



**4-Year Bachelor of Pharmacy (B.Pharm.) Curriculum and
Syllabus
First Semester**

Subject Code	Name of Subject	No. of hours	Tutorial	Credit points
TIU-UBP-101T	Human Anatomy and Physiology I - Theory	3	1	4
TIU-UBP-102T	Pharmaceutical Analysis I - Theory	3	1	4
TIU-UBP-103T	Pharmaceutics I – Theory	3	1	4
TIU-UBP-104T	Pharmaceutical Inorganic Chemistry - Theory	3	1	4
TIU-UBP-105T	Communication Skills– Theory*	2	-	2
TIU-UBP-106RBT TIU-UBP-106RMT	Remedial Biology/ Mathematics – Theory*	2	-	2
TIU-UBP-107P	Human Anatomy and Physiology - Practical	4	-	2
TIU-UBP-108P	Pharmaceutical Analysis I - Practical	4	-	2
TIU-UBP-109P	Pharmaceutics I - Practical	4	-	2
TIU-UBP-110P	Pharmaceutical Inorganic Chemistry - Practical	4	-	2
TIU-UBP-111P	Communication Skills – Practical*	2	-	1
TIU-UBP-112RBP	Remedial Biology - Practical*	2	-	1
Total		32/34[§]/36[#]	4	27/29[§]/30[#]

[§]Applicable ONLY for the students who have studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM) course.

[#]Applicable ONLY for the students who have studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB) course.

*Non University Examination (NUE)

Approved By:

External Expert

Vice-Chancellor

Registrar

Director, School of Pharmacy



HUMAN ANATOMY AND PHYSIOLOGY-I (THEORY)

Subject Code: TIU-UBP-101T

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Objectives: Upon completion of this course the student should be able to

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the various experiments related to special senses and nervous system.
5. Appreciate coordinated working pattern of different organs of each system

Course Content

Unit I

- ***Introduction to human body***

Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology

- ***Cellular level of organization***

Structure and functions of cell, transport across cell membrane, cell division, cell junctions
General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine.

- ***Tissue level of organization***

Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

Unit II

- ***Integumentary system***

Structure and functions of skin

- ***Skeletal system***

Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system, Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction.

- ***Joints***

Structural and functional classification, types of joints movements and its articulation.

Unit III

- ***Nervous system***

Organization of nervous system, neuron, neuroglia, classification and properties of



nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters.

- **Central nervous system:** Meninges, ventricles of brain and cerebrospinal fluid. structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity)

Unit IV

- **Peripheral nervous system**

Classification of peripheral nervous system

Origin and functions of spinal and cranial nervous reflex arc

Autonomic nervous system: structure and functions of sympathetic and parasympathetic nervous system.

- **Special senses**

Structure and functions of eye, ear, nose and tongue and their disorders

Unit V

- **Endocrine system**

Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders.

HUMAN ANATOMY AND PHYSIOLOGY-I (PRACTICAL)

Subject Code: TIU-UBP-107P

4 Hours/Week

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones
6. Study of human eye with the help of specimen, models, etc.
7. Study of human ear with the help of specimen, models, etc.
8. Study of human tongue with the help of specimen, models, etc.
9. Study of the nervous system using specimen, models, etc.
10. Study the endocrine system using specimen, models, etc
11. To demonstrate the visual acuity of human eye.
12. To examine the different types of taste of human tongue.
13. To demonstrate the reflex activity of human.



14. To demonstrate the general neurological examination of human.
15. Recording of body temperature

PHARMACEUTICAL ANALYSIS (THEORY)

Subject Code: TIU-UBP-102T

45 Hours

Scope: This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs

Objectives: Upon completion of the course student shall be able to

- understand the principles of volumetric and electro chemical analysis
- carryout various volumetric and electrochemical titrations
- develop analytical skills

Course Content

Unit I

(a) Pharmaceutical analysis- Definition and scope

- i) Different techniques of analysis
- ii) Methods of expressing concentration
- iii) Primary and secondary standards.
- iv) Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate

(b) Errors: Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures

Unit II

- **Acid base titration:** Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves
- **Non aqueous titration:** Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl.

