PHARMACY COUNCIL OF INDIA

SYLLABUS

BACHELOR OF PHARMACY (B. Pharm)

(2026)

As per NEP 2020





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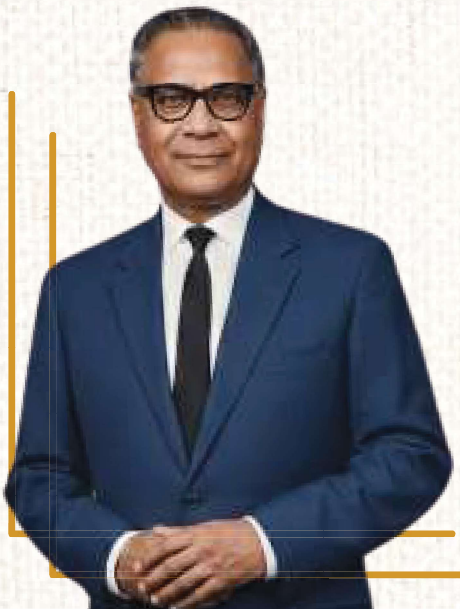
I-300, 3rd floor, Tower-I, World Trade Centre, Nauroji Nagar,
New Delhi 110 029.

A TRIBUTE TO
PROFESSOR MAHADEVA LAL SCHROFF

Professor Mahadeva Lal Schroff, revered as the Father of Pharmaceutical Education in India, was a visionary whose pioneering efforts laid the foundation of structured pharmacy education in the country. His unwavering commitment to academic excellence, professional ethics, and scientific advancement transformed pharmacy from a trade into a respected profession rooted in knowledge, innovation, and research.

Through his relentless dedication, Professor Schroff, introduced formal pharmacy education and emphasized the importance of quality, innovation, and patient-centered care. His contributions not only shaped the academic framework of pharmacy education but also strengthened its role in advancing healthcare in India. His legacy continues to inspire generations of pharmacists, educators, and researchers to uphold excellence and contribute meaningfully to healthcare.

This syllabus stands as a tribute to his enduring vision—reflecting a commitment to empowering pharmacy education, fostering research, and advancing innovation in alignment with the evolving needs of society and the profession.



डॉ. मोंटूकुमार एम. पटेल
अध्यक्ष
DR. MONTUKUMAR M. PATEL
President

भारतीय भेषजी परिषद्
Pharmacy Council of India
(Ministry of Health & Family Welfare, Govt. of India)

17/04/2026

Dear Esteemed Colleagues, Faculty, Students, and Stakeholders in Pharmacy Education

It gives me great pleasure to present the Bachelor of Pharmacy (B.Pharm) syllabus, proposed for implementation from the academic year 2026–27. This curriculum has been developed in alignment with the vision of the National Education Policy (NEP) 2020, to strengthen pharmacy education and prepare graduates to meet the evolving needs of healthcare and the pharmaceutical sector.

The syllabus places strong emphasis on scientific fundamentals, practical and experiential learning, research orientation, and the development of professional competencies essential for modern pharmacy practice. It also introduces emerging areas, including Artificial Intelligence (AI) and latest digital technologies, enabling students to understand their applications in fields such as drug discovery, pharmaceutical manufacturing, pharmacokinetics, and pharmacy practice, while remaining firmly grounded in the core pharmaceutical sciences.

The curriculum also offers greater academic flexibility through elective courses, along with opportunities for projects, internships and industry exposure. These features are intended to equip students with broader perspectives and practical competence, preparing them to contribute effectively to healthcare, research, industry, and regulatory services.

I sincerely acknowledge the valuable contributions of the Education Regulations Committee (ERC), subject experts, academic leaders, and industry representatives whose collective efforts have shaped this curriculum. Their dedication has been instrumental in developing a syllabus that reflects both academic strength and the emerging needs of the profession.

I wish all institutions, faculty members, and students every success in implementing this curriculum and in advancing the future of pharmacy education in India.

DR. MONTUKUMAR M. PATEL
President, Pharmacy Council of India

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GRADUATE ATTRIBUTES (GA's)

Graduate Attributes (GAs) represent the key competencies and professional qualities expected from every pharmacy graduate, irrespective of the program such as D.Pharm, B.Pharm,Pharm.D or M.Pharm. While the level of mastery may vary, these attributes remain common and guide the overall outcomes of pharmacy education.

1. **Pharmaceutical Knowledge Proficiency**

   – Strong grounding in core and applied pharmaceutical sciences and practice.

2. **Scientific and Analytical Thinking**

   – Ability to critically analyze data, processes, and clinical information.

3. **Ethical and Professional Integrity**

   – Commitment to ethical conduct, patient safety, and regulatory compliance.

4. **Patient-Centered Orientation**

   – Sensitivity to patient needs, cultural diversity, and healthcare outcomes.

5. **Industry and Practice Readiness**

   – Preparedness for roles in industry, hospitals, community pharmacy, research, and regulation.

6. **Digital and Technological Awareness**

   – Familiarity with AI, data analytics, automation, and modern pharmaceutical technologies.

7. **Effective Communication Skills**

   – Clear, empathetic, and professional interaction across healthcare settings.

8. **Teamwork and Leadership Skills**

   – Ability to collaborate, lead, and contribute constructively in teams.

9. **Innovation and Problem-Solving Mindset**

   – Capability to identify problems and develop practical, evidence-based solutions.

10. **Lifelong Learning Orientation**

    – Motivation for continuous professional development and higher education.

PROGRAMME EDUCATIONAL OBJECTIVES

The Bachelor of Pharmacy (B. Pharm) programme aims to prepare graduates with strong knowledge of pharmaceutical sciences, practical skills, professional ethics, and a commitment to patient care and public health. The graduates of the programme are expected to achieve the following Programme Educational Objectives (PEOs):

PEO 1: Apply fundamental knowledge of pharmaceutical sciences to work effectively in pharmacy practice, pharmaceutical industry, research, and related healthcare fields.

PEO 2: Demonstrate practical skills in drug formulation, manufacturing, pharmaceutical analysis, quality control, and pharmacy practice.

PEO 3: Use scientific reasoning and problem-solving skills to address challenges related to medicines, drug development, and patient care.

PEO 4: Practice pharmacy with ethical responsibility, good communication, teamwork, and concern for patient safety and public health.

PEO 5: Pursue continuous learning and professional development to keep pace with advances in pharmaceutical sciences and healthcare.

PROGRAMME OUTCOMES (POs)

Bachelor of Pharmacy (B. Pharm)

PO1. Pharmacy Knowledge

Apply comprehensive knowledge of pharmaceutical sciences, biomedical sciences, pharmacology, pharmacognosy, pharmaceutical chemistry, pharmacy practice, and manufacturing processes to understand drug actions, disease mechanisms, and therapeutic interventions and solve professional problems across diverse pharmacy domains.

PO2. Problem Analysis, Critical Thinking and Evidence-Based Decision Making

Identify, formulate, analyze, and interpret complex pharmaceutical problems using principles of scientific inquiry, critical thinking, biostatistics, and evidence-based reasoning to arrive at defensible solutions and informed decision-making.

PO3. Pharmaceutical Skills & Practice

Demonstrate proficiency in formulation development, analysis, quality assurance, pharmacovigilance, clinical pharmacotherapy, and pharmacy practice through laboratory work, simulations, internships, and experiential learning.

PO4. Modern Tools, AI & Digital Competence

Select, apply, and evaluate modern pharmaceutical tools, analytical instruments, digital technologies, artificial intelligence, machine learning, and computational techniques with awareness of their limitations and ethical use.

