feedback and guide them through the course of their research project. The project may be in the form of a scientific experiment, survey, literature review or case study. As this is the first time students have carried out such a study, the emphasis will be on students following of the methodology they have learnt rather than the unique contribution their study will make to the field of P&O. In the course of Research Project - I, with the approval of their supervisor, they will have chosen their topic to research, decided on the process, presented their proposal and be in the process of collecting the data. Throughout this process, the supervisor will receive periodic progress reports form the student.

LEARNING OBJECTIVES:

By the end of the course the students will be able to:

- Select a suitable topic to research
- Decide on the type and scope of his/her chosen topic of research
- Demonstrate the ability to conduct an effective literature search and critically review the results of his/her search
- Make ethical considerations and understand the application process for ethical approval
- Formulate and plan the process that the research will follow
- Write, present and defend his/her research proposal

Course Content:

Under the supervision of an appointed supervisor, the student will select a research topic, make the necessary literature searches and evaluation of that literature to refine the topic, scope and methodology of his/her research.

The student will plan his/her project, considering the ethics, resources and time available and present his research proposal in both written and verbal form to his supervisor.

When his research proposal has been accepted, he/she will begin to collect the data required by the appropriate means (e.g. experimentation, survey or evaluation), providing his/her supervisor with periodic progress reports.

Under the supervision of an appointed supervisor, the student will continue with the collection of his or her data by the means appropriate to the research project (e.g.

experimentation, survey or evaluation), providing his/her supervisor with periodic progress reports.

When sufficient data has been gathered, the student will compile the results, make an analysis, discuss and derive conclusions. All this, he or she will bring together into a dissertation, which he or she will eventually present before an examining panel and be given the opportunity to defend.