



PCET's
**Pimpri
Chinchwad
University**

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Chinchwad
University**

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Pimpri Chinchwad Education Trust's

Pimpri Chinchwad University

School of Pharmacy

Sate, Pune – 412106, Maharashtra, India

(Established under Maharashtra Act No V of 2023)

Rules, Structure and Syllabus for Second Year

Diploma in Pharmacy
(Batch: 2024-2026)

[Syllabus framed under Regulation 7, and Education Regulations, 2020 For Diploma Course in Pharmacy]



Effective from Academic Year 2025-26



Preamble

PCET's Pimpri Chinchwad University offers Diploma in Pharmacy (D. Pharm) program. This diploma program aims to provide students with a comprehensive understanding of diverse world of Pharmacy as an integral part of healthcare system. The syllabus for Diploma in Pharmacy has been regulated by Pharmacy Council of India (PCI).

The pharmacy profession is noble in its ideals and pious in its character. Apart from being a career for earning livelihood, it has inherent in it the attitude of service and sacrifice in the interests of the suffering humanity. A pharmacist is involved in handling, selling, distributing, compounding and dispensing medical substances (including poisons and potent drugs) in collaboration with medical personnel charged with the onerous responsibility of safeguarding the health of people. As such a pharmacist must uphold the interests of his patrons above all the things. The lofty ideals set up by Charaka, the ancient Philosopher Physician and Pharmacist in his enunciation: "Even if your own life be in danger, you should not betray or neglect the interests of your patients" should be fondly cherished by all Pharmacist. Government of India restricts the practice of Pharmacy to those who qualify under regulatory requirements and grant them privileges necessarily denied to others. In return Government expects the Pharmacist to recognize his/her responsibilities and to fulfill his/her professional obligations honorably with due regard for the wellbeing of Society. Standards of professional conduct for pharmacy are necessary in the public interest to ensure an efficient pharmaceutical service. Every pharmacist should not only be willing to play his/her part in giving such a service but should also avoid any act or omission which would prejudice the giving of the services or impair confidence in any respect for pharmacists as a body. The nature of pharmaceutical practice is such that its demands may be beyond the capacity of the individual to carry out as quickly or as efficiently as the needs of the public require. There should, therefore always, be a readiness to assist colleagues with information or advice. A Pharmacist must, above all be a good citizen and must uphold and defend the laws of the state and the Nation.

The goal of the syllabus is that the students at the end can secure a high ending job. Keeping in mind with the changing nature of the program, passable emphasis has been given on new practices of mapping and understanding of the different subjects. The syllabus has also been outlined in such a way that the basic skills of the program are taught to the students, which thereby increases the chances of securing job in pharmaceuticals. Further, this also inculcate the students mind to proceed with their own startup or business ideas to become entrepreneur.



Vision and Mission of Program:

Vision:

- To emerge as a Centre of Excellence in Pharmaceutical Education, Research and Healthcare Services.

Mission:

- To deliver quality Pharmacy education to cater the evolving needs of the students, industries and the society at large.
- To foster and disseminate high quality research and creative work which enhances learning and contributes to the advancement of knowledge.
- To produce highly productive professionals and leaders to serve the healthcare needs of the society.

Program Educational Objectives:

Program Educational Objectives (PEOs) for a B. Pharm program are as follows:

- **PEO 1:** To generate excellent trained undergraduates with state of art knowledge in pharmaceutical technology and allied subjects in an ambience of motivation that could stimulate growth and excellence.
- **PEO 2:** To create professional undergraduates who are trained in sync with the requirements of the pharmaceutical industry spread across the country and the globe and adapt readily to education, research, industry and healthcare programs.
- **PEO 3:** To mold students to emerge as future leaders of the pharmaceutical industry and as entrepreneurs.
- **PEO 4:** To sensitize students to local and global needs of environment protection and sustainability.
- **PEO 5:** To promote the development of trained human resource in Pharmaceutical Sciences for dissemination of quality education with highly professional and ethical attitude, strong communication skills, effective skills to work in a team with a multidisciplinary approach.

Program Outcome

PO	PO Statement
PO1:	Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
PO2:	Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines
PO3:	Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice.



PO4:	Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
PO5:	Leadership skills: Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.
PO6:	Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
PO7:	Pharmaceutical Ethics: Apply ethical principles in professional and social contexts, honor personal values.
PO8:	Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
PO9:	The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
PO10:	Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO11:	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Objectives

PSO1:	Apply fundamental principles of pharmacy in developing entrepreneurial expertise and solving community-based problems.
PSO2:	Work competently in various areas of pharmaceutical industry and inter-disciplinary research.
PSO3:	Work effectively and ethically in their professional environment.
PSO4:	Seek constant improvement and develop new skills to enhance the state of their pharmaceutical practice.



Competencies for the Indian D. Pharm Holders

Competency is defined as “A distinct composite of knowledge, skill, attitude and value that is essential to the practice of the profession in real life contexts”.

The candidates who successfully complete the Diploma in Pharmacy (DPharm) program of Education Regulations 2020 (ER-2020), from the institutions approved by the Pharmacy Council of India are expected to attain the following professional competencies.

1. Review the Prescriptions
2. Dispense Prescription / Non-Prescription Medicines
3. Provide Patient Counselling / Education
4. Hospital and Community Pharmacy Management
5. Expertise on Medications
6. Proficiency on drugs / pharmaceuticals
7. Entrepreneurship and Leadership
8. Deliver Primary and Preventive Healthcare
9. Professional, Ethical and Legal Practice
10. Continuing Professional Development

1. **Review the Prescriptions:** The student should receive and handle the prescriptions in a professional manner and be able to check for its completeness and correctness. Also, the prescribers should be contacted for any clarifications and corrections in the prescriptions with suggestions if any.
2. **Dispense Prescription / Non-Prescription Medicines:** The student should be able to dispense the various scheduled drugs / medicines as per the implications of the Drug & Cosmetics Act and Rules thereunder. Also, the non-prescription medicines (over-the-counter drugs) should be dispensed judiciously to the patients as required.
3. **Provide Patient Counselling / Education:** The student should be able to effectively counsel / educate the patients / caretakers about the prescription / non-prescription medicines and other health related issues. Effective communication includes using both oral and written communication skills and various communication techniques.
4. **Hospital and Community Pharmacy Management:** The student should be able to manage the drug distribution system as per the policies and guidelines of the hospital pharmacy, good community pharmacy practice and the recommendations of regulatory agencies. Also, be able to manage the procurement, inventory and distribution of medicines in hospital / community pharmacy settings.



5. **Expertise on Medications:** The student should be able to provide an expert opinion on medications to the health care professionals on safe and effective medication-use, relevant policies and procedures based on available evidences.
6. **Proficiency on Pharmaceutical Formulations:** The student should be able to describe the chemistry, characteristics, types, merits and demerits of both drugs and excipients used in the pharmaceutical formulations based on her/his knowledge and scientific resources.
7. **Entrepreneurship and Leadership:** The student should be able to acquire the entrepreneurial skills in the dynamic professional environments. Also, be able to achieve leadership skills through teamwork and sound decision making skills.
8. **Deliver Primary and Preventive Healthcare:** The student should be able to contribute to various healthcare programs of the nation including disease prevention initiatives to improve public health. Also contribute to the promotion of national health policies.
9. **Professional, Ethical and Legal Practice:** The student should be able to deliver professional services in accordance with legal, ethical and professional guidelines with integrity.
10. **Continuing Professional Development:** The student should be able to recognize the gaps in the knowledge and skills in the effective delivery of the professional services from time to time and be self-motivated to bridge such gaps by attending continuing professional development programs.



Competency Mapping with the Courses (Part I, II & III) of Education Regulations 2020

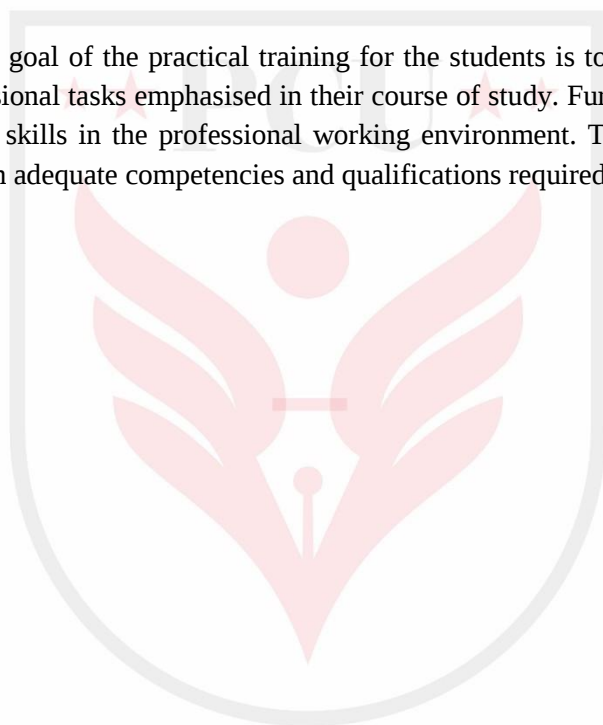
Competencies	Pharmaceutics	Pharmaceutical Chemistry	Pharmacognosy	Human Anatomy & Physiology	Social Pharmacy	Pharmacology	Community Pharmacy & Management	Biochemistry & Clinical Pathology	Pharmacotherapeutics	Hospital & Clinical Pharmacy	Pharmacy Law & Ethics	Practical Training
1. Review the Prescriptions	√	√	√	√		√	√	√	√	√	√	√
2. Dispense Prescription / Non-Prescription Medicines	√	√	√		√	√	√	√	√	√	√	√
3. Provide Patient Counselling / Education	√	√	√	√	√	√	√	√	√	√	√	√
4. Hospital and Community Pharmacy Management					√		√			√	√	√
5. Expertise on Medications	√	√	√	√	√	√	√	√	√	√	√	√
6. Proficiency on Pharmaceutical Formulations	√	√	√			√			√			√
7. Entrepreneurship and Leadership							√			√		√
8. Deliver Primary and Preventive Healthcare				√	√	√	√	√	√	√	√	√
9. Professional, Ethical and Legal Practice					√		√		√	√	√	√
10. Continuing Professional Development	√	√	√		√	√	√		√	√	√	√

ER-2020 D. Pharm Syllabus – An Overview

The ER-2020 DPharm Syllabus has the following structure in every course. Though the theory and practical courses are not mutually exclusive, as per the regulations, the theory and practical are to be considered as individual courses.

1. **Scope:** These are broader statements on the purpose of the course in the curriculum, key contents of the course that will contribute to the specific knowledge and or skill developments. The teacher is expected to orient the students about the scope of the particular course at the beginning and intermittently.
2. **Course Objectives:** The course objectives describe the key topics that are intended by the teacher to be covered in the course. In general, these are more specific than the scope and broader than the course outcomes. The teacher is expected to discuss the objectives of the course with the students and break-down the course objectives into micro levels as objectives of a specific topic / objectives of a specific lecture, etc. Such an exercise shall make the students to understand the significance of the course / topic / lecture and enhance their attention on the course / topic / lecture.
3. **Course Outcomes:** The course outcomes are more specific than the course objectives describe that describe the abilities of the students to perform/act, upon successful completion of the course. Hence, conventionally the course outcomes are described with verbs that are measurable or observable actions. The teacher is expected to describe the desired outcomes of the particular course, so that the students shall understand the various assessment criteria, modalities and parameters. This also serves as a broader guideline for the teachers for preparing the assessment plan. A well-structured assessment plan associated with the course outcomes shall enable to mapping with the professional competencies and their attainment levels that are attributed to the program outcomes.
4. **Theory Courses:** The theory courses basically provide concepts and explain the relationships between the concepts. Understanding of the theoretical courses enable the students to identify the problems in real life situation and make a plan for addressing such problems. Also, the theory course helps to understand what is not known and thus is the tool for accumulation of knowledge. The syllabus of the theory courses has been systematically and logically described as different chapters and the minimum number of hours to be spent on teaching are mentioned chapter wise and course wise. The teachers shall further distribute the total hours of any given chapter among the sub-topics as required by the subject matter.
5. **Practical Courses:** The practical courses are designed for applying the theoretical knowledge in the given experimental / simulated conditions. The practical courses deepen the understanding of theories, develop the skills, hone professional competencies, provide opportunities to observe, think and analyse problem solving methods. Further, they help to gain experience with the real things in practice. The teachers shall train the students in actual / simulated practical conditions.
6. **Tutorials:** The purpose of the tutorial hour is typically to engage the students in smaller groups in order to pay a closer attention on their learning process. This is an opportunity for the students to complete their assignments, develop specific skills, discuss any problems in the study topics in a less formal way. During the tutorial hour, the students shall exchange their ideas within the small group, and learn to accept constructive criticism and listen to others. Also, the tutorial hour enables the teachers to closely monitor the progress of the individual student and provide additional academic support to individuals, if necessary.

