SCHEME OF INSTRUCTION AND SYLLABUS

Diploma in Pharmacy

As per Education Regulation - 2020

Academic Session 2025-26

विद्या कल्पलतेव

Faculty of Pharmacy

United University

Rawatpur, Jhalwa (Prayagraj)

Uttar Pradesh

University Vision

"To establish a Value based Global University having dynamic learning environment encouraging creativity and innovation, research inspired experimental learning and focusing on topics that are pertinent to the development of the region, the Country and the World."

University Mission

- To provide a dynamic, inspiring, and varied learning environment with global exposure.
- To position the institution as a premier hub for research and experiential learning.
- To develop into an adaptable university meeting the demands of society and business.
- To incorporate Value thinking, integrity, wisdom and passion in professional for their career and life.

Department Vision

"To be an organization known for its values, excellence in academics, research and nurturing professionals for pharmacy careers."

Department Mission

M1: To develop competent professionals with ethical & social responsibility.

M2: To prepare students for emerging trends & concepts in pharmaceutical sciences.

M3: To provide state-of-the-art infrastructure and conducive learning environment for academics & research.

M4: To establish & strengthen collaboration between academia & pharmaceutical industries.

Program Educational Objectives (Diploma)

1. PEO-1: To make available a thorough pharmaceutical education leading to D. Pharmacy Degree.
2. PEO-2: To impart students with adequate knowledge and skills to perform as health care provider in hospital and community pharmacy.
3. PEO-3: To develop trained pharmacists having technical expertise along with strong communication skills and multidisciplinary approach.

4. PEO-4: To inculcate systematic approaches about the management of resources and functioning of hospital and community pharmacy.
5. PEO-5: To nurture pharmacists to tackle obstacles of pharmacy practice.

Program Outcomes

On successful completion of D. Pharm program the student will be able to:

- PO1- Demonstrate the knowledge of pharmaceutical and basic sciences in Manufacturing, marketing and healthcare services.
- PO2- Plan, design, conduct experiments, analyze and interpret data.
- PO3- To develop trained pharmacists having technical expertise along with strong communication skills and multidisciplinary approach.
- PO4- To inculcate systematic approaches about the management of resources and functioning of hospital and community pharmacy.
- PO5- To nurture pharmacists to tackle obstacles of pharmacy practice.
- PO6- To ensure persistent development and to participate in life-long learning process for a highly fruitful career.

Program Specific Outcomes

- PSO1: To create pharmacy professional with respect to society & environment with excellence in acquiring knowledge in various field of pharmaceutical sciences.
- PSO2: To create professionals with skills of analyzing and applying the technical knowledge in pharmaceutical industry for research & development of quality medicines.

FACULTY OF PHARMACY

SCHEME OF INSTRUCTION FOR TWO YEAR DIPLOMA PROGRAMME

SCHEME OF INSTRUCTION

COURSE CATEGORY ABBREVIATIONS

1) Program Core-PC
2) Soft Skills-SS
3) Skill Enhancement Course-SEC
4) Compulsory Course-MC
5) Program Elective-PE
6) Open Elective-OE
7) Internship/Project

FACULTY OF PHARMACY

SCHEME OF INSTRUCTION FOR TWO YEAR DIPLOMA PROGRAMME

Table-I: Course of study for Part I

S. No.	Course Code	Course Category	Name of the Course	Total Theory / Practical Hours	Total Tutorial Hours	Theory / Practical Hours per Week	Tutorial Hours per Week	Total Tutorial and Theory/ Practical Hours	Total Tutorial and Theory/ Practical Hours per Week
1	ER20-11T	PC	Pharmaceutics-Theory	75	25	3	1	100	4
2	ER20-11P	PC	Pharmaceutics-Practical	75	-	3	-	75	3
3	ER20-11P	PC	Pharmaceutical Chemistry-Theory	75	25	3	1	100	4
4	ER20-12P	PC	Pharmaceutical Chemistry-Practical	75	-	3	-	75	3
5	ER20-13T	PC	Pharmacognosy-Theory	75	25	3	1	100	4
6	ER20-13P	PC	Pharmacognosy-Practical	75	-	3	-	75	3
7	ER20-14T	PC	Human Anatomy & Physiology-Theory	75	25	3	1	100	4
8	ER20-14P	PC	Human Anatomy & Physiology-Practical	75	-	3	-	75	3
9	ER20-15T	PC	Social Pharmacy-Theory	75	25	3	1	100	4
10	ER20-15P	PC	Social Pharmacy-Practical	75	-	3	-	75	3
11	PTS1DP002T	SEC	Professional Communication and Environmental Studies	50	-	1	-	50	1
Total				800	125	31	5	925	36

SUBJECT CODE & NAME: ER20-11T/ PHARMACEUTICS – THEORY

COURSE OUTCOMES

1) Describe about the different dosage forms and their formulation aspects
2) Explain the advantages, disadvantages, and quality control tests of different dosage forms
3) Discuss the importance of quality assurance and good manufacturing practices.

UNIT I:

History of Pharmacy: History of the profession of Pharmacy in India in relation to Pharmacy education, industry, pharmacy practice, and various professional associations, Pharmacy as a career, Pharmacopoeia: Introduction to IP, BP, USP, NF, and Extra Pharmacopoeia. Salient features of the Indian Pharmacopoeia

UNIT II:

Packaging materials: Types, selection criteria, advantages and disadvantages of glass, plastic, metal, rubber as packaging materials

UNIT III:

Pharmaceutical aids: Organoleptic (Colouring, flavouring, and sweetening) agents

Preservatives: Definition, types with examples and uses

UNIT IV:

Unit operations: Definition, objectives/applications, principles, construction, and workings of:

Size reduction: hammer mill and ball mill.