PO5. Research & Innovation

Design and conduct basic research, analyze data, interpret results, and contribute to innovation through research projects, startup initiatives, and problem-based learning relevant to industry, healthcare, and society.

PO6. Professional Ethics & Human Values

Apply ethical principles, professional integrity, regulatory frameworks, intellectual property rights, and universal human values while addressing professional, legal, and societal responsibilities in pharmacy practice.

PO7. Communication & Interpersonal Skills

Communicate effectively with patients, healthcare professionals, industry personnel, and society through clear documentation, reports, presentations, counseling, teamwork, and interdisciplinary collaboration.

PO8. Leadership, Management & Entrepreneurship

Demonstrate leadership, teamwork, planning, and managerial skills in pharmaceutical organizations, healthcare systems, quality systems, and entrepreneurial ventures, including innovation and startup ecosystems.

PO9. Pharmacist & Society

Evaluate public health, patient safety, legal, and societal issues related to pharmacy practice and contribute responsibly to healthcare delivery, rational use of medicines, and improvement of community health outcomes.

PO10. Environment and sustainability:

Recognize and address the environmental impact of pharmaceutical manufacturing, use, and disposal, and promote environmentally responsible practices, green pharmacy principles, and sustainable healthcare aligned with the United Nation's Sustainable Development Goals (SDGs).

PO11. Life-Long Learning & Professional Development

Recognize the need for continuous learning and demonstrate the ability to engage in self-directed, life-long learning to adapt to technological advancements, evolving healthcare needs, and professional growth.



वयमत्रे दु आतप्तानाम् प्रतिक्रियार्तिनाशकम्

PHARMACIST'S OATH

I swear by the code of ethics of Pharmacy Council of India, in relation to the community and shall act as an integral part of health care team.

I shall uphold the laws and standards governing my profession.

I shall strive to perfect and enlarge my knowledge to contribute to the advancement of pharmacy and public health.

I shall follow the system which I consider best for pharmaceutical care and counselling of patients.

I shall endeavour to discover and manufacture drugs of quality to alleviate sufferings of humanity.

I shall hold in confidence the knowledge gained about the patients in connection with my professional practice and never divulge unless compelled to do so by the law.

I shall associate with organizations having their objectives for betterment of the profession of Pharmacy and make contribution to carry out the work of those organizations.

While I continue to keep this oath unviolated, may it be granted to me to enjoy life and the practice of pharmacy respected by all, at all times !

Should I trespass and violate this oath, may the reverse be my lot !

GLOSSARY

KEYWORD	DEFINITION
Ability Enhancement Courses	Courses of varying durations which are optional, and offered in the curriculum that improves the understanding of the subject and enhance ability of the students.
Academic Calendar	The schedule of the institution for the academic year, giving details of all academic and administrative events.
Assessment	Performance evaluation based on certain established criteria
Attainment of Course Outcomes (COs)	COs are to be attained by all students at the end of a formal course. While the method of computation of attainment of COs is not unique, each institution has to follow a well-defined direct method of computing CO attainment based on the student performance in all assessment instruments, and indirect method of computing COs through course exit survey of students
Bloom's Taxonomy	A hierarchical framework used to classify educational learning objectives into levels of complexity and specificity, utilized here to design question papers and assessment tools.
Choice Based Credit System (CBCS)	A mode of learning in higher education which facilitates a student to have some freedom in selecting his/her own choices, across various disciplines for completing a UG / PG program. All UG and PG programs, as per UGC, have to implement CBCS
Co-Curricular Activities	Activities, which support the curriculum such as field trips, hospital visits, community medicine shops, display of academic achievements, quiz, debate, discussion, seminars, role-play, etc
Collaboration	Formal agreement/ understanding between any two or more institutions for training, research, student/ faculty exchange or extension support.
Continuous Assessment	A component of internal assessment that evaluates regular engagement, including attendance and student-teacher interaction.
Counseling	Assisting and mentoring students individually or collectively for academic, career, personal and financial decision-making.

Course	A course is a unit of 1 to 6 credits in a formal program. A 3-credit course will have three classroom sessions of one-hour duration during each week for the entire semester.
Course Outcomes (COs)	COs are statements that describe what students should be able to do at the end of a course.
Credit	A credit system is a systematic way of describing an educational programme by attaching credits to its components as a unit of measure for academic work. One (1) credit is assigned for every one hour of lecture per week or every two hours of practical (laboratory) work per week. For internship and projects, 30 hours equals 1 credit.
Cumulative Grade Point Average (CGPA)	A calculation based on the SGPA of all eight semesters, used to determine the final class and rank.
E-learning Resources	Learning resources available on Internet
Elective Courses	A choice available to students to select from among a large number of Courses
Enrichment Courses	Value added courses offered by institution for student empowerment. They enhance the curriculum by amplifying, supplementing and replacing such parts or features as have become ineffective or obsolete.
Evaluation Process	Assessment of learning, teaching and evaluation process and reforms to increase the efficiency and effectiveness of the system.
Experiential Learning	Is a process of learning through experience and is more specifically defined as “learning through reflection on doing”.
Field Project	Formal projects students need to undertake that involve conducting surveys outside the college/university premises and collection of data from designated communities or natural places
Graduate Attributes	The disciplinary expertise or technical knowledge that has traditionally formed the core of most university courses. They are qualities that also prepare graduates as agents for social good in an unknown future.
Grievance Redressal	Mechanisms for receiving, processing and addressing dissatisfaction expressed, complaints and other formal requests

	made by learners, staff and other stakeholders on the institutional provisions promised and perceived.
ICT	Information and Communication Technology Consists of the hardware, software, networks and media for the collection, storage, processing, transmission and presentation of information (voice, data, text, images) as well as related services.
Internal Examination Committee	A body chaired by the Principal that plans the internal assessment calendar, approves question paper patterns, and addresses student grievances regarding internal marks.
Internship	A mandatory period of at least 120 hours of work in a pharmaceutical industry, hospital, or clinical research organization, typically completed after Semester V and VI under an identified mentor.
Learning Outcomes	Specific intentions of a Programme or module, written in clear terms. They describe what a student should know, understand, or be able to do at the end of that Programme or module
Levels of Outcomes	**Programme Educational Objectives (PEOs):** PEOs are broad statements that describe the professional achievements and career accomplishments that graduates are expected to attain a few years after completing the programme. **Programme Outcomes (POs):** POs are statements that describe the knowledge, skills, and competencies that students should acquire by the time they graduate from the programme. **Course Outcomes (COs):** COs are statements that describe what students should be able to know, understand, and perform at the end of a specific course.
Miller's Pyramid	A framework for assessing clinical competence, used to monitor the progress and attainment of pharmacy students.
Multi-disciplinary Courses	Courses of varying durations which are optional, and offered outside the curriculum in the multidisciplinary areas that

	encourage understanding of recent trends in allied areas and helping the students in getting placed.
OBE: Outcome Based Education	OBE is an educational theory that bases each part of an educational system around goals (outcomes). Each student should have achieved the goal by the end of the educational experience
Outcome	An outcome of an educational Programme is what the student should be able to do at the end of a Programme/ course/ instructional unit.
Participative Learning	Participatory Learning and Action is a family of approaches, methods, attitudes, behaviours and relationships, which enable and empower people to share, analyze and enhance their knowledge of their life and conditions, and to plan, act, monitor, evaluate and reflect.
Problem Based Learning (PBL)	Is a student-centred pedagogy in which students learn about a subject through the experience of solving an open-ended problem found in trigger material. The PBL process does not focus on problem solving with a defined solution, but it allows for the development of other desirable skills and attributes. This includes knowledge acquisition, enhanced group collaboration and communication.
Programme	A structured set of courses and learning experiences offered over a specified period, leading to the award of a certificate, diploma, or degree recognized by the appropriate regulatory authority (e.g., UGC/PCI).
Program Committee	A committee led by a senior teacher that reviews class progress, discusses curriculum issues, and monitors the attainment of program outcomes.
Remedial Courses	Courses offered to academically disadvantaged students in order to help them cope with academic requirements.
Research Project	A supervised project carried out in groups of no more than three students during the final year, relating to an elective subject.