7. **Assignments:** The purpose the assignments are to encourage the students for self- directed learning. Further, the assignments will provoke the critical thinking, enhance the skills such as literature search, data mining, data interpretation, report formatting, time-management and written communication. This is also a mode of self- assessment for the student about the level understanding the concepts of a particular course. The teachers shall apply their knowledge and wisdom in choosing the assignment topics at micro level in alignment with the topics given in the syllabus. The assignments shall be evaluated against a set of criteria. A typical format for the assessment of an assignment is given in Appendix -1.
8. **Field Visits:** The purpose of field visits is to provide the real-world experience to the students. The field visits will help them to realize that what they learn within the walls of the classroom / laboratory can help them solve the problems they see in the world around them. Also, this is helpful to the teachers to widen their horizons of knowledge and broadening the scope of the syllabus. Every student shall submit a report describing their objectives, experience, learning points, etc. pertaining to the field trip in the typical format given in Appendix- 2.
9. **Practical Training:** The goal of the practical training for the students is to provide a real-time, supervised experience on the professional tasks emphasised in their course of study. Further, it helps them to apply their acquired knowledge and skills in the professional working environment. The practical training intensively prepares the students with adequate competencies and qualifications required for the career opportunity in the future.



Thus, the ER 2020 DPharm syllabus is designed to nurture the students in all the three domains of Bloom's Taxonomy viz. cognitive (knowledge), affective (attitude) and psychomotor (skills). Further, it also provides ample of scope to the students for different learning styles viz. visual, auditory and kinesthetics, i.e., 'see, hear and do'.

The summary of the curriculum, courses and other activities and their metrics across the ER-2020 D. Pharm program

(Part I, II & III) are given here.

Criteria	Metrics
Number of subject areas (considering both theory & practical together)	11
Number of theory courses	11
Number of practical courses	10
Number of theory hours	825
Number of practical hours	600
Number of practical training hours	500
Number of tutorial hours	275
Number of course outcomes for theory courses	45
Number of course outcomes for practical courses	40
Number of courses which have given assignments	9
Number of assignment topics given	75
Number of assignments reports each student shall submit	27
Number of courses which have given field visit	5
Number of field visit reports each student shall submit	9
Number of professional competencies	10

GUIDELINES FOR THE CONDUCT OF THEORY EXAMINATIONS

Sessional Exams:

There shall be two or more periodic sessional (internal assessment) examinations during each academic year. The duration of the sessional exam shall be 90 minutes. The highest aggregate of any two performances shall form the basis of calculating the sessional marks. The scheme of the question paper for theory sessional examinations shall

be as given below.

I. Long Answers (Answer 3 out of 4)	=	3 x 5 = 15
II. Short Answers (Answer 5 out of 6)	=	5 x 3 = 15
III. Very Short Answers (Answer any 5 out of 6)	=	5 x 2 = 10
Total	=	----- 40 marks -----

Internal assessment:

The marks secured by the students out of the total 40 shall be reduced to 20 in each sessional, and then the internal assessment shall be calculated based on the best two averages for 20 marks.

The scheme of the question paper for the theory examinations conducted by the examining authority (Board / University) shall be as given below. The duration of the final examination shall be 3 hours.

I. Long Answers (Answer 6 out of 7)	=	6 x 5 = 30
II. Short Answers (Answer 10 out of 11)	=	10 x 3 = 30
III. Very Short Answers (Answer any 10 out of 11)	=	10 x 2 = 10
Total	=	----- 80 marks -----

GUIDELINES FOR THE CONDUCT OF PRACTICAL EXAMINATIONS

Sessional Exams:

There shall be two or more periodic sessional (internal assessment) practical examinations during each academic year. The duration of the sessional exam shall be three hours. The highest aggregate of any two performances shall form the basis of calculating the sessional marks. The scheme of the question paper for practical sessional examinations shall be as given below.

I. Synopsis	=	10
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II. Experiments	=	50*
III. Viva voce	=	10
IV. Practical Record Maintenance	=	10

Total	=	80 marks

* The marks for the experiments shall be divided into various categories, viz. major experiment, minor experiment, spotters, etc. as per the requirement of the course.

Internal assessment:

The marks secured by the students out of the total of 80 shall be reduced to 10 in each sessional, and then the internal assessment shall be calculated based on the best two averages for 10 marks from the sessional and other 10 marks shall be awarded as per the details given below.

Actual performance in the sessional examination marks (Average of three)	= 10 marks	Assignment
Report marks (Average for the reports)	= 5 marks*	Field Visit
	= 5 marks ^{\$}	

Total	= 20 marks	

*, ^{\$} Only for the courses given with both assignments and field visit/s.

Note:

1. For the courses having either assignments or field visit/s, the assessments of assignments or field visit/s shall be done directly for 10 marks and added to the sessional marks.
2. For the courses not having both assignment and filed visit, the whole 20 marks shall be calculated from the sessional marks.

Final Board / University Exams

The scheme of question paper for the practical examinations conducted by the examining authority (Board / University) shall be as given below. The duration of the final examination shall be 3 hours.

I. Synopsis	=	10
II. Experiments	=	60*

III. Viva voce

= 10

Total = 80 marks

* The marks for the experiments shall be divided into various categories, viz. major experiment, minor experiment, spotters, etc. as per the requirement of the course.





COURSE STRUCTURE

ER-2020 D. Pharm Syllabus – Part II

Sr. No.	Course Code	Name of the Course	Total Theory / Practical Hours	Total Tutorial Hours	Theory / Practical Hours per Week	Tutorial Hours per Week
1	ER20-21T	Pharmacology – Theory	75	25	3	1
2	ER20-21P	Pharmacology – Practical	50	-	2	-
3	ER20-22T	Community Pharmacy & Management – Theory	75	25	3	1
4	ER20-22P	Community Pharmacy & Management – Practical	75	-	3	-
5	ER20-23T	Biochemistry & Clinical Pathology – Theory	75	25	3	1
6	ER20-23P	Biochemistry & Clinical Pathology – Practical	50	-	2	-
7	ER20-24T	Pharmacotherapeutics – Theory	75	25	3	1
8	ER20-24P	Pharmacotherapeutics – Practical	25	-	1	-
9	ER20-25T	Hospital & Clinical Pharmacy – Theory	75	25	3	1
10	ER20-25P	Hospital & Clinical Pharmacy – Practical	25	-	1	-
11	ER20-26T	Pharmacy Law & Ethics	75	25	3	1
12	UFL201	German A1.1/Japanese B1.1*	30	-	-	

* UFL201A- GERMAN, * UFL201B- JAPANESE, # Ability Enhancement Course

Foreign Languages:

Course Code	Course Type	Subject name
UFLI 201A	AEC	German
UFLI 201 B	AEC	Japanese



ADD ON COURSES FOR D. PHARM EFFECTIVE FROM A. Y. 2025-26

For Second Year D. Pharm

Sr. No.	Name of the Course	No. of Hours/Week	Credit Points
1	Drug Registration	10	0
2	Medical Billing and Coding Fundamentals Specialization	10	0
3	Good with Words: Speaking and Presenting Specialization	25	0
4	Training and Learning Programs for Volunteer Community Health Workers	15	0
5	AI in Healthcare Specialization	14	0
Total Hours		74	Nil



COURSE CURRICULUM

Name of the Program:		D. Pharm		Annual Pattern		Level: Diploma	
Course Name		Pharmacology (Theory)		Course Code/ Course Type		ER20-21T	
Course Pattern		2025		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical /Oral
3	-	1	-	75	20	80	-
Pre-Requisite:		Nil					
Course Objectives (CO):					The objectives of Pharmacology are: 1. To understand the fundamental concepts of pharmacology. 2. To comprehend the pharmacological actions of drugs on the nervous system. 3. To identify the pharmacological actions and clinical uses of drugs acting on systems of body. 4. To study the mechanisms and therapeutic uses of hormones and hormone antagonist 5. To analyze the clinical applications and adverse effects of chemotherapeutic agents and biologicals.		
Course Learning Outcomes (CLO):					Students would be able to: 1. Explain the fundamental concepts of pharmacology. 2. Describe the pharmacological actions of drugs act on the nervous system. 3. Identify and evaluate the therapeutic applications and pharmacological effects of medications that target different bodily systems. 4. Learn how hormones and hormone antagonists work and their medicinal applications. 5. Assess the clinical applications and possible side effects of biologicals and chemotherapeutic drugs.		



Course Contents/Syllabus:

(All the units carry equal weightage in Summative Assessment and equal engagement)

Topic	CLO	Hours
Chapter 1		
General Pharmacology: Introduction and scope of Pharmacology, Various routes of drug administration - advantages and disadvantages, Drug absorption - definition, types, factors affecting drug absorption, Bioavailability and the factors affecting bioavailability, Drug distribution - definition, factors affecting drug distribution, Biotransformation of drugs - Definition, types of biotransformation reactions, factors influencing drug metabolisms, Excretion of drugs - Definition, routes of drug excretion, General mechanisms of drug action and factors modifying drug action.	CLO1	10
Chapter 2		
Drugs Acting on the Peripheral Nervous System: Steps involved in neurohumoral transmission, Definition, classification, pharmacological actions, dose, indications, and contraindications of • Cholinergic drugs • Anti-Cholinergic drugs • Adrenergic drugs • Anti-adrenergic drugs • Neuromuscular blocking agents • Drugs used in Myasthenia gravis • Local anesthetic agents • h) Non-Steroidal Anti-Inflammatory drugs (NSAIDs)	CLO2	11
Chapter 3		
Drugs Acting on the Eye: Definition, classification, pharmacological actions, dose, indications and contraindications of • Miotics • Mydriatics • Drugs used in Glaucoma	CLO3	02
Chapter 4		
Drugs Acting on the Central Nervous System: Definition, classification, pharmacological actions, dose, indications, and contraindications of • General anesthetics • Hypnotics and sedatives • Anti-Convulsant drugs • Anti-anxiety drugs • Anti-depressant drugs • Anti-psychotics • Nootropic agents • Centrally acting muscle relaxants • Opioid analgesics	CLO2	08
Chapter 5		



Drugs Acting on the Cardiovascular System: Definition, classification, pharmacological actions, dose, indications, and contraindications of Anti-hypertensive drugs • Anti-anginal drugs • Anti-arrhythmic drugs • Drugs used in atherosclerosis and • Congestive heart failure • Drug therapy for shock	CLO3	06
Chapter 6		
Drugs Acting on Blood and Blood Forming Organs: Definition, classification, pharmacological actions, dose, indications, and contraindications of • Hematinic agents • Anti-coagulants • Anti-platelet agents • Thrombolytic drugs	CLO3	04
Chapter 7		
Definition, classification, pharmacological actions, dose, indications, and contraindications of • Bronchodilators, Expectorants • Anti-tussive agents • Mucolytic agent	CLO3	02
Chapter 8		
Drugs Acting on the Gastro Intestinal Tract: Definition, classification, pharmacological actions, dose, indications, and contraindications of • Anti-ulcer drugs • Anti-emetics • Laxatives and purgatives • Anti-diarrheal drugs	CLO3	05
Chapter 9		
Drugs Acting on the Kidney Definition, classification, pharmacological actions, dose, indications, and contraindications of • Diuretics • Anti-Diuretics	CLO3	02
Chapter 10		
Hormones and Hormone Antagonists: Physiological and pathological role and clinical uses of • Thyroid hormones • Anti-thyroid drugs • Parathormone • Calcitonin, Vitamin D • Insulin • Oral hypoglycemic agents • Estrogen • Progesterone • Oxytocin • Corticosteroids	CLO4	08
Chapter 11		
Autocoids: • Physiological role of Histamine, 5 HT and Prostaglandins	CLO4	03



Classification, clinical uses, and adverse effects of antihistamines and 5 HT antagonists		
Chapter 12		
Chemotherapeutic Agents: Introduction, basic principles of chemotherapy of infections, infestations and neoplastic diseases, Classification, dose, indication and contraindications of drugs belonging to following classes: - Penicillin - Cephalosporins - Aminoglycosides - Fluoroquinolones - Macrolides - Tetracyclines - Sulphonamides - Anti-tubercular drugs - Anti-fungal drugs - Anti-viral drugs - Anti-amoebic agents - Anthelmintics - Anti-malarial agents - Anti-neoplastic agents	CLO5	12
Chapter 13		
Biologicals: Definition, types, and indications of biological agents with examples	CLO5	02
Total		75

Learning Resource:

Text Reading:

1. Pharma Satoskar, R.S. and Bhandarkar, S.D. Pharmacology and Pharmacotherapeutics
2. B. Suresh, A Text Book of Pharmacology
3. H.K. Sharma. Principles of Pharmacology
4. Mary J. Mycek, Lippincott Williams and Wilkins. Lippincott's illustrated Reviews: Pharmacology
5. Tripathi, K.D. Essentials of Medical Pharmacology.