Size separation: Classification of powders according to IP, Cyclone separator, Sieves and standards of sieves.

Mixing: Double cone blender, Turbine mixer, Triple roller mill and Silverson mixer homogenizer.

Filtration: Theory of filtration, membrane filter and sintered glass filter.

Drying: working of fluidized bed dryer and process of freeze drying.

Extraction: Definition, Classification, method, and applications

UNIT V:

Tablets- coated and uncoated, various modified tablets (sustained release, extended-release, fast dissolving, multi- layered, etc.)

Capsules - hard and soft gelatine capsules

Liquid oral preparations - solution, syrup, elixir, emulsion, suspension, dry powder for reconstitution

Topical preparations - ointments, creams, pastes, gels, liniments and lotions, suppositories, and pessaries, Nasal preparations, Ear preparations

Powders and granules - Insufflations, dusting powders, effervescent powders, and effervescent granules

Sterile formulations – Injectables, eye drops and eye ointments

Immunological products: Sera, vaccines, toxoids, Their manufacturing methods.

UNIT VI:

Basic structure, layout, sections, and activities of pharmaceutical manufacturing plants

Quality control and quality assurance: Definition and concepts of quality control and quality assurance, current good manufacturing practice (cGMP), Introduction to the concept of calibration and validation

UNIT VII:

Novel drug delivery systems: Introduction, Classification with examples, advantages, and challenges

SUBJECT CODE & NAME: ER20-11P/ PHARMACEUTICS PRACTICAL

Course Outcomes:

Upon successful completion of this course, the students will be able to:

1) Calculate the working formula from the given master formula
2) Formulate the dosage form and dispense in an appropriate container
3) Design the label with the necessary product and patient information
4) Perform the basic quality control tests for the common dosage forms

Practical

1) Handling and referring the official references: Pharmacopoeias, Formularies, etc. for retrieving formulas, procedures, etc.
2) Formulation of the following dosage forms as per monograph standards and dispensing with appropriate packaging and labelling

- Liquid Oral: Simple syrup, Piperazine citrate elixir, Aqueous Iodine solution
- Emulsion: Castor oil emulsion, Cod liver oil emulsion
- Suspension: Calamine lotion, Magnesium hydroxide mixture
- Ointment: Simple ointment base, Sulphur ointment
- Cream: Cetrimide cream
- Gel: Sodium alginate gel
- Liniment: Turpentine liniment, White liniment BPC
- Dry powder: Effervescent powder granules, Dusting powder
- Sterile Injection: Normal Saline, Calcium gluconate Injection
- Hard Gelatine Capsule: Tetracycline capsules
- Tablet: Paracetamol tablets

3) Formulation of at least five commonly used cosmetic preparations – e.g. cold cream, shampoo, lotion, toothpaste etc.
4) Demonstration on various stages of tablet manufacturing processes

5) Appropriate methods of usage and storage of all dosage forms including special dosage such as different types of inhalers, spacers, insulin pens.
6) Demonstration of quality control tests and evaluation of common dosage forms viz tablets, capsules, emulsion, sterile injections as per the monographs.

Assignments

The students shall be asked to submit written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. Various systems of measures commonly used in prescribing, compounding and dispensing practices
2. Market preparations (including Fixed Dose Combinations) of each type of dosage forms, their generic name, minimum three brand names and label contents of the dosage forms mentioned in theory/practical
3. Overview of various machines / equipments / instruments involved in the formulation and quality control of various dosage forms / pharmaceutical formulations.
4. Overview of extemporaneous preparations at community / hospital pharmacy vs. manufacturing of dosage forms at industrial level.
5. Basic pharmaceutical calculations: ratios, conversion to percentage fraction, alligation, proof spirit, isotonicity

Field Visit

The students shall be taken for an industrial visit to pharmaceutical industries to witness and understand the various processes of manufacturing of any of the common dosage forms viz. tablets, capsules, liquid orals, injectables, etc. Individual reports from each student on their learning experience from the field visit shall be submitted.

TEXTBOOKS:

1) History of Pharmacy in India by Dr. Harikishan Singh.
2) Indian Pharmacopoeia, Govt. of India Publication.
3) A Text book of Pharmaceuticals Formulation by B.M. Mithal, Vallabh Prakashan.
4) Bentleys' Text book of Pharmaceutics, Editor E.A. Rawlins, Elsevier Int.
5) The Theory and Practice of Industrial Pharmacy. Leon Lachman, Herbert Lieberman and Joseph Kanig, Editors, Lea and Febiger, Philadelphia. Varghese Publishing House.
6) Responsible Use of Medicines: A Layman's Handbook, www.ipapharma.org / publications.

SUBJECT CODE & NAME: ER20-12T/ PHARMACEUTICAL CHEMISTRY – THEORY

Course Outcomes:

Upon successful completion of this course, the students will be able to

1. Describe the chemical class, structure and chemical name of the commonly used drugs and pharmaceuticals of both organic and inorganic nature
2. Discuss the pharmacological uses, dosage regimen, stability issues and storage conditions of all such chemical substances commonly used as drugs
3. Describe the quantitative and qualitative analysis, impurity testing of the chemical substances given in the official monographs
4. Identify the dosage form & the brand names of the drugs and pharmaceuticals popular in the marketplace

UNIT I:

Introduction to Pharmaceutical chemistry: Scope and objectives

Sources and types of errors: Accuracy, precision, significant figures

Impurities in Pharmaceuticals: Source and effect of impurities in Pharmacopoeial substances, importance of limit test, Principle and procedures of Limit tests for chlorides, sulphates, iron, heavy metals and arsenic.