Unit III

- **Precipitation titrations:** Mohrs method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.
- **Complexometric titration:** Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.
- **Gravimetry:** Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate.



Unit IV

Redox titrations

- (a) Concepts of oxidation and reduction
- (b) Types of redox titrations (Principles and applications)

Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate

Unit V

- **Electrochemical methods of analysis**

Conductometry- Introduction, Conductivity cell, Conductometric titrations, applications.

Potentiometry - Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.

Polarography - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications

PHARMACEUTICAL ANALYSIS (PRACTICAL)

Subject Code: TIU-UBP-108P

4 Hours/Week

- ***Preparation and standardization of***
 1. Sodium hydroxide
 2. Sulphuric acid
 3. Sodium thiosulfate
 4. Potassium permanganate
 5. Ceric ammonium sulphate
- ***Assay of the following compounds along with standardization of titrant***
 1. Ammonium chloride by acid base titration
 2. Ferrous sulphate by Cerimetry
 3. Copper sulphate by Iodometry
 4. Calcium gluconate by complexometry
 5. Hydrogen peroxide by Permanganometry
 6. Sodium benzoate by non-aqueous titration
 7. Sodium Chloride by precipitation titration
- ***Determination of Normality by electro-analytical methods***
 1. Conductometric titration of strong acid against strong base
 2. Conductometric titration of strong acid and weak acid against strong base
 3. Potentiometric titration of strong acid against strong base



PHARMACEUTICS- I (THEORY)

Subject Code: TIU-UBP-103T

45 Hours

Scope: This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

Objectives: Upon completion of this course the student should be able to:

- Know the history of profession of pharmacy
- Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
- Understand the professional way of handling the prescription
- Preparation of various conventional dosage forms

Course Content:

Unit I

- **Historical background and development of profession of pharmacy:**
History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.
- **Dosage forms:** Introduction to dosage forms, classification and definitions
- **Prescription & Posology:** Definition, Parts of prescription, handling of Prescription and Errors in prescription.
- **Posology:** Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area

Unit II

- **Pharmaceutical calculations:** Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight.
Powders: Definition, classification, advantages and disadvantages, Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions.
- **Liquid dosage forms:** Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms.

Unit III

- **Monophasic liquids:** Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions.
- **Biphasic liquids:**
Suspensions: Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems.



Emulsions: Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability problems.

Unit IV

- **Suppositories**: Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.
- **Pharmaceutical incompatibilities**: Definition, classification, physical, chemical and therapeutic incompatibilities with examples.

Unit V

- **Semisolid dosage forms**: Definitions, classification, mechanisms and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams and gels. Excipients used in semi solid dosage forms. Evaluation of semi solid dosages forms.

PHARMACEUTICS - I (PRACTICAL)

Subject Code: TIU-UBP-109P

4 Hours/Week

1. Syrups

- a) Simple syrup
- b) Ferrous phosphate syrup

2. Elixirs

- a) Piperazine citrate elixir
- b) Paracetamol pediatric elixir

3. Solutions

- a) Strong solution of ammonium acetate
- b) Cresol with soap solution

4. Suspensions

- a) Calamine lotion
- b) Aluminum hydroxide suspension

5. Emulsions

- a) Turpentine Liniment
- b) Liquid paraffin emulsion

6. Powders and Granules

- a) Eutectic powder
- b) Effervescent powder

7. Suppositories

- a) Boric acid suppository
- b) Zinc Oxide suppository

8. Semisolids

- a) Sulphur ointment
- b) Cold cream
- c) Vanishing cream



d) Bentonite gel

9. Gargles and Mouthwashes

- a) Potassium chlorate gargle
- b) Iodine mouthwash

PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY)

Subject Code: TIU-UBP-104T

45 Hours

Scope: This subject deals with the monographs of inorganic drugs and pharmaceuticals.

