K.R. MANGALAM UNIVERSITY

THE COMPLETE WORLD OF EDUCATION

SCHOOL OF MEDICAL & ALLIED SCIENCES

(SMAS)

Programme Handbook
(Programme Structure & Evaluation Scheme)

Diploma In Pharmacy

Programme Code: 13

TWO YEAR UNDERGRADUATE PROGRAMME

As per Pharmacy Council of India
2024-25

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1. Preface

Welcome to the Diploma in Pharmacy (D. Pharm) program at K R Mangalam University.

This Programme Handbook is designed to serve as a comprehensive guide throughout your academic journey in the field of pharmacy. As you embark on this two-year course, this handbook will provide you with essential information about the program structure, course content, evaluation methods, and other key aspects of your studies.

Our D. Pharm program offers a rigorous curriculum that encompasses foundational subjects such as Pharmaceutics, Pharmacology, Pharmaceutical Chemistry, Pharmacognosy, and Pharmaceutical Biotechnology. The program is designed to integrate theoretical knowledge with practical skills, ensuring that you gain a well-rounded education that prepares you for a successful career in pharmacy.

At K R Mangalam University, we are dedicated to creating an enriching educational environment that fosters academic excellence and professional development. Our esteemed faculty members are committed to delivering high-quality instruction through lectures, practical laboratory sessions, seminars, and industrial visits. This diverse approach ensures that you acquire both the academic knowledge and practical experience needed in the pharmacy profession.

This handbook provides detailed information about the program's structure, course descriptions, assessment methods, and academic policies. It also outlines the expectations for attendance, grading, and other important requirements. We encourage you to review this handbook carefully, as it will be a valuable resource throughout your time in the program.

Your success in the D. Pharm program will depend on your dedication, hard work, and active participation in both academic and practical components of the course. Our goal is to support you in achieving your full potential and to guide you towards becoming a skilled and knowledgeable pharmacy professional.

We are pleased to welcome you to K R Mangalam University and to the Diploma in Pharmacy program. We look forward to supporting you and celebrating your achievements as you progress through your studies.

2. University Vision and Mission

2.1. Vision

K.R. Mangalam University aspires to become an internationally recognized institution of higher learning through excellence in inter-disciplinary education, research, and innovation, preparing socially responsible life-long learners contributing to nation building.

2.2. Mission

- Foster employability and entrepreneurship through futuristic curriculum and progressive pedagogy with cutting-edge technology.
- Instill notion of lifelong learning through stimulating research, Outcomes-based education, and innovative thinking
- Integrate global needs and expectations through collaborative programs with premier universities, research centres, industries, and professional bodies.
- Enhance leadership qualities among the youth understanding ethical values and environmental realities

1. About the School

The School of Medical & Allied Sciences (SMAS) at K. R. Mangalam University started in the year 2013 after being duly approved by the Pharmacy Council of India (PCI). The SMAS comprises of modular laboratories equipped with state-of-the-art facilities and infrastructure. The School of Medical and Allied Sciences currently offers D. Pharm, B. Pharm, M. Pharm and PhD courses in Pharmacy. The Centre for Education Growth and Research adjudged School of Medical & Allied Sciences, as Best Pharmacy College in India in March 2016 at India International Centre, New Delhi.

2. School Vision and Mission

School Vision

To become a premier educational institution dedicated to empowering students with the knowledge and skills needed to lead in pharmaceutical field and enhance healthcare access, thereby making a positive impact on society in India and globally.

School Mission

1. To empower students to become self-motivated, self-reliant, and socially aware healthcare professionals, effectively addressing the needs of academia, industry, and research.
2. To establish a dynamic centre of excellence for learning and research in pharmaceutical and allied health sciences, emphasizing interdisciplinary approaches and fostering collaboration between industry and academia.
3. To nurture translational research initiatives that benefit society and improve community health outcomes.
4. To integrate pharmaceutical and allied health sciences with interdisciplinary life sciences, promoting innovation and collaboration.
5. To offer lifelong learning opportunities in healthcare, equipping professionals with the skills to adapt and excel in a rapidly evolving field.

3. About the Programme

The Department of Pharmacy under the School of Medical & Allied Sciences (SMAS) at K. R. Mangalam University started in the year 2013 after being duly approved by the Pharmacy Council of India (PCI). The PCI approved D. Pharmacy programme started in the year 2017 and aims to provide an extra edge to our students by teaching and training by leading pharma industry experts to facilitate industry academia interaction, participation in conferences / workshops / skill development programs and carrier guidance. The students are encouraged to participate in various health camps organized by department to make general awareness amongst people regarding various diseases like diabetes, hypertension, communicable and non-communicable diseases and lay down the platform for students for getting jobs in various government and private institutions.

5.1. Definitions

Programme Educational Objectives (PEOs)

Programme Educational Objectives of a degree programme are the statements that describe the expected achievements of graduates in their career, and what the graduates are expected to perform and achieve during the first few years after graduation.

Programme Outcomes (POs)

Programme Outcomes are statements that describe what the students are expected to know and would be able to do upon the graduation. These relate to the skills, knowledge, and behaviour that students acquire through the programme.

Programme Specific Outcomes (PSOs)

Programme Specific Outcomes define what the students should be able to do at the time of graduation and they are programme specific. There are two to four PSOs for a programme.

Credit

Credit refers to a unit of contact hours/tutorial hours per week or 02 hours of lab/practical work per week

5.2. Programme Educational Objectives (PEOs)

The PEOs are delayed outcomes measured few years after completion of the programme, where the graduates of this program will:

PEO-1: Become professional experts in careers associated to pharmaceutical Sciences, and allied fields, establishing knowhow and compliance.

PEO-2: Emerge as leaders, entrepreneurs, and managers, guiding pharma professionals within the healthcare field.

PEO-3: Maintain morals & ethics in their professional conduct, thereby taking responsible decisions which endorse the reliability of the professional healthcare person.

PEO-4: Support for sustainable practices and engage in environment-friendly methods of dealing with patients in healthcare.

PEO-5: Be as good citizens with high value attributes towards society, demonstrating extraordinary professionalism, as a contribution towards well-being of the society.

5.3. Programme Outcomes (POs)

After completion of the course, the student will be capable of

PO 1 Problem solving: Possessing the **core and basic knowledge** associated with the profession of pharmacy to deal with related issues efficiently.

PO 2 Thinking Abilities: Developing **critical thinking skills** to deal with healthcare issues and integrating relevant drug and patient information to support effective clinical decisions

PO 3 Interpersonal skills: Developing **interpersonal skills** to deal with people empathetically, effectively engage with patients and collaborate with healthcare professionals in a clinical setting.

PO 4 Leadership skills: Acquiring **leadership traits and skills** through curricular and co-curricular activities and develop skills and abilities that will enable him/her to lead or actively contribute to organizational improvement.

PO 5 Environment and sustainability: Recognizing the impact of the **profession on the environment** to meet the requirements of sustainable development goals.

PO 6 Professional Ethics: Adhering to **ethical principles in professional and social settings** while being responsible for the consequences of their decisions.

PO 7 Social Responsibility: Recognizing and explaining the **key roles of pharmacists** in enhancing public health and community well-being.

PO8 Effective Communication skills: Demonstrating effective communication skills to clearly convey pharmaceutical concepts and provide accurate information for enhanced patient care.

PO 9 Life-long Learning: Engaging life-long learning and continuous improvement in the skills and knowledge by incorporating modern techniques in professional development.

5.4. Programme Specific Outcomes

On completion of the programme, the students will be

PSO1: Understanding key concepts in pharmacy, including drug mechanisms of action, therapeutic classifications, formulation techniques, pharmacokinetics, and patient care practices to enhance clinical outcomes.

PSO2: Applying the knowledge gained in formulation techniques, mechanistic studies and quality assurance for effective prescription handling, accurate labelling and dispensing processes to ensure safe and efficient patient care.

PSO3: Analysing active pharmaceutical ingredients to assess their purity, safety and efficacy and further utilizing the skills in quality control, drug formulation, pharmacological evaluation and community health practices.

PSO4: Evaluating pharmaceutical products and formulations using analytical techniques, integrating concepts of quality assurance, formulation development, and safety assessment to ensure efficacy and compliance.

PSO5: Observing core techniques in pharmaceutics, pharmaceutical chemistry, and pharmacognosy labs to understand principles of drug formulation, compounding, and natural product analysis.