UNIT II:

Volumetric analysis: Fundamentals of volumetric analysis, Acid-base titration, non-aqueous titration, precipitation titration, complexometric titration, redox titration

Gravimetric analysis: Principle and method.

Unit III:

Inorganic Pharmaceuticals: Pharmaceutical formulations, market preparations, storage conditions and uses of:

Haematinics: Ferrous sulphate, Ferrous fumarate, Ferric ammonium citrate, Ferrous ascorbate, Carbonyl iron.

Gastro-intestinal Agents: Antacids: Aluminium hydroxide gel, Magnesium hydroxide,

Magaldrate, Sodium bicarbonate, Calcium Carbonate, Acidifying agents, Adsorbents, Protectives, Cathartics

Topical agents: Silver Nitrate, Ionic Silver, Chlorhexidine Gluconate, Hydrogen peroxide, Boric acid, Bleaching powder, Potassium permanganate

Dental products: Calcium carbonate, Sodium fluoride, Denture cleaners, Denture adhesives, Mouth washes

Medicinal gases: Carbon dioxide, nitrous oxide, oxygen

UNIT IV:

Introduction to nomenclature of organic chemical systems with particular reference to heterocyclic compounds containing up to three rings.

Study of the following category of medicinal compounds with respect to classification, chemical name, chemical structure (compounds marked with*) uses, stability and storage conditions, different types of formulations and their popular brand names

UNIT V:

Drugs Acting on Central Nervous System

Anaesthetics: Thiopental Sodium*, Ketamine Hydrochloride*, Propofol

Sedatives and Hypnotics: Diazepam*, Alprazolam*, Nitrazepam, Phenobarbital*

Antipsychotics: Chlorpromazine Hydrochloride*, Haloperidol*, Risperidone*, Sulpiride*, Olanzapine, Quetiapine, Lurasidone

Anticonvulsants: Phenytoin*, Carbamazepine*, Clonazepam, Valproic Acid*, Gabapentin*, Topiramate, Vigabatrin, Lamotrigine

Anti-Depressants: Amitriptyline Hydrochloride*, Imipramine Hydrochloride*, Fluoxetine*, Venlafaxine, Duloxetine, Sertraline, Citalopram, Escitalopram, Fluvoxamine, Paroxetine

UNIT VI:

Drugs Acting on Autonomic Nervous System

Sympathomimetic Agents: Direct Acting: Nor Epinephrine*,

Epinephrine, Phenylephrine, Dopamine*, Terbutaline, Salbutamol (Albuterol),

Naphazoline*, Tetrahydrozoline.

Indirect Acting Agents: Hydroxy Amphetamine, Pseudoephedrine. Agents with Mixed Mechanism: Ephedrine, Metaraminol

Adrenergic Antagonists: Alpha Adrenergic Blockers: Tolazoline, Phentolamine

Phenoxybenzamine, Prazosin. Beta Adrenergic Blockers: Propranolol*, Atenolol*, Carvedilol

Cholinergic Drugs and Related Agents: Direct Acting Agents: Acetylcholine*, Carbachol, And Pilocarpine. Cholinesterase Inhibitors: Neostigmine*, Edrophonium Chloride, Tacrine

Hydrochloride, Pralidoxime Chloride, Echothiopate Iodide

Cholinergic Blocking Agents: Atropine Sulphate*, Ipratropium Bromide

Synthetic Cholinergic Blocking Agents: Tropicamide, Cyclopentolate Hydrochloride, Clidinium Bromide, Dicyclomine Hydrochloride*

UNIT VII:

Drugs Acting on Cardiovascular System

Anti-Arrhythmic Drugs: Quinidine Sulphate, Procainamide Hydrochloride, Verapamil, Phenytoin Sodium*, Lidocaine Hydrochloride, Lorcainide Hydrochloride, Amiodarone and Sotalol

Anti-Hypertensive Agents: Propranolol*, Captopril*, Ramipril, Methyldopate Hydrochloride,

Clonidine Hydrochloride, Hydralazine Hydrochloride, Nifedipine,

Antianginal Agents: Isosorbide Dinitrate

UNIT VIII:

Diuretics: Acetazolamide, Frusemide*, Bumetanide, Chlorthalidone, Benzthiazide, Metolazone, Xipamide, Spironolactone

UNIT IX:

Hypoglycemic Agents: Insulin and Its Preparations,

Metformin*,Glibenclamide*,Glimepiride,Pioglitazone, Repaglinide, Gliflozins, Gliptins

UNIT X:

Analgesic And Anti-Inflammatory Agents: Morphine Analogues, Narcotic Antagonists; Nonsteroidal Anti- Inflammatory Agents (NSAIDs) - Aspirin*, Diclofenac, Ibuprofen*, Piroxicam, Celecoxib, Mefenamic Acid, Paracetamol*, Aceclofenac

UNIT XI:

Anti-Infective Agents-

Antifungal Agents: Amphotericin-B,Griseofulvin,Miconazole,Ketoconazole*,Itraconazole,

Fluconazole*, Naftifine Hydrochloride

Urinary Tract Anti-Infective Agents: Norfloxacin, Ciprofloxacin, Ofloxacin*, Moxifloxacin