Objectives: Upon completion of course student shall be able to

- know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
- understand the medicinal and pharmaceutical importance of inorganic compounds

Course Content

Unit I

- **Impurities in pharmaceutical substances:** History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate.
- **General methods of preparation**, assay for the compounds superscripted with **asterisk (*)**, properties and medicinal uses of inorganic compounds belonging to the following classes

Unit II

- **Acids, Bases and Buffers:** Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity.
- **Major extra and intracellular electrolytes:** Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance.
- **Dental products:** Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.

Unit III

- Gastrointestinal agents
- **Acidifies:** Ammonium chloride* and Dil. HCl
- **Antacids:** Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture
- **Cathartics:** Magnesium sulphate, Sodium orthophosphate, Kaoline and Bentonite
- **Antimicrobials:** Mechanism, classification, Potassium permanganate, Boric acid,



Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations.

Unit IV

- Miscellaneous compounds
Expectorants: Potassium iodide, Ammonium chloride*.
Emetics: Copper sulphate*, Sodium potassium tartarate
Haematinics: Ferrous sulphate*, Ferrous gluconate
Poison and Antidote: Sodium thiosulphate*, Activated charcoal, Sodium nitrate
Astringents: Zinc Sulphate, Potash Alum

Unit V

- *Radiopharmaceuticals:* Radio activity, Measurement of radioactivity, Properties of α , β , γ radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide I121, Storage conditions, precautions & pharmaceutical application of radioactive substances.

PHARMACEUTICAL INORGANIC CHEMISTRY (PRACTICAL)

Subject Code: TIU-UBP-110P

4 Hours/Week

- I. Limit tests for following ions**
Limit test for Chlorides and Sulphates
Modified limit test for Chlorides and Sulphates
Limit test for Iron
Limit test for Heavy metals
Limit test for Lead
Limit test for Arsenic
- II. Identification test**
Magnesium hydroxide
Ferrous sulphate
Sodium bicarbonate
Calcium gluconate
Copper sulphate
- III. Test for purity**
Swelling power of Bentonite
Neutralizing capacity of aluminum hydroxide gel
Determination of potassium iodate and iodine in potassium Iodide
- IV. Preparation of inorganic pharmaceuticals**
Boric acid
Potash alum
Ferrous sulphate



COMMUNICATION SKILLS (THEORY)

Subject Code: TIU-UBP-105T

30 Hours

Scope: This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.

Objectives: Upon completion of the course the student shall be able to

1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
2. Communicate effectively (Verbal and Non Verbal)
3. Effectively manage the team as a team player
4. Develop interview skills
5. Develop Leadership qualities and essentials

Course content

Unit I

- **Communication Skills:** Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context.
- **Barriers to communication:** Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers.
- **Perspectives in Communication:** Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment.

Unit II

- **Elements of Communication:** Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication.
- **Communication Styles:** Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style.

Unit III

- **Basic Listening Skills:** Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations
- **Effective Written Communication:** Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of



Meaning, Formal Communication.

- **Writing Effectively:** Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message

Unit IV

- **Interview Skills:** Purpose of an interview, Do's and Don't's of an interview.
- **Giving Presentations:** Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery.

Unit V

- **Group Discussion:** Introduction, Communication skills in group discussion, Do's and Don't's of group discussion

COMMUNICATION SKILLS (PRACTICAL)

Subject Code: TIU-UBP-111P

2 Hours/Week

The following learning modules are to be conducted using wordsworth® English language lab software

Basic communication covering the following topics

Meeting People

Asking Questions

Making Friends

What did you do?

Do's and Don't's

Pronunciations covering the following topics

Pronunciation (Consonant Sounds)

Pronunciation and Nouns

Pronunciation (Vowel Sounds)

Advanced Learning

Listening Comprehension / Direct and Indirect Speech

Figures of Speech

Effective Communication

Writing Skills

Effective Writing

Interview Handling Skills

E-Mail etiquette



Presentation Skills

REMEDIAL BIOLOGY (THEORY)

Subject Code: TIU-UBP-106RBT

30 Hours

Scope: To learn and understand the components of living world, structure and functional system of plant and animal kingdom.