References:

1. Derasari and Gandhi's Elements of Pharmacology
2. S.K. Kulkarni, Practical Pharmacology and Clinical Pharmacy
3. Various Drug Information Books like British National Formulary, MIMS, CIMS, Drug Today etc., WHO, NIH Websites.

Online resource/ E-learning resource:

1. https://www.nichd.nih.gov/health/topics/pharma/more_information/resources
2. <https://www.qmul.ac.uk/library/academic-skills/online-study-resources/resource-guides-by-subject/biological-sciences/useful-websites/pharmacology---useful-websites/>
3. <https://www.pharmacologyeducation.org/resources/links-other-resources>
4. <https://libguides.bodleian.ox.ac.uk/pharmacology/free-online-resources>
5. https://guides.library.harvard.edu/drug_resources



COURSE CURRICULUM

Name of the Program:		D. Pharm		Annual Pattern		Level: Diploma	
Course Name		Pharmacology (Practical)		Course Code/ Course Type		ER20-21P	
Course Pattern		2025		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
-	2	-	-	50	20	80	-
Pre-Requisite: Nil							
Course Objectives (CO):					The objectives of Pharmacology are: 1. To study the principles and techniques of experimental pharmacology, focusing on pre-clinical drug testing. 2. To provide hands-on experience in handling laboratory animals and understanding ethical considerations in pharmacological research. 3. To familiarize students with commonly used instruments in experimental pharmacology and various drug administration routes in animal models. 4. To teach students different pre-clinical testing methods, including In-Vivo, In Vitro, and Ex-Vivo experiments for assessing drug effects. 5. To develop practical skills in assessing drug effects on behavioural and physiological parameters.		
Course Learning Outcomes (CLO):					Students would be able to: 1. Apply principles and techniques of experimental pharmacology with a focus on understanding experimental methodologies. 2. Demonstrate proficiency in handling laboratory animals in pharmacological research. 3. Identify and utilize commonly used instruments in experimental pharmacology and drug administration routes in animal models. 4. Evaluate different pre-clinical testing methods to assess drug effects in experimental settings. 5. Assess and analyze drug effects on behavioral and physiological parameters in laboratory animals.		



Course Contents/Syllabus:

(All the units carry equal weightage in Summative Assessment and equal engagement)

Assignment/Practical/Activity Number	Assignment/Practical/Activity Title	Week Number/Turn	Details	CLO	Hours
1	Practical 1: Introduction	Week 1/ Turn 1	Introduction to experimental pharmacology	CLO1	02
2	Practical 2: Laboratory animals	Week2/ Turn 1	Study of laboratory animals	CLO2	02
3	Practical 3: Instrument's Study	Week 3/ Turn 1	To study the commonly used instruments in experimental pharmacology	CLO1	02
4	Practical 4: Routes of Administration	Week 4 / Turn 1	Study the different routes of administration of drugs in animals. Part-I	CLO3	02
5	Practical 5: Routes of Administration	Week 5/ Turn 1	Study the different routes of administration of drugs in animals. Part-II	CLO3	02
6	Practical 6: Pre-clinical study	Week 6 / Turn 1	Types of pre-clinical experiments: In-Vivo, In Vitro, Ex-Vivo, etc.	CLO4	02
7	Practical 7: Blood collection	Week 7 / Turn 1	Techniques of blood collection from animals	CLO4	02
8	Practical 8: Effect of Local Anesthetics	Week 8 / Turn 1	Study of local anesthetics on rabbit eye	CLO5	02
9	Practical 9: Mydriatic effect	Week 9 / Turn 1	Study of Mydriatic effect on rabbit eye	CLO5	02
10	Practical 10: Miotic effect	Week 10 / Turn 1	Study of Miotic effect on rabbit eye	CLO5	02
11	Practical 11: Pyrogen testing	Week 11 / Turn 1	Pyrogen testing by rabbit method	CLO5	02
12	Practical 12: Effect of Analgesics	Week 12 / Turn 1	Effect of analgesics using tail flick apparatus	CLO5	02
13	Practical 13: Effect of Analgesics	Week 13 / Turn 1	Effect of analgesics using hot plate apparatus	CLO5	02
14	Practical 14: Effect of Analgesics	Week 14 / Turn 1	Study of analgesic activity by writhing test	CLO5	02
15	Practical 15: Anti-convulsant effect	Week 15 / Turn 1	Screening of anticonvulsant using Electro Convulsimeter	CLO5	02
16	Practical 16: Muscle relaxant screening	Week 16 / Turn 1	Screening of Muscle relaxants using Rota-Rod apparatus	CLO5	02



17	Practical 17: CNS stimulant screening	Week 17 / Turn 1	Screening of CNS stimulants using Actophotometer	CLO5	02
18	Practical 18: CNS Anti- depressants	Week 18 / Turn 1	Screening of CNS depressants using Actophotometer	CLO5	02
19	Practical 19: Anxiolytic activity	Week 19 / Turn 1	Study of anxiolytic activity using elevated plus maze method	CLO5	02
20	Practical 20: Sympathomimet ic activity	Week 20 / Turn 1	Study of effect of sympathomimetics (adrenaline) on isolated heart	CLO5	02
21	Practical 21: Parasympathomi metic activity	Week 21 / Turn 1	Study of effect of Parasympathomimetic (acetylcholine) on isolated heart	CLO5	02
22	Practical 22: Effect of ions	Week 22 / Turn 1	Study of effect of calcium and potassium ions on isolated heart	CLO5	02
23	Practical 23: Effect of cardiotonic agents	Week 23 / Turn 1	Study of effect of cardiotonic on isolated heart	CLO5	02
24	Practical 24: Effect of drugs	Week 24 / Turn 1	Effect of drugs (acetylcholine) on ciliary motility on frog 's buccal cavity/ esophagus	CLO5	02
25	Practical 25: Effect of drugs	Week 25 / Turn 1	Effect of drugs (Atropine) on ciliary motility on frog 's buccal cavity/ esophagus	CLO5	02

Learning Resource:

Text Reading:

1. Kulkarni SK. Hand book of experimental pharmacology. Vallabh Prakashan, Delhi
2. Goyal RK. Practical in Pharmacology, B. S. Shah Prakashan.
3. Badyal D. Practical manual pharmacology. 1st edition, Jaypee Brothers Medical Publishers, New Delhi.

References:

1. Guide for the care and use of laboratory animals, Eighth Edition, The national academic press, Washington, D.C.
2. Bronswijk and Cohen. The first recordings of pharmacological effects. British Journal of Clinical Pharmacology. 2008; 66(5):588–593.
3. Dannerman PJ. In: Monitoring of analgesia in analgesia in anesthesia and analgesia in laboratory animals. Kon DK, Sally K, Wixson B, White WJ, John G, editors. USA: Academic Press; 1977. Pp.83-99. Ch. 6.

Online resource/ E-learning resource:

1. <https://heb-nic.net.in/Ex-Pharm/login.php>
2. <https://youtu.be/O6DYNOf5GeI>
3. <https://www.mycalpharm.com/>



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. Newer techniques in experimental pharmacology
2. Introduction to High Throughput screening
3. Introduction to ELISA test
4. Intro to Allergy Testing
5. Intro to Toxicity Studies
6. Drugs available as paediatric formulations
7. Drug Facts Labels of USFDA
8. Antimicrobial Resistance
9. Introduction to Bioassays
10. Pre-clinical studies in new drug development





COURSE CURRICULUM

Name of the Program:		D. Pharm		Annual Pattern		Level: Diploma	
Course Name		Community Pharmacy and Management (Theory)		Course Code/ Course Type		ER20-22T	
Course Pattern		2025		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
3	-	1	-	75	20	80	-
Pre requisite:					Nil		
Course Objectives (CO):				The objectives of Community Pharmacy and Management are: 1. To study opening and operating a community pharmacy and the legal needs. 2. To discuss the professional features of prescription filling and handling. 3. To acquire effective communication skills for patient counselling. 4. To know disease advice for patients, whether prescribed or non-prescribed medications. 5. To conduct basic health screenings in community pharmacy environments.			
Course Learning Outcomes (CLO):				Students would be able to: 1. Explain establishment of a community pharmacy, and the required laws thereby. 2. Expertly understand prescriptions and process of dispensing medications. 3. Express effective communication skills in both professional and patient interactions. 4. Understand the process of patients counselling on their health, prescription drugs and over-the-counter remedies. 5. Learn basic patient health screenings and analyse the results in community pharmacy settings.			



Course Contents/Syllabus:

(All the units carry equal weightage in Summative Assessment and equal engagement)

Topic	CLO	Hours
Chapter 1		
Community Pharmacy Practice: Definition, history and development of community pharmacy - International and Indian scenarios.	CLO1	02
Chapter 2		
Professional responsibilities of community pharmacists: Introduction to the concept of Good Pharmacy Practice and SOPs.	CLO1	03
Chapter 3		
Prescription and prescription handling: Definition, parts of prescriptions, legality of prescriptions, prescription handling, labelling of dispensed medications (Main label, ancillary label, pictograms), brief instructions on medication usage, Dispensing process, Good Dispensing Practices, dispensing errors and strategies to minimize them	CLO2	07
Chapter 4		
Communication skills: Definition, types of communication skills, Interactions with professionals and patients, Verbal communication skills (one-to-one, over the telephone), Written communication skills, Body language, Patient interview techniques	CLO3	06
Chapter 5		
Patient counselling: Definition and benefits of patient counselling, Stages of patient counselling - Introduction, counselling content, counselling process, and closing the counselling session, Barriers to effective counseling - Types and strategies to overcome the barriers, Patient counselling points for chronic diseases/disorders - Hypertension, Diabetes, Asthma, Tuberculosis, Chronic obstructive pulmonary disease, and AIDS, Patient Package Inserts - Definition, importance and benefits, Scenarios of PPI use in India and other countries, Patient Information leaflets - Definition and uses	CLO4	10
Chapter 6		
Medication Adherence: Definition, factors influencing non- adherence, strategies to overcome non-adherence	CLO4	02
Chapter 7		
Health Screening Services in Community Pharmacy: Introduction, scope, and importance of various health screening services - for routine monitoring of patients, early detection, and referral of undiagnosed cases	CLO4	05
Chapter 8		
Over The Counter (OTC) Medications: Definition, need and role of Pharmacists in OTC medication dispensing, OTC medications in India, counseling for OTC products, Self-medication and role of pharmacists in promoting the safe practices during self-medication, Responding to symptoms, minor ailments, and advice for self-care in conditions such as - Pain management, Cough, Cold, Diarrhea, Constipation, Vomiting, Fever, Sore throat, Skin disorders, Oral health (mouth ulcers, dental pain, gum swelling)	CLO4	15
Chapter 9		
Community Pharmacy Management: Legal requirements to set up a community pharmacy, Site selection requirements, Pharmacy designs and interiors, Vendor selection and ordering. Procurement, inventory control methods, and inventory management, financial planning and management, Accountancy in community pharmacy – Day book, Cash book, Introduction to pharmacy operation	CLO5	25



software's – usefulness and availability, Customer Relation Management (CRM), Audits in Pharmacies, SOP of Pharmacy Management, Introduction to Digital Health, mHealth and Online pharmacies		
Total		75

Learning Resource

Text Reading:

1. Health Education and Community Pharmacy by N.S. Parmar.
2. WHO consultative group report.
3. Drug store and Business management by Mohammed Ali and Jyoti.
4. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical Press
5. Comprehensive Pharmacy Review – Edt. Leon Shargel. Lippincott Williams and Wilkins.
6. Good Pharmacy Practices Training Manual by IPA/CDSCO/WHO India
7. Training Module for Community Pharmacists in TB Care and Control/ by MoH/IPA
8. Hand Book of Pharma Sos, Drugs in Special population- Pregnancy and Lactation, Tobacco free future- Choice is yours: KSPC Publications.