Anti-Tubercular Agents: INH*, Ethambutol, Para Amino Salicylic Acid, Pyrazinamide, Rifampicin, Bedaquiline, Delamanid, Pretomanid*

Antiviral Agents: Amantadine Hydrochloride, Idoxuridine, Acyclovir*, Foscarnet, Zidovudine, Ribavirin, Remdesivir, Favipiravir

Antimalarials: Quinine Sulphate, Chloroquine Phosphate*, Primaquine Phosphate, Mefloquine*, Cycloguanil, Pyrimethamine, Artemisinin

Sulfonamides: Sulfanilamide, Sulfadiazine, Sulfamethoxazole, Sulfacetamide*, Mafenide Acetate, Cotrimoxazole, Dapsone*

UNIT XII:

Antibiotics: Penicillin G, Amoxicillin*, Cloxacillin, Streptomycin, Tetracyclines: Doxycycline, Minocycline, Macrolides: Erythromycin, Azithromycin, Miscellaneous: Chloramphenicol* Clindamycin

UNIT XIII:

Anti-Neoplastic Agents: Cyclophosphamide*, Busulfan, Mercaptopurine, Fluorouracil*,

Methotrexate, Dactinomycin, Doxorubicin Hydrochloride, Vinblastine Sulphate, Cisplatin*, Dromostanolone Propionate

SUBJECT CODE & NAME: ER20-12P/ PHARMACEUTICAL CHEMISTRY – PRACTICAL

Course Outcomes:

Upon successful completion of this course, the students will be able to

1. Perform the limit tests for various inorganic elements and report.
2. Prepare standard solutions using the principles of volumetric analysis.
3. Test the purity of the selected inorganic and organic compounds against the monograph standards.
4. Synthesize the selected chemical substances as per the standard synthetic scheme.
5. Perform qualitative tests to systematically identify the unknown chemical substances.

Practicals

1. Limit test for Chlorides; sulphate; Iron; heavy metals
2. Identification tests for Anions and Cations as per Indian Pharmacopoeia
3. Fundamentals of Volumetric analysis
4. Preparation of standard solution and standardizatio of Sodium
5. Hydroxide, Potassium Permanganate
6. Assay of the following compounds
- Ferrous sulphate- by redox titration
- Calcium gluconate-by complexometric
- Sodium chloride-by Modified Volhard's method
- Ascorbic acid by iodometryIbuprofen by alkalimetry
- Fundamentals of preparative organic chemistry
7. Determination of Melting point and boiling point of organic compounds
- Benzoic acid from Benzamide
- Picric acid from Phenol
8. Preparation of organic compounds.
9. Identification and test for purity of pharmaceuticals Aspirin, Caffeine, Paracetamol, Sulfanilamide
10. Systematic Qualitative analysis experiments (4 substances)

Assignments

The students shall be asked to submit the written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. Different monographs and formularies available and their major contents.
2. Significance of quality control and quality assurance in pharmaceutical industries
3. Overview on Green Chemistry
4. Various software programs available for computeraided drug discovery
5. Various instrumentations used for characterization and quantification of drug

TEXTBOOKS

1. Medicinal & Pharmaceutical chemistry by Harikishan Singh and VK Kapoor
2. Wilson and Griswold's Text book of Organic Medicinal and pharmaceutical Chemistry
3. Practical Organic Chemistry by Mann and Saunders.
4. Practical Pharmaceutical Chemistry, Volume- I & II by Beckett and J. B. Stenlake
5. Indian Pharmacopoeia
6. Vogel's text book of Practical Organic Chemistry

SUBJECT CODE & NAME: ER20-13T/ PHARMACOGNOSY – THEORY

Course Outcomes:

Upon successful completion of this course, the students will be able to

1. Identify the important/common crude drugs of natural origin
2. Describe the uses of herbs in nutraceuticals and cosmeceuticals
3. Discuss the principles of alternative system of medicines
4. Describe the importance of quality control of drugs of natural origin

UNIT I:

Definition, history, present status and scope of Pharmacognosy

UNIT II:

Classification of drugs:

- Alphabetical
- Taxonomical
- Morphological
- Pharmacological
- Chemical
- Chemo-taxonomical

UNIT III:

Quality control of crude drugs:

- Different methods of adulteration of crude drugs
- Evaluation of crude drugs

UNIT IV:

Brief outline of occurrence, distribution, isolation, identification tests, therapeutic activity and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils,tannins and resins.

UNIT V:

Biological source, chemical constituents and therapeutic efficacy of the following categories of crude drugs.

Laxatives- Aloes, Castor oil, Ispaghula, Senna.

Cardiotonics- Digitalis, Arjuna.

Carminatives & G.I. regulators- Coriander, Fennel, Cardamom, Ginger, Clove, Black pepper , Asafoetida, Nutmeg, Cinnamon.

Astringents-Myrobalan, Black Catechu, Pale Catechu

Drugs acting on nervous system- Hyoscyamus, Belladonna, Ephedra, Opium, Tea Leaves, Coffee seeds, Coca

a) Antihypertensive- Rauwolfia.
b) Antitussives- Vasaka, Tolu balsam.
c) Antirheumatics- Colchicum seed
d) Antitumour- Vinca, Podophyllum.
e) Antidiabetics-Pterocarpus, Gymnema
f) Diuretics- Gokhru, Punarnava
g) Antidysenterics- Ipecacuanha
h) Antiseptics and disinfectants- Benzoin, Myrrh, Neem, Curcuma
i) Antimalarials- Cinchona, Artemisia
j) Oxytocics- Ergot
k) Vitamins- Cod liver oil, Shark liver oil.
l) Enzymes- Papaya, Diastase, Pancreatin, Yeast.
m) Pharmaceutical aids- kaolin, Lanolin, Beeswax, Acacia, Tragacanth, Sodium Alginate, Agar, Guargum, Gelatin.