Objectives: Upon completion of the course, the student shall be able to

- know the classification and salient features of five kingdoms of life
- understand the basic components of anatomy & physiology of plant
- know understand the basic components of anatomy & physiology animal with special reference to human

Course Content

Unit I

Living world

Definition and characters of living organisms

Diversity in the living world

Binomial nomenclature

Five kingdoms of life and basis of classification. Salient features of Monera, Protista, Fungi, Animalia and Plantae, Virus

Morphology of Flowering plants

Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed.

General Anatomy of Root, stem, leaf of monocotyledons & Dicotyledons

Unit II

Body Fluids and Circulation

Composition of blood, blood groups, coagulation of blood

Composition and functions of lymph

Human circulatory system

Structure of human heart and blood vessels

Cardiac cycle, cardiac output and ECG

Digestion and Absorption

Human alimentary canal and digestive glands

Role of digestive enzymes

Digestion, absorption and assimilation of digested food

Breathing and Respiration

Human respiratory system

Mechanism of breathing and its regulation

Exchange of gases, transport of gases and regulation of respiration

Respiratory volumes



Unit III

Excretory Products and their Elimination

Modes of excretion

Human excretory system- structure and function

Urine formation

Rennin angiotensin system

Neural Control and Coordination

Definition and classification of nervous system

Structure of a neuron

Generation and conduction of nerve impulse

Structure of brain and spinal cord

Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata

Chemical Coordination and Regulation

Endocrine glands and their secretions

Functions of hormones secreted by endocrine glands

Human Reproduction

Parts of female reproductive system

Parts of male reproductive system

Spermatogenesis and Oogenesis

Menstrual cycle

Unit IV

Plants and Mineral Nutrition

Essential mineral, macro and micronutrients

Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation

Photosynthesis

Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis.

Unit V

Plant Respiration: Respiration, glycolysis, fermentation (anaerobic).

Plant Growth and Development

Phases and rate of plant growth, Condition of growth, Introduction to plant growth regulators

Cell - The Unit of Life

Structure and functions of cell and cell organelles. Cell division

Tissues

Definition, types of tissues, location and functions.



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REMEDIAL BIOLOGY (PRACTICAL)

Subject Code: TIU-UBP-112RBP

2 Hours/Week

1. Introduction to experiments in biology
 - a) Study of Microscope
 - b) Section cutting techniques
 - c) Mounting and staining
 - d) Permanent slide preparation
2. Study of cell and its inclusions
3. Study of Stem, Root, Leaf and its modifications
4. Detailed study of frog by using computer models
5. Microscopic study and identification of tissues
6. Identification of bones
7. Determination of blood group
8. Determination of blood pressure
9. Determination of tidal volume



REMEDIAL MATHEMATICS (THEORY)

Subject Code: TIU-UBP-106RMT

30 Hours

Scope: This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

Objectives: Upon completion of the course the student shall be able to:

1. Know the theory and their application in Pharmacy
2. Solve the different types of problems by applying theory
3. Appreciate the important application of mathematics in Pharmacy

Course Content

Unit I

Partial fraction

Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction, Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics

Logarithms

Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.

Function

Real Valued function, Classification of real valued functions

Limits and continuity

Introduction, Limit of a function, Definition of limit of a function ($\epsilon - \delta$ definition),

$$\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}, \quad \lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$$



Unit II

Matrices and Determinant

Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants, Product of determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix, Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley – Hamilton theorem, Application of Matrices in solving Pharmacokinetic equations

Unit III

• Calculus

Differentiation : Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function, Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – **Without Proof**, Derivative of x^n w.r.t x , where n is any rational number, Derivative of e^x , Derivative of $\log_e x$, Derivative of a^x , Derivative of trigonometric functions from first principles (**without Proof**), Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application

Unit IV

• Analytical Geometry

Introduction: Signs of the Coordinates, Distance formula,

Straight Line : Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line

Integration: Introduction, Definition, Standard formulae, Rules of integration, Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

Unit V

- **Differential Equations** : Some basic definitions, Order and degree, Equations in separable form, Homogeneous equations, Linear Differential equations, Exact equations, **Application in solving Pharmacokinetic equations**
- **Laplace Transform** : Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve Linear differential equations, **Application in solving Chemical kinetics and Pharmacokinetics equations**