PSO6: Imitating observed lab practices to build hands-on skills in formulation, chemical analysis, and natural product identification, while upholding ethical standards in pharmacy.

PSO7: Performing key lab techniques to develop skills in drug formulation, chemical analysis, and the assessment of natural products, while applying principles of safety, efficacy, and ethical practices in pharmacy.

5.5.Career Avenues

Students will get themselves registered in the state pharmacy council and the registered pharmacists may work at drug stores in Government Hospitals, Private Hospitals, Clinics, Community Health Centers or Private Drug Stores. They may even start their own Pharmacy shop (Entrepreneurship) and online Pharmacy. Pharmacists can also work as Medical sales Representative and as Manufacturing and Quality Control Chemist in Pharmaceutical Industries.

5.6. Duration

The program duration of Diploma in Pharmacy is 2 years (yearly pattern)

5.7. Criteria for Award of Degree

The criteria for the award of a Diploma in Pharmacy (D. Pharm) degree typically include the following:

Examinations

Diploma in Pharmacy (theory)- 40% marks in each of the subject separately, including sessional marks

Diploma in Pharmacy (practical)-at least 40% marks in each of the practical examinations including sessional marks.

The candidates securing 60% marks or above in aggregate in all subjects in a single attempt at the Diploma in Pharmacy (Part-I) or Diploma in Pharmacy (Part-II) examinations shall be declared to have passed in first class the Diploma in Pharmacy (Part-I) or Diploma in Pharmacy (Part-II) examinations.

Candidates securing 75% marks or above in any subject or subjects shall be declared to have passed with distinction in the subject or those subjects provided he/she passes in all the subjects in a single attempt.

Practical Training

After completing the academic course, the candidate must undergo practical training in a hospital, pharmacy, or pharmaceutical manufacturing unit for a stipulated period *(usually 500 hours over not less than 3 months).*

Attendance

The candidate must meet the minimum attendance requirement *(~75%)* in both theory and practical classes for each subject.

Submission of Practical Records

The candidate must submit complete and satisfactory practical records and reports of the training period as required by the institution.

6. Student's Structured Learning Experience from Entry to Exit in the Programme

- **Education Philosophy and Purpose**
- **Learn to Earn a Living**

At KRMU we believe in equipping students with the skills, knowledge, and qualifications necessary to succeed in the job market and achieve financial stability. All the programmes are tailored to meet industry demands, preparing students to enter specific careers and contributing to economic development.

- **Learn to Live**

The university believes in the holistic development of learners, fostering sensitivity towards society, and promoting a social and emotional understanding of the world. Our aim is to nurture well-rounded individuals who can contribute meaningfully to society, lead fulfilling lives, and engage with the complexities of the human experience.

- **University Education Objective**

Focus on Employability and Entrepreneurship through Holistic Education using Bloom's Taxonomy.

By targeting all levels of Bloom's Taxonomy—remembering, understanding, applying, analysing, evaluating, and creating—students are equipped with the knowledge, skills, and attitudes necessary for the workforce and entrepreneurial success. At KRMU we emphasize on

learners critical thinking, problem-solving, and innovation, ensuring application of theoretical knowledge in practical settings. This approach nurtures adaptability, creativity, and ethical decision-making, enabling graduates to excel in diverse professional environments and to innovate in entrepreneurial endeavours, contributing to economic growth and societal well-being.

- **Importance of Structured Learning Experiences**

  Structured learning experiences in a Diploma in Pharmacy (D. Pharm) course are crucial for developing competent pharmacists. They ensure a comprehensive understanding of core subjects, enhance practical skills through hands-on training, and provide essential clinical exposure. This approach promotes professional competency by integrating ethical and legal education, maintaining consistency and standardization, and preparing students for advanced studies and diverse career opportunities. Ultimately, structured learning equips students with the knowledge, skills, and practical experience needed to excel in various pharmacy roles and contribute effectively to healthcare.

- **Educational Planning and Execution**
  - The educational planning and execution for the Diploma in Pharmacy (D. Pharm) course focuses on creating an effective learning environment through a structured curriculum over two academic years.
  - The curriculum includes core subjects such as Pharmacology, Pharmacognosy, Pharmaceutical Chemistry, Pharmaceutics, and Clinical Pharmacy, complemented by practical training and soft skills development like communication and ethics.
  - The course is divided into two years, each, with three sessional examinations and final examination to assess student performance. Teaching methods include lectures, seminars, group discussions, hands-on training, case studies, and e-learning resources, catering to various learning styles.
  - To monitor and review the educational process, continuous assessments, student feedback, and faculty meetings are conducted regularly. Additionally, annual curriculum reviews and faculty development workshops ensure that the program remains current and effective. Through these strategies, the D. Pharm course aims to equip students with the necessary knowledge and skills to excel in the pharmacy profession.

- **Course Registration and Scheduling**
  - **Major and Minor Selection**: The D. Pharm program is typically a diploma course focusing on core pharmaceutical sciences. Unlike degree programs, there are no major and minor selections, as the curriculum is standardized by PCI to ensure foundational knowledge in pharmacy.
  - **Internships/Projects/Dissertations/Apprenticeships**:
  - **Internships**: The PCI mandates a compulsory practical training for not less than 500 hours spread over a period of not less than 3 months after completing the final year. This training is typically conducted in a hospital, pharmacy, or industry.
  - **Projects/Dissertations**: Projects or dissertations are not a mandatory part of the D. Pharm curriculum, but some institutions may include small projects or case studies to enhance practical learning.
  - **Apprenticeships**: Apprenticeships in a pharmaceutical setting are encouraged to provide real-world experience, aligning with PCI's focus on practical training.

  - **Academic Support Services (Slow & Advanced Learners)**:
    - **Slow Learners**: Tailored support such as additional tutoring, peer mentoring, and remedial classes may be provided to help slow learners grasp the essential concepts.
    - **Advanced Learners**: Opportunities like advanced laboratory work, involvement in research activities, and participation in seminars and workshops are provided to challenge and engage advanced learners.
  - **Student Support Services**
  - **Mentor-Mentee System**

A structured mentor-mentee system is typically implemented, where each student is assigned a faculty mentor. The mentor provides guidance on academic, personal, and professional matters, ensuring holistic development.

- **Counselling and Wellness Services**

Counselling services are provided to students to address their mental and emotional well-being. Wellness services may include workshops on stress management, physical fitness, and healthy lifestyle choices.

- **Career Services and Training**

Career Services: These services provided by the institution help students with job placements, resume building, interview preparation, and networking with potential employers.

Training: Institution offers specialized training sessions on soft skills, communication and industry-specific competencies to prepare students for the workforce.

- **Learning and Development Opportunities**
  - **Laboratories and Practical Learning**

    PCI mandates that D. Pharm programs be equipped with well-furnished laboratories for subjects like Pharmaceutics, Pharmacology, Pharmacognosy and Pharmaceutical Chemistry. These labs provide hands-on training essential for understanding drug formulation, analysis, and pharmacological testing.

  - **Experiential Learning**

    Practical exposure is a key component, with students engaging in activities such as drug preparation, dispensing, patient counselling, and clinical pharmacy practice during their internship or practical training.

  - **Case-Based Learning/Problem-Based Learning/Project-Based Learning**
  - **Case-Based Learning (CBL)**
    Students analyze and discuss real-world cases to develop problem-solving skills, particularly in subjects like Pharmacology and Therapeutics.
  - **Problem-Based Learning (PBL)**
    This method involves students working in groups to solve complex, real-world problems, fostering critical thinking and teamwork. This includes incorporation of small projects to enhance practical application of knowledge.
  - **Workshops, Seminars, Guest Lectures**
    Regular workshops, seminars, and guest lectures by industry professionals and academicians are organized to keep students updated with the latest trends and practices in pharmacy.

  - **Inside & Outside Classroom Learning**

- **Inside Classroom**: It includes providing theoretical knowledge through lectures, interactive sessions, and group discussions.
- **Outside Classroom**: This includes Field visits, community pharmacy practice, health camps, and participation in pharmaceutical events and competitions.

- **Holistic Education**

  The curriculum is designed not only to impart technical knowledge but also to promote overall personal and professional growth. Activities such as sports, cultural events, and community service are encouraged to ensure the development of well-rounded individuals.

➢ **Assessment and Evaluation**

The Pharmacy Council of India (PCI) provides guidelines for the registration and scheduling of courses within the Diploma in Pharmacy (D. Pharm) program.

Periodic assessments are scheduled throughout the year to evaluate students' progress.

A) Theory examinations

a) Sessional examinations: 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
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b) 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.

c) Final Examinations: At the end of each academic year, students must appear for final exams in each subject. The dates for these exams are scheduled in advance and are part of the academic calendar.

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 = 20

Total	=	80 marks

B) Practical examination

a) Sessional Examinations

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

Total	=	80 marks
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* 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.

b) 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	=	10 marks
Assignment marks (Average of three)	=	5 marks*
Field Visit Report marks (Average for the reports)	=	5 marks$

Total	=	20 marks

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*, $ 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.

c) Final Practical Examination: 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.

Practical Training and Internships

Internship Period: After completing the theoretical and practical components of the course, students must undergo a mandatory internship or practical training.

This is typically scheduled after the second academic year, lasting a minimum of 500 hours over not less than 3 months.

Scheduling Training: The internship schedule is often flexible, depending on the availability of training positions in hospitals, pharmacies, or pharmaceutical companies.

- **Feedback and Continuous Improvement Mechanisms**

The university has designed various mechanisms for improvement in the curriculum and related areas which includes

Student Feedback Mechanisms: Student feedback is collected through surveys, timely evaluations, and focus groups to identify areas for improvement in course delivery and content.

Faculty Feedback and Peer Review: Faculties are actively engaged in self-assessment, peer reviews, and regular departmental meetings to refine teaching practices and enhance course effectiveness.

Industry and Alumni Feedback: Feedback from industry professionals, alumni, and employers is also collected time to time which helps in ensuring that the curriculum remains relevant to current industry standards and prepares students for the workforce.

Academic Performance Monitoring: Student progress is tracked and analysed through exam results to identify academic challenges and adjust instructional methods accordingly.

Curriculum Review and Revision: Regular review and updation in the curriculum is done at school level to incorporate the latest advancements in pharmaceutical sciences and educational best practices.

Professional Development for Faculty: Faculty are encouraged to participate in workshops, seminars, and continuous learning programs to stay current with teaching methodologies and industry trends.

Student Support and Development: Remedial programs are incorporated for struggling students and enrichment opportunities are provided to the advanced learners based on feedback and performance data.

- **Academic Integrity and Ethics**

Academic integrity and ethics are fundamental principles in the D Pharmacy course, ensuring that students conduct themselves with honesty, responsibility, and respect for the academic process. Upholding these values is crucial for fostering a culture of trust and professionalism, essential in the pharmaceutical field where ethical decision-making directly impacts patient care and public health. Students are expected to avoid academic misconduct, such as plagiarism, cheating, and falsification of data, and are encouraged to engage in fair and transparent practices in their studies and research. The course emphasizes the importance of ethical behaviour not only in academic work but also in future professional practice, preparing students to be responsible and ethical pharmacists.

SMAS	D. PHARMACY (Scheme of Studies)			
YEAR	**Subject Code**	**Course Title**	**L**	**P**
FIRST	**ER20-11T**	Pharmaceutics – Theory	4	-
	ER20-11P	Pharmaceutics – Practical	-	3
	ER20-12T	Pharmaceutical Chemistry – Theory	4	-
	ER20-12P	Pharmaceutical Chemistry – Practical	-	3
	ER20-13T	Pharmacognosy – Theory	4	-
	ER20-13P	Pharmacognosy – Practical	-	3
	ER20-14T	Human Anatomy & Physiology – Theory	4	-
	ER20-14P	Human Anatomy & Physiology – Practical	-	3
	ER20-15T	Social Pharmacy – Theory	4	-
	ER20-15P	Social Pharmacy – Practical	-	3
		Total	**20**	**15**
SECOND	**ER20-21T**	Pharmacology –Theory	4	-
	ER20-21P	Pharmacology –Practical	-	2
	ER20-22T	Community Pharmacy & Management	4	-
	ER20-22P	Community Pharmacy & Management – Practical	-	3
	ER20-23T	Biochemistry & Clinical Pathology – Theory	4	-
	ER20-23P	Biochemistry & Clinical Pathology – Practical	-	2
	ER20-24T	Pharmacotherapeutics	4	-
	ER20-24P	Pharmacotherapeutics– Practical	-	1
	ER20-25T	Hospital & Clinical Pharmacy – Theory	4	-
	ER20-25P	Hospital & Clinical Pharmacy – Practical	-	1
	ER20-26T	Pharmacy Law & Ethics	4	-
		Total	**24**	**9**

Diploma in Pharmacy

Ist Year

ER 20-11 T	Pharmaceutics	L	T	P	C
Version	2.0	**3**	**1**	**0**	**0**
Category of Course	Theory				
Total Contact Hours	75 hours				
Pre-Requisites/ Co-Requisites	Pharmaceutics				

Course Perspective

This course equips students with essential skills in pharmaceutical formulation, preparation, and dispensing, ensuring a solid foundation for careers in pharmaceutical industry. It will also provide understanding of medication-compounding and management techniques and their quality control. Theoretical knowledge gained will be helpful in applying for both immediate employment and advanced studies in pharmacy. Effective communication and patient safety are emphasized throughout the course.

Course Outcomes

Upon completion of the course the learner will be able to:

CO1: Understanding the basics of dosage forms, drug interactions, calculations, and proper medication handling in a healthcare setting.

CO2: Applying knowledge to distinguish between quality control and quality assurance while preparing conventional formulations with proper techniques.

CO3: Analyzing the characteristics and performance of various dosage forms to assess their appropriateness for diverse therapeutic applications in pharmacy.

Course Content

Unit 1 **7 Hrs**

History of the profession of Pharmacy in India in relation to Pharmacy education, industry, pharmacy practice, and various professional associations.

Pharmacy as a career

Pharmacopoeia: Introduction to IP, BP, USP, NF and Extra Pharmacopoeia. Salient features of Indian Pharmacopoeia

Unit 2 **5 Hrs**

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

Unit 3 **3 Hrs**

Pharmaceutical aids: Organoleptic (Colouring, flavouring, and sweetening) agents Preservatives: Definition, types with examples and uses.

Unit 4 **9 Hrs**

Unit operations: Definition, objectives/applications, principles, construction, and workings of:
Size reduction: hammer mill and ball mill
Size separation: Classification of powders according to IP, Cyclone separator, Sieves and standards of sieves.
Mixing: Double cone blender, Turbine mixer, Triple roller mill and Silverson mixer homogenizer.
Filtration: Theory of filtration, membrane filter and sintered glass filter.
Drying: working of fluidized bed dryer and process of freeze drying.
Extraction: Definition, Classification, method, and applications.

Unit 5 **41 Hrs**

Tablets – Coated and uncoated, various modified tablets (sustained release, extended-release, fast dissolving, multilayered, etc.)
Capsules - hard and soft gelatine capsules.
Liquid oral preparations - solution, syrup, elixir, emulsion, suspension, dry powder for reconstitution.
Topical preparations - ointments, creams, pastes, gels, liniments and lotions, suppositories, and pessaries.
Nasal preparations, Ear preparations.
Powders and granules - Insufflations, dusting powders, effervescent powders, and effervescent granules.
Sterile formulations – Injectables, eye drops and eye ointments.
Immunological products: Sera, vaccines, toxoids, and their manufacturing methods.

Unit 6 **5 Hrs**

Basic structure, layout, sections, and activities of pharmaceutical manufacturing plants Quality control and quality assurance: Definition and concepts of quality control and quality assurance, current good manufacturing practice (cGMP), Introduction to the concept of calibration and validation.

Unit 7 **5 Hrs**

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

Learning Experience

- Lectures and Demonstrations: Interactive lectures using visual aids and real-world examples will be used to teach key ideas.
- Hands-On Learning: Opportunities for hands-on learning will be offered through virtual simulations and practical lab sessions.
- Assignments and Assessments: Regular quizzes, practical assignments, and comprehensive exams will assess understanding and application of course material.
- Support and Feedback: During class hours, instructors will provide extra assistance, and students are encouraged to ask for aid and work with others.

Textbooks

- Pharmaceutics: V. N. Raje, for first year diploma by CBS Publisher.
- Pharmaceutics-I by R. M. Mehta

Suggested Readings

- Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems by Loyd V. Allen, Nicholas G. Popovich and Howard C. Ansel.
- Aulton's Pharmaceutics by Kevin M.G. Taylor & Michael E. Aulton

Open Educational Resources (OER)

- Books
- PPT
- Notes
- Videos

Evaluation Scheme:

	Evaluation Component	Duration	Weightage (%)	Date, Time & Venue
1	Sessional examination-I, II and III	90 Minutes	20	
2	End term examination	180 Min	80	
Total			100	

ER 20-11 P	Pharmaceutics-Practical	L	T	P	C
Version	2.0	**0**	**0**	**3**	**0**
Category of Course	Practical				
Total Contact Hours	75 hours				
Pre-Requisites/ Co-Requisites	-				

Course Perspective

This course provides hands-on experience of preparing and evaluating various dosage forms. It helps in learning formulation techniques, stability and efficacy evaluation processes. The course emphasizes on quality control testing and develops essential teamwork and documentation skills. The practical learnings of this course are helpful in achieving the best career opportunities in the pharmaceutical industry and healthcare settings.

Course Outcomes

Upon completion of the course the learner will be able to:

CO1: Understanding by observing and calculating working formulas from official master formulas to ensure accurate formulation.
CO2: Applying the knowledge gained in preparation of various dosage forms based on calculated working formulas to demonstrate practical application.
CO3: Adapting product labels to include essential information for both the product and the patient, enhancing safety and compliance.
CO4: Performing basic quality control tests on common dosage forms to evaluate their quality and efficacy.

Course Content

1. Handling and referring the official references: Pharmacopoeias, Formularies, etc. for retrieving formulas, procedures, etc.
2. Formulation of the following dosage forms as per monograph standards and dispensing with appropriate packaging and labelling
    - Liquid Oral: Simple syrup, Piperazine citrate elixir, Aqueous Iodine solution
    - Emulsion: Castor oil emulsion, Cod liver oil emulsion
    - Suspension: Calamine lotion, Magnesium hydroxide mixture
    - Ointment: Simple ointment base, Sulphur ointment
    - Cream: Cetrimide cream
    - Gel: Sodium alginate gel
    - Liniment: Turpentine liniment, White liniment BPC
    - Dry powder: Effervescent powder granules, Dusting powder
    - Sterile Injection: Normal Saline, Calcium gluconate Injection
    - Hard Gelatine Capsule: Tetracycline capsules
    - Tablet: Paracetamol tablets

3. Formulation of at least five commonly used cosmetic preparations – e.g. cold cream, shampoo, lotion, toothpaste etc
4. Demonstration on various stages of tablet manufacturing processes
5. Appropriate methods of usage and storage of all dosage forms including special dosage such as different types of inhalers, spacers, insulin pens
6. Demonstration of quality control tests and evaluation of common dosage forms viz. tablets capsules, emulsion, sterile injections as per the monographs

Learning Experience

- Hands-On Learning: Opportunities for hands-on learning will be offered through virtual simulations and practical lab sessions.
- Assignments and Assessments: Regular quizzes, practical assignments, and comprehensive exams will assess understanding and application of course material.

Textbooks

- A Text book of Pharmaceuticals Formulation by B.M. Mithal, Vallabh Prakashan.
- Bentleys' Text book of Pharmaceutics, Editor E.A. Rawlins, Elsevier Int.
- The Theory and Practice of Industrial Pharmacy. Leon Lachman, Herbert Lieberman and Joseph Kanig, Editors, Lea and Febiger, Philadelphia. Varghese Publishing House

Suggested Readings

- Indian Pharmacopoeia, Govt. of India Publication
- Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems by Loyd V. Allen, Nicholas G. Popovich and Howard C. Ansel.
- Aulton's Pharmaceutics by Kevin M.G. Taylor & Michael E. Aulton

Open Educational Resources (OER)

https://www.youtube.com/playlist?list=PLtEqsPSBZlXvvyG09oEF5kgOKCf0WWacG

Evaluation Scheme:

	Evaluation Component	Duration	Weightage (%)	Date, Time & Venue
1	Sessional examination-I, II and III	180 Minutes	20	
2	End term examination	180 Min	80	
Total			100	

ER 20-12 T	Pharmaceutical Chemistry	L	T	P	C
Version	2.0	**3**	**1**	**0**	**0**
Category of Course	Theory				
Total Contact Hours	75 hours				
Pre-Requisites/ Co-Requisites	Chemistry, Organic Chemistry and Physical Chemistry				

Course Perspective

This course focuses on providing a thorough understanding of theoretical concepts of pharmaceutical chemistry. It covers foundational principles, advanced theories, and their interrelationships within the field. It is helpful in gaining the knowledge necessary for effective drug development and therapeutic application, thereby ensuring safer and more effective pharmaceutical care.

Course Outcomes

Upon completion of the course the learner will be capable of:

CO1: Understanding the basic concepts of pharmaceutical chemistry.

CO2: Applying pharmaceutical chemistry knowledge to identify and select appropriate chemical classes of drugs.

CO3: Analysing results of impurity testing of the chemical substances given in the official monographs.

CO4: Evaluating the pharmacological uses, dosage regimen, stability issues and storage conditions of all such chemical substances commonly used as drugs.

Course Content

Unit 1 **8 Hrs**

Introduction to Pharmaceutical Chemistry

- Scope and objectives
- Sources and types of errors: Accuracy, precision, significant figures
- Impurities in pharmaceuticals: Source and effect of impurities in pharmacopeial substances, importance of limit tests

Unit 2 **8 Hrs**

Volumetric and Gravimetric Analysis

- Fundamentals of volumetric analysis
- Acid-base titration, non-aqueous titration, precipitation titration, complexometric titration, redox titration
- Gravimetric analysis: Principle and method

Unit 3 **7 Hrs**

Inorganic Pharmaceuticals

- Pharmaceutical formulations, market preparations, storage conditions, and uses of haematinics, antacids, anti-microbial agents, dental products, and medicinal gases

Unit 4 **2 Hrs**

Nomenclature of Organic Chemical Systems

- Introduction to nomenclature with a focus on heterocyclic compounds containing up to three rings

Unit 5 **9 Hrs**

Drugs Acting on the Central Nervous System

- Anaesthetics, sedatives and hypnotics, antipsychotics, anticonvulsants, and anti-depressants

Unit 6 **9 Hrs**

Drugs Acting on the Autonomic Nervous System

- Sympathomimetic agents, adrenergic antagonists, cholinergic drugs, and related agents

Unit 7 **5 Hrs**

Drugs Acting on the Cardiovascular System

- Anti-arrhythmic drugs, anti-hypertensive agents, anti-anginal agents

Unit 8 **2 Hrs**

Diuretics

- Types of diuretics and their pharmaceutical applications

Unit 9 **3 Hrs**

Hypoglycemic Agents

- Insulin and its preparations, various hypoglycemic agents

Unit 10 **3 Hrs**

Analgesic and Anti-Inflammatory Agents

- Morphine analogues, narcotic antagonists, NSAIDs

Unit 11 **8 Hrs**

Anti-Infective Agents

- Antifungal agents, urinary tract anti-infective agents, anti-tubercular agents, antiviral agents, antimalarials, sulfonamides

Unit 12 **8 Hrs**

Antibiotics

- Penicillins, tetracyclines, macrolides, and miscellaneous antibiotics

Unit 13 **8 Hrs**

Anti-Neoplastic Agents

- Classification, chemical structures, uses, and formulations of anti-cancer drugs

Textbooks

- Medicinal and pharmaceutical chemistry by Harkishan Singh, V.K. Kapoor.

Suggested Readings

- Bendale et al., 2023. Pharmaceutical Chemistry for Diploma in Pharmacy, AITBS Publishers, India.
- Bhawna Sharma and Upendra Kumar Sharma; TextBook of Pharmaceutical Chemistry; Himalaya Publishing House Pvt Ltd.

Textbooks

I. Chatwal G.R., Pharmaceutical inorganic chemistry, Edition 2021, Volume 1, Himalaya Publishing House.

II. Singh H.K., Kapoor V.K., Medicinal and Pharmaceutical Chemistry, Vallabh Prakashan.

Suggested Readings:

I. Wilson and Gisvold, "Organic, medicinal, and Pharmaceutical chemistry", Wolter Kluwer India Pvt. Ltd.

Evaluation Scheme:

	Evaluation Component	Duration	Weightage (%)	Date, Time & Venue
1	Sessional examination-I, II and III	90 Minutes	20	
2	End term examination	180 Min	80	
Total			100	

		L	T	P	C
ER20-12P	**Pharmaceutical Chemistry Practical**	**0**	**0**	**3**	**0**
Version	2.0				
Category of course	Practical				
Total Contact Hours	75 hours				
Pre-Requisites/ Co-Requisites	Pharmaceutical chemistry/ Analytical chemistry				

Course Perspective

This course provides detailed knowledge of identification, analysis and synthesis of compounds with therapeutic potential. It develops a deep understanding of the chemical structures, properties, and interactions of pharmaceuticals, alongside mastering the analytical methodologies employed to ascertain purity, safety, and efficacy of the active moiety.

Course Outcomes

Students of School of medical and allied science at the time of graduation will be capable of:
CO1: Understanding and performing the limit tests for various inorganic elements.
CO2: Applying the knowledge to prepare standard solutions using different analytical techniques.
CO3: Analyzing purity of the selected compounds against the monograph standards.
CO4: Evaluating qualitative tests to systematically identifying the unknown chemical substances.
CO5: Synthesizing chemical substances in the laboratory by observing and imitating the theoretical procedures.

Course Content **No. of Hours: 75 hours**

S. No.	Experiment
1	**Limit test for** ● Chlorides; Sulphate; Iron; heavy metals
2	Identification tests for Anions and Cations as per Indian Pharmacopoeia
3	**Fundamentals of Volumetric analysis** Preparation of standard solution and standardization of Sodium Hydroxide, Potassium Permanganate
4	**Assay of the following compounds** ● Ferrous sulphate- by redox titration ● Calcium gluconate-by complexometric ● Sodium chloride-by Modified Volhard's method ● Ascorbic acid by iodometry ● Ibuprofen by alkalimetry

5	**Fundamentals of preparative organic chemistry** Determination of Melting point and boiling point of organic compounds
6	**Preparation of organic compounds** • Benzoic acid from Benzamide • Picric acid from Phenol
7	**Identification and test for purity of pharmaceuticals** Aspirin, Caffeine, Paracetamol, Sulfanilamide
8	Systematic Qualitative analysis experiments (4 substances)

Textbooks:

1. Pharmaceutical Chemistry Lab Manual By Amrita Parle Second Edition
2. Organic Chemistry by I.L. Finar, Volume-I
3. Organic Chemistry by P.L.Soni
4. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.
5. Vogel's Inorganic Analysis
6. Organic Chemistry by Morrison and Boyd.
7. Heterocyclic Chemistry by T.L. Gilchrist.

Suggested Readings:

1. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
2. Practical Organic Chemistry by Mann and Saunders.
3. Heterocyclic Chemistry by Raj K. Bansal

Open Educational Resources (OER):

1. **Videos:**
   - https://ww w.youtube.c om/watch?v=nSGr1Dg nrCE
   - https://www.youtube.com/watch?v=sn1CNpH hnmU
   - https://www.youtube.com/c/DrPuspendraClasses

Evaluation Scheme:

	Evaluation Component	**Duration**	**Weightage (%)**	**Date**
2	Sessional I/II Examination (Practical Examination)	180 Minutes	20	
3	End Term Examination (Practical Examination)	180 Minutes	80	
Total			**100**	

ER20-13T	Pharmacognosy Theory	L	T	P	C
Version 2.0		3	1	0	0
Category of Course	Theory				
Total Contact Hours	75 hrs				
Pre-Requisites/ Co-Requisites	Remedial Biology				

Course Objectives

This course provides a foundation that can enhance career opportunities in various fields such as pharmaceuticals, herbal medicine, and natural product industries. It helps in equipping the skills needed for roles in quality control, research and development and product formulation. The course also opens doors to opportunities in regulatory affairs, where knowledge of natural substances is crucial for ensuring product safety and compliance. It also aligns with growing trends in industries seeking eco-friendly solutions and increasing employability in emerging pharmaceutical sectors.

Course Outcomes (COs)

Upon successful completion of this course, the students will be capable of

CO1: Understanding fundamental principles of pharmacognosy and their applications to pharmaceuticals

CO2: Applying this knowledge in identification, cultivation and application of various herbs in health food prescribing for solving various health issues.

CO3: Analysing various processes and latest techniques for identification of phytoconstituents.

Course Content

Chapter	Topic		Hours
1	Definition, history, present status and scope of Pharmacognosy		2
2	Classification of drugs: • Alphabetical • Taxonomical • Morphological • Pharmacological • Chemical • Chemotaxonomically		4
3	Quality control of crude drugs: Different methods of adulteration of crude drugs Evaluation of crude drugs		6
4	Brief outline of occurrence, distribution, isolation, identification tests, therapeutic activity and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.		

5	Biological source, chemical constituents and therapeutic efficacy of the following categories of crude drugs.		. 30
	Laxative	Aloe, Castor oil, Ispaghula, Senna	
	Cardiotonic	Digitalis, Arjuna	
	Carminatives and G.I. regulators	Coriander, Fennel, Cardamom, Ginger, Clove, Black Pepper, Asafoetida, Nutmeg, Cinnamon	
	Astringents	Myrobalan, Black Catechu, Pale Catechu	
	Drugs acting on nervous system	Hyoscyamus, Belladonna, Ephedra, Opium, Tea leaves, Coffee seeds, Coca	
	Anti-hypertensive	Rauwolfia	
	Anti-tussive	Vasaka, Tolu Balsam	
	Anti-rheumatics	Colchicum seed	
	Anti-tumour	Vinca, Podophyllum	
	Antidiabetics	Pterocarpus, Gymnema	
	Diuretics	Gokhru, Punarnava	
	Antiseptics and disinfectants	Benzoin, Myrrh, Neem, Turmeric	
	Antimalarials	Cinchona, Artemisia	
	Oxytocic	Ergot	
	Vitamins	Cod liver oil, Shark liver oil	
	Enzymes	Papaya, Diastase, Pancreatin, Yeast	
	Pharmaceutical Aids	Kaolin, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatine	

	Miscellaneous	Squill, Galls, Ashwagandha, Tulsi, Guggul	
6	Plant fibres used as surgical dressings: Cotton, silk, wool and regenerated fibres Sutures – Surgical Catgut and Ligatures		3
7	● Basic principles involved in the traditional systems of medicine like: Ayurveda, Siddha, Unani and Homeopathy ● Method of preparation of Ayurvedic formulations like: Arista, Asava, Gutika, Taila, Churna, Lehya and Bhasma		8
8	Role of medicinal and aromatic plants in national economy and their export potential		2
9	Herbs as health food: Brief introduction and therapeutic applications of: Nutraceuticals, Antioxidants, Pro-biotics, Pre-biotics, Dietary fibres, Omega-3-fatty acids, Spirulina, Carotenoids, Soya and Garlic		4
10	Introduction to herbal formulations		4
11	Herbal cosmetics: Sources, chemical constituents, commercial preparations, therapeutic and cosmetic uses of: Aloe vera gel, Almond oil, Lavender oil, Olive oil, Rosemary oil, Sandal Wood oil		4
12	Phytochemical investigation of drugs		2

Textbook

1.Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.

2. Textbook of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.

Reference Books/Materials

1. W.C. Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co.,London, 2009.

2. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.

3. Textbook of Pharmacognosy by T.E. Wallis

	Evaluation Component	**Duration**	**Weightage (%)**
1	Average of best two Sessional examination-I, II and III	90 Minutes	20
2	End term examination	180 Min	80
Total			**100**

ER20-13P	Pharmacognosy – Practical	L	T	P	C
Version 2.0		0	0	3	0
Category of Course	Practical				
Total Contact Hours	75 hrs				
Pre-Requisites/ Co-Requisites	Pharmaceutics and Pharmacognosy				

Course Perspective

This course focuses on understanding and identifying various medicinal plants by examining their physical traits and microscopic characteristics. It involves hands-on evaluations of natural substances using established methods. Through the study of plant materials, analytical skills are enhanced, fostering an appreciation for the internal structures and potential health benefits of these plants. Ultimately, the course provides essential knowledge for effectively using and ensuring the quality of medicinal plants in professional contexts.

Course Outcomes

Upon completion of the course the learner will be capable of

CO1: Understanding the physical and internal features of medicinal plants for identification.
CO2: Applying various tests to evaluate the quality and purity of natural substances.
CO3: Analyzing cross-sections of plant materials to observe microscopic traits for classification.
CO4: Assessing the therapeutic potential and quality standards of medicinal plants for use in formulations.

Course Content

1. **Morphological Identification of the following drugs:**
   Ispaghula, Senna, Coriander, Fennel, Cardamom, Ginger, Nutmeg, Black Pepper, Cinnamon, Clove, Ephedra, Rauwolfia, Gokhru, Punarnava, Cinchona, Agar.
2. **Gross anatomical studies (Transverse Section) of the following drugs:**
   Ajwain, Datura, Cinnamon, Cinchona, Coriander, Ashwagandha, Liquorice, Clove, Curcuma, Nux vomica, Vasaka
3. **Physical and chemical tests for evaluation of any FIVE of the following drugs:** Asafoetida, Benzoin, Pale catechu, Black catechu, Castor oil, Acacia, Tragacanth, Agar, Guar gum, Gelatine.

Learning Experience

- **Plant Identification:** Accurately identify and classify medicinal plants and natural substances using morphological and anatomical features.
- **Extraction Techniques:** Perform various extraction methods to isolate active compounds from plant materials, evaluating their purity and effectiveness.
- **Phytochemical Screening:** Conduct tests to analyze the presence of phytochemicals, assessing their potential therapeutic properties.

- **Quality Control:** Implement quality control procedures to ensure the authenticity and standardization of herbal products and natural remedies.

Textbooks

1. Text book of Pharmacognosy by C. K. Kokate, S. B. Gokhale, A.P. Purohit, Nirali Prakashan.
2. Text book of Pharmacognosy by C.S. Shah and J. S. Qadry, CBS Publishers & Distributors Pvt. Ltd.
3. Text Book of Pharmacognosy by T. E. Wallis. CBS Publishers & Distributors Pvt. Ltd.

Suggested Readings

1. Study of crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal
2. Powder crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal
3. Anatomy of crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal
4. Augmented Textbook of Homeopathic Pharmacy by Dr. D. D. Banerjee, Jain Publishers (P) Ltd.

Open Educational Resources (OER)

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4629281/
2. https://diabit.blogspot.com/2020/04/chapter-8-gross-anatomical-studies-id.html
3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4542405/

Evaluation Scheme

Evaluation Scheme:				
	Evaluation Component	**Duration**	**Weightage (%)**	**Date**
1	Sessional examination-I, II and III	180 Minutes	20	
2	End term examination	180 Minutes	80	
Total			**100**	

ER20-14T	HUMAN ANATOMY AND PHYSIOLOGY	L	T	P	C
Version		**3**	**1**	**0**	**0**
Category of Course	Theory				
Total Contact Hours	75				
Pre-Requisites/ Co-Requisites	Biology				

(L – Lecture T – Tutorial P – Practical C – Credits)

Course Perspective

This course imparts a foundational understanding of the human body's structure and functional mechanisms, focusing on the balance maintained within various systems. It explores the interaction between these systems and provides insights into how they operate collectively. The course enhances the ability to identify and address imbalances and conditions, enabling informed responses to practical situations. This course helps in developing a deeper comprehension of essential bodily processes and their significance in maintaining overall well-being.

Course Outcomes

Upon completion of the course the learner will be able to:

CO1: Understanding the working of different systems and structures in the body.
CO2: Applying this knowledge to assess bodily functions and identify abnormalities and irregularities.
CO3: Analyzing key physiological indicators and their roles in maintaining health.

Course Content

Chapter	Topic	Hours
1	Scope of Anatomy and Physiology Definition of various terminologies	2
2	Structure of Cell: Components and its functions	2
3	Tissues of the human body: Epithelial, Connective, Muscular and Nervous tissues – their sub-types and characteristics.	4
4	Osseous system: structure and functions of bones of axial and appendicular skeleton Classification, types and movements of joints, disorders of joints	6
5	Haemopoietic system • Composition and functions of blood • Process of Hemopoiesis • Characteristics and functions of RBCs, WBCs, and platelets • Mechanism of Blood Clotting • Importance of Blood groups	8
6	Lymphatic system ● Lymph and lymphatic system, composition, function and its formation ● Structure and functions of spleen and lymph node	3
7	Cardiovascular system • Anatomy and Physiology of heart	8

	• Blood vessels and circulation (Pulmonary, coronary and systemic circulation) • Cardiac cycle and Heart sounds, Basics of ECG • Blood pressure and its regulation	
8	Respiratory system • Anatomy of respiratory organs and their functions. • Regulation, and Mechanism of respiration. • Respiratory volumes and capacities – definitions	4
9	Digestive system ● Anatomy and Physiology of the GIT ● Anatomy and functions of accessory glands ● Physiology of digestion and absorption	8
10	Skeletal muscles ● Histology ● Physiology of muscle contraction ● Disorder of skeletal muscles	2
11	Nervous system ● Classification of nervous system ● Anatomy and physiology of cerebrum, cerebellum, mid brain ● Function of hypothalamus, medulla oblongata and basal ganglia ● Spinal cord-structure and reflexes ● Names and functions of cranial nerves ● Anatomy and physiology of sympathetic and parasympathetic nervous system (ANS)	8
12	Sense organs - Anatomy and physiology of ● Eye ● Ear ● Skin ● Tongue ● Nose	6
13	Urinary system ● Anatomy and physiology of urinary system ● Physiology of urine formation ● Renin - angiotensin system ● Clearance tests and micturition	4
14	Endocrine system (Hormones and their functions) ● Pituitary gland ● Adrenal gland ● Thyroid and parathyroid gland ● Pancreas and gonads	6
15	Reproductive system ● Anatomy of male and female reproductive system ● Physiology of menstruation ● Spermatogenesis and Oogenesis ● Pregnancy and parturition	4

Learning Experience

- **Lectures and Demonstrations:** Core concepts will be taught through interactive lectures with visual aids and real-life examples.

- **Hands-On Learning:** Practical lab sessions and virtual simulations will provide experiential learning opportunities.
- **Assignments and Assessments:** Regular quizzes, practical assignments, and comprehensive exams will assess understanding and application of course material.
- **Support and Feedback:** Instructors will offer additional support through accademic hours, and students will be encouraged to seek help and collaborate with peers.

Textbooks

- Ross and Wilson Anatomy and Physiology in Health and illness
- Human Anatomy and Physiology by Tortora Gerard J

Suggested Readings

- anatomy and physiology ross and wilson - Search (bing.com)
- (PDF) Principles of Anatomy and Physiology 14e with Atlas of the Skeleton Set by Gerard J. Tortora | Paula C - Academia.edu

Open Educational Resources (OER)

- Books
- PPT
- Notes
- Videos

Evaluation Scheme

Evaluation Scheme:

	Evaluation Component	Duration	Weightage (%)	Date, Time & Venue
1	Sessional examination-I, II and III	90 Minutes	20	
4	End term examination	180 Min	80	
Total			**100**	

ER20-14P	HUMAN ANATOMY AND PHYSIOLOGY-PRACTICAL	L	T	P	C
Version		**0**	**0**	**3**	**0**
Category of Course	Practical				
Total Contact Hours	75				
Pre-Requisites/ Co-Requisites	Biology				

(L – Lecture T – Tutorial P – Practical C – Credits)

Course Perspective

The course provides hands-on experience to reinforce theoretical concepts related to the human body's structure and functions. It involves practical exploration of various body systems. Laboratory exercises enhance the ability to identify and address physiological conditions. This course emphasizes the application of knowledge in real-world scenarios, promoting critical thinking and problem-solving capabilities.

Course Outcomes

Upon completion of the course the learner will be capable of

CO1: Understanding essential concepts related to human body and their importance through hands-on observation.
CO2: Applying the knowledge gained by performing practicals and monitoring various indicators to assess overall health.
CO3: Analysing the findings to recognize patterns and make informed decisions about health.

Course Content

S. No.	Title of Experiments	Hours/week
1.	Study of Compound microscope	3
2.	General techniques for the collection of blood.	3
3.	Microscopic Examination of Various Tissues	3
4.	Study of Human Skeleton-Axial Skeleton And Appendicular Skeleton	3
5.	Determination of Blood Group	3
6.	Determination of the ESR	3
7.	Determination of Haemoglobin Content of Blood	3
8.	Determination of Bleeding Time and Clotting Time	3
9.	Determination of WBC Count of Blood	3
10.	Determination of RBC Count of Blood	3
11.	Determination of Differential count of blood	3

12.	Recording of Blood Pressure	3
13.	Recording of Body Temperature by using a clinical thermometer	3
14.	Recording the Pulse Rate, Heart Rate, And Respiratory Rate	3
15.	Recording the Pulse Oxygen	3
16.	Determination of Force of Air Expelled using Peak Flow Meter	3
17.	Measurement of the height, weight and BMI of Human being	3
18.	Study of Human Cardiovascular System	3
19.	Study of Human Respiratory System	3
20.	Study of Human Digestive System and its organs	3
21.	Study of Human Urinary System and its organs	3
22.	Study of Human Endocrine System and its organs	3
23.	Study of Human Reproductive System and its organs	3
24.	Study of Human Central Nervous System and its organs	3
25.	Study of Human Sense Organs (Eye, Ear & Skin)	3

Learning Experience

- **Hands-on Skills:** These practicals offer real-world experience in handling equipment, conducting experiments, and performing clinical measurements, vital for healthcare qpractice.
- **Deeper Understanding:** Observing tissues, organs, and physiological functions enhances theoretical knowledge with tangible, visual learning.
- **Critical Analysis:** Engaging with tasks like blood testing, body measurements, and system studies fosters analytical thinking and precision.
- **Clinical Relevance:** The experiments connect directly to healthcare practices, building foundational skills for diagnostics and patient care.
- **Holistic Learning:** The comprehensive scope covers multiple systems of the body, helping to integrate and apply knowledge across different areas of anatomy and physiology.

Textbooks

- S.R. Kale and R.R. Kale, Textbook of Practical Anatomy and Physiology
- Goyal R.K., Natvar M.P. and Shah S.A., Practical Anatomy, Physiology and Biochemistry, Experimental Physiology

Open Educational Resources (OER)

- Books
- PPT
- Charts/Models
- Videos

Evaluation Scheme

Evaluation Scheme:				
	Evaluation Component	**Duration**	**Weightage (%)**	**Date, Time & Venue**
1	Sessional examination-I, II, and III	180 Minutes	20	
4	End term examination	180 Minutes	80	
Total			100	

ER20-15T	Social Pharmacy (Theory)	L	T	P	
Version 2.0		0	0	3	
Category of course	Theory				
Total Contact Hours	75 hrs.				
Pre-requisites/Exposure	Social Sciences				
Co-requisites	Pharmaceutics				

Course Perspectives

This course is designed to align academic knowledge with career and professional development goals. By focusing on public health, preventive care, nutrition, microbiology, and health systems, it prepares students for a variety of roles in pharmacy and public health. It also equips them with the skills needed for career advancement and professional growth, ensuring they can contribute effectively to community health and the broader healthcare system.

Course Outcomes (COs)

On completion of this course, the student will be capable of:

CO1: Understanding various sources of health hazards and preventive measures for diseases.

CO2: Applying knowledge for the successful implementation of various national health programs and engaging in discussions about the roles of pharmacists in these programs.

CO3: Analysing various healthcare issues related to food and nutritional substances.

Course Content

Chapter		Hours
1.	**Introduction to Social Pharmacy** • Definition and Scope. Social Pharmacy as a discipline and its scope in improving the public health. Role of Pharmacists in Public Health. (2) • Concept of Health -WHO Definition, various dimensions, determinants, and health indicators. (3) • National Health Policy – Indian perspective (1) • Public and Private Health System in India, National Health Mission (2) • Introduction to Millennium Development Goals, Sustainable Development Goals, FIP Development Goals (1)	9
2	**Preventive healthcare** – Role of Pharmacists in the following • Demography and Family Planning (3) • Mother and child health, importance of breastfeeding, ill effects of infant milk substitutes and bottle feeding (2) • Overview of Vaccines, types of immunity and immunization (4) • Effect of Environment on Health – Water pollution, importance of safe drinking water, waterborne diseases, air pollution, noise pollution, sewage and solid waste disposal, occupational illnesses, Environmental pollution due to pharmaceuticals (7)	18

	• Psychosocial Pharmacy: Drugs of misuse and abuse – psychotropics, narcotics, alcohol, tobacco products. Social Impact of these habits on social health and productivity and suicidal behaviours (2)	
3	**Nutrition and Health** • Basics of nutrition – Macronutrients and Micronutrients (3) • Importance of water and fibres in diet (1) • Balanced diet, Malnutrition, nutrition deficiency diseases, ill effects of junk foods, calorific and nutritive values of various foods, fortification of food (3) • Introduction to food safety, adulteration of foods, effects of artificial ripening, use of pesticides, genetically modified foods (1) • Dietary supplements, nutraceuticals, food supplements – indications, benefits, Drug-Food Interactions (2)	10
4	**Introduction to Microbiology and common microorganisms** (3) **Epidemiology:** Introduction to epidemiology, and its applications. Understanding of terms such as epidemic, pandemic, endemic, mode of transmission, outbreak, quarantine, isolation, incubation period, contact tracing, morbidity, mortality, . (2) Causative agents, epidemiology and clinical presentations and Role of Pharmacists in educating the public in prevention of the following communicable diseases: • Respiratory infections – chickenpox, measles, rubella, mumps, influenza (including Avian-Flu, H1N1, SARS, MERS, COVID-19), diphtheria, whooping cough, meningococcal meningitis, acute respiratory infections, tuberculosis, Ebola (7) • Intestinal infections – poliomyelitis, viral hepatitis, cholera, acute diarrheal diseases, typhoid, amebiasis, worm infestations, food poisoning (7) Arthropod-borne infections - dengue, malaria, filariasis and, chikungunya (4) • Surface infections – trachoma, tetanus, leprosy (2) • STDs, HIV/AIDS (3)	28
5	Introduction to health systems and all ongoing National Health programs in India, their objectives, functioning, outcome, and the role of pharmacists.	8
6	Pharmacoeconomics – Introduction, basic terminologies, importance of pharmacoeconomics	2

Learning Experience (Theory Focus)

Hands-on Skills

Engage in case studies and simulations that provide practical applications of theoretical concepts, such as disease prevention, health policies, and nutrition.

Deeper Understanding

Explore the definitions and dimensions of health, and the role of various determinants and indicators, through in-depth discussions and analyses of real-world examples.

Critical Analysis

Analyze national health policies and programs, assessing their effectiveness and relevance to public health challenges through group projects and presentations.

Clinical Relevance

Relate theoretical knowledge of diseases and health systems to current healthcare practices, emphasizing the pharmacist's role in public health initiatives.

Holistic Learning

Integrate knowledge across various subjects, such as microbiology, nutrition, and epidemiology, to understand the interconnectedness of health issues and their impact on community health.

Text Books

- Social Pharmacy: Tayler, Geoffrey. Pharmaceutical Press. London.
- S Khurana, P Suresh and R Kalsi. Health Education & Community Pharmacy. S Vikas & Co.
- Textbook by Dandiya PC, Zafer ZYK, Zafer A. Health education & Community Pharmacy. Vallabh Prakashan.

Reference Books/OERs

- Social Pharmacy – Innovation and development. Geoff Harding, Sarah Nettleton and Kevin Taylor. The Pharmaceutical Press.
- Websites of Ministry of Health and Family Welfare, National Health Portal
- Various WHO publications www.who.int

Sr. No.	Evaluation Component	Duration	Weightage (%)
1	Sessional examination-I, II and III	90 Minutes	20
2	End term examination	180 min	80
Total			100

ER20-15P	**Social Pharmacy** (Practical)	L	T	P	C
Version 2.0		0	0	3	0
Category of course	Practical				
Total Contact Hours	75 hrs.				
Pre-requisites/Exposure	Social Sciences				
Co-requisites	Pharmaceutics				

Course Perspectives:

This course is designed to imparting hands-on knowledge and skills essential for public health improvement. It covers diverse areas including immunization schedules, reproductive and child health, and family planning devices. It provides insights into practical knowledge related to personal and public hygiene. The course also emphasizes on health communication, water purification and dietary counselling, providing students with the ability to educate the public on health, hygiene and nutrition.

Course outcomes

On completion of this course, the student will be capable of:

CO1: Understanding and explaining social pharmacy principles and their importance in healthcare.

CO2: Applying the knowledge gained in demonstrating hands-on skills using pharmacy tools and equipments.

CO3: Analysing community health data and conduct needs-assessment with real-world cases requiring interdisciplinary problem-solving.

CO4: Evaluating the outcomes of health interventions on community health and engaging in self-assessment and peer feedback sessions to identify areas in need of improvement.

Course content

1. National immunization schedule for children, adult vaccine schedule, Vaccines which are not included in the National Immunization Program.
2. RCH – reproductive and child health – nutritional aspects, relevant national health programmes.
3. Family planning devices
4. Microscopical observation of different microbes (readymade slides)
5. Oral Health and Hygiene
6. Personal hygiene and etiquettes – hand washing techniques, Cough and sneeze etiquettes.
7. Various types of masks, PPE gear, wearing/using them, and disposal.
8. Menstrual hygiene, products used
9. First Aid – Theory, basics, demonstration, hands on training, audio-visuals, and practice, BSL (Basic Life Support) Systems [SCA - Sudden Cardiac Arrest, FBAO - Foreign Body Airway Obstruction, CPR, Defibrillation (using AED) (Includes CPR techniques, First Responder).

10. Emergency treatment for all medical emergency cases viz. snake bite, dog bite, insecticide poisoning, fractures, burns, epilepsy etc.
11. Role of Pharmacist in Disaster Management.
12. Marketed preparations of disinfectants, antiseptics, fumigating agents, antilarval agents, mosquito repellents, etc.
13. Health Communication: Audio / Video podcasts, Images, Power Point Slides, Short Films, etc. in regional language(s) for mass communication / education / Awareness on 5 different communicable diseases, their signs and symptoms, and prevention.
14. Water purification techniques, use of water testing kit, calculation of Content/percentage of KMnO4, bleaching powder to be used for wells/tanks
15. Counselling children on junk foods, balanced diets – using Information, Education and Communication (IEC), counselling, etc. (Simulation Experiments).
16. Preparation of various charts on nutrition, sources of various nutrients from Locally available foods, calculation of caloric needs of different groups (e.g. child, mother, sedentary lifestyle, etc.). Chart of glycemic index of foods.
17. Tobacco cessation, counselling, identifying various tobacco containing products through charts/pictures.

Learning Experience

1. **Leadership in Health Awareness**: The course empowers students to take leadership roles in promoting public health awareness, from vaccinations to tobacco cessation campaigns.
2. **Proficiency in First Aid and Emergency Response**: Gaining skills in CPR, defibrillation, and emergency treatment significantly enhances students' capabilities in life-saving interventions and first-responder responsibilities.
3. **Competency in Health Education**: Through health communication exercises, students develop strong communication and interpersonal skills, allowing them to educate diverse populations on critical health issues.
4. **Critical Thinking in Disease Prevention**: Understanding microbiology, disease prevention techniques, and epidemiology equips students with critical thinking abilities essential for tackling healthcare challenges.
5. **Professional Ethics and Social Responsibility**: Engaging in activities such as menstrual hygiene and disaster management fosters a sense of social responsibility and ethical professional behavior in pharmacy practice.

Text Books

- Social Pharmacy: Tayler, Geoffrey. Pharmaceutical Press. London.
- S Khurana, P Suresh and R Kalsi. Health Education & Community Pharmacy. S Vikas & Co.

Reference Books/OERs

- Websites of Ministry of Health and Family Welfare, National Health Portal
- Various WHO publications www.who.int

Sr. No.	Evaluation Component	Duration	Weightage (%)
1	Sessional examination-I, II and III	180 Minutes	20
2	End term examination	180 min	80
Total			100

D. Pharmacy IInd Year

ER2021 T	Pharmacology – Theory	L	T	P	C
Version	2.0	**3**	**1**	**0**	**0**
Category of Course	Core				
Total Contact Hours	75				
Pre-Requisites/ Co-Requisites	Human Anatomy and Physiology				

Course Perspective

This course offers a foundational understanding of drug interactions and their effects on the body, developing key skills for applying pharmacological principles in practical settings. As the course progresses, it deepens theoretical knowledge, preparing individuals for roles in pharmacy practice, healthcare, and regulatory sectors. It provides a strong base for future career growth in the pharmaceutical and healthcare industries.

Course Outcomes (Cos)

Upon completion of the course the learner will be capable of

CO1: Explaining fundamental pharmacological concepts and principles, detailing how drugs interact with biological systems.

CO2: Applying the knowledge gained so far using case studies related to drug interactions and their implications in health outcomes.

CO3: Analyzing theoretical scenarios related to drug distribution and patient care to identify challenges and propose evidence-based solutions.

Course Content

		Hours
Unit I.	**General Pharmacology**	**10 hr**
	Introduction and scope of Pharmacology	1
	Various routes of drug administration - advantages and disadvantages	1
	Drug absorption - definition, types, factors affecting drug absorption	1
	Bioavailability and the factors affecting bioavailability	1
	Drug distribution - definition, factors affecting drug distribution	1
	Biotransformation of drugs - Definition, types of biotransformation reactions, factors influencing drug metabolisms.	2
	Excretion of drugs - Definition, routes of drug excretion	1
	General mechanisms of drug action and factors modifying drug action	2
Unit II.	**Drugs Acting on the Peripheral Nervous System**	**11 hr**
	• Steps involved in neurohumoral transmission • Definition, classification, pharmacological actions, dose,indications, and contraindications of	2
	a) Cholinergic drugs	2
	b) Anti-Cholinergic drugs	1
	c) Adrenergic drugs	1

	d) Anti-adrenergic drugs	1
	e) Neuromuscular blocking agents	1
	f) Drugs used in Myasthenia gravis	1
	g) Local anaesthetic agents	1
	h) Non-Steroidal Anti-Inflammatory drugs	1
Unit III	**Drugs Acting on the Eye**	**2 hr**
	Definition, classification, pharmacological actions, dose, indications and contraindications of Miotics	1
	Mydriatics	30 min
	Drugs used in Glaucoma	30 min
Unit IV	**Drugs Acting on the Central Nervous System**	**8 hr**
	Definition, classification, pharmacological actions, dose,indications, and contraindications of	
	General anaesthetics	1
	Hypnotics and sedatives	1
	Anti-Convulsant drugs	1
	Anti-anxiety drugs	30 min
	Anti-depressant drugs	30 min
	Anti-psychotics	1
	Nootropic agents	1
	Centrally acting muscle relaxants	1
	Opioid analgesics	1
Unit V	**Drugs Acting on the Cardiovascular System**	**6 hr**
	Definition, classification, pharmacological actions, dose, indications, and contraindications of-	
	Anti-hypertensive drugs	1
	Anti-anginal drugs	1
	Anti-arrhythmic drugs	1
	Drugs used in atherosclerosis and	1
	Congestive heart failure	1
	Drug therapy for shock	1
	Drugs Acting on Blood and Blood Forming Organs	**4 hr**

Unit VI	Definition, classification, pharmacological actions, dose, indications, and contraindications of-	
	Hematinic agents	1
	Anti-coagulants	1
	Anti-platelet agents	1
	Thrombolytic drugs	1
Unit VII	**Definition, classification, pharmacological actions, dose, indications, and contraindications of-**	**2 hr**
	Bronchodilators	30 min
	Expectorants	30 min
	Anti-tussive agents	30 min
	Mucolytic agents	30 min
Unit VIII	**Drugs Acting on the Gastro Intestinal Tract**	**5 Hr**
	Definition, classification, pharmacological actions, dose,indications, and contraindications of	
	Anti-ulcer drugs	2
	Anti-emetics	1
	Laxatives and purgatives	1
	Anti-diarrheal drugs	1
Unit IX	**Drugs Acting on the Kidney**	**2 hr**
	Definition, classification, pharmacological actions, dose, indications, and contraindications of -	
	Diuretics	1
	Anti-Diuretics	1
Unit X	**Hormones and Hormone Antagonists**	**8 Hr**
	Physiological and pathological role and clinical uses of –	
	Thyroid hormones	1
	Anti-thyroid drugs	30 min
	Para hormone	15 min
	Calcitonin	15 min
	Vitamin D	30 min
	Insulin	1
	Oral hypoglycemic agents	1

	Estrogen	1
	Progesterone	1
	Oxytocin	30 min
	Corticosteroids	1
Unit XI	**Autocoids**	**3 hr**
	Physiological role of Histamine, 5 HT and Prostaglandins	1.5 hr.
	Classification, clinical uses, and adverse effects of antihistamines and 5 HT antagonists	1.5 hr.
Unit XII	**Chemotherapeutic Agents**	**12 hrs**
	Penicillins	1
	Cephalosporins	1
	Aminoglycosides	1
	Fluoroquinolones	1
	Macrolides	1
	Tetracyclines	30 min
	Sulphonamides	30 min
	Anti-tubercular drugs	1
	Anti-fungal drugs	1
	Anti-viral drugs	1
	Anti-amoebic agents	30 min
	Anthelmintics	30 min
	Anti-malarial agents	1
	Anti-neoplastic agents	1
Unit XIII	