Miscellaneous- Squill, Galls, Ashwagandha, Tulsi, Guggul

UNIT VI:

Plant fibres used as surgical dressings: Cotton, silk, wool and regenerated fibres Sutures – Surgical Catgut and Ligatures.

UNIT VII:

Basic principles involved in the traditional systems of medicine like: Ayurveda, Siddha, Unani and Homeopathy

Method of preparation of Ayurvedic formulations like: Arista, Asava, Gutika, Taila, Churna, Lehya and Bhasma

UNIT-VIII:

Role of medicinal and aromatic plants in national economy and their export potential

UNIT-IX:

Herbs as health food: Brief introduction and therapeutic applications of: Nutraceuticals, Antioxidants, Pro-biotics, Prebiotics, Dietary fibres, Omega-3-fatty acids, Spirulina, Carotenoids, Soya and Garlic

UNIT-X:

Introduction to herbal formulations

UNIT-XI:

Herbal cosmetics: Sources, chemical constituents, commercial preparations, therapeutic and cosmetic uses of: Aloe vera gel, Almond oil, Lavender oil, Olive oil, Rosemary oil, Sandal Wood oil

UNIT-XII:

Phytochemical investigation of drugs

SUBJECT CODE & NAME: ER20-13P / PHARMACOGNOSY -

PRACTICAL

Course Outcomes: Upon successful completion of this course, the students will be able to

1. Identify the given crude drugs based on the morphological characteristics
2. Take a transverse section of the given crude drugs.
3. Describe the anatomical characteristics of the given crude drug under microscopical conditions
4. Carry out the physical and chemical tests to evaluate the given crude drugs.

Practicals

1. Morphological Identification of the following drugs:

Ispaghula, Senna, Coriander, Fennel, Cardamom, Ginger, Nutmeg, Black Pepper, Cinnamon, Clove, Ephedra, Rauwolfia, Gokhru, Punarnava, Cinchona, Agar.

2. Gross anatomical studies (Transverse Section) of the following drugs

Ajwain, Datura, Cinnamon, Cinchona, Coriander, Ashwagandha, Liquorice, Clove, Curcuma, Nux vomica, Vasaka

3. Physical and chemical tests for evaluation of any FIVE of the following drugs:

Asafoetida, Benzoin, Pale catechu, Black catechu, Castor oil, Acacia, Tragacanth, Agar, Guar gum, Gelatine.

Assignments

The students shall be asked to submit the written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

a. Market preparations of various dosage forms of Ayurvedic, Unani, Siddha, Homeopathic (Classical and Proprietary), indications, and their labelling requirements

b. Market preparations of various herbal formulations and herbal cosmetics, indications, and their labelling requirements

c. Herb-Drug interactions documented in the literature and their clinical significances

Field Visit

The students shall be taken in groups to a medicinal garden to witness and understand the nature of various medicinal plants discussed in theory and practical courses. Additionally, they shall be taken in groups to the pharmacies of traditional systems of medicines to understand the availability of various dosage forms and their labelling requirements. Individual reports from each student on their learning experience from the field visit shall be submitted.

TEXTBOOKS

1. Text book of Pharmacognosy by C. K. Kokate, S. B. Gokhale, A.P. Purohit, Nirali Prakashan
2. Text book of Pharmacognosy by C.S. Shah and J. S. Qadry, CBS Publishers & Distributors Pvt. Ltd.
3. Text Book of Pharmacognosy by T. E. Wallis. CBS Publishers & Distributors Pvt. Ltd.
4. Study of crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal
5. Powder crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal
6. Anatomy of crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal
7. Augmented Text Book of Homeopathic Pharmacy by Dr. D D Banerjee, B Jain Publishers (P) ltd.

SUBJECT CODE & NAME: ER20-14T/ HUMAN ANATOMY AND PHYSIOLOGY – THEORY

Course Outcomes:

Upon successful completion of this course, the students will be able to

i. Describe the various organ systems of the human body
ii. Discuss the anatomical features of the important human organs and tissues
iii. Explain the homeostatic mechanisms regulating the normal physiology in the human system
iv. Discuss the significance of various vital physiological parameters of the human body

UNIT I:

Scope of Anatomy and Physiology, Definition of various terminologies

UNIT II:

Structure of Cell: Components and its functions

UNIT III:

Tissues of the human body: Epithelial, Connective Muscular and Nervous tissues their sub-types and characteristics

UNIT IV:

Osseous system: structure and functions of bones of axial and appendicular skeleton Classification, types and movements of joints, disorders of joints

UNIT V:

Haemopoietic system

Composition and functions of blood

Process of Hemopoiesis

Characteristics and functions of RBCs, WBCs, and platelets

Mechanism of Blood Clotting

Importance of Blood Groups

UNIT VI:

Lymphatic system Lymph and lymphatic system, composition, function and its formation.
Structure and functions of spleen and lymph node.

UNIT VII:

Cardiovascular system
Anatomy and Physiology of heart
Blood vessels and circulation (Pulmonary, coronary and systemic circulation)
Cardiac cycle and Heart sounds, Basics of ECG Blood pressure and its regulation

UNIT VIII:

Respiratory system
Anatomy of respiratory organs and their functions.
Regulation, and Mechanism of respiration. Respiratory volumes and capacities – definitions

UNIT IX:

Digestive system
Anatomy and Physiology of the GIT
Anatomy and functions of accessory glands
Physiology of digestion and absorption

UNIT X:

Skeletal muscles
Histology
Physiology of muscle contraction
Disorder of skeletal muscles

UNIT XI:

Nervous system
Classification of nervous system
Anatomy and physiology of cerebrum, cerebellum, mid brain
Function of hypothalamus, medulla oblongata and basal ganglia
Spinal cord-structure and reflexes
Names and functions of cranial nerves.
Anatomy and physiology of sympathetic and parasympathetic system (ANS)

UNIT XII:

Sense organs - Anatomy and physiology of

Eye

Ear

Skin

Tongue Nose

UNIT XIII:

Urinary system

Anatomy and physiology of urinary system

Physiology of urine formation

Renin - angiotensin system

Clearance tests and micturition

UNIT XIV:

Endocrine system (Hormones and their functions)

Pituitary gland

Adrenal gland

Thyroid and parathyroid gland

Pancreas and gonads

UNIT XV:

Anatomy of male and female reproductive system

Physiology of menstruation

Spermatogenesis and Oogenesis

Pregnancy and parturition

SUBJECT CODE & NAME: ER20-14P/ HUMAN ANATOMY AND PHYSIOLOGY – PRACTICAL

Course Outcomes:

Upon successful completion of this course, the students will be able to

1. Perform the haematological tests in human subjects and interpret the results
2. Record, monitor and document the vital physiological parameters of human subjects and interpret the results
3. Describe the anatomical features of the important human tissues under the microscopical conditions
4. Discuss the significance of various anatomical and physiological characteristics of the human body

Practicals

1. Study of the compound microscope
2. General techniques for the collection of blood
3. Microscopic examination of Epithelial tissue, Cardiac muscle, Smooth muscle, Skeletal muscle, Connective tissue, and Nervous tissue of ready / pre-prepared slides.
4. Study of Human Skeleton-Axial skeleton and appendicular skeleton
5. Determination of
    a. Blood group
    b. ESR
    c. Haemoglobin content of blood
    d. Bleeding time and Clotting time
6. Determination of WBC count of blood
7. Determination of RBC count of blood
8. Determination of Differential count of blood

9. Recording of Blood Pressure in various postures, different arms, before and after exertion and interpreting the results
10. Recording of Body temperature (using mercury, digital and IR thermometers at various locations), Pulse rate/ Heart rate (at various locations in the body, before and after exertion), Respiratory Rate
11. Recording Pulse Oxygen (before and after exertion)
12. Recording force of air expelled using Peak Flow Meter
13. Measurement of height, weight, and BMI
14. Study of various systems and organs with the help of chart, models, and specimens
    a. Cardiovascular system
    b. Respiratory system
    c. Digestive system
    d. Urinary system
    e. Endocrine system
    f. Reproductive system
    g. Nervous system
    h. Eye
    i. Ear
    j. Skin

TEXTBOOKS

1. Human Physiology by C. C. Chatterjee
2. Human Anatomy and Physiology by S. Chaudhary and A. Chaudhary
3. Derasari and Gandhi's elements of Human Anatomy, Physiology and Health Education
4. S.R. Kale and R.R. Kale, Textbook of Practical Anatomy and Physiology
5. Ross and Wilson Anatomy and Physiology in Health and illness

6. Human Anatomy and Physiology by Tortora Gerard J

7. Fundamentals of Medical Physiology by K. Sambulingam and P Sambulingam

8. Ranade V.G. Text Book of Practical Physiology

9. Goyal R.K., Natvar M.P. and Shah S.A., Practical Anatomy, Physiology and Biochemistry, Experimental Physiology

SUBJECT CODE & NAME: ER20-15T/ SOCIAL PHARMACY – THEORY

Course Outcomes:

Upon successful completion of this course, the students will be able to

1. Discuss about roles of pharmacists in the various national health programs
2. Describe various sources of health hazards and disease preventive measures
3. Discuss the healthcare issues associated with food and nutritional substances
4. Describe the general roles and responsibilities of pharmacists in public health

UNIT I:

Introduction to Social Pharmacy:

- Definition and Scope. Social Pharmacy as a discipline and its scope in improving the public health. Role of Pharmacists in Public Health.
- Concept of Health -WHO Definition, various dimensions, determinants, and health Indicators.
- National Health Policy – Indian perspective
- Public and Private Health System in India, National Health Mission
- Introduction to Millennium Development Goals, Sustainable Development Goals, FIP Development goals

UNIT II

Preventive healthcare – Role of Pharmacists in the following:

- Demography and Family Planning
  - Mother and child health, importance of breastfeeding, ill effects of infant milk substitutes and bottle feeding
- Overview of Vaccines, types of immunity and immunization
- Effect of Environment on Health – Water pollution, importance of safe drinking water, waterborne diseases, air pollution, noise pollution, sewage and solid waste disposal, occupational illnesses, Environmental pollution due to pharmaceuticals
- Psychosocial Pharmacy: Drugs of misuse and abuse – psychotropics, narcotics, alcohol, tobacco products. Social Impact of these habits on social health and productivity and suicidal behaviors

UNIT-III:

Nutrition and Health

- Basics of nutrition – Macronutrients and Micronutrients
- Importance of water and fibres in diet
- Balanced diet, Malnutrition, nutrition deficiency diseases, ill effects of junk foods, calorific and nutritive values of various foods, fortification of food
- Introduction to food safety, adulteration of foods, effects of artificial ripening, use of pesticides,

genetically modified foods

- Dietary supplements, nutraceuticals, food supplements– indications, benefits, Drug-Food Interactions

UNIT IV:

Introduction to Microbiology and common micro-organisms:

Epidemiology:

- Introduction to epidemiology, and its applications. Understanding of terms such as epidemic, pandemic, endemic, mode of transmission, outbreak, quarantine, isolation, incubation period, contact tracing, morbidity, mortality,
- Causative agents, epidemiology and clinical presentations and Role of Pharmacists in educating the public in prevention of the following communicable diseases:
- Respiratory infections – chickenpox, measles, rubella, mumps, influenza (including Avian-Flu, H1N1, SARS, MERS, COVID-19), diphtheria, whooping cough, meningococcal meningitis, acute respiratory infections, tuberculosis, Ebola Intestinal infections – poliomyelitis, viral hepatitis, cholera, acute diarrheal diseases, typhoid, amebiasis, worm infestations, food poisoning
- Arthropod-borne infections - dengue, malaria, filariasis and, chikungunya Surface infections – trachoma, tetanus, leprosy STDs, HIV/AIDS

UNIT V

Introduction to health systems and all ongoing National Health programs in India, their objectives, functioning, outcome, and the role of pharmacists.

UNIT VI:

Pharmacoeconomics – Introduction, basic terminologies, importance of pharmacoeconomics

SUBJECT CODE & NAME: ER20-15P/ SOCIAL PHARMACY – PRACTICAL

Course Outcomes:

Upon successful completion of this course, the students will be able to

1. Describe the roles and responsibilities of pharmacists in various National health programs
2. Design promotional materials for public health awareness
3. Describe various health hazards including microbial sources
4. Advice on preventive measures for various diseases
5. Provide first aid for various emergency conditions

Note: Demonstration / Hands-on experience / preparation of charts / models / promotional materials / role plays / enacting / e-brochures / e-flyers / podcasts / video podcasts / any other innovative activities to understand the concept of various elements of social pharmacy listed here. (At least one activity to be carried out for each one of the following):

Practical

1. National immunization schedule for children, adult vaccine schedule, Vaccines which are not included in the National Immunization Program.
2. RCH – reproductive and child health – nutritional aspects, relevant national health programmes.
3. Family planning devices
4. Microscopical observation of different microbes (readymade slides)
5. Oral Health and Hygiene
6. Personal hygiene and etiquettes – hand washing techniques, Cough and sneeze etiquettes.
7. Various types of masks, PPE gear, wearing/using them, and disposal.
8. Menstrual hygiene, products used

9. First Aid – Theory, basics, demonstration, hands on training, audio-visuals, and practice, BSL (Basic Life Support) Systems [SCA - Sudden Cardiac Arrest, FBAO - Foreign Body Airway Obstruction, CPR, Defibrillation (using AED) (Includes CPR techniques, First Responder).
10. Emergency treatment for all medical emergency cases viz. snake bite, dog bite, insecticide poisoning, fractures, burns, epilepsy etc.
11. Role of Pharmacist in Disaster Management.
12. Marketed preparations of disinfectants, antiseptics, fumigating agents, antilarval agents, mosquito repellents, etc.
13. Health Communication: Audio / Video podcasts, Images, Power Point Slides, Short Films, etc. in regional language(s) for mass communication / education / Awareness on 5 different communicable diseases, their signs and symptoms, and prevention.
14. Water purification techniques, use of water testing kit, calculation of Content/percentage of $KMnO_4$, bleaching powder to be used for wells/tanks
15. Counselling children on junk foods, balanced diets – using Information, Education and Communication (IEC), counselling, etc. (Simulation Experiments).
16. Preparation of various charts on nutrition, sources of various nutrients from Locally available foods, calculation of caloric needs of different groups (e.g. child, mother, sedentary lifestyle, etc.). Chart of glycemic index of foods.
17. Tobacco cessation, counselling, identifying various tobacco containing products through charts/pictures

Assignment

The students shall be asked to submit the written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. An overview of Women's Health Issues
2. Study the labels of various packed foods to understand their nutritional contents
3. Breastfeeding counselling, guidance – using Information, Education and Communication (IEC)
4. Information about the organizations working on de-addiction services in the region (city / district, etc.)
5. Role of a pharmacist in disaster management – A case study
6. Overview on the National Tuberculosis Elimination Programme (NTEP)
7. Drug disposal systems in the country, at industry level and citizen level
8. Various Prebiotics or Probiotics (dietary and market products)
9. Emergency preparedness: Study of local Government structure with respect to Fire, Police departments, health department
10. Prepare poster/presentation for general public on any one of the Health Days. e.g. Day, AIDS Day, Handwashing Day, ORS day, World Diabetes Day, World Heart Day, etc.
11. List of home medicines, their storage, safe handling, and disposal of unused medicines
12. Responsible Use of Medicines: From Purchase to Disposal
13. Collection of newspaper clips (minimum 5) relevant to any one topic and its submission in an organized form with collective summary based on the news items
14. Read a minimum of one article relevant to any theory topic, from Pharma

    /Science/ or other Periodicals and prepare summary of it for submission
15. Potential roles of pharmacists in rural India

Field Visits

The students shall be taken in groups to visit any THREE of the following facilities to witness and understand the activities of such centres/facilities from the perspectives of the topics discussed in theory and/or practical courses. Individual reports from each student on their learning experience from the field visits shall be submitted.

1. Garbage Treatment Plant
2. Sewage Treatment Plant
3. Bio-medical Waste Treatment Plant
4. Effluent Treatment Plant
5. Water purification plant
6. Orphanage / Elderly-Care-Home / School and or Hostel/Home for persons with disabilities 7. Primary health care centre

TEXTBOOKS

1. Social Pharmacy – Innovation and development. Geoff Harding, Sarah Nettleton and Kevin Taylor. The Pharmaceutical Press.
2. Text Book of Community Pharmacy Practice. RPSGB Publication
3. Community Pharmacy Handbook- Jonathan Waterfield
4. S Khurana, P Suresh and R Kalsi. Health Education & Community Pharmacy. S Vikas & Co
5. Social Pharmacy: Tayler, Geoffrey. Pharmaceutical Press. London.
6. Textbook by Dandiya PC, Zafer ZYK, Zafer A. Health education & Community Pharmacy. Vallabh Prakashan.
7. Websites of Ministry of Health and Family Welfare, National Health Portal
8. Pharmacists at the Frontlines: A Novel Approach at Combating TB www.ipapharma.org Visit Publications

9. Where There Is No Doctor: A Village Health Care Handbook by David Werner ,2015 updated version

10. Various WHO publications www.who.int

SUBJECT CODE AND NAME: **PTS1DOO2T / Professional Communication and Environmental Studies**

Course Outcome: Upon completion of syllabus students are able to understand:

1. To enhance students' communication skills in professional and social settings.
2. To understand the environmental issues relevant to pharmaceutical sciences and public health.
3. To develop awareness of the pharmacist's role in promoting sustainability and environmental ethics.
4. To foster effective reporting and communication on environmental, health, and social issues.

Unit I: HARD skills:

Revision of Parsing, Preposition (difficult level), Idioms and Phrasal Verbs, Reported Speech, Interchange of Affirmative and Negative Sentences, Interchange of Interrogative and Assertive Sentences

Unit II: Basics of Communication and the Environment

- Communication: Definition, types, barriers, and models (linear, interactive, transactional)
- Principles of effective communication
- Introduction to environmental science: Definition, scope, and importance
- Natural resources: Renewable and non-renewable, their impact on public health

Unit III: Interpersonal & Professional Communication in Environmental Contexts

- Verbal and non-verbal communication in community health and environment
- Listening and presentation skills for community-based health/environmental campaigns
- Role of pharmacists in community outreach, environmental awareness, and advocacy

Unit IV: SOFT SKILLS:

- PowerPoint presentations, Group Discussions, and debate.
- **Conversation exercises including:** Each student should speak for 5 minutes, 3-4 times in 1st semester on topics of their choice selected from Social, Environmental, Sports, Business and Economics, Medicines and Health Care, Science and Technology, Politics, World Affairs, and Religion, etc.

Unit V: Ecosystem and Public Health Communication

- Structure and function of ecosystems: Forest, desert, aquatic
- Biodiversity: Types, importance, threats, conservation methods
- Communicating biodiversity concerns to the public

- Writing skills: Reports, pamphlets, posters for environmental health education

Unit VI: Environmental Pollution and Communication Strategies

- Types of pollution: Air, water, soil, noise, radioactive
- Impact of pollution on health and pharmaceutical practices
- Communication techniques for risk awareness and mitigation strategies
- Using social media and digital tools for environmental campaigns

Unit VII: LOGICAL REASONING

- Simplification & Approximation.
- Number Series.
- Alphabetical Series.
- Coding-Decoding

Unit VIII: Environment and Ethics in Pharmaceutical Practice

- Environmental ethics and sustainable development
- Waste management in pharmaceutical industries

Unit IX: Green pharmacy:

- Eco-friendly drug manufacturing and disposal
- Ethical communication in environmental decision-making and public engagement
- Case studies: Communication failures and environmental crises (e.g., Bhopal Gas Tragedy)

Unit X: Practice Sheet

- Questions (Subjective and Objective) based on the instructions given for hard skills to be distributed every week.
- The aim should be to bring the instruction given in practice by making them write, speak, and think along the lines of the instruction given. The practice sheet should be evaluated, and necessary feedback must be given.
- Some exercise on compositional skills must be given so that they develop a sense of writing and expressing themselves through the written word.

Practical Components (Lab Work/Field Activities)

1. **Group Discussions/Debates**: Environmental policies, pollution control, climate change
2. **Role Plays**: Pharmacist-patient communication about environmental health risks
3. **Presentations**: Prepare and deliver presentations on local environmental issues
4. **Report Writing**: Visit to a local pollution control board, water treatment plant, or eco-pharmacy unit and write a report

5. **Poster Making**: Design awareness posters on waste disposal, water conservation, or biodiversity
6. **Letter/Email Writing**: To local authorities or organizations on environmental concerns

Assessment Pattern

- **Theory**: Midterm + End-semester examination (written)
- **Practical**: Viva, written reports, presentations, participation in activities
- **Internal Assignments**: Case study analysis, reflective journals

Textbooks

1. **Communication Skills in English** – K. Alex / Leena Sen
2. **Environmental Studies** – Erach Bharucha
3. **Professional Communication** – Aruna Koneru
4. **Textbook of Environmental Studies for Undergraduate Courses** – Anindita Basak
5. Government Reports (CPCB, WHO guidelines, UNEP reports)