References:

1. Dwivedi MC, Pandey MA, Tiple MS, Lanjhiyana S, Lanjhiyana SK. COMMUNITY PHARMACYZAND MANAGEMENT. JEC PUBLICATION;
2. Jishnu V, Gilhotra RM, Mishra DN. Pharmacy education in India: Strategies for a better future. Journal of Young Pharmacists. 2011 Oct 1;3(4):334-42.
3. Bosse N, Machado M, Mistry A. Efficacy of an over-the-counter intervention follow-up program in community pharmacies. Journal of the American Pharmacists Association. 2012 Jul 1;52(4):535-40.
4. Stoehr GP, Ganguli M, Seaberg EC, Echemen DA, Belle S. Over-the-Counter Medication Use in an Older Rural Community: The Mo VIES Project. Journal of the American Geriatrics Society. 1997 Feb;45(2):158-65.
5. Gast A, Mathes T. Medication adherence influencing factors—an (updated) overview of systematic reviews. Systematic reviews. 2019 Dec; 8:1-7.
6. Maguire P, Pitceathly C. Key communication skills and how to acquire them. Bmj. 2002 Sep 28;325(7366):697-700.

Online resource/ E-learning resource:

1. [Responsible Use of Medicines: A Layman's Handbook. www.ipapharma.org /publications](http://www.ipapharma.org/publications)
2. [Community Pharmacy Practice around the Globe: Part One: www.ipapharma.org /publications](http://www.ipapharma.org/publications)
3. [Over-the-counter\(OTC\)medications:https://www.rxlist.com/over-the-counter_otc_medicines/drugs-condition.htm](https://www.rxlist.com/over-the-counter_otc_medicines/drugs-condition.htm)
4. [Communication skills: https://www.coursera.org/articles/communication-skills](https://www.coursera.org/articles/communication-skills)
5. [Making Online Pharmacies Better With eLearning: Helping Professionals and Customers.](#)



COURSE CURRICULUM

Name of the Program:		D. Pharm		Annual Pattern		Level: Diploma	
Course Name		Community Pharmacy and Management (Practical)		Course Code/ Course Type		ER20-22P	
Course Pattern		2025		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
-	3	-	-	75	20	80	-
Pre-Requisite:		Nil					
Course Objectives (CO):				The objectives of Community Pharmacy and Management are: 1. To expertly manage and complete prescriptions. 2. To counsel patients on illnesses and minor conditions, and to identify drug-drug interactions. 3. To provide patient counselling regarding over-the-counter and prescription medications. 4. To develop counselling resources, including patient information booklets. 5. To carry out routine health examinations.			
Course Learning Outcomes (CLO):				Students would be able to: 1. Demonstrate professional handling and correct prescription filling correctly. 2. Provide appropriate counselling to patients on common illnesses and mild conditions, including the identification of potential drug-drug interactions. 3. Effectively advise patients on the use of prescription and over-the-counter medications. 4. Conduct routine health screenings and interpret basic health indicators. 5. Design and develop patient information leaflets to support counselling and medication adherence.			



Course Contents/Syllabus:

(All the practical's carry equal weightage in Summative Assessment and equal engagement)

Assignment/ Practical/ Activity Number	Assignment/ Practical/Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1: Handling of prescriptions	Week1/ Turn 1	To Review, Handle and Identify the Parts of Prescription	CLO1	03
2	Practical 2: Checking of compliance.	Week 2/ Turn 1	To check the legal compliance and completeness of Prescription.	CLO 1	03
3	Practical 3: Identification of errors.	Week 3/ Turn 1	To Identify the Errors in the given prescription.	CLO1	03
4	Practical 4: Identification of errors.	Week 4 / Turn 1	To Identify the Omission Errors in the given prescription and make necessary correction for ensuring the completeness of the prescription.	CLO1	03
5	Practical 5: Identification of over dose.	Week 5/ Turn 1	To Identify the over dose in the given prescription	CLO 1	03
6	Practical 6: Identification of drug-drug interactions	Week 6 / Turn 1	To Identify and Resolve the Pharmacokinetic drug-drug interactions in the prescription.	CLO 2	03
7	Practical 7: Identification of drug-drug interactions	Week 7 / Turn 1	To identify and Resolve the Pharmacodynamic drug-drug interactions in the prescription	CLO 2	03
8	Practical 8: Preparation of dispensing labels and auxiliary labels	Week 8 / Turn 1	To prepare dispensing and auxiliary labels for the prescribed solid dosage form.	CLO 3	03
9	Practical 9: Preparation of dispensing labels and auxiliary labels	Week 9 / Turn 1	To prepare dispensing and auxiliary labels for the prescribed monophasic liquid dosage form.	CLO 3	03
10	Practical 10: Preparation of dispensing labels and auxiliary labels	Week 10 / Turn 1	To prepare dispensing and auxiliary labels for the prescribed biphasic liquid dosage form.	CLO 3	03
11	Practical 11: Preparation of dispensing labels and auxiliary labels	Week 11 / Turn 1	To prepare dispensing and auxiliary labels for the prescribed semisolid dosage form.	CLO 3	03
12	Practical 12: Preparation of dispensing labels and auxiliary labels	Week 12 / Turn 1	To prepare dispensing and auxiliary labels for the prescribed suppositories.	CLO 3	03
13	Practical 13: Blood Pressure Recording	Week 13 / Turn 1	To determine blood pressure by using sphygmomanometer	CLO 4	03
14	Practical 14: Capillary Blood Glucose Monitoring	Week 14 / Turn 1	To determine the capillary blood glucose level by using glucometer.	CLO 4	03
15	Practical 15: Lung function assessment	Week 15 / Turn 1	To measure the peak expiratory Flow rate using peak flow meter and maximum value of air inhaled using Incentive Spirometer.	CLO 4	03
16	Practical 16: recording	Week 16 /	To measure the capillary oxygen	CLO 4	03



	capillary oxygen level	Turn 1	level using pulse oximeter.		
17	Practical 17: BMI measurement	Week 17 / Turn 1	To determine the body mass index (BMI) of subject and interpret the body weight status.	CLO 4	03
18	Practical 18: management of Diabetes Mellitus	Week 18 / Turn 1	To counsel the simulated patient for the management of Diabetes Mellitus (Type2).	CLO 5	03
19	Practical 19: management of Primary Hypertension	Week 19 / Turn 1	To counsel the simulated patient for the management of Primary Hypertension.	CLO 5	03
20	Practical 20: management of Asthma	Week 20 / Turn 1	To counsel the simulated patient for the management of Asthma.	CLO 5	03
21	Practical 21: management of Hyperlipidemia	Week 21 / Turn 1	To counsel the simulated patient for the management of Hyperlipidemia.	CLO 5	03
22	Practical 22: Management of Rheumatoid Arthritis	Week 22 / Turn 1	To counsel the simulated patient for the management of Rheumatoid Arthritis.	CLO 5	03
23	Practical 23: Management of Minor Ailments	Week 23 / Turn 1	To counsel the simulated patient for the management of Minor Ailments.	CLO 5	03
24	Practical 24: Handling of dummy dosage forms	Week 24 / Turn 1	To demonstrate the handling and administration techniques for various dosage forms.	CLO 2	03
25	Practical 25: Use of Community Pharmacy Software and digital health tools	Week 25 / Turn 1	To introduce with Community Pharmacy Software and Digital Health Tools.	CLO 2	03
	Total				75

Learning Resource

Text Reading:

1. A textbook of Community Pharmacy and Management y Dr. Ashok Hajare.
2. Dispensing Pharmacy by R. M. Mehta.
3. A textbook of Pharmaceutics II by R. M. Mehta.

References:

1. Good Pharmacy Practices Training Manual by IPA/CDSCO/WHO India
2. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical Press
3. Hand Book of PharmaSoS, Drugs in Special population- Pregnancy and Lactation, Tobacco free future- Choice is yours: KSPC Publications.

Online resource/ E-learning resource:

1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2723200/>
2. <https://www.healthline.com/health/drug-overdose#risk-factors>
3. <https://journals.lww.com/journaladdictionmedicine>
4. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3897029/>
5. <https://www.mayoclinic.org/diseases-conditions/type-2-diabetes/symptoms-causes/syc-20351193>
6. <https://my.clevelandclinic.org/health/diseases/21656-hyperlipidemia>



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. SOPs for various activities in Community Pharmacy (as discussed in Theory and Practical)
2. List out the various abbreviations, short forms used in prescriptions and their interpretation
3. Patient Information Leaflet for a given chronic disease / disorder
4. Patient Information Leaflet for prescription / non-prescription drugs
5. Preparation of window / shelf display materials for the model community pharmacy
6. Software available for retail pharmacy management including billing, inventory, etc.
7. Dosage / Medication Reminder Aids
8. Overview on the operations and marketing strategies of various online pharmacies
9. Overview on the common fixed dose combinations
10. Overview on the medications require special storage conditions
11. Roles of Community Pharmacists in preventing Antimicrobial Resistance
12. Jan Aushadhi and other Generic Medicine initiatives in India
13. Overview of various professional associations of Pharmacy / Pharmacists in India
14. Community Pharmacy Practice Standards: Global Vs. Indian Scenario
15. Overview on Pharma Marketing

Field Visit:

The students shall be taken in groups to visit community pharmacies (both retail and wholesale) to understand and witness the professional activities of the community pharmacists. Individual reports from each student on their learning experience from the field visit shall be submitted.



COURSE CURRICULUM

Name of the Program:		D. Pharm		Annual Pattern		Level: Diploma	
Course Name		Biochemistry & Clinical Pathology (Theory)		Course Code/ Course Type		ER20-23T	
Course Pattern		2025		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	-	1	-	75	20	80	-
Pre-Requisite:		Nil					
Course Objectives (CO):					The objectives of Biochemistry & Clinical Pathology are: 1. To provide an understanding of the fundamental concepts of biochemistry and its scope in pharmacy. 2. To explain the structure, classification, chemical properties, and biological roles of carbohydrates, proteins, lipids, and nucleic acids. 3. To describe the functions and mechanisms of enzymes, vitamins, and their role in metabolism. 4. To explore the importance of minerals, water, electrolytes, and their balance in the human body. 5. To introduce key concepts in biotechnology, organ function tests, and pathological analysis of blood and urine.		
Course Learning Outcomes (CLO):					Students would be able to: 1. Explain the scope of biochemistry in pharmacy and the biochemical organization of cells. 2. Describe the classification, structure, properties, and biological roles of carbohydrates, proteins, lipids, and nucleic acids. 3. Analyze enzyme mechanisms, enzyme inhibitors, vitamins, and their role in biochemical reactions and metabolism. 4. Gain the knowledge of the functions, dietary requirements, and clinical significance of minerals, water, and electrolytes. 5. Elucidate the biochemical diagnostic tests related to organ function and pathology, including kidney, liver, lipid profile, and blood/urine tests.		



Course Contents/Syllabus:

(All the units carry equal weightage in Summative Assessment and equal engagement)

Topic	CLO	Hours
Chapter 1		
Introduction to biochemistry: Scope of biochemistry in pharmacy; Cell and its biochemical organization.	CLO1	02
Chapter 2		
Carbohydrates • Definition, classification with examples, chemical properties • Monosaccharides - Structure of glucose, fructose and galactose • Disaccharides - structure of maltose, lactose and sucrose • Polysaccharides - chemical nature of starch and glycogen • Qualitative tests and biological role of carbohydrates	CLO2	05
Chapter 3		
Proteins • Definition, classification of proteins based on composition and solubility with examples • Definition, classification of amino acids based on chemical nature and nutritional requirements with examples • Structure of proteins (four levels of organization of protein structure) • Qualitative tests and biological role of proteins and amino acids • Diseases related to malnutrition of proteins	CLO2	05
Chapter 4		
Lipids • Definition, classification with examples • Structure and properties of triglycerides (oils and fats) • Fatty acid classification - Based on chemical and nutritional requirements with examples • Structure and functions of cholesterol in the body • Lipoproteins - types, composition and functions in the body • Qualitative tests and functions of lipids	CLO2	05
Chapter 5		
Nucleic acids • Definition, purine and pyrimidine bases • Components of nucleosides and nucleotides with examples • Structure of DNA (Watson and Crick model), RNA and their functions	CLO2	04
Chapter 6		
Enzymes • Definition, properties and IUB and MB classification • Factors affecting enzyme activity • Mechanism of action of enzymes, Enzyme inhibitors • Therapeutic and pharmaceutical importance of enzymes	CLO3	05
Chapter 7		
Vitamins • Definition and classification with examples • Sources, chemical nature, functions, coenzyme form, recommended dietary requirements, deficiency diseases of fat-and water-soluble vitamins	CLO3	06



Chapter 8		
Metabolism (Study of cycle/pathways without chemical structures) • Metabolism of Carbohydrates: Glycolysis, TCA cycle and glycogen metabolism, regulation of blood glucose level. Diseases related to abnormal metabolism of Carbohydrates • Metabolism of lipids: Lipolysis, β-oxidation of Fatty acid (Palmitic acid) ketogenesis and ketolysis. Diseases related to abnormal metabolism of lipids such as Ketoacidosis, Fatty liver, Hypercholesterolemia • Metabolism of Amino acids (Proteins): General reactions of amino acids and its significance– Transamination, deamination, Urea cycle and decarboxylation. Diseases related to abnormal metabolism of amino acids, Disorders of ammonia metabolism, phenylketonuria, alkaptonuria and Jaundice. • Biological oxidation: Electron transport chain and Oxidative phosphorylation	CLO3	20
Chapter 9		
Minerals: Functions, Deficiency diseases, recommended dietary requirements of calcium, phosphorus, iron, sodium and chloride	CLO4	05
Chapter 10		
Water and Electrolytes • Distribution, functions of water in the body • Water turnover and balance • Electrolyte composition of the body fluids, Dietary intake of electrolyte and Electrolyte balance • Dehydration, causes of dehydration and oral rehydration therapy	CLO4	05
Chapter 11		
Introduction to Biotechnology	CLO5	01
Chapter 12		
Organ function tests • Functions of kidney and routinely performed tests to assess the functions of kidney and their clinical significances • Functions of liver and routinely performed tests to assess the functions of liver and their clinical significances • Lipid profile tests and its clinical significances	CLO5	06
Chapter 13		
Introduction to Pathology of Blood and Urine • Lymphocytes and Platelets, their role in health and disease • Erythrocytes - Abnormal cells and their significance • Normal and Abnormal constituents of Urine and their significance	CLO5	06
Total		75



Learning Resource

Text Reading:

1. 1 Essentials of Biochemistry by U. Satyanarayana, Books and Allied (P) Ltd.
2. A Textbook of Biochemistry by A.V.S.S. Rama Rao, UBS Publishers' Distributors Pvt. Ltd.
3. Practical Biochemistry by R.C. Gupta and S. Bhargava.
4. Laboratory manual of Biochemistry by Pattabiraman and Sitaram Acharya

References:

1. Bennett, T. P., and Frieden, E.: Modern Topics in Biochemistry, pg. 43-45, Macmillan, London (1969).
2. Holum, J.: Elements of General and Biological Chemistry, 2nd ed., 377, Wiley, NY (1968).
3. Martinek, R.: Practical Clinical Enzymology: J. Am. Med. Tech., 31, 162 (1969).
4. Harrow, B., and Mazur, A.: Textbook of Biochemistry, 109, Saunders, Philadelphia (1958).
5. Pfeiffer, J.: Enzymes, the Physics and Chemistry of Life, pg 171-173, Simon and Schuster, NY (1954)

Online resource/ E-learning resource

1. <https://onlinelibrary.wiley.com/journal/9353>
2. <http://aulanni.lecture.ub.ac.id/files/2012/01/15616949-Lehninger-Principles-of-Biochemistry-1-copy.pdf>
3. <https://www.ncbi.nlm.nih.gov/books/NBK234935/>
4. <https://www.medicalnewstoday.com/articles/161547>
5. <https://www.britannica.com/science/protein>
6. <https://www.ncbi.nlm.nih.gov/books/NBK218759/>
7. <https://www.medicalnewstoday.com/articles/319704>



COURSE CURRICULUM

Name of the Program:		D. Pharm		Annual Pattern		Level: Diploma	
Course Name		Biochemistry & Clinical Pathology (Practical)		Course Code/ Course Type		ER20-23P	
Course Pattern		2025		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
-	2	-	-	50	20	80	-
Pre-Requisite:		Nil					
Course Objectives (CO):					The objectives of Biochemistry & Clinical Pathology are: 1. To introduce fundamental concepts and techniques in biochemistry and clinical pathology laboratories. 2. To perform qualitative analysis of biomolecules, including carbohydrates, proteins, amino acids, lipids, and cholesterol. 3. To analyze normal and abnormal constituents of urine using qualitative biochemical tests. 4. To estimate biochemical parameters such as glucose, creatinine, cholesterol, calcium, and urea in urine and blood samples. 5. To demonstrate enzymatic hydrolysis of starch and understand its biochemical significance.		
Course Learning Outcomes (CLO):					Students would be able to: 1. Explain the basic principles and importance of biochemistry and clinical pathology laboratory techniques. 2. Perform qualitative tests to identify and differentiate carbohydrates, proteins, amino acids, lipids, and cholesterol. 3. Analyze and interpret results from qualitative urine tests to detect normal and abnormal constituents. 4. Estimate biochemical parameters in urine and blood samples and assess their clinical significance. 5. Demonstrate the process of starch hydrolysis and explain its enzymatic role in digestion.		



Course Contents/Syllabus:

(All the Practical's carry equal weightage in Summative Assessment and equal engagement)

Assignment / Practical/ Activity number	Assignment / Practical/ Activity number Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1: Introduction to Biochemistry and Clinical Pathology Laboratory	Week1	Introduction to Biochemistry and Clinical Pathology Laboratory	CLO1	02
2	Practical 2: Qualitative analysis of carbohydrate	Week 2/ Turn 1	Qualitative analysis of carbohydrate (C1)	CLO2	02
3	Practical 3: Qualitative analysis of carbohydrate	Week 3/ Turn 1	Qualitative analysis of carbohydrate (C2)	CLO2	02
4	Practical 4: Qualitative analysis of carbohydrate	Week 4/ Turn 1	Qualitative analysis of carbohydrate (C3)	CLO2	02
5	Practical 5: Qualitative analysis of carbohydrate	Week 5/ Turn 1	Qualitative analysis of carbohydrate (C4)	CLO2	02
6	Practical 6: Qualitative analysis of carbohydrate	Week 6/ Turn 1	Qualitative analysis of carbohydrate (C5)	CLO2	02
7	Practical 7: Qualitative analysis of protein	Week 7/ Turn 1	Qualitative analysis of protein (P1)	CLO2	02
8	Practical 8: Qualitative analysis of protein	Week 8/ Turn 1	Qualitative analysis of protein (P2)	CLO2	02
9	Practical 9: Qualitative analysis of a sample containing amino acid	Week 9/ Turn 1	Qualitative analysis of a sample containing amino acid (AA1)	CLO2	02
10	Practical 10: Qualitative analysis of a sample containing amino acid	Week 10 /Turn 1	Qualitative analysis of a sample containing amino acid (AA2)	CLO2	02
11	Practical 11: Qualitative analysis of lipid	Week 11 /Turn 1	Qualitative analysis of lipid	CLO2	02
12	Practical 12: Identification tests of cholesterol	Week 12 /Turn 1	Identification tests of cholesterol	CLO2	02
13	Practical 13: Qualitative analysis of urine sample for normal constituents	Week 13 /Turn 1	Qualitative analysis of urine sample for normal constituents (UN1)	CLO3	02



14	Practical 14: Qualitative analysis of urine sample for normal constituents	Week 14 /Turn 1	Qualitative analysis of urine sample for normal constituents (UN2)	CLO3	02
15	Practical 15: Qualitative analysis of urine sample for abnormal constituents	Week 15 /Turn 1	Qualitative analysis of urine sample for abnormal constituents (UA1)	CLO3	02
16	Practical 6: Qualitative analysis of urine sample for abnormal constituents	Week 16 /Turn 2	Qualitative analysis of urine sample for abnormal constituents (UA2)	CLO3	02
17	Practical 17: Qualitative analysis of urine sample for abnormal constituents	Week 17 /Turn 3	Qualitative analysis of urine sample for abnormal constituents (UA3)	CLO3	02
18	Practical 18: Estimation of glucose in urine sample	Week 18 /Turn 1	Estimation of glucose in urine sample	CLO4	02
19	Practical 19: Estimation of creatinine in urine sample	Week 19 /Turn 1	Estimation of creatinine in urine sample	CLO4	02
20	Practical 20: Estimation of creatinine in human blood	Week 20 /Turn 1	Estimation of creatinine in human blood	CLO4	02
21	Practical 21: Estimation of glucose in human blood	Week 21 /Turn 1	Estimation of glucose in human blood	CLO4	02
22	Practical 22: Estimation of cholesterol in human blood	Week 22 /Turn 1	Estimation of cholesterol in human blood	CLO4	02
23	Practical 23: Estimation of calcium in human blood	Week 23 /Turn 1	Estimation of calcium in human blood	CLO4	02
24	Practical 24: Estimation of urea in human blood	Week 24 /Turn 1	Estimation of urea in human blood	CLO4	02
25	Practical 25: Hydrolysis of starch	Week 25 /Turn 1	Hydrolysis of starch	CLO5	02



Learning Resource

Text Reading:

1. Essentials of Biochemistry by U. Satyanarayana, Books and Allied (P) Ltd.
2. A Textbook of Biochemistry by A.V.S.S. Rama Rao, UBS Publishers' Distributors Pvt. Ltd.
3. Practical Biochemistry by R.C. Gupta and S. Bhargava.
4. Laboratory manual of Biochemistry by Pattabiraman and Sitaram Acharya
5. Biochemistry and Clinical Pathology Practical Notebook for Second Year Diploma in Pharmacy 2ed. [Paperback] Varun Dutt Sharma and S.K

References:

1. Bennett, T. P., and Frieden, E.: Modern Topics in Biochemistry, pg. 43-45, Macmillan, London (1969).
2. Holum, J.: Elements of General and Biological Chemistry, 2nd ed., 377, Wiley, NY (1968).
3. Martinek, R.: Practical Clinical Enzymology: J. Am. Med. Tech., 31, 162 (1969).
4. Harrow, B., and Mazur, A.: Textbook of Biochemistry, 109, Saunders, Philadelphia (1958).
5. Pfeiffer, J.: Enzymes, the Physics and Chemistry of Life, pg 171-173, Simon and Schuster, NY (1954)

Online resource/ E-learning resource:

1. <https://onlinelibrary.wiley.com/journal/9353>
2. <http://aulanni.lecture.ub.ac.id/files/2012/01/15616949-Lehninger-Principles-of-Biochemistry-1-copy.pdf>
3. <https://www.slideshare.net/slideshow/biochemistry-biochemistry-and-clinical-pathology-notes/75469172>
4. https://14.139.61.83/BioChemicalEstimations/qualitativetests_carbohydrates.tn
5. <https://amrita.olabs.edu.in/?brch=8&cnt=1&sim=140&sub=73>
6. <https://www.egyankosh.ac.in/bitstream/123456789/68528/1/Experiment-6.pdf>
7. [https://bio.libretexts.org/Bookshelves/Microbiology/Microbiology_Laboratory_Manual_\(Hartline\)/01%3A_Labs/1.17%3A_Starch_Hydrolysis](https://bio.libretexts.org/Bookshelves/Microbiology/Microbiology_Laboratory_Manual_(Hartline)/01%3A_Labs/1.17%3A_Starch_Hydrolysis)

Assignments:

The students shall be asked to submit written assignments on Various Pathology Lab Reports (One assignment per student per sessional period. i.e., a minimum of three assignments per student)



COURSE CURRICULUM

Name of the Program:		D. Pharm		Annual Pattern		Level: Diploma	
Course Name		Pharmacotherapeutics (Theory)		Course Code/ Course Type		ER20-24T	
Course Pattern		2024		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credit	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	-	1	-	75	20	80	-
Pre-Requisite:					Nil		
Course Objectives (CO):					The objectives of Pharmacotherapeutics are: 1. To explain the fundamentals of pharmacotherapeutics, including its scope, rational use of medicines, evidence-based medicine, and standard treatment guidelines. 2. To describe the pathophysiology and therapeutic management of cardiovascular, respiratory, endocrine, and central nervous system disorders. 3. To discuss the pharmacological and non-pharmacological management of gastrointestinal, hematological, and infectious diseases. 4. To analyze and design therapeutic care plans for musculoskeletal, dermatological, psychiatric, and ophthalmological disorders. 5. To explain antimicrobial resistance and women’s health conditions, and apply therapeutic knowledge in clinical decision-making.		
Course Learning Outcomes (CLO):					Students would be able to: 1. Define pharmacotherapeutics, rational use of medicines, evidence-based medicine, essential medicines list, and standard treatment guidelines. 2. Explain the etiopathogenesis, clinical manifestations, and pharmacological and non-pharmacological management of cardiovascular, respiratory, endocrine, and CNS disorders. 3. Describe and counsel on the management of gastrointestinal, hematological, and infectious diseases, including lifestyle modification and monitoring. 4. Plan and design individualized therapeutic interventions for musculoskeletal, dermatological, psychiatric, and ophthalmological disorders. 5. Discuss antimicrobial resistance and women's health conditions and integrate them into patient counselling and rational pharmacotherapy.		



Course Contents/Syllabus:

(All the units carry equal weightage in Summative Assessment and equal engagement)

Topic	CLO	Hours
Chapter 1		
Pharmacotherapeutics – Introduction, scope and objectives. Rational use of Medicines, Evidence Based Medicine, Essential Medicines List, Standard Treatment Guidelines (STGs)	CLO 1	10
Chapter 2		
Definition, etiopathogenesis, clinical manifestations, non-pharmacological and pharmacological management of the diseases associated with, (a) Cardiovascular System - Hypertension - Angina and Myocardial infarction - Hyperlipidaemia - Congestive Heart Failure	CLO 2	08
(b) Respiratory System - Asthma - COPD	CLO 2	04
(c) Endocrine System - Diabetes - Thyroid disorders- Hypo and Hyperthyroidism	CLO 2	05
(d) Central Nervous System - Epilepsy - Parkinson's disease - Alzheimer's disease - Stroke - Migraine	CLO 2	08
(e) Gastro Intestinal Disorders - Gastro oesophageal reflux disease - Peptic Ulcer Disease - Alcoholic liver disease - Inflammatory Bowel Diseases (Crohn's Disease and Ulcerative Colitis)	CLO 3	08
(f) Haematological disorders - Iron deficiency anaemia - Megaloblastic anaemia	CLO 3	04
(g) Infectious diseases - Tuberculosis - Pneumonia - Urinary tract infections - Hepatitis - Gonorrhoea and Syphilis - Malaria - HIV and Opportunistic infections - Viral Infections (SARS, CoV2)	CLO 3	12
(h) Musculoskeletal disorders - Rheumatoid arthritis - Osteoarthritis	CLO 4	03



(i) Dermatology • Psoriasis • Scabies • Eczema	CLO 5	03
(j) Psychiatric Disorders • Depression • Anxiety • Psychosis	CLO 5	04
(k) Ophthalmology • Conjunctivitis (bacterial and viral) • Glaucoma	CLO 5	02
(l) Anti-microbial Resistance	CLO 5	02
(m) Women's Health • Polycystic Ovary Syndrome • Dysmenorrhea • Premenstrual Syndrome	CLO 5	04
Total		75

Learning Resource:

Text Reading:

1. Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone Publication
2. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
3. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA Lippincott, Williams and Wilkins Publication.
4. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton and Lange Publication.
5. National Formulary of India, Indian Pharmacopoeia Commission, Ghaziabad.

References:

1. World Health Organization. The influence of varicocele on parameters of fertility in a large group of men presenting to infertility clinics. *Fertil Steril* 1992; 57(6): 1289–1293. doi: 10.1016/S0015-0282(16)55089-4, PMID 1601152.
2. Silber S. The varicocele argument resurfaces. *J Assist Reprod Genet* 2018; 35(6): 1079–1082. doi: 10.1007/s10815-018-1160-2, PMID 29589295.
3. Hafeez M, Ahmed A, Usmanhane K, et al. Clinical evaluation of herbal medicine for oligospermia. *Pak J Nutr* 2011; 10(3): 238–240. doi: 10.3923/pjn.2011.238.240

Online resource/ E-learning resource:

1. National Rural Health Scheme: <https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=969&lid=49>
2. National Urban Health Scheme: <https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=970&lid=137>
3. Health Impact Assessment: <https://www.who.int/hia/about/faq/en/>
4. http://www.euro.who.int/_data/assets/pdf_file/0011/261929/Health-inImpact-Assessments-final-version.pdf?ua=1
5. <https://fdspharmacy.in/pharmacotherapeutics-notes/>



COURSE CURRICULUM

Name of the Program:		D. PHARM		Annual Pattern		Level: Diploma	
Course Name		Pharmacotherapeutics (Practical)		Course Code/ Course Type		ER20-24P	
Course Pattern		2024		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
-	1	-	-	25	20	80	-
Pre-Requisite:					Nil		
Course Objectives (CO):				The objective of Pharmacotherapeutics is: 1. How to prepare a SOAP (Subjective, Objective, Assessment and Plan) note for clinical cases of selected common diseases 2. Patient counselling techniques/methods for common disease conditions 3. What is the life-style modifications and monitoring parameters. 4. Etiopathogenesis of selected common diseases and evidence-based medicine therapy 5. Importance of individualized therapeutic plans based on diagnosis.			
Course Learning Outcomes (CLO):				Students would be able to: 1. Write the SOAP (Subjective, Objective, Assessment and Plan) notes for the given clinical cases of selected common diseases 2. Counsel the patients about the disease conditions, uses of drugs, methods of handling and administration of drugs, life-style modifications and monitoring parameters 3. Participate in planning the rational medicine therapy for common diseases 4. Design and deliver discharge counselling for patients, 5. life-style modifications and monitoring parameters.			



Course Contents/Syllabus:

(All the units carry equal weightage in Summative Assessment and equal engagement)

Assignment/ Practical/ Activity Number	Assignment/Practical/ Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1: Prepare and Discuss SOAP	Week 1/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for Hypertension. (real / hypothetical)	CLO1	03
2	Practical 2: Prepare and Discuss SOAP	Week 2/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for Angina Pectoris (real / hypothetical)	CLO1	03
3	Practical 3: Prepare and Discuss SOAP	Week 3/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for Myocardial Infarction (real / hypothetical)	CLO1	03
4	Practical 4: Prepare and Discuss SOAP	Week 4/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for Hyperlipidemia (real/ hypothetical)	CLO1	03
5	Practical 5: Prepare and Discuss SOAP	Week 5/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for Rheumatoid Arthritis (real / hypothetical)	CLO1	03
6	Practical 6: Prepare and Discuss SOAP	Week 6/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for Asthma	CLO1	03
7	Practical 7: Prepare and Discuss SOAP	Week 7/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for COPD	CLO2	03
8	Practical 8: Prepare and Discuss SOAP	Week 8/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for Diabetes Mellitus	CLO2	03
9	Practical 9: Prepare and Discuss SOAP	Week 9/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for Epilepsy	CLO2	03
10	Practical 10: Prepare and Discuss SOAP	Week 10/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for Stroke	CLO2	03
11	Practical 11: Prepare and Discuss SOAP	Week 11/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for Depression	CLO2	03
12	Practical 12: Prepare and Discuss SOAP	Week 12/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for Tuberculosis	CLO2	03
13	Practical 13: Prepare and Discuss SOAP	Week 13/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for Iron Deficiency Anemia	CLO2	03
14	Practical 14: Prepare and Discuss SOAP	Week 14/Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for COVID-19	CLO3	03



15	Practical 15: Prepare and Discuss SOAP	Week 15/ Turn 1	To Prepare and Discuss notes on Subjective, Objective, Assessment and Plan for Psoriasis	CLO3	03
16	Practical 16: counselling to Patient	Week 16/ Turn 1	To Provide Counselling to Patient on Hypertension Disease Condition, Medications, Life-Style Modifications, Monitoring Parameters	CLO3	03
17	Practical 17: counselling to Patient	Week 17/ Turn 1	To Provide Counselling to Patient on Diabetes Disease Condition, Medications, Life-Style Modifications, Monitoring Parameters	CLO4	03
18	Practical 18: counselling to Patient	Week 18/ Turn 1	To Provide Counselling to Patient on Asthma Disease Condition, Medications, Life-Style Modifications, Monitoring Parameters	CLO4	03
19	Practical 19: counselling to Patient	Week 19/ Turn 1	To Provide Counselling to Patient on Tuberculosis Disease Condition, Medications, Life-Style Modifications, Monitoring Parameters	CLO4	03
20	Practical 20: counselling to Patient	Week 20/ Turn 1	To Provide Counselling to Patient on AIDS Disease Condition, Medications, Life-Style Modifications, Monitoring Parameters	CLO4	03
21	Practical 21: Calculation of dose in paediatrics	Week 21/ Turn 1	To calculate dose in pediatrics and under various pathological conditions	CLO4	03
22	Practical 22: Calculation of dose in paediatrics	Week 22/ Turn 1	To calculate dose in pediatrics and under various pathological conditions	CLO5	03
23	Practical 23: Calculation of dose in geriatrics	Week 23/ Turn 1	To calculate dose in geriatrics and under various pathological conditions	CLO5	03
24	Practical 24: Calculation of dose in patients	Week 24/ Turn 1	To calculate dose in patients with Impaired Renal Functions	CLO5	03
25	Practical 25: Calculation of dose in patients	Week 25/ Turn 1	To calculate dose in patients with Hepatic Dysfunction.	CLO5	03
	Total				75



Learning resources:

Reference Books:

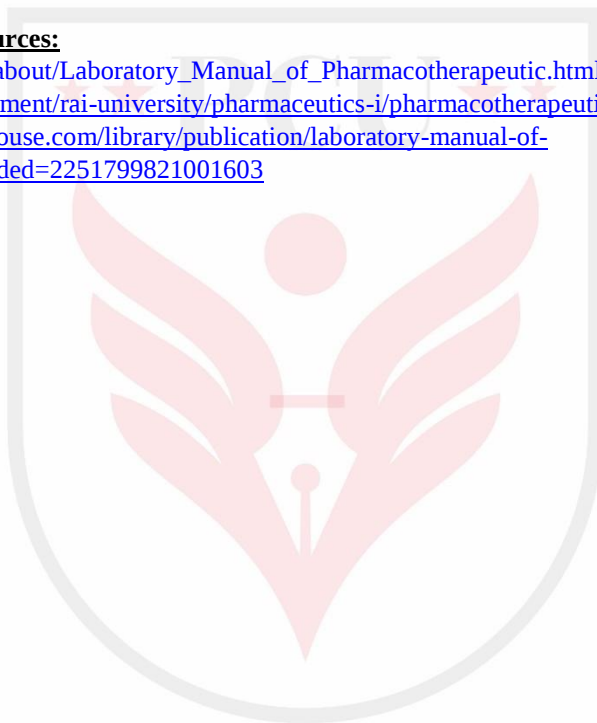
1. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA Lippincott, Williams and Wilkins Publication.
2. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton and Lange Publication.
3. National Formulary of India, Indian Pharmacopoeia Commission, Ghaziabad.

Practical Text Book :

1. A Practical Manual of Pharmacotherapeutics, Evincepub Publishing
2. Laboratory Manual of Pharmacotherapeutics, Trinity Publications.
3. A Practical Manual of Pharmacotherapeutics, by Nirali Publications.
4. Pharmacotherapeutics for advance practice.

Online Resources/E-Learning Resources:

1. https://books.google.co.in/books/about/Laboratory_Manual_of_Pharmacotherapeutic.html?id=BzHaEAAAQBAJ&redir_esc=y
2. <https://www.studocu.com/in/document/rai-university/pharmaceutics-i/pharmacotherapeutics/67625499>
3. <https://ebooks.everestpublishinghouse.com/library/publication/laboratory-manual-of-pharmacotherapeutics?recommended=2251799821001603>





COURSE CURRICULUM

Name of the Program:		D. Pharm			Annual Pattern		Level: Diploma	
Course Name		Hospital and Clinical Pharmacy (Theory)			Course Code/ Course Type		ER20-24T	
Course Pattern		2024			Version		1.0	
Teaching Scheme					Assessment Scheme			
Theory	Practical	Tutorial	Total Credit	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral	
3	-	1	-	75	20	80	-	
Pre-Requisite: Nil								
Course Objectives (CO):					The objectives of Hospital and Clinical Pharmacy are: 1. To explain the organization, structure, functions and standards of hospital pharmacy, committees, and hospital formulary development. 2. To manage procurement, supply chain, inventory control, storage, and distribution of medicines and medical supplies in hospital settings. 3. To understand and apply hospital-based compounding practices, handling of radiopharmaceuticals, and computerized hospital pharmacy operations. 4. To assist in clinical pharmacy services through ward rounds, treatment chart reviews, patient counselling, medication therapy management, and interprofessional collaboration. 5. To interpret clinical laboratory reports, understand poisoning management, pharmacovigilance practices, drug interactions, and strategies to minimize medication errors.			
Course Learning Outcomes (CLO):					Students would be able to: 1. Describe the organization, structure, professional responsibilities, committees, hospital formulary, and pharmacy standards in hospitals. 2. Manage drug procurement, supply chain, inventory techniques, storage, distribution systems, and documentation processes. 3. Explain and perform hospital-based compounding, IV admixtures, radiopharmaceutical handling, and computerized pharmacy practices. 4. Assist in providing clinical pharmacy services, participate in ward rounds, ADR monitoring, patient counseling, and medication therapy management. 5. Interpret laboratory investigation reports, manage poisoning, understand pharmacovigilance, and apply strategies to minimize medication errors and drug interactions.			



Course Contents/Syllabus:

(All the Chapters carry equal weightage in Summative Assessment and equal engagement)

Topic	CLO	Hours
Chapter 1		
Hospital Pharmacy - Definition, scope, national and international scenario - Organisational structure - Professional responsibilities, Qualification and experience requirements, job specifications, work load requirements and inter professional relation Practice (GPP) in hospital - Hospital Pharmacy Standards (FIP Basel Statements, AHSP) - Introduction to NABH Accreditation and Role of Pharmacists	CLO1	06
Chapter 2		
Different Committees in the Hospital - Pharmacy and Therapeutics Committee - Objectives, Composition, and functions - Hospital Formulary - Definition, procedure for development and use of hospital formulary - Infection Control Committee – Role of Pharmacist in preventing Antimicrobial Resistance	CLO1	04
Chapter 3		
Supply Chain and Inventory Control - Preparation of Drug lists - High Risk drugs, Emergency drugs, Schedule H1 drugs, NDPS drugs, reserved antibiotics - Procedures of Drug Purchases – Drug selection, short term, long term and tender/e-tender process, quotations, etc. - Inventory control techniques: Economic Order Quantity, Reorder Quantity Level, Inventory Turnover etc. - Inventory Management of Central Drug Store – Storage conditions, Methods of storage, Distribution, Maintaining Cold Chain, Devices used for cold storage (Refrigerator, ILR, Walk-in-Cold rooms) - FEFO, FIFO methods - Expiry drug removal and their disposal methods e.g., Narcotics - Documentation - purchase and inventory	CLO2	14
Chapter 4		
Drug distribution - Drug distribution (in- patients and out - patients) – Definition, advantages and disadvantages of individual prescription order method, Floor Stock Method, Chapter Dose Drug Distribution Method, Drug Basket Method. - Distribution of drugs to ICCU/ICU/NICU/Emergency wards. - Automated drug dispensing systems and devices - Distribution of Narcotic and Psychotropic substances and their storage	CLO2	07
Chapter 5		
Compounding in Hospitals. Bulk compounding, IV admixture services and incompatibilities, Total parenteral nutrition	CLO3	04
Chapter 6		
Radio Pharmaceuticals Storage, dispensing and disposal of radiopharmaceuticals.	CLO3	02



Chapter 7		
Application of computers in Hospital Pharmacy Practice, Electronic health records, Software used in hospital pharmacy.	CLO3	02
Chapter 8		
Clinical Pharmacy: Definition, scope and development - in India and other countries Technical definitions, common terminologies used in clinical settings and their significance such as Paediatrics, Geriatric, Anti-natal Care, Post-natal Care, etc. Daily activities of clinical pharmacists: Definition, goal and procedure of - Ward round participation - Treatment Chart Review - Adverse drug reaction monitoring - Drug information and poisons information - Medication history - Patient counselling - Inter-professional collaboration Pharmaceutical care: Definition, classification of drug related problems. Principles and procedure to provide pharmaceutical care Medication Therapy Management, Home Medication Review	CLO4	12
Chapter 9		
Clinical laboratory tests used in the evaluation of disease states - significance and interpretation of test results - Haematological, Liver function, Renal function, thyroid function tests - Tests associated with cardiac disorders - Pulmonary Function Tests	CLO5	10
Chapter 10		
Poisoning: Types of poisoning: Clinical manifestations and Antidotes Drugs and Poison Information Centre and their services – Definition, Requirements, Information resources with examples, and their advantages and disadvantages	CLO5	06
Chapter 11		
Pharmacovigilance - Definition, aim and scope - Overview of Pharmacovigilance	CLO5	02
Chapter 12		
Medication errors: Definition, types, consequences, and strategies to minimize medication errors, LASA drugs and Tallman lettering as per ISMP Drug Interactions: Definition, types, clinical significance of drug interactions	CLO5	06
Total		75



Learning Resource:

Text Reading:

1. A comprehensive practical manual of hospital and clinical pharmacy, kripa drishti publication.
2. Textbook of Hospital and Clinical Pharmacy, Prime Publishing House
3. Hospital and Clinical Pharmacy by Thakur publication PVT. Ltd.
4. Hospital and Clinical Pharmacy by V. N Raje

References:

1. World Health Organization. The influence of varicocele on parameters of fertility in a large group of men presenting to infertility clinics. *Fertil Steril* 1992; 57(6): 1289–1293. doi: 10.1016/S0015-0282(16)55089-4, PMID 1601152.
2. Silber S. The varicocele argument resurfaces. *J Assist Reprod Genet* 2018; 35(6): 1079–1082. doi: 10.1007/s10815-018-1160-2, PMID 29589295.
3. Hafeez M, Ahmed A, Usmanghani K, et al. Clinical evaluation of herbal medicine for oligospermia. *Pak J Nutr* 2011; 10(3): 238–240. doi: 10.3923/pjn.2011.238.240

Online resource/ E-learning resource:

1. <https://pharmanotes.org/2022/01/hospital-and-clinical-pharmacy-d-pharma-2nd-year-notes/>
2. <https://fdspharmacy.in/hospital-and-clinical-pharmacy-notes/>
3. <https://pharmalibrary.in/d-pharma/2nd-year/hospital-and-clinical-pharmacy/>
4. https://books.google.co.in/books?id=kRS5sLAaxx8C&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false



COURSE CURRICULUM

Name of the Program:		D. PHARM			Annual Pattern		Level: Diploma	
Course Name		Hospital and Clinical Pharmacy (Practical)			Course Code/ Course Type		ER20-25T	
Course Pattern		2024			Version		1.0	
Teaching Scheme					Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral	
-	1	-	-	25	20	80	-	
Pre-Requisite:								
Course Objectives (CO):					The objective of Hospital and Clinical Pharmacy are- 1. Methods to systematically approach and respond to drug information queries 2. How to interpret the common laboratory reports to understand the need for optimizing the dosage regimen 3. How to report the suspected adverse drug reactions to the concerned authorities 4. Uses and methods of handling various medical/surgical aids and devices 5. How to interpret the drug-drug interactions in the treatment of common diseases.			
Course Learning Outcomes (CLO):					Students would be able to: 1. Professionally handle and answer the drug information queries. 2. Interpret the common laboratory reports 3. Report suspected adverse drug reactions using standard procedures 4. Understand the uses and methods of handling various medical/surgical aids and devices 5. Interpret and report the drug-drug interactions in common diseases for optimizing the drug therapy			

Course Contents/Syllabus:

(All the units carry equal weightage in Summative Assessment and equal engagement)

Assignment/ Practical/ Activity Number	Assignment/Practical/ Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1: Systemic Approach in handling drugs	Week 1/ Turn 1	Systemic Approach in handling drug information queries: Case 1	CLO1	03
2	Practical 2: Systemic Approach in handling drug	Week 2/ Turn 2	Systemic Approach in handling drug information queries: Case 2	CLO1	03
3	Practical 3: Interpretation of laboratory reports	Week 3/ Turn3	Interpretation of laboratory reports to optimization of the drug therapy: Case 1	CLO1	03



4	Practical 4: Interpretation of laboratory reports	Week 4/ Turn 4	Interpretation of laboratory reports to optimization of the drug therapy: Case 2	CLO1	03
5	Practical 5: Adverse drug reaction	Week 5/ Turn 5	Adverse drug reaction reporting form and casualty assessment: Case 1	CLO1	03
6	Practical 6: Adverse drug reaction	Week 6/ Turn 6	Adverse drug reaction reporting form and casualty assessment: Case 2	CLO2	03
7	Practical 7: Demonstration of Knee cap and cervical collar.	Week 7/ Turn 7	Demonstration of Knee cap and cervical collar.	CLO2	3
8	Practical 8: Demonstration of orthopedic aids: lumbosacral and abdominal belts.	Week 8/ Turn 8	Demonstration of orthopedic aids: lumbosacral and abdominal belts.	CLO2	03
9	Practical 9: Demonstration of walking aids.	Week 9/ Turn 9	Demonstration of walking aids.	CLO2	3
10	Practical 10: Demonstration on bandages.	Week 10/ Turn 10	Demonstration of different types of bandages.	CLO2	3
11	Practical 11: Demonstration of needles and syringes.	Week 11/ Turn 11	Demonstration of needles and syringes.	CLO3	3
12	Practical 12: Demonstration of (IV) sets.	Week 12/ Turn 12	Demonstration of intravenous (IV) sets.	CLO3	3
13	Practical 13: Demonstration of Ryle's tube.	Week 13/ Turn 13	Demonstration of Ryle's tube.	CLO3	3
14	Practical 14: Demonstration of oxygen masks	Week 14/ Turn 14	Demonstration of oxygen masks.	CLO4	3
15	Practical 15: Demonstration urinary system	Week 15/ Turn 15	Demonstration of urinary catheters, urine bags, urine pots.	CLO4	3
16	Practical 16: Demonstration	Week 16/ Turn 16	Demonstration of colostomy bags.	CLO4	3
17	Practical 17: Drug-drug interaction.	Week 17/ Turn 17	Drug-drug interaction. Case 1	CLO4	3
18	Practical 18: Drug-drug interaction.	Week 18/ Turn 18	Drug-drug interaction. Case II	CLO4	3
19	Practical 19: Wound dressing	Week 19/ Turn 19	Wound dressing in forehead injury	CLO5	3
20	Practical 20: Wound dressing	Week 20/ Turn 20	Wound dressing in knee injury	CLO5	3
21	Practical 21: Administration of intravenous infusions.	Week 21/ Turn 21	Administration of intravenous infusions.	CLO5	3



22	Practical 22: Administration of intramuscular injections.	Week 22/ Turn 22	Administration of intramuscular injections.	CLO5	3
23	Practical 23: Administration of subcutaneous injections.	Week 23/ Turn 23	Administration of subcutaneous injections.	CLO5	3
24	Practical 24: Administration of injectable vaccines.	Week 24/ Turn 24	Administration of injectable vaccines.	CLO5	3
25	Practical 25: Introduction to hospital pharmacy software.	Week 25/ Turn 25	Introduction to hospital pharmacy software.	CLO5	3
Total					75

Learning resources:

Reference Books:

1. Gupta B.K and Gupta R.N., GPP in Hospital Pharmacy, Vallabh Prakashan.
2. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc.
3. Australian drug information- Procedure manual. The Society of Hospital Pharmacists of Australia.

Practical Text Book :

1. A Textbook of Clinical Pharmacy Practice - Essential concepts and skills - Parthasarathi G, Karin Nyfort-Hansen and Milap Nahata. Orient Longman Pvt. Ltd. Hyderabad.
2. Text Book of Hospital and Clinical Pharmacy by Dr. Pratibha Nand and Dr. Roop K Khar, Birla publications, New Delhi.

Online Resources/E-Learning Resources:

1. <https://pharmacyinfo.com/definition-classification-of-hospital/>
2. <https://pharmacyinfo.com/hospital-clinical-pharmacy-practical-d-pharm/>
3. https://A_Practical_Manual_Of_Hospital_And_Clinical_Pharmacy
4. <https://www.scribd.com/document/641902076/Chapter-1-Hospital-and-Clinical-Pharmacy-Choplete-PDF-Notes-D-Pharma-2nd-Notes-PDF-Noteskarts>
5. <https://www.slideshare.net/slideshow/d-pharma-2nd-year-hospital-and-clinical-pharmacypdf/251995955>
6. <https://www.slideshare.net/slideshow/d-pharma-2nd-year-hospital-and-clinical-pharmacypdf/251995955>



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. Typical profile of a drug to be included in the hospital formulary
2. Brief layout and various services of the Central Sterile Supplies Department (CSSD)
3. Various types of sterilizers and sterilization techniques used in hospitals
4. Fumigation and pesticide control in hospitals
5. Genesis and development of Drug / Poison Information centres in India
6. Role of Pharmacists in Transition of Care: Discharge cards, post hospitalization care, medicine reconciliation activities in developed countries.
7. Total parenteral nutrition and IV admixtures and their compatibility issues
8. Concept of electronic health records.
9. Invasive and Non-invasive diagnostic tests - HRCT, MRI, Sonography, 2DECHO, X-rays, Mammography, ECG, EMG
10. Diagnostic Kits - Pregnancy Test
11. Measures to be taken in hospitals, ICUs to minimize the Antimicrobial Resistance
12. Antimicrobial Stewardship Program

Field Visit:

The students shall be taken in groups to visit a Govt / private healthcare facility to understand and witness the various hospital and clinical pharmacy services provided. Individual reports from each student on their learning experience from the field visit shall be submitted.



COURSE CURRICULUM

Name of the Program:		D. Pharm		Annual Pattern		Level: Diploma	
Course Name		Pharmacy Law and Ethics (Theory)		Course Code/ Course Type		ER20-26T	
Course Pattern		2025		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
3	-	1	-	75	20	80	-
Pre-Requisite:		Nil					
Course Objectives (CO):					The objectives of Pharmacy Law and Ethics are: 1. To understand the historical background, principles, and key legal frameworks governing the pharmacy profession in India. 2. To gain in-depth knowledge of the Drugs and Cosmetics Act and related laws governing the manufacture, import, sale, and control of pharmaceuticals. 3. To study the role of pharmaceutical regulatory bodies, pricing policies, and ethical guidelines for pharmacy practice, legal frameworks on food supplements 4. To explore laws related to waste management, clinical research, and intellectual property rights in pharmacy. 5. To evaluate legal considerations in patient care, emergency medicine, disaster management, and consumer rights.		
Course Learning Outcomes (CLO):					Students would be able to: 1. Explain the history, principles, and significance of pharmaceutical laws and regulatory policies. 2. Interpret and apply legal provisions related to drug import, manufacture, sale, and control mechanisms in India. 3. Demonstrate knowledge of the functions of pharmacy regulatory authorities, ethical considerations, and pricing mechanisms, legal frameworks on food supplements 4. Assess the impact of legal frameworks on biomedical waste disposal, and pharmaceutical research. 5. Evaluate the role of pharmaceutical regulations in healthcare, patient safety, and emergency response.		



Course Contents/Syllabus:

(All the units carry equal weightage in Summative Assessment and equal engagement)

Topic	CLO	Hours
Chapter 1		
General Principles of Law, History and various Acts related to Drugs and Pharmacy profession	CLO1	02
Chapter 2		
Pharmacy Act-1948 and Rules: Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils, Registration of Pharmacists, Offences and Penalties. Pharmacy Practice Regulations 2015	CLO1	05
Chapter 3		
Drugs and Cosmetics Act 1940 and Rules 1945 and New Amendments Objectives, Definitions, Legal definitions of schedules to the Act and Rules Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Manufacture of drugs – Prohibition of manufacture and sale of certain drugs, Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license. Study of schedule C and C1, G, H, H1, K, P, M, N, and X. Sale of Drugs – Wholesale, Retail sale and Restricted license, Records to be kept in a pharmacy Drugs Prohibited for manufacture and sale in India Administration of the Act and Rules – Drugs Technical Advisory Board, Central Drugs Laboratory, Drugs Consultative Committee, Government analysts, licensing authorities, controlling authorities, Drug Inspectors.	CLO2	23
Chapter 4		
Narcotic Drugs and Psychotropic Substances Act 1985 and Rules- Objectives, Definitions, Authorities and Officers, Prohibition, Control and Regulation, Offences and Penalties.	CLO2	02
Chapter 5		
Drugs and Magic Remedies (Objectionable Advertisements) Act 1954- Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties.	CLO2	02
Chapter 6		
Prevention of Cruelty to Animals Act-1960: Objectives, Definitions, CPCSEA - brief overview, Institutional Animal Ethics Committee, Breeding and Stocking of Animals, Performance of Experiments, Transfer and Acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties	CLO2	02
Chapter 7		
Poisons Act-1919: Introduction, objective, definition, possession, possession for sales and sale of any poison, import of poisons	CLO2	02
Chapter 8		
FSSAI (Food Safety and Standards Authority of India) Act and Rules: brief overview and aspects related to manufacture, storage, sale, and labelling of Food Supplements	CLO3	02
Chapter 9		
National Pharmaceutical Pricing Authority: Drugs Price Control Order (DPCO) - 2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, Pharmaceutical Policy 2002, National List of Essential Medicines (NLEM)	CLO3	05



Chapter 10		
Code of Pharmaceutical Ethics: Definition, ethical principles, ethical problem solving, registration, code of ethics for Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath.	CLO3	05
Chapter 11		
Medical Termination of Pregnancy Act and Rules – basic understanding, salient features, and Amendments	CLO3	02
Chapter 12		
Role of all the government pharma regulator bodies – Central Drugs Standards Control Organization (CDSCO), Indian Pharmacopoeia Commission (IPC)	CLO3	01
Chapter 13		
Good Regulatory practices (documentation, licenses, renewals, e-governance) in Community Pharmacy, Hospital pharmacy, Pharma Manufacturing, Wholesale business, inspections, import, export of drugs and medical devices	CLO3	03
Chapter 14		
Introduction to BCS system of classification, Basic concepts of Clinical Trials, ANDA, NDA, New Drug development, New Drugs and Clinical Trials Rules, 2019. Brand v/s Generic, Trade name concept, Introduction to Patent Law and Intellectual Property Rights, Emergency Use Authorization	CLO4	07
Chapter 15		
Blood bank – basic requirements and functions	CLO4	02
Chapter 16		
Clinical Establishment Act and Rules – Aspects related to Pharmacy	CLO4	02
Chapter 17		
Biomedical Waste Management Rules 2016 – Basic aspects, and aspects related to pharma manufacture to disposal of pharma / medical waste at homes, pharmacies, and hospitals	CLO4	02
Chapter 18		
Bioethics - Basic concepts, history and principles. Brief overview of ICMR's National Ethical Guidelines for Biomedical and Health Research involving human participants	CLO4	02
Chapter 19		
Introduction to the Consumer Protection Act	CLO5	01
Chapter 20		
Introduction to the Disaster Management Act	CLO5	01
Chapter 21		
Medical Devices – Categorization, basic aspects related to manufacture and sale	CLO5	02
Total		75



Learning Resource:

Text Reading:

1. Text book of Forensic Pharmacy by B.M. Mithal
2. Forensic Pharmacy by B. Suresh
3. Hand book of drug law-by M.L. Mehra
4. A text book of Forensic Pharmacy by N.K. Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.
6. Medicinal and Toilet preparations Act 1955 by Govt. of India publications.
7. Narcotic Drugs and Psychotropic Substances Act by Govt. of India publications
8. Drugs and Magic Remedies Act by Govt. of India publications.
9. CDSCO Website, NPPA Website
10. Books on Drugs and Cosmetic Act by Nilesh Gandhi and Sudhir Deshpande
11. Text Book of Forensic Pharmacy by Dr Guruprasad Mohanta
12. Text book Pharmacy Law and Ethics by Prof. Bhanudas S. Kuchekar.

References:

1. A Textbook of Pharmacy Law and Ethics – Interior, June 2023, Edition: 1, Publisher: Astitva Prakashan, Editor: DHARMESH TRIVEDI, SEEMA V JOSHI, ISBN: 9789358380231.
2. Pharmacy Law and Ethics, June 2022, Publisher: Everest publishing House, Pune, India, ISBN: 9789394683839.
3. <https://notionpress.com/in/read/textbook-of-pharmacy-law-and-ethics>

Online resource/ E-learning resource:

1. https://www.researchgate.net/publication/371788206_A_Textbook_of_Pharmacy_Law_and_Ethics_-_Interior.
2. <https://pmc.ncbi.nlm.nih.gov/articles/PMC9121985/>
3. <https://g.co/kgs/toDt9df>
4. <https://g.co/kgs/tVFowd2>

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. Requirements for Ayurvedic, Homeopathic manufacturing, sale and licensing requirements.
2. Layout and contents of official websites of various agencies regulating the profession of pharmacy in India: e.g., CDSCO, SUGAM portal, PCI, etc.
3. Licenses required, application processes (online/offline), drug regulatory office website of the respective state
4. Case studies – actions taken on violation of any act / rule related to pharmacy from the literature / media
5. Schedule H1 drugs and its implementation in India
6. Counterfeit / Spurious medicines
7. Drug Testing Labs in India
8. Generic Medicines
9. Before or after food/Medicines and Meals