Semester	A period of study consisting of not less than 90 working days. Odd semesters run from June/July to November/December, and even semesters run from December/January to May/June
Semester Grade Point Average (SGPA)	A number representing the weighted average of the grade points obtained in all courses during a single semester.
Sessional	Tests conducted for each course during the semester, the average of which contributes to the internal assessment marks.
Skill Enhancement Courses	Courses of varying durations which are optional, and offered in the curriculum that develop the required skills and helping the students in getting placed.
Progression	Vertical movement of students from one level of education to the next higher level successfully or towards gainful employment.
Value Added Courses	Courses of varying durations which are optional, and offered outside the curriculum that add value and helping the students in getting placed.

Semester I

Course Code	Name of the course	No. of hours per week (L/P)	Credit points
BP101T	Basics of Python Programming for Pharmaceutical Sciences (Theory)	2	2
BP102T	General Pharmacy (Theory)	3	3
BP103T	Healthcare Psychology and Communication Skills (Theory)	1	1
BP104T	Human Anatomy, Physiology and Pathophysiology I (Theory)	4	4
BP105T	Introduction to Pharmacognosy (Theory)	3	3
BP106T	Pharmaceutical Inorganic and Analytical Chemistry (Theory)	3	3
BP107P	General Pharmacy (Practical)	3	1
BP108P	Healthcare Psychology and Communication Skills (Practical)	2	1
BP109P	Human Anatomy, Physiology and Pathophysiology I (Practical)	3	1
BP110P	Introduction to Pharmacognosy (Practical)	3	1
BP111P	Pharmaceutical Inorganic and Analytical Chemistry (Practical)	3	1
Total		**30**	**21**

Course Code	Course Title			Course Type
BP101T	**Basics of Python Programming for Pharmaceutical Sciences (Theory)**			Core
Credit	Hours Per Week (L-T-P)			Max. Hours
	L	T	P	
2	2	--	--	30
Maximum Marks	SE			ESE
50	20			30

Course Objectives:

The objectives of this course are to:

1. Introduce the fundamentals of Python programming for pharmaceutical sciences.
2. Develop basic programming skills using control structures, functions, and data structures.
3. Provide knowledge of data handling techniques for structured dataset management.
4. Familiarize students with data analysis tools such as NumPy and Pandas for healthcare datasets.
5. Enable students to visualize and interpret pharmaceutical data.

Course Outcomes (CO):

CO No.	Upon successful completion of this course, the students will be able to:
1	Explain the fundamentals of Python programming, including variables, data types, operators, and libraries.
2	Analyze program logic using control structures and functions.
3	Organize, manipulate, and retrieve data using data structures and file handling techniques.
4	Analyze pharmaceutical datasets using Python libraries.
5	Visualize and interpret pharmaceutical data using graphical tools.

Detailed Syllabus:

Unit No.	Topics	No. of Lectures
I	**Introduction to Python programming** • Installing Python and an Integrated Development Environment (IDE) [Jupyter Notebook, PyCharm, VS Code etc.], Advantages of IDEs over text editors. • Python variables and data types (integers, floats, strings, booleans), Type casting and basic operators (arithmetic, comparison, logical), Input and output operations.	6 Hours

	• Basic string operations and manipulation techniques. Introduction to standard libraries and third-party libraries, installing and uninstalling libraries.	
II	**Control Structures & Functions** • Conditional statements (if, if-else, if-elif-else), nested conditions • Loops (for loop, while loop). • Break and continue statements. • Defining and calling functions, passing arguments and returning values. • Writing modular programs for simple pharmaceutical applications- dosage calculation and BMI calculation.	6 hours
III	**Data Structures & File Handling** • Lists, tuples, and dictionaries. • Indexing and slicing lists, basic operations on lists and dictionaries, string manipulation techniques. • Introduction to NumPy arrays, basic operations using NumPy (array creation, arithmetic operations). • Reading and writing CSV files. • Understanding structured healthcare datasets. • Importing small pharmaceutical datasets and performing basic data access and manipulation tasks.	6 hours
IV	**Data Handling with Pandas** • Introduction to Pandas library. • Pandas Series and DataFrame structures. • Reading CSV and Excel files-PK study datasets and ADR reports • Inspecting datasets using functions such as head(), tail(), info(), and describe(). • Data cleaning techniques and handling missing values. • Filtering and selecting data based on conditions. • Grouping data and performing aggregation functions.	6 Hours
V	**Data Visualization with Matplotlib** • Introduction to Matplotlib. • Creating line plots, histograms, scatter plots, and box plots. • Labeling axes, titles, and legends. • Create plots and visualize pharmaceutical datasets - concentration-time curves for oral and IV administration, ADR reporting rates across drugs, dissolution profiles. • Scientific interpretation of plots.	6 Hours

Recommended References *(Preferably Latest Editions)*:

1. Weiss, C.J., 2017. *Scientific Computing for Chemists with Python*. Available at: https://weisscharlesj.github.io/SciCompforChemists/notebooks/introduction/intro.html
2. Perkovic, L., 2015. *Introduction to Computing Using Python: An Application Development Focus*. 2nd ed. Hoboken: Wiley.
3. Sweigart, A., 2025. *Automate the Boring Stuff with Python*. 3rd ed. Available at: https://automatetheboringstuff.com/
4. W3Schools, n.d. *Python Tutorial*. Available at: https://www.w3schools.com/python/
5. Datasets for Education and Research:
   Mentors and students can access healthcare datasets from sources such as Kaggle (healthcare records), government agencies (healthdata.gov, WHO, https://www.data.gov.in/), and clinical trial registries (https://ctri.nic.in/, https://clinicaltrials.gov/). *Always use data responsibly*.

Course Code	Course Title			Course Type
BP102T	**General Pharmacy (Theory)**			**Core**
Credit	Hours Per Week (L-T-P)			Max. Hours
	L	T	P	
3	3	--	--	45
Maximum Marks	SE			ESE
75	30			45

COURSE OBJECTIVES

The objectives of this course are to:

1. Provide knowledge about evolution and development of Pharmacy profession in India and the growth of the Pharmaceutical Industries over the years.
2. Provide understanding of different types of pharmacopoeias and other official books in maintaining the standards of medicines.
3. Provide knowledge about the basic pharmaceutical calculations used in dispensing and compounding.
4. Understand the role of active pharmaceutical ingredients and pharmaceutical excipients in drug formulations
5. Impart basic knowledge about formulation and preparation of Various solid, liquid and semisolid dosage forms

Course Outcomes (CO):

CO No.	Upon successful completion of this course, the students will be able to:
1	Describe the history and evolution of the pharmacy profession, including pharmacopeial practices and prescription handling.
2	Perform accurate pharmaceutical calculations required in the formulation and preparation of various types of dosage forms.
3	Explain the properties and functions of active pharmaceutical ingredients (APIs) and excipients and demonstrate the methods of preparation of solid dosage forms.
4	Illustrate the formulation principles of liquid dosage forms by analyzing the role of APIs and excipients involved.
5	Compare and evaluate the formulation of semisolid dosage forms based on the characteristics of APIs, excipients, and preparation methods.

Detailed Syllabus:

Unit No.	Topics	No. of Lectures
I	**Introduction to the Profession of Pharmacy** • History of the Profession of Pharmacy in India: In relation to pharmacy education, pharmaceutical industries and organizations – evolution, development and milestones. • Scope of the Pharmacy Profession: Role and responsibilities of pharmacists in retail/community pharmacy, hospital and clinical pharmacy, and industrial pharmacy including research and development. • Pharmacopoeias: Introduction to IP, BP, USP, BPC, International Pharmacopoeia, other pharmacopoeias and the National Formulary of India; structure and content of the Indian Pharmacopoeia; study of one model IP monograph. • Introduction to Prescription: Structure and format/parts of prescription, handling of prescriptions, Latin terminology related to prescriptions.	9 hours
II	**Introduction to Pharmaceutical Calculations and Dosage Forms** • Metric system of weights and measures; calculations based on alligation, proof spirit, isotonic solutions, dilute solutions (percentage and ratio) and geometric dilution; scientific notation of units and measures. • Posology: Definition and dose calculation based on age, body weight and body surface area. • Introduction to Dosage Forms: Routes of administration and classification of dosage forms. • Introduction to Active Pharmaceutical Ingredients and Excipients: Definition, ideal characteristics and importance.	9 hours
III	**Solid Dosage Forms** • Powders: Classification, advantages and disadvantages; dusting powders, effervescent powders, efflorescent powders, hygroscopic powders and eutectic mixtures; introduction to excipients and methods of preparation. • Tablets: Definition, types of tablets including moulded tablets and pills with examples; advantages and disadvantages; introduction to excipients and methods of preparation. • Capsules: Definition, types of capsules, advantages and disadvantages, capsule sizes; introduction to excipients and methods of preparation.	9 hours
IV	**Monophasic and Biphasic Liquids** • For internal use – aromatic waters, syrups, elixirs and linctus (definition and preparation).	9 hours

	• For external use and body cavities – liniments, lotions, throat paints, applications, gargles, mouthwashes, enemas, eye drops, ear drops, nasal drops and tinctures with examples. • Study of official preparations- Introduction to excipients and methods of preparation. • Suspensions- Definition and types (flocculated and deflocculated), advantages and disadvantages, formulation excipients and general methods of preparation. • Emulsions- Definition and types, emulsifying agents, tests for identification of types of emulsions, formulation excipients and general methods of preparation.	
V	**Semisolid Dosage Forms** • Definitions, classification, advantages and disadvantages, ointment bases and other excipients used in semisolid dosage forms; general methods of preparation of ointments, pastes, creams and gels. • Suppositories / Pessaries: Definition, types of suppositories, advantages and disadvantages, formulation excipients used in suppositories, properties of ideal suppository bases, types of suppository bases, displacement value and general method of preparation.	9 hours

Recommended References *(Preferably Latest Editions)*:

1. Ansel, H.C., Allen, L.V. and Popovich, N.G., *Pharmaceutical Dosage Forms and Drug Delivery Systems*. Lippincott Williams & Wilkins, New Delhi.
2. Carter, S.J., *Cooper and Gunn's Dispensing for Pharmaceutical Students*. CBS Publishers, New Delhi.
3. Indian Pharmacopoeia Commission, *Indian Pharmacopoeia*. Ghaziabad.
4. Indian Pharmacopoeia Commission, National Formulary of India. Ghaziabad, India.
5. British Pharmacopoeia Commission, *British Pharmacopoeia*. London.
6. United States Pharmacopeial Convention, *United States Pharmacopeia (USP–NF)*. Rockville, Maryland, USA.
7. Lachman, L., Lieberman, H.A. and Kanig, J.L., *The Theory and Practice of Industrial Pharmacy*. Lea & Febiger, University of Michigan.
8. Gennaro, A.R., *Remington: The Science and Practice of Pharmacy*. Lippincott Williams & Wilkins, New Delhi.
9. Rawlins, E.A., *Bentley's Textbook of Pharmaceutics*. Elsevier Health Sciences, USA.
10. Nieloud, F. and Marti-Mestres, G., *Pharmaceutical Emulsions and Suspensions*. Marcel Dekker Inc., New York.

Course Code	Course Title			Course Type
BP103T	**Healthcare Psychology and Communication Skills (Theory)**			**Core**
Credit	Hours Per Week (L-T-P)			Max. Hours
	L	T	P	
1	1	--	--	15
Maximum Marks	SE			ESE
50	20			30

COURSE OBJECTIVES:

The objectives of this course are to:

1. Introduce the fundamental concepts and branches of psychology relevant to healthcare.
2. Help students understand human behavior, development, and psychological responses to illness.
3. Develop awareness of common psychological disorders and coping mechanisms in healthcare contexts.
4. Equip students with effective health communication skills for clinical and community settings.
5. Promote professional interaction with patients, caregivers, and healthcare teams through ethical and empathetic communication.

Course Outcomes (CO):

CO No.	Upon successful completion of this course, the students will be able to:
1	Explain the fundamental concepts of psychology and their relevance in healthcare settings.
2	Describe the stages of human development, personality traits, and behavioral responses associated with illness and recovery.
3	Apply effective communication models and techniques in clinical and interdisciplinary healthcare scenarios.
4	Demonstrate professional communication skills including active listening, empathetic interaction, and accurate clinical documentation.
5	Analyze psychological and behavioral interventions that promote mental health, treatment adherence, and stigma reduction.

Detailed Syllabus:

Unit No.	Topics	No. of Lectures
I	**Introduction to Psychology in Healthcare** Definition, scope, and relevance of psychology in health sciences. Branches of psychology with healthcare relevance: clinical, health, behavioural, and developmental psychology. Sensation, perception, and attention in clinical assessment. Learning and memory: reinforcement in health behaviour change. Emotion and motivation: theories and implications in health contexts.	3 hours
II	**Developmental and Behavioural Psychology** Human developmental stages and healthcare needs. Personality theories and patient interaction styles. Psychological factors affecting illness perception and recovery. Common psychological disorders in healthcare: anxiety, depression, and somatization. Coping strategies, resilience, and stress management techniques.	3 hours
III	**Foundations of Health Communication** Elements and models of communication in healthcare. Types of communication: interpersonal, group, mass, and telehealth communication. Barriers to effective communication in clinical settings. Active listening, questioning techniques, and empathy. Culturally appropriate and inclusive communication.	3 hours
IV	**Professional Communication in Healthcare Settings** Communication with patients, caregivers, and interdisciplinary teams. Delivering difficult news and handling emotionally charged situations. Legal and ethical issues in health communication (confidentiality, consent). Writing patient records, reports, and discharge summaries. Use of technology and digital communication tools in healthcare services.	3 hours
V	**Health Psychology and Behavioural Interventions** Health belief models and illness behaviour. Psychosomatic illnesses and the mind–body connection. Behaviour change theories (e.g., CBT, TTM) in treatment adherence. Psychological first aid and crisis communication. Mental health promotion and stigma reduction through communication.	3 hours

Recommended References *(Preferably Latest Editions)*:

1. Feldman, R.S., Understanding Psychology. McGraw-Hill Education, New York.
2. Taylor, S.E., Health Psychology. McGraw-Hill Education, New York.
3. Hargie, O., The Handbook of Communication Skills. Routledge, London.

4. Nevid, J.S., Rathus, S.A. and Greene, B., Psychology and the Challenges of Life: Adjustment and Growth. Wiley, New York.
5. Atkinson, R.L., Atkinson, R.C., Smith, E.E., Bem, D.J. and Nolen-Hoeksema, S., Introduction to Psychology. Wadsworth Publishing, Belmont.
6. Kumar, A., Communication Skills for Health Professionals. Jaypee Brothers Medical Publishers, New Delhi.
7. Park, K., Park's Textbook of Preventive and Social Medicine. Banarsidas Bhanot Publishers, Jabalpur.

Course Code	Course Title			Course Type
BP104T	**Human Anatomy, Physiology and Pathophysiology I (Theory)**			**Core**
Credit	Hours Per Week (L-T-P)			Max. Hours
	L	T	P	
4	4	--	--	60
Maximum Marks	SE			ESE
100	40			60

COURSE OBJECTIVES:

The objectives of this course are to:

1. Understand the structural organization of the human body from cells to systems.
2. Comprehend physiological functions of various body systems and the principles of homeostasis.
3. Learn the cellular basis of disease including injury, adaptation, and inflammation.
4. Recognize common pathological conditions related to skin, bones, joints, blood, cardiovascular system, and special senses.
5. Establish the groundwork for clinical interpretation of symptoms and disease mechanisms relevant to pharmacy and therapeutics.

Course Outcomes (CO):

CO No.	Upon successful completion of this course, the students will be able to:
1	Explain the fundamental concepts of Human Anatomy, Physiology and Pathophysiology.
2	Explain the gross morphology, structure and functions of various organs of the human body.
3	Understand the etiology and pathogenesis of diseases/disorders associated with integumentary system, peripheral nervous system and cardiovascular system
4	Understand the basic mechanism behind inflammation
5	Identify and differentiate the various tissues and organs of different systems of human body.

Detailed Syllabus:

Unit No.	Topics	No. of Lectures
I	**Introduction to human body** Cellular and tissue level of organization. Definition and scope of anatomy, physiology and pathophysiology. Levels of structural organization and body systems, basic life processes,	12 hours

	homeostasis, basic anatomical terminologies. Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, forms of intracellular signalling- a) Contact-dependent, b) Paracrine, c) Synaptic, d) Endocrine Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues. **Basic principles of cell injury and adaptation** Components and types of feedback systems, causes of cellular injury, pathogenesis (cell membrane damage, mitochondrial damage, ribosome damage and nuclear damage), morphology of cell injury – adaptive changes (atrophy, hypertrophy, hyperplasia, metaplasia, dysplasia), cell swelling, intra cellular accumulation and cell death. Definitions of commonly used relevant medical terminologies.	
II	**Integumentary system and wound healing** Structure and functions of skin. Skin disorders: Psoriasis and dermatitis and pathophysiology of Leprosy. Basic principles of wound healing. **Skeletal system and joints** Divisions of skeletal system, types of bones, salient features and functions of bones of axial and appendicular skeletal system. Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction. Structural and functional classification of joints. **Diseases of bones and joints** Pathophysiology of rheumatoid arthritis, osteoporosis and gout.	12 hours
III	**Body fluids, blood and lymphatic system** Body fluids, composition and functions of blood, hemopoiesis, formation of haemoglobin, mechanisms of coagulation, blood grouping, Rh factors and transfusion. Lymphatic organs and tissues, lymphatic vessels, lymph formation, circulation and functions of lymphatic system. **Basic mechanism of inflammation and repair** Introduction, classification and pathophysiology of inflammation, mediators of inflammation. **Haematological diseases** Pathophysiology of iron deficiency, megaloblastic anaemia (Vit B12 and folic acid), sickle cell anaemia, Thalassemia, hereditary acquired anaemia and haemophilia.	12 hours
IV	**Peripheral nervous system** Classification of peripheral nervous system: structure and functions of sympathetic and parasympathetic nervous system. Origin and functions of spinal and cranial nerves. **Special senses** Structure and functions of eye, ear, nose and tongue. Pathophysiology	12 hours

	of special sense disorders- glaucoma, cataract, myopia, otitis externa, otitis media, vertigo and anosmia	
V	**Cardiovascular system** Anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heartbeat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram. Pathophysiology of hypertension, cardiac arrhythmias, congestive heart failure, ischemic heart disease (angina, myocardial infarction, atherosclerosis and coronary artery disease).	12 hours

Recommended References *(Preferably Latest Editions)*:

1. Sembulingam, K. and Sembulingam, P., *Essentials of Medical Physiology*. Jaypee Brothers Medical Publishers, New Delhi.
2. Guyton, A.C. and Hall, J.E., *Textbook of Medical Physiology*. Elsevier Saunders, Philadelphia, USA.
3. Tortora, G.J. and Grabowski, S.R., *Principles of Anatomy and Physiology*. Wiley, Palmetto, GA, USA.
4. Kumar, V., Cotran, R.S. and Robbins, S.L., *Basic Pathology*. W.B. Saunders Company, Philadelphia.

Course Code	Course Title			Course Type
BP105T	**Introduction to Pharmacognosy (Theory)**			**Core**
Credit	Hours Per Week (L-T-P)			Max. Hours
	L	T	P	
3	3	--	--	45
Maximum Marks	SE			ESE
75	30			45

COURSE OBJECTIVES

The objectives of this course are to:

1. Explain the origin, history, and classification of natural drugs.
2. Understand cultivation and conservation methods for medicinal plants.
3. Study quality control and evaluation of crude drugs.
4. Study primary and secondary metabolites with their therapeutic relevance
5. Introduce traditional systems of medicine and phyto-therapeutic agents.

COURSE OUTCOMES (CO)

CO No.	Upon successful completion of this course, the students will be able to:
1	Describe the historical development, classification, and scope of Pharmacognosy.
2	Explain cultivation, processing, and conservation techniques for medicinal plants.
3	Apply quality evaluation methods to crude drugs using organoleptic, microscopic, and chemical parameters.
4	Identify primary and secondary metabolites with their therapeutic relevance.
5	Recognize traditional systems of medicine and commonly used phyto-therapeutic agents.

Detailed Syllabus:

Unit No.	Topics	No. of Lectures
I	**Fundamentals of Pharmacognosy** (a) Definition, history, present status, scope and development of pharmacognosy. (b) **Sources of drugs:** Plants, animals, microbial, marine, mineral and plant tissue culture. (c) **Historical milestones in drug discovery:** Morphine, quinine, aspirin, warfarin, penicillin, cephalosporin, taxol and artemisinin. (d) **Introduction to different herbal / traditional pharmacopoeias:** Indian Pharmacopoeia, British Herbal Pharmacopoeia, United States Pharmacopeia – Herbal Medicines and Dietary Supplements, Ayurvedic Pharmacopoeia of India, Unani	10 hours

	Pharmacopoeia of India and American Herbal Pharmacopoeia. (e) **Official and non-official; codified and non-codified drugs.** Classification of crude drugs: alphabetical, morphological, taxonomical, chemical, pharmacological and chemotaxonomic classification along with their merits and limitations.	
II	**Cultivation, Collection, Processing and Storage of Drugs of Natural Origin** Methods of plant cultivation and Good Agricultural and Collection Practices (WHO / GAP / GCP guidelines) for medicinal plants. Factors influencing cultivation, collection and storage of medicinal plants. Plant hormones and their applications in cultivation of medicinal plants. Application of polyploidy, mutation and hybridization concepts with reference to secondary metabolites. Ex-situ and in-situ conservation and strategies for value addition of medicinal plants. Role of eco-pharmacognosy in sustainable conservation of endangered medicinal plants such as kutki and chirata.	8 hours
III	**Quality Control of Drugs of Natural Origin (WHO Guidelines)** Adulteration of drugs of natural origin. Evaluation of drugs using organoleptic, microscopic (qualitative and quantitative), physical, chemical and biological methods. Physicochemical parameters: extractive values, moisture content, foreign organic matter, ash values, bitterness value, foaming index, haemolytic potential, swelling index, viscosity, optical rotation, refractive index, acid value and saponification value. DNA barcoding.	8 hours
IV	**Introduction to Metabolites of Plant Origin** Definition and general properties of plant metabolites. Primary and secondary metabolites such as carbohydrates, proteins, lipids, alkaloids, glycosides, flavonoids, tannins, terpenoids, volatile oils and resins. **Traditional Systems of Medicine** Basic principles of treatment of diseases in different systems of medicine including AYUSH and TCM. Types of dosage forms in AYUSH medicines. Role of pharmacognosy in allopathy and traditional systems of medicine such as AYUSH and TCM.	12 hours
V	**Phyto-therapeutic Agents** Biological source, major constituents and uses of the following classes of drugs: • Adaptogens and Immunomodulators: Ashwagandha, Tulsi, Amla • Hepatoprotectives: Milk thistle, Kutki • Cardiovascular drugs: Garlic, Arjuna • Antidiabetics: Gymnema, Fenugreek • Anti-inflammatory and analgesics: Turmeric, Boswellia • CNS drugs: Brahmi • Antimicrobial and antivirals: Giloy, Neem, Andrographis • Gastrointestinal drugs: Psyllium • Dermatological agents: Aloe • Drugs used in women's health: Chasteberry, Shatavari • Respiratory drugs: Vasaka	7 hours

Recommended References (*Preferably latest editions*):

1. Evans, W.C., *Trease and Evans Pharmacognosy*. 16th ed. London: W.B. Saunders & Co., 2009.
2. Tyler, V.E., Brady, L.R. and Robbers, J.E., *Pharmacognosy*. 9th ed. Philadelphia: Lea & Febiger, 1988.
3. Wallis, T.E., *Textbook of Pharmacognosy*. London: J. & A. Churchill Ltd.
4. World Health Organization (2002) *WHO traditional medicine strategy 2002–2005*. Geneva: World Health Organization

5. World Health Organization (1998) *Quality control methods for medicinal plant materials*. Geneva: World Health Organization.
6. World Health Organization (2003) *WHO guidelines on good agricultural and collection practices (GACP) for medicinal plants*. Geneva: World Health Organization.

Course Code	Course Title			Course Type
BP106T	**Pharmaceutical Inorganic and Analytical Chemistry (Theory)**			**Core**
Credit	Hours Per Week (L-T-P)			Max. Hours
	L	T	P	
3	3	--	--	45
Maximum Marks	SE			ESE
75	30			45

COURSE OBJECTIVES:

The objectives of this course are to:

1. Understand the importance of errors, impurities in pharmaceuticals.
2. Comprehend the principles of buffer systems.
3. Develop skills in performing and interpreting limit tests and titrimetric analysis.
4. Emphasize the importance of inorganic compounds and radiopharmaceuticals in Pharmacy
5. Explain synthesis and analysis of inorganic compounds/products of pharmaceutical importance

COURSE OUTCOMES (CO):

CO No.	Upon successful completion of this course, the students will be able to:
1	Identify sources and types of errors in pharmaceutical analysis, and impurities products
2	Apply concepts of acid-base chemistry, buffer systems with importance of electrolytes
3	Describe and differentiate various analytical techniques used in pharmaceutical analysis, including titrimetric methods, and their specific applications in quality assessment.
4	Analyze the properties, mechanisms, and therapeutic uses of gastrointestinal agents, radiopharmaceuticals, expectorants, antidotes, and other pharmaceutical compounds, illustrating their roles in therapy and safety considerations.
5	Describe the drugs used in expectorants, emetics, haemintics, poison and antidote and astringents.

Detailed Syllabus:

Unit No.	Topics	No. of Lectures
I	**Introduction to pharmaceutical analysis** Different techniques of analysis, Methods of expressing strength of solutions, Primary and secondary standards with examples. **Errors** Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures. **Impurities** Definition, types, contents and regulatory importance. Sources and types of impurities in Pharmaceuticals, limit tests for chloride, sulphate, iron, arsenic, lead, heavy metals, and modified limit test for chloride and sulphate.	7 hours
II	**Acid-Base Chemistry and Buffer Systems in Pharmacy** Definition of acids, bases, buffers, pH Scale and its significance, Buffer equation, calculation of pH for Buffer solution. Isotonicity and its application in IV Fluids and Ophthalmic Solutions. **Major extra and intracellular electrolytes** Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium chloride and Oral Rehydration Salt (ORS), Physiological acid base balance.	8 hours
III	**Acid base titrations** Theories of acid base indicators, classification of acid base titrations. Preparation and standardization of titrants viz. hydrochloric acid and sodium hydroxide. Theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves. Assay of Ammonium hydroxide. **Non-aqueous titrations** Types of solvents used, acidimetric and alkalimetric titration using non-aqueous solvents. Preparation and standardization of acidic and basic titrants. Estimation of weakly acidic and basic substances using non-aqueous titrants, estimation of Sodium benzoate. **Precipitation titrations and gravimetry** Principle and steps involved in gravimetric analysis, Mohr's method, Volhard's, Modified Volhard's, Fajans method. Estimation of barium sulphate by gravimetry. **Complexometric titrations** Classification, metal ion indicators, masking and demasking reagents, preparation and standardization of disodium EDTA. Estimation of Magnesium sulphate and Calcium gluconate*.	14 hours

	Redox titrations Concepts of oxidation and reduction, Types of redox titrations viz. Permanganometry, Cerimetry, Iodimetry, Iodometry and titrations with potassium iodate.	
IV	**Gastrointestinal agents** Acidifiers: Sodium acid phosphate and Dilute Hydrochloric acid. Antacids: Ideal properties of antacids, combinations of antacids, Sodium bicarbonate*, Aluminium hydroxide gel*. Agents promote bowel movements: Magnesium hydroxide, Sodium orthophosphate, Sodium Potassium tartrate and magnesium trisilicate. Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations. **Radiopharmaceuticals** Basics of radioactivity, applications of radioisotopes of Sodium Iodide I-131, Technetium-99m, Cobalt-60, Phosphorus-32 including safe handling, storage, and disposal of radiopharmaceuticals, adhering to regulatory guidelines for safety.	10 hours
V	**Miscellaneous Compounds** **Expectorants:** Potassium iodide, Ammonium chloride*. **Emetics:** Copper sulphate*, Sodium potassium tartrate. **Haematinics:** Ferrous sulphate*, Ferrous gluconate. **Poison and Antidote:** Definition, classification of antidotes, Sodium thiosulphate	06 hours

Recommended References (*Preferably latest editions*):

1. Bentley, R. and Driver, J., *Bentley and Driver's Textbook of Pharmaceutical Chemistry*. Oxford: Oxford University Press.
2. Vogel, A.I., *Vogel's Textbook of Quantitative Chemical Analysis*. Essex: Pearson Education Limited.
3. Beckett, A.H. and Stenlake, J.B., *Practical Pharmaceutical Chemistry*. Part I & II. London: The Athlone Press, University of London.
4. Schroff, M.L., *Inorganic Pharmaceutical Chemistry*. New Delhi: Oxford Book Company.
5. Indian Pharmacopoeia Commission, *Indian Pharmacopoeia*. Ghaziabad, India.

Course Code	Course Title			Course Type
BP107P	**General Pharmacy (Practical)**			**Core**
Credit	Hours Per Week (L-T-P)			Max. Hours
	L	T	P	
1	--	--	3	45
Maximum Marks	SE			ESE
50	20			30

COURSE OBJECTIVES:

The objectives of this course are to:

1. Familiarize students with essential pharmaceutical calculations including dilution, concentration, and allegation methods required for accurate formulation of dosage forms.
2. Impart practical skills in the preparation of official and non-official dosage forms such as solutions, syrups, powders, granules, suppositories, semisolids, gargles, and mouthwashes in accordance with pharmacopeial standards.
3. Develop understanding of formulation principles related to selection of ingredients, dosage form design, stability, and patient acceptability.
4. Train students in the application of pharmacopoeial specifications (IP, BPC, WHO) during compounding, labeling, and evaluation of pharmaceutical preparations.
5. Enhance hands-on competency and professional confidence required for dispensing practice and pharmaceutical compounding in hospital and community pharmacy settings.

COURSE OUTCOMES (CO):

CO No.	Upon successful completion of this course, the students will be able to:
1	Perform accurate pharmaceutical calculations using dilution and allegation principles for the preparation of various dosage forms.
2	Prepare and dispense liquid dosage forms such as solutions, syrups, gargles, and mouthwashes following official pharmacopeial procedures.
3	Formulate solid dosage forms including powders, divided powders, dusting powders, and effervescent granules as per standard guidelines.
4	Prepare semisolid and specialized dosage forms such as ointments, liniments, and suppositories using appropriate bases and techniques.
5	Compile and evaluate a compendium of marketed dosage forms, demonstrating compliance with pharmacopeial standards, labeling requirements, and patient-centric considerations

Detailed Syllabus:

List of practical
1. Pharmaceutical Calculations Solutions based on allegation and dilution methods **2. Solutions** a) Strong solution of ammonium acetate – IP b) Cresol with soap solution – IP c) Lugol's solution – BPC **3. Syrups** a) Simple Syrup – IP **4. Powders & Granules** a) ORS powder – WHO b) Effervescent granules – IP c) Dusting powder – IP d) Divided powders – IP **5. Suppositories** a) Glycerogelatin suppository – BPC b) Cocoa butter suppository – IP c) Zinc Oxide suppository – IP **6. Semisolids** a) Sulphur ointment – IP b) Non-staining iodine ointment with methyl salicylate – BPC **7. Gargles & Mouthwashes** a) Iodine gargle – BPC b) Chlorhexidine mouthwash – IP ***Note:*** *a) Preparation of compendia of dosage forms (marketed products), is recommended.* *b) Any other practical relevant to the syllabus can be introduced.* *c) Minimum 12 experiments must be performed covering all dosage forms.*

Recommended References (*Preferably latest editions*):

1. Carter, S.J., *Cooper and Gunn's Dispensing for Pharmaceutical Students*. 12th ed. New Delhi: CBS Publishers.
2. Indian Pharmacopoeia Commission, *Indian Pharmacopoeia*, Vol. I. Ghaziabad: IPC.
3. United States Pharmacopeial Convention, *United States Pharmacopeia–National Formulary (USP–NF)*. Rockville, MD, USA.
4. British Pharmacopoeia Commission, *British Pharmacopoeia Codex*. London: The Stationery Office.
5. World Health Organization, *Oral Rehydration Salts (ORS) Formulation Guidelines*. Geneva: WHO.

Course Code	Course Title			Course Type
BP108P	**Healthcare Psychology and Communication Skills (Practical)**			**Core**
Credit	Hours Per Week (L-T-P)			Max. Hours
	L	T	P	
1	--	--	2	30
Maximum Marks	SE			ESE
50	20			30

COURSE OBJECTIVES:

The objectives of this course are:

1. To develop effective communication skills essential for diverse clinical and community health scenarios.
2. To enhance empathetic interaction through role plays, simulations, and reflective practices.
3. To promote collaborative learning and peer feedback in communication-based tasks.
4. To encourage application of psychological principles in real-life healthcare contexts.
5. To build confidence in delivering health education and awareness activities in community settings.

COURSE OUTCOMES (CO):

CO No.	Upon successful completion of this course, the students will be able to:
1	Demonstrate patient-centered communication through role plays and clinical simulations.
2	Analyze healthcare communication challenges using case study discussions.
3	Practice reflective listening, paraphrasing, and team-based communication strategies.
4	Design and deliver effective health education messages for the community.
5	Reflect on personal emotional growth and improvement in communication competencies.

Detailed Syllabus:

List of practical
1. **Role Plays and Simulations** Counselling a patient with chronic illness Breaking bad news in a clinical setting Empathetic listening in crisis response

2. **Case Study Discussions**
   Mental health cases in primary care
   Impact of miscommunication in healthcare errors
3. **Peer-to-Peer Practice Sessions**
   Reflective listening and paraphrasing
   Effective team communication and decision-making
4. **Community Engagement Tasks**
   Designing IEC materials for public health awareness
   Conducting mock health education sessions
5. **Journaling & Self-Reflection Logs**
   Weekly reflection on emotional responses during care simulations
   Growth in communication skill development over the semester

Recommended References (*Preferably latest editions*):

1. Morgan, C.T. and King, R.A., *Introduction to Psychology*. New York: McGraw-Hill.
2. Taylor, S.E., *Health Psychology*. New York: McGraw-Hill Education.
3. Hargie, O., *Skilled Interpersonal Communication: Research, Theory and Practice*. London: Routledge.
4. Balzer-Riley, J., *Communication in Nursing and Healthcare*. Boston: Pearson.
5. Weinman, J., Petrie, K.J. and Moss-Morris, R., *The Psychology of Health and Illness*. London: Routledge.

Course Code	Course Title			Course Type
BP109P	**Human Anatomy, Physiology and Pathophysiology I (Practical)**			Core
Credit	Hours Per Week (L-T-P)			Max. Hours
	L	T	P	
1	--	--	3	45
Maximum Marks	SE			ESE
50	20			30

COURSE OBJECTIVES:

The objectives of this course are to:

1. Provide fundamental knowledge of the structure and functions of various organ systems of the human body.
2. Understand the mechanisms of homeostasis and their role in maintaining normal physiological functions.
3. Introduce the basic concepts of pathophysiology and the causes of diseases affecting different organ systems.
4. Explain the body's physiological responses to disease-producing agents.
5. Lay the foundation for understanding clinical conditions through the study of functional alterations in organs and systems.

COURSE OUTCOMES (CO):

CO No.	Upon successful completion of this course, the students will be able to:
1	Explain the principles, applications, and experimental use of microscopy techniques, and perform basic laboratory experiments related to the nervous system and special senses.
2	Describe the gross morphology, microscopic structure, and coordinated functioning of major human organs and organ systems, emphasizing their roles in maintaining normal physiology.
3	Estimate and interpret key hematological parameters, and explain the mechanisms of homeostasis along with related physiological and pathological disorders.
4	Discuss the etiology and pathogenesis of selected disease states, linking structural and functional changes to clinical manifestations.
5	Identify and explain common diseases with respect to their signs and symptoms, risk factors, diagnostic methods, preventive measures, treatment strategies, and possible complications.

Detailed Syllabus:

List of practical
(Minimum 12 experiments must be performed) Practical HAPP allows the verification of physiological processes discussed in theory classes through experiments on living tissues, simulated videos, models and charts. 1. Study of compound microscopes. 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. Introduction to hemocytometry. 7. Demonstration of total blood count by cell analyser. 8. Enumeration and interpretation of white blood cell (WBC) count, differential count. 9. Enumeration and interpretation of total red blood corpuscles (RBC) count. 10. Determination of bleeding time and clotting time. 11. Estimation and interpretation of hemoglobin content. 12. Determination of blood group. 13. Determination and interpretation of erythrocyte sedimentation rate (ESR). 14. Determination of pulse rate, heart rate and blood pressure. 15. Recording and interpretation of ECG. 16. To study the cardiovascular system and integumentary system. 17. Case studies/files of patients with anaemia, thalassemia, haemophilia, leprosy, gout, hypertension and ischemic heart disease.
Recommended References *(Preferably latest editions)*: 1. Wilson, K.J.W., *Anatomy and Physiology in Health and Illness*. New York: Churchill Livingstone. 2. Guyton, A.C. and Hall, J.E., *Textbook of Medical Physiology*. Philadelphia: Elsevier. 3. Tortora, G.J. and Grabowski, S.R., *Principles of Anatomy and Physiology*. New York: Wiley.

Course Code	Course Title			Course Type
BP110P	**Introduction to Pharmacognosy (Practical)**			**Core**
Credit	Hours Per Week (L-T-P)			Max. Hours
	L	T	P	
1	--	--	3	45
Maximum Marks	SE			ESE
50	20			30

COURSE OBJECTIVES:

The objectives of this course are to:

1. Identify medicinal plants and crude drugs using morphological and microscopical characters.
2. Analyze powdered drugs and perform quantitative microscopy.
3. Evaluate crude drugs using physicochemical parameters.
4. Introduce standardization and quality control of herbal materials.
5. Collect medicinal plants and prepare voucher specimens.

COURSE OUTCOMES (CO):

CO No.	Upon successful completion of this course, the students will be able to:
1	Identify medicinal plants and crude drugs using morphological and microscopical characters.
2	Analyze powdered drugs microscopically to identify diagnostic cell contents.
3	Perform quantitative microscopy for stomatal and vein parameters.
4	Evaluate quality and purity of crude drugs using physicochemical parameters.
5	Collect medicinal plants and prepare voucher specimens during field visits.

Detailed Syllabus:

List of practices
(Minimum 12 experiments must be performed) 1. Morphological study of medicinal plants (as mentioned in Unit V Theory). 2. Organoleptic evaluation and powder microscopical characters of the following drugs: Tulsi and Ashwagandha. 3. Organoleptic evaluation and powder microscopical characters of the following drugs: Amla and Arjuna. 4. Organoleptic evaluation and powder microscopical characters of the following drugs: Turmeric and Psyllium husk.

5. Organoleptic evaluation and powder microscopical characters of the following drugs: Brahmi and Fenugreek.
6. Determination of moisture content of crude drugs.
7. Determination of swelling index and foaming index of crude drugs.
8. Determination of stomatal number and stomatal index of leaf.
9. Determination of vein islet and vein termination number of leaf.
10. Determination of ash value and extractive values of crude drugs.
11. Determination of foreign organic matter of crude drugs.
12. Determination of dimensions of calcium oxalate crystals and phloem fibers by eyepiece micrometry.
13. Determination of percentage purity of powder drug using lycopodium spore method.
14. Experiential learning-based experiments involving collection, identification of medicinal plant material, preparation of voucher specimens and excursion visits to medicinal plant garden.

Recommended References *(Preferably Latest Editions)*:

1. Evans, W.C., 2009. *Trease and Evans Pharmacognosy*. 16th ed. London: W.B. Saunders & Co.
2. Tyler, V.E., Brady, L.R. and Robbers, J.E., 1988. *Pharmacognosy*. 9th ed. Philadelphia: Lea & Febiger.
3. Wallis, T.E., *Textbook of Pharmacognosy*. London: J. & A. Churchill Ltd.

Course Code	Course Title			Course Type
BP111P	**Pharmaceutical Inorganic and Analytical Chemistry (Practical)**			**Core**
Credit	Hours Per Week (L-T-P)			Max. Hours
	L	T	P	
1	--	--	3	45
Maximum Marks	SE			ESE
50	20			30

COURSE OBJECTIVES:

The objectives of this course are to:

1. Gain practical knowledge on various volumetric titration techniques.
2. Learn the principles of volumetric analysis.
3. Study the preparation and assessment of inorganic compounds.
4. Determine the assay of various inorganic compounds in pharmaceutical use.
5. Develop analytical skill for the qualitative and quantitative analysis of various inorganic compounds.

COURSE OUTCOMES (CO):

CO No.	Upon successful completion of this course, the students will be able to:
1	Perform limit tests to detect and identify impurities in pharmaceutical substances.
2	Prepare various pharmaceutical inorganic compounds following standard procedures.
3	Analyze the significance of quality control in pharmaceutical products and raw materials.
4	Demonstrate proficiency in titrimetric analysis using different volumetric techniques.
5	Competence in applying analytical skills to qualitative and quantitative data.

Detailed Syllabus:

List of practical
1. **Limit tests (Any 4 Experiments)** a. Limit test and modified limit test for Chloride as per Indian Pharmacopoeia b. Limit test and modified limit test for sulphate as per Indian Pharmacopoeia c. Limit test for Iron d. Limit test for Lead e. Limit test for arsenic 2. **Preparation of inorganic pharmaceuticals (Any 3 Experiments)** a. Preparation of Aluminium hydroxide b. Preparation of potash alum c. Preparation of ferrous sulphate d. Preparation of Magnesium sulphate from magnesium hydroxide or magnesium carbonate

3. **Test for Purity (Any 2 Experiments)** a. Assessment of swelling power of bentonite as per Indian Pharmacopoeia b. Evaluation of acid neutralizing capacity of aluminium hydroxide gel c. Determination of potassium iodate and iodine in potassium Iodide
4. **Assay of the following inorganic compounds including standardization of titrant (Any 5 Experiments)** a. Assay of ammonium chloride by acid base titration, b. Assay of Ferrous sulphate by Cerimetry, c. Assay of Copper sulphate by Iodometry, d. Assay of Calcium gluconate by Complexometry, e. Assay of Hydrogen peroxide by Permanganometry, f. Assay of Sodium benzoate by non-aqueous titration, g. Assay of Sodium Chloride by precipitation titration (Modified Volhard's method)

Recommended References *(Preferably Latest Editions)*:

1. Bentley, R. and Driver, J., *Bentley and Driver's Textbook of Pharmaceutical Chemistry*. Oxford: Oxford University Press.
2. Vogel, A.I., *Vogel's Textbook of Quantitative Chemical Analysis*. Essex: Pearson Education Limited.
3. Beckett, A.H. and Stenlake, J.B., *Practical Pharmaceutical Chemistry*. Part I & II. London: The Athlone Press, University of London.
4. Kennedy, J.H., *Analytical Chemistry: Principles*. New York: Saunders College Publishing.
5. Schroff, M.L., *Inorganic Pharmaceutical Chemistry*. New Delhi: Oxford Book Company.
6. Indian Pharmacopoeia Commission, *Indian Pharmacopoeia.* Ghaziabad, India.