M.Phil Courses in Pharmacology

COURSE NO.	TITLE	Cr.hr.
PHL 801	Biostatistics	3
PHL 802	Research methodology &statistical packages	3
PHL 803	Drugs acting on autonomic nervous system and their therapeutic applications	3
PHL 804	Basis of endocrine disorders and their therapeutic approaches	3
PHL 805	Immunotoxicology	3
PHL 806	Chemotherapy of infections	3
PHL 807	Pharmacotherapy of cardiovascular disorders	3
PHL 808	Psychopharmacology	3
PHL 809	Co-morbid diseases:dose calculation and management in special population	3
PHL 810	Pharmacology & Therapeutics of natural products	3

Note:

- Out of 10 courses students have to opt 8 courses in two semesters.
- Each course is of 3 Credit hours

PHL 801 BIOSTATISTICS Cr. Hrs. 03

Introduction: What is Biostatistics? Application of statistics in biological sciences. ***Sample and Population***: Simple random sampling. Sampling distribution and standard error. Stratified random sampling. Systematic and Cluster Sampling. ***Test of hypothesis and significance:*** statistical hypotheses, level of significance, Confidence Intervals. ***Test Involving Binomial and normal distribution***. Test of significance based on t and z Distribution. ***Goodness of fit test*:** Chi-Square distribution, Test of Homogeneity. ***Analysis of Variance***: One Way Classification, Partitioning of Sum of squares and degree of freedom. ***Two way classifications***: Complete randomized design, Latin square design. Co-relation and regression.

PHL 802 RESEARCH METHODOLOGY AND STATISTICAL PACKAGE Cr. Hrs. 03

Research: Meaning, purpose, Types (Educational, Clinical, Experimental, historical descriptive, Basic applied and Patent oriented Research), objective of research. ***Literature survey***: Use of Library, books & journals, Medlines, Internet, gating patients & reprints of articles as a source for Literature survey. ***Research proposal***: Selecting a problem & preparing Research proposals for different researches ***Methods & tools used in research***: Qualitative studies, quantitative studies, simple data organization, descriptive data analysis, Limitation & sources of Error
Documentations:Inquiries in form of Questionnaire, Opinions or by Interview, Techniques of documentation,Importance of documentation. The Research Report Paper writing/ thesis writing ***Different parts of the research paper:****Title*: Title of project with author's name,

Abstract: Statement of the problem, Background list in brief, purpose and scope, key words.*Methodology*: subject, apparatus, instrumentation & procedure. *Results*: tables, graphs, figures & statistical presentation, *Discussion*: support or non-support of hypothesis, practical & theoretical implications, *Conclusion, Acknowledgements, References, Errata importance of Spell check for entire project, Uses of footnotes*.***Fundamental***: Basic concepts of hardware and software, Concept of operating systems & programming.***Packages***: PC tools and utilities. Any one of popular Word processor, Spread sheet, Graphics & presentation, data base, Statistical package, Chem. Draw and MM calculation. ***Use of Computer in Research***: Literature survey and use of information services via computer. Paper & dissertation composing by computer.

Use of Computer in Hospital Pharmacy: Exposure of students to computerization of different hospital systems including management, finances, patient history and profiles, drug utilization reports. Drug information systems of diagnostics. Computerization of drug distribution system, drug inventory control system. ***Use of Computer in Pharmaceutical Industry***: Exposure of students to use of computers in production, planning, budgeting, accounts, batch wise cost accounting, managing production and raw material. Quality assurance and quality assessment. Sales and distribution control and evaluation.

PHL 803 DRUGS ACTING ON AUTONOMIC NERVOUS SYSTEM AND THEIR THERAPEUTIC APPLICATIONS Cr. Hrs. 03

Drug acting at synaptic and neuroeffector junction sites: Neurohumoral transmission, Receptors, classification, theories, functions. **Neurohumoral transmitters**: Acetylcholine, dopamine, adrenaline, noradrenaline, prejunctional and junctional effects. **Cholinergic transmission**: Acetylcholinesterases, blocking agents. **Adrenergic transmission**: Synthesis, release and metabolism, effects on various organs.

PHL 804 BASIS OF ENDOCRINE DISORDERS AND THEIR THERAPEUTIC APPROACHES Cr. Hrs. 03

Thyroid Hormones: Synthesis, actions and therapeutic uses. Antithyroid Drugs. Mechanism of action, therapeutic uses of ionic inhibitors. Radioactive iodine. ***Estrogen and Progesterone***: Physiology and Pharmacological actions, mechanism of actions, preparations, untoward responses and therapeutic uses of estrogens and progestins. Antiestrogens. ***Adenohypophyseal and related hormones***: Therapeutic uses and regulations. ***Adrenocorticotropic hormones***: Regulation of secretion, therapeutic and diagnostic application. ***Insulin:***Physiological functions and pharmacological effects of insulin and hypoglycemic drugs. Treatment of diabetes mellitus.

Glucagon: Chemistry and biosynthesis, mechanism of action, regulation of release, metabolic effects, preparation and adverse reactions.

PHL 805 IMMUNOTOXICOLOGY Cr. Hrs. 03

Fundamentals and scope of toxicology: Definition and classification, Sub-division of toxicology (clinical, occupational, environmental, forensic and ecotoxicology), Mechanism of action of toxic agents. ***Immunotoxicity***: Immunology and Immunotoxicology-related aspects of toxicology, Consequences and mechanisms of immunotoxicity, immune deficiencies and immunosuppression, Drug-induced immunosupression (i.e. ADRs) e.g. blood dyscrasia, decreased serum level of immunoglobulin. ***Immunotoxicological-aspects of Allergy***: Classification, mechanism and effects. Drug-induced and clinical autoimmunity; Mechanism and effects of various autoimmune disorders. ***Adverse immunostimulation;*** Definition, mechanism and pharmacological basis of immunostimulation.

PHL 806 CHEMOTHERAPY OF INFECTIONS Cr. Hrs. 03

General principles in the use of antibiotics. Classification, Mechanism of action and rational choice of antibacterials, Anti-virals, Anti-protozoals, Anti-fungals and anthelmintics in different types of infections.

PHL 807 PHARMACOTHERAPY OF CARDIOVASCULAR DISORDERS Cr. Hrs. 03

Hypertension*:** Classification of antihypertensive Drugs and rational choice of diuretics, vasodilators, sympatholytic, ACE inhibitors. ***Angina pectoris: Classification and mechanism of action of antianginal drugs. Rational selection of Nitrates, Calcium channel blocker, beta blockers. ***Hyperlipidemia and hyperlipoproteinemia***: Pathophysiology: Diseases caused by hyperlipoprotenemia, Therapeutics strategy, rational choice of Niacin,clofibrate, gemfibrozil, fenofibrate, statin and other related drugs. ***Congestive heart failure***; Drug Therapy, classification, mechanism of action of drug e.g. Digoxin (history, Chemistry, mechanism of action, cardiovascular properties). Digitalis intoxication. Pharmacokinetic & metabolism of digoxin. ***Cardiac arrhythmias;*** Classification of anti-arrhythmic drugs, rational choice of specific drug e.g. Quinidine, Procainamide, Dysopyramide, Phenytoin, calcium channel blockers, beta blockers etc.

PHL 808 PSYCHOPHARMACOLOGY Cr. Hrs. 03

Drug abuse, Addiction, tolerance and physical dependence. Study of sources, chemical signaling pathways, receptors and effects of various psychoactive substances e.g. Anti-depressants, Anti-psychotics, alcohol, benzodiazepines, hypnotics, hallucinogens, marijuana and cannabinoids, opiates and CNS stimulants.

PHL 809 CO-MORBID DISEASES: DOSE CALCULATION AND MANAGEMENT IN SPECIAL POPULATION Cr. Hrs. 03

Management of different medicines in co-morbid conditions such as Hypertension with ischemic heart disease, MI, arrhythmia; Diabetes with hypertension, hypercholesterolemia, renal impairment, CHF; Hyperlipidemia with IHD or MI; Thyroid Disorders with metabolic syndrome etc. Pediatric, Geriatric dose calculations. Renal and hepatic compromised dose management as well as pregnancy and lactation protocols.

PHL 810 PHARMACOLOGY & THERAPEUTICS OF NATURAL PRODUCTS Cr. Hrs. 03

Studies on potential anticancer, bactericidal, anti-hypertensive, anti-diabetic and immunomodulating properties of plant extracts derived from commonly occurring plants · Semi

and total synthesis of plant secondary metabolites and its derivatives. Drug synthesis techniques from plants.

M.PHIL COURSES IN PHARMACEUTICAL CHEMISTRY

COURSE NO	**Title**	**CR.Hr**
		CR.Hr
PHC 801	Biostatistics	
PHC 802	Reasearch methodlogy statistical packages	3
PHC 803	Instrumental analysis and techniques I	3
PHC 804	Instrumental analysis and techniques-II	3
PHC 805	Drug design	3
PHC 806	Medicinal chemistry I	3
PHC 807	Medicinal chemistry II	3
PHC 808	Drug stability	3
PHC 809	Solvent extraction and chromatographic techniques	3
PHC 810	Clinical chemistry	3

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PHC 801 BIOSTATISTICS

Introduction: What is Biostatistics? Application of statistics in biological sciences. Sample and Population: Simple random sampling. Sampling distribution and standard error. Stratified random sampling. Systematic and Cluster Sampling. Test of hypothesis and significance: statistical hypotheses, level of significance, Confidence Intervals. Test Involving Binomial and normal distribution. Test of significance based on t and z Distribution. Goodness of fit test: Chi-Square distribution, Test of Homogeneity. Analysis of Variance: One Way Classification, Partitioning OF Sum of squares and degree of freedom. Two Way Classifications. Complete randomized design, Latin square design. Co-relation and regression

PHC 802 REASEARCH METHODLOGY STATISTICAL PACKAGES

Research-Meaning, purpose, Types, (Educational, Clinical, Experimental, historical descriptive, Basic applied and Patent oriented Research) objective of research ,Literature survey-Use of Library, books & journals-Medlines-Internet, gating patients & reprints of articles as a source for Literature survey. Selecting a problem & preparing Research proposals for different of Research .Methods & tools use in research – Qualities studies, quantitative studies , simple data organization descriptive data analysis, Limitation & sources of Error . Inquiries in form of Questionnaire, Opinionnare or by Interview Documentation- “How” of documentation

,Techniques of documentation ,Importance of documentation. The Research Report Paper writing/ thesis writing Different parts of the Research paper Title –Title of project with authors name , Abstract- Statement of the problem, Background list in brief and purpose and scope. Key Words. Methology-subject, apparatus, instrumentation & procedure. Results- tables, graphs, figures & statistical presentation . Discussion support or non support of hypothesis, practical & theoretical implications , Conclusion , Acknowledgements. References , Errata Importance of Spell check for entire project , Uses of footnotes.

Fundamental: Basic concepts of hardware and software, Concept of operating systems & programming. Packages: PC tools and utilities. Any one of popular Word processor, Spread sheet, Graphics & presentation, data base, Statistical package, Chem. Draw and MM calculation. Use of Computer in Research: Literature survey and use of information services via computer. Paper & dissertation composing by computer. Use of Computer in Hospital Pharmacy: Exposure of students to computerization of different hospital systems including management, finances, patient history and profiles, drug utilization reports. Drug information systems of diagnostics. Computerization of drug distribution system, drug inventory control system. Use of Computer in Pharmaceutical Industry: Exposure of students to use of computers in production, planning, budgeting, accounts, batch wise cost accounting, managing production and raw material. Quality assurance and quality assessment. Sales and distribution control and evaluation.

PHC 803 INSTRUMENTAL ANALYSIS AND TECHNIQUES-I

INSTRUMENTATION (radiation sources, monochromators, detectors, signal processors, readout devices, single and double-beam spectrophotometers), ULTRAVOILET AND VISIBLE SPECTROPHOTOMETRY (origin of molecular spectra, electronic transitions, solvent and steric effects, change transfer spectra. Analysis of multicomponent systems, irrelevant absorption corrections). INFRARED SPECTROPHOTOMETRY (near infrared spectroscopy, fouier transform infrared spectroscopy, quantitative analysis).
HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (theory, stationery and mobile phase, elutripic series, recent advances, application to the analysis of drugs and metabolites). GAS CHROMATOGRAPHY (theory, retention properties of stationery phase, derivatization techniques (methylation, acylation, silylation etc.) capillary GC, GC-mass spectrometry, application to the analysis of drug and metabolites).

INTRODUCTION TO NMR SPECTROSCOPY (theory, principle, instrumentation and application)

INTRODUCTION TO MASS SPECTROSCOPY (theory, principle, instrumentation and application)

PHC 804 INSTRUMENTAL ANALYSIS AND TECHNIQUES-II

FLUORESCENCE SPECTROPHOTOMETRY: Factors affecting fluorescence, quantitative analysis of single and two component systems, derivatisation reactions, advantages of fluorimetric methods.

INTRODUCTION TO ELECTROCHEMICAL METHODS (classification of electrochemical methods, advantages and limitations of electrochemical methods, electrochemical terminologies, principles of electrochemical cell, Nernst equation, potential generation across membranes, ion-selective electrodes, dropping mercury electrode, rotating platinum, gold and carbon electrodes).

INTRODUCTION TO PCR (POLYMERASE CHAIN REACTION)

PHC-805 DRUG DESIGN

Concept Of Structure Activity Relationship, Use of Computational Chemistry in Drug Designing, Screening Methods for New Compounds, Development in Opium Analgesics; Structure and Interaction with Receptors. SAR Studies of Morphine Analogues with reference to Agonist and Antagonist Activities. SAR Studies of Quinolones Analogues with reference to Antimicrobial Activity.

PHC 806 MEDICINAL CHEMISTRY I

INTRODUCTION TO MEDICINAL CHEMISTRY: Introduction and Nomenclature, to study the sources, chemistry, classification, preparation, structure activity relationship and mechanism of action of the following
Antiseptics
Disinfectants
Antimetabolites
Anti Myco Bacterial Agents
Antibiotics

PHC 807 MEDICINAL CHEMISTRY II

DRUG ACTIONS & PHYSICOCHEMICAL PROPERTIES (Drug transportation by body fluid, absorption, metabolism, therapeutic action and excretion, drug polarity, solubility, ionization).
To study the sources, chemistry, classification, preparation, structure activity relationship and mechanism of action of the following
Antifungal Drugs
Diagnostic Agents
Steriodal Drugs
Analeptics
Vitamins
Steroid
Hormones

PHC 808 DRUG STABILITY

DRUG STABILITY: introduction and objectives of drug stability studies, stability as an essential quality attribute for pharmaceuticals, significance of stability, rationale for stability testing, mode of degradation of drugs, stability studies at the preformulation and formulation stages of drug, physical factors affecting the stability of drugs, chemical factors affecting the stability of drugs, essentials elements of a stability program, stability protocols, kinetic principles in drug stability, stability indicating assay methods, accelerated stability testing methods, regulatory aspects of stability testing, examples of stability studies of some drug substances.

PHC 809 SOLVENT EXTRACTION AND CHROMATOGRAPHIC TECHNIQUES

1.Solvent Extraction
Generalprinciples ,methods of extraction,experimental variables. definition, classification (Adsorption,partition,ion exchange, molecular exclusion etc) and basic principles of chromatographic process.

2 Open-Bed Chromatography
Thin-layer chromatography: Theory types of stationary phases and solvents, visualization and identification qualitative applications to the analysis of drugs and metabolites

3 Adsorption Column Chromatography
Theory, stationary and mobile phase chromatography, application to the analysis of drugs and metabolites.

4 High performance Liquid Choromatography
Theory, Stationary and mobile phase, elutripic series, recent advances, applications to the analysis of drugs and metabolites.

5 Gas chromatography
Theory, retention properties of stationary phases, derivatisation techniques(Methylation ,acylation, silylation etc) capillary GC, GC- mass spectrometry, applications to the analysis of drug and metabolites

6 Size exclusion chromatography
Theory.types of stationary phased, separation of high molecular weight organic compounds and biopolymers.

PHC 810 CLINICAL CHEMISTRY

Introduction to methods of enzymatic analysis, Biochemical specimens and normal values.Whole blood,serum plasma and other body fluids, Electrolytic balance of serum,CSF and other body fluids(Na and K ,chloride, physiological significance of electrolytes concentration in serum eclectrolytes in urine. Liver function test.Bilirubin, bromosulfaphthalein (BSP), Bile pigments in urine, urobilinogen,porphyrins, porphobilinogen, Method for flocculation tests. Kidney function tests and urine analysis. Routine urine analysis total solutes total protein,urinary calculi, creatinine clearance,glucose, urinary calculi,creatinin clearance, Testing of drugs and their metabolites, classes of the drugs and poisons, methodlogy of drugs and poison, blood alcohol. Barbiturates, bromide, salicylates ,digoxin ,carbon dioxide,lead, lithium.,Testing of blood gases, Ph ,bicarbonate , glucose and nitrogenous non-protein nitrogen(NPN), Analysis of calcium ,phosphorous.magnesium,iron,serum iron and iron binding capacity Methods of enzymatic analysis.Use of auto-analyzer in clinical analysis.

M.PHIL COURSES IN PHARMACOGNOSY

COURSE	TITLE	CR.Hr

NO		
PHG 801	Biostatistics	3
PHG 802	Reasearch methodlogy statistical packages	3
PHG 803	Instrumental analysis and techniques	3
PHG 804	Instrumental analysis and techniques-II	3
PHG 805	Cell Biotechnology	3
PHG 806	Rational phytotherapy	3
PHG 807	Phytochemistry	3
PHG 808	Advances in pharmacognosy	3
PHG 809	Analytical pharmacognosy	3
PHG 810	Industrial pharmacognosy	3

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Introduction: What is Biostatistics? Application of statistics in biological sciences. Sample and Population: Simple random sampling. Sampling distribution and standard error. Stratified random sampling. Systematic and Cluster Sampling. Test of hypothesis and significance: statistical hypotheses, level of significance, Confidence Intervals. Test Involving Binomial and normal distribution. Test of significance based on t and z Distribution. Goodness of fit test: Chi-Square distribution, Test of Homogeneity. Analysis of Variance: One Way Classification, Partitioning OF Sum of squares and degree of freedom. Two Way Classifications. Complete randomized design, Latin square design. Co-relation and regression

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Research-Meaning, purpose, Types, (Educational, Clinical, Experimental, historical descriptive, Basic applied and Patent oriented Research) objective of research ,Literature survey-Use of Library, books & journals-Medlines-Internet, gating patients & reprints of articles as a source for Literature survey. Selecting a problem & preparing Research proposals for different of Research .Methods & tools use in research – Qualities studies, quantitative studies , simple data organization descriptive data analysis, Limitation & sources of Error . Inquiries in form of Questionnaire, Opinionnare or by Interview Documentation- "How" of documentation ,Techniques of documentation ,Importance of documentation. The Research Report Paper writing/ thesis writing Different parts of the Research paper Title –Title of project with authors name , Abstract- Statement of the problem, Background list in brief and purpose and scope. Key Words. Methology-subject, apparatus, instrumentation & procedure. Results- tables, graphs, figures & statistical presentation . Discussion support or non support of hypothesis, practical & theoretical implications , Conclusion , Acknowledgements. References , Errata Importance of Spell check for entire project , Uses of footnotes.

Fundamental: Basic concepts of hardware and software, Concept of operating systems & programming. Packages: PC tools and utilities. Any one of popular Word processor, Spread sheet, Graphics & presentation, data base, Statistical package, Chem. Draw and MM calculation. Use of Computer in Research: Literature survey and use of information services via computer. Paper &

dissertation composing by computer. Use of Computer in Hospital Pharmacy: Exposure of students to computerization of different hospital systems including management, finances, patient history and profiles, drug utilization reports. Drug information systems of diagnostics. Computerization of drug distribution system, drug inventory control system. Use of Computer in Pharmaceutical Industry: Exposure of students to use of computers in production, planning, budgeting, accounts, batch wise cost accounting, managing production and raw material. Quality assurance and quality assessment. Sales and distribution control and evaluation.

PHG 803 INSTRUMENTAL ANALYSIS AND TECHNIQUES-I

INSTRUMENTATION (radiation sources, monochromators, detectors, signal processors, readout devices, single and double-beam spectrophotometers), ULTRAVOILET AND VISIBLE SPECTROPHOTOMETRY (origin of molecular spectra, electronic transitions, solvent and steric effects, change transfer spectra. Analysis of multicomponent systems, irrelevant absorption corrections). INFRARED SPECTROPHOTOMETRY (near infrared spectroscopy, fouier transform infrared spectroscopy, quantitative analysis).
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INTRODUCTION TO NMR SPECTROSCOPY (theory, principle, instrumentation and application)

INTRODUCTION TO MASS SPECTROSCOPY (theory, principle, instrumentation and application)

PHG 804 Instrumental Analysis and Techniques-II

FLUORESCENCE
SPECTROPHOTOMETRY: Factors affecting fluorescence, quantitative analysis of single and two component systems, derivatisation reactions, advantages of fluorimetric methods.

INTRODUCTION TO ELECTROCHEMICAL METHODS (classification of electrochemical methods, advantages and limitations of electrochemical methods, electrochemical terminologies, principles of electrochemical cell, Nernst equation, potential generation across membranes, ion-selective electrodes, dropping mercury electrode, rotating platinum, gold and carbon electrodes).

INTRODUCTION TO PCR (POLYMERASE CHAIN REACTION)

PHG 805 CELL BIOTECHNOLOGY

Study plant cell culture techniques for higher yield of secondary metabolites that are used as drugs. Elucidation and regulation of biosynthetic pathways in cell cultures of plants having scientific as well as economic value

PHG 806 RATIONAL PHYTOTHERAPY

The detailed determination of clinical approaches and its applications and implications to cure and prevent the diseases and promote health care. Medicinal plants, phytomedicine and phytotherapy, Central nervous system (CNS), Cardio vascular system (CVS), Respiratory system (RS), Digestive system (GIT), Urinary tract, Skin, Trauma, Rheumatism and pain, Age and resistance to diseases,

PHG 807 PHYTOCHEMISTRY

Introduction and general methods. Extraction, Separation and Isolation of constituents of medicinal plants. Characterization of known isolated compounds. Methods of studying metabolism, Fat and fatty acid metabolism, Terpenoid biosynthesis, Peptides and protein synthesis and Alkaloid and Glycosides biosynthesis and Secondary metabolites. Drugs of biological origin; Phenols and phenolic glycosides, Volatile oils and Resins, Saponins, Cardioactive drugs and other steroids, Alkaloids and Tumor Inhibitors from plants. Plant growth hormones and their metabolism.

PHG 808 ADVANCES IN PHARMACOGNOSY, CR. HRS. 3

Study of selected topics about biologically and therapeutically active constituents of natural origin, as:
Screening and evaluation.Cleavage of glycoside linkages.Isolation of triterpenoidal saponins.Isolation of the biologically active principles.Detection and isolation of steroidal saponins.Pharmacological approaches to natural product.Neolignans with potential biological activity.Toxic alkaloids and diterpenes from Euphorbiaceae.Saponins with biological and pharmacological activity.Dimeric natural compounds with pharmacological activity.mono-, di- and sequi-terpenes from plants with pharmacological or therapeutical activity. Recent experimental and clinical data for antitumor and cytotoxic agents.Problems and prospects of discovering new drugs from higher plants. Chinese drug constituents.

PHG 809ANALYTICAL PHARMACOGNOSY

Introduction and application of ion exchange chromatography , thin layer chromatography, column chromatography, droplet counter current chromatography , gas chromatography, high pressure liquid chromatography, gel chromatography and gel electrophoresis for the separation of bioactive compounds from natural sources.Quantitative determination of active compounds in plants extracts.

PHG 810INDSUSTRIAL PHARMACOGNOSY

1.Herbal Drug Industry

2 Information Retrieval systems of Herbal Drugs.

3 Literature Survey, Dossage form and Drugs Design of the following:

Immunomodulators: withania somnifera,Centella astiatica, Embelica officinalis, Ocimum sanctum

Antipeptic ulcer: Glycerrhiza glabra, Zingiber officinale, Solamum tuberosum, Atropa belladonna.
Hepatoprotectives: Silybum marianum, Phyllanthus indica, Picrorrhiza kurroa, Andrographis paniculata.
Anticancer: Taxus species, Camptotheca acuminata,Cantharathus roseus.
Antifertility: Embelica ribes,Azadirachta indica, Gassypium species.
Nervine Tonic: Centella asiatica , Acorus calamus ,Valeriana wallichi, Valerana jatamensii
Anti-AIDS: Areeca catechu, Thea sinensis, Ricinus communis.
Volatile oils and their Commercial Significance.
Review of Natural Sweeteners, Dyes ,Pigments and preservatives.

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PHT 803	Instrumental analysis and techniques	3
PHT 804	Instrumental analysis and techniques-II	3
PHT 805	Rheology of Pharmaceuticals	3
PHT806	Pharmaceutical quality control	3
PHT 807	Biopharmaceutics and pharmacokinetics	3
PHT 808	Pharmaceutical product development	3
PHT 809	Computer application in pharmacy	3
PHT 810	Microbial control in pharmaceutical	3

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.Methods & tools use in research – Qualities studies, quantitative studies , simple data organization descriptive data analysis, Limitation & sources of Error . Inquiries in form of Questionnaire, Opinionnare or by Interview Documentation- "How" of documentation ,Techniques of documentation ,Importance of documentation. The Research Report Paper writing/ thesis writing Different parts of the Research paper Title –Title of project with authors name , Abstract- Statement of the problem, Background list in brief and purpose and scope. Key Words. Methology-subject, apparatus, instrumentation & procedure. Results- tables, graphs, figures & statistical presentation . Discussion support or non support of hypothesis, practical & theoretical implications , Conclusion , Acknowledgements. References , Errata Importance of Spell check for entire project , Uses of footnotes.

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PHT 803 INSTRUMENTAL ANALYSIS AND TECHNIQUES-I

INSTRUMENTATION (radiation sources, monochromators, detectors, signal processors, readout devices, single and double-beam spectrophotometers), ULTRAVOILET AND VISIBLE SPECTROPHOTOMETRY (origin of molecular spectra, electronic transitions, solvent and steric effects, change transfer spectra. Analysis of multicomponent systems, irrelevant absorption corrections). INFRARED SPECTROPHOTOMETRY (near infrared spectroscopy, fouier transform infrared spectroscopy, quantitative analysis).
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PHT 804 Instrumental Analysis and Techniques-II

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INTRODUCTION TO ELECTROCHEMICAL METHODS (classification of electrochemical methods, advantages and limitations of electrochemical methods, electrochemical terminologies, principles of electrochemical cell, Nernst equation, potential generation across membranes, ion-selective electrodes, dropping mercury electrode, rotating platinum, gold and carbon electrodes).

INTRODUCTION TO PCR (POLYMERASE CHAIN REACTION)

PHT 805 PHYSICAL PHARMACY

Rheology of Pharmaceuticals: Rheology of suspension, emulsion, and ointments, determination of flow properties, thixotropy, thixotrophy in formulation, viscosity of dispersions, visco elasticity, electro viscous effect, psychorheology, application of rheological properties in pharmaceutical preparation.

Physical studies on surface active:Micellization and theories of solubilization by surface active agents in pharmaceutical systems.Uses of surface active agents as solubilizars in biochemical research.Effect of surfactants in analytical procedures.

PHT 806 PHARMACEUTICAL QUALITY CONTROL

Current status of regulation ,enforcement, and quality assurance,Quality assurance principles and strategies applicable to pharmacy, The Problem of Medication Errors, Why Do Errors Occur?, The Pharmacist's Responsibility Sources of Quality Variation,Control of Quality Variation Raw Materials Control , Active or Therapeutic Materials, Inactive or Inert Materials, Quality Assurance Before Start-Up, Environmental and microbiologic control and sanitation, Quality Assurance At Start-Up, Raw Material processing,Compounding , Packaging Material Control , Labels Control , finished product control, Auditing ,Testing Program and Method, Physical and chemical test,Biologic and microbiologic tests, Quality management ,quality planning ,quality control ,quality assurance and quality improvement Precautions in handling /storage and manufacturing of pharmaceutical products containing antibiotics
Calibration and validation of instruments equipments used in testing and manufacturing ,STABILITY, Concept of stability of pharmaceuticals. Understanding of statistical aspects in expiry period. Degradation pathways, Physical instabilities & evaluation methods. Overages and ICH guidelines.

PHG 807 BIOPHARMACEUTICS AND PHARMACOKINETICS

Biopharmaceutics in preformulation stages of drugs development consideration of physic chemical parameters, aqueous solubility , Pka , partition coefficient. Dissolution , in vivo studies on animals: designing.Pilot study , finalizing protocol, intravenous and oral administration. Evaluation of absorption data.

Bioavailability of Oral Dossage forms

Primary variables to correlate formulation variables and clinical effects.Methods to quantitated primary variables.Establishment of relationship between bioavalibility and clinical response. Formulation factors of therapeutic inequivalence.

Effect of formulation Additives on Drugs Bioavalibility

Designing the experimental protocol for in vivo Bioequivalence studies and its statistical evaluation.

Evaluation of effect of different dietary and pathological factors on bioavalibility.

Pharmaco kinetics basis of variability in clinical response and drug therapy.

PHT 808 PHARMACEUTICAL PRODUCT DEVELOPMENT

Formulation additives: Study of different types of additives e.g. antioxidants and preservatives, coloring and flavoring agents, emulsifying and suspending agents, basic materials for ointment bases, diluents and pharmaceutical solvents, new developments in excipient science, international patented excipients. Drug excipient interaction and incompatibilities; Physical, chemical, pharmaceutical and therapeutic. Formulation development: Principles, technology, problems and evaluations for different classes of dosage forms; Solid dosage forms, Liquids, Polydisperse systems, Sterile products and admixtures., Aerosols.,Package development: Package types for different dosage forms, packaging materials, labelling, preformulation screening of package components.Design of materials and product specifications: Factory design, laying down and optimization of material and product specifications, process and in process controls.Documentation: Protocols, forms and maintenance of records in product development department including clinical batches.

PHT 809 COMPUTER APPLICATIONS IN PHARMACY

Fundamentals

Basic concepts of computers ,Disk, Disk Operating Systems and Programming.

Use of Computer in Research

Basic concepts of computers, Disk, Disk Operating Systems and Programming.

PC Tools, Norton Utilities

Any one of popular word processor, data base, and spread sheet packages, energraphics and SPSS statistical package, Paper and dissertation composing by computer.

Use of Computer in Hospital pharmacy

Exposure of students to computerization of different hospital systems including management.finances.Patient history and profiles, drug utilization reports,Drug information systems of diagnostics.Interactions and poison control.Computerization of drug distribution system in central pharmacy and on satellite pharmacies, drug inventory control and impatient registration and management of nusrsing floors and surgical rooms.

Patient information distribution among medical professionals.Prescription evaluation, costing,transmission of necessary information for patient and record keeping. Drug/plasma level monitoring, dose calculations.

Use of Computer in Pharmaceutical Industry

Exposure of students to use of computers in production planning, budgeting,scheduling ,Accounts batch wise cost accounting, managing production packaging and raw material and packing material stores via computer.Quality assurance assessments, quality control charts, computation of shelf life and bioequivalence studies.Personnel management.Sales and distribution control and evaluation.

PHT 810 MICROBIAL CONTROL IN PHARMACEUTICAL.

Microbial contamination, contamination of pharmaceutical products, source of microbial contamination in pharmaceutical products,factors which effect survival and growth of organisms in products,microbiological spoilage of pharmaceutical products; break down of active ingredients, production of toxin and general formulation break down.

Infection hazards from microbial contamination of pharmaceuticals. Types of organisms, infective dose, host resistance in infection , route of administration.
Control of contamination of row material and finished pharmaceutical products.

M.Phil Pharmacy Practice

		CR.Hr
PHP 801	Biostatistics	
PHP 802	Research methodology statistical packages	3
PHP 803	Evidence based pharmacotherapy	3
PHP 804	Dermatology	3
PHP805	Biology of wound healing and effect of Systemic medication	3
PHP 806	Behavioral and cognitive Neuroscience	3
PHP 807	Introduction to epidemiology and biostatistics	3
PHP 808	Pharmaceutical economics	3
PHP 809	Clinical governance in community Pharmacy	3
PHP 810	Medication Compliance by Rational Drug designing	3

PHP 801 BIOSTATISTICS

Cr. Hrs. 3

Introduction: What is Biostatistics? Application of statistics in biological sciences. Sample and Population: Simple random sampling. Sampling distribution and standard error. Stratified random sampling. Systematic and Cluster Sampling. Test of hypothesis and significance: statistical hypotheses, level of significance, Confidence Intervals. Test Involving Binomial and normal distribution. Test of significance based on t and z Distribution. Goodness of fit test: Chi-Square distribution, Test of Homogeneity. Analysis of Variance: One Way Classification, Partitioning OF Sum of squares and degree of freedom. Two Way Classifications. Complete randomized design, Latin square design. Co-relation and regression

PHP 802 REASEARCH METHODLOGY STATISTICAL PACKAGES

Research-Meaning, purpose, Types, (Educational, Clinical, Experimental, historical descriptive, Basic applied and Patent oriented Research) objective of research ,Literature survey-Use of Library, books & journals-Medlines-Internet, gating patients & reprints of articles as a source for Literature survey. Selecting a problem & preparing Research proposals for different of Research .Methods & tools use in research – Qualities studies, quantitative studies , simple data organization descriptive data analysis, Limitation & sources of Error . Inquiries in form of Questionnaire, Opinionnare or by Interview Documentation- "How" of documentation ,Techniques of documentation ,Importance of documentation. The Research Report Paper writing/ thesis writing Different parts of the Research paper Title –Title of project with authors name , Abstract- Statement of the problem, Background list in brief and purpose and scope. Key Words. Methology-subject, apparatus, instrumentation & procedure. Results- tables, graphs, figures & statistical presentation . Discussion support or non support of hypothesis, practical & theoretical implications , Conclusion , Acknowledgements. References , Errata Importance of Spell check for entire project , Uses of footnotes.

Fundamental: Basic concepts of hardware and software, Concept of operating systems & programming. Packages: PC tools and utilities. Any one of popular Word processor, Spread sheet, Graphics & presentation, data base, Statistical package, Chem. Draw and MM calculation. Use of Computer in Research: Literature survey and use of information services via computer. Paper & dissertation composing by computer. Use of Computer in Hospital Pharmacy: Exposure of students to computerization of different hospital systems including management, finances, patient history and profiles, drug utilization reports. Drug information systems of diagnostics. Computerization of drug distribution system, drug inventory control system. Use of Computer in Pharmaceutical Industry: Exposure of students to use of computers in production, planning, budgeting, accounts, batch wise cost accounting, managing production and raw material. Quality assurance and quality assessment. Sales and distribution control and evaluation.

PHP 803 INSTRUMENTAL ANALYSIS AND TECHNIQUES-I

INSTRUMENTATION (radiation sources, monochromators, detectors, signal processors, readout devices, single and double-beam spectrophotometers), ULTRAVOILET AND VISIBLE SPECTROPHOTOMETRY (origin of molecular spectra, electronic transitions, solvent and steric effects, change transfer spectra. Analysis of multicomponent systems, irrelevant absorption corrections). INFRARED SPECTROPHOTOMETRY (near infrared spectroscopy, fouier transform infrared spectroscopy, quantitative analysis).

HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (theory, stationery and mobile phase, elutripic series, recent advances, application to the analysis of drugs and metabolites). GAS CHROMATOGRAPHY (theory, retention properties of stationery phase, derivatization techniques (methylation, acylation, silylation etc.) capillary GC, GC-mass spectrometry, application to the analysis of drug and metabolites).

INTRODUCTION TO NMR SPECTROSCOPY (theory, principle, instrumentation and application)

INTRODUCTION TO MASS SPECTROSCOPY (theory, principle, instrumentation and application)

PHP 804 Instrumental Analysis and Techniques-II

FLUORESCENCE SPECTROPHOTOMETRY: Factors affecting fluorescence, quantitative analysis of single and two component systems, derivatisation reactions, advantages of fluorimetric methods.

INTRODUCTION TO ELECTROCHEMICAL METHODS (classification of electrochemical methods, advantages and limitations of electrochemical methods, electrochemical terminologies, principles of electrochemical cell, Nernst equation, potential generation across membranes, ion-selective electrodes, dropping mercury electrode, rotating platinum, gold and carbon electrodes).

INTRODUCTION TO PCR (POLYMERASE CHAIN REACTION)

PHP 805 Principles of Epidemiology

At the end of the lecture, the student will be able to:

- Define Epidemiology, disease Transmission.
- Explain Measuring the occurrence of disease: Morbidity and Mortality, Assessing the Validity and Reliability of diagnostic and screening tests.
- Identify the roles of genetic and environmental factors in disease causation,
- Evaluate health services by Epidemiology.

PHP806 Pharmacotherapeutics-

- Describe the underlying pathophysiology and describe the basis of pharmacotherapy of these diseases including dosage calculation, adverse reactions, drug interactions, alternative therapies and monitoring parameters.
- List a possible management plan of adverse reactions and interaction of pharmacotherapy observed.

- Apply evidence-based medicine to identify the limitation and benefits of the pharmacotherapy to individual patient.

- Diseases includes: Endocrine and reproductive: hypo and hyperthyroidism, contraceptive drugs, diabetes mellitus, osteoporosis, adrenal diseases, rheumatoid arthritis and osteoarthritis.

PHP 807 Clinical Biochemistry

The students will be able to

- Demonstrates an in-depth knowledge of the molecular and cell biology of cancer, AIDS, etc.
- Facilitate research skills relevant to the field
- Explain the use of biochemical tests their significance and interpretation in clinical situations.
- Discuss the biochemistry ageing and enviroment.
- Elaborate biophysics‟ principles and importance
- Breiefly discuss applied molecular medicine

PHP 808 Advanced Clinical Pharmacy Practice

Students will study the scientific and clinical factors that influence treatment with medicines and the delivery of pharmaceutical care. Advanced training in the practice of clinical pharmacy enables students to judge new treatments critically and to extend clinical services. This course builds on the limited knowledge imparted in some undergraduate courses, whilst underpinning that acquired professionally.

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

1. Describe various clinical activities in extended pharmaceutical care
2. Describe resources of information and their management
3. Explain clinical pharmacist specialist board certification.
4. Describe difference between clinical pharmacist and clinical pharmacist specialist.
5. Define evidence based practice and explain implementation.
6. Discuss procedure of critical appraisal.
7. Describe formulary and explain the role of clinical pharmacist in formulary management.

PHP 809 Health Management in Pharmacy

The students will be able to

- Describe Health Services System
- Explain Health Services System
- Discuss Legal Aspects of Health Care
- Elaborate Health Care Marketing
- Provide Quality Management in Health Care

PHP 810 Clinical Trial

Covers fundamental concepts and basic analytic methods pertaining to the design, analysis, and interpretation of clinical research studies. designed to help professionals gain the understanding of the entire clinical trials process--from drug and device development to monitoring and post marketing activities as well as relevant information vitally important to the conduct of clinical research.

The students will be able to

1. Demonstrate a foundational understanding of clinical research methodologies described in study protocols with emphasis on study design, operational aspects, and regulatory

compliance

2. Describe various approaches to data collection and Interpret statistical results from the published studies in the peer reviewed literature and clinical study reports

3. Incorporate and prioritize the protection of human subjects and other ethical considerations in all aspects of clinical research

4. Describe sources for regulations, guidance, and best practices commonly used in the conduct of clinical trials and postmarketing studies in the US and abroad

5. Write, communicate, and interact effectively in a professional environment as an entry-level professional

6. Think critically when planning or evaluating a research study, complex operational endeavor, or ethical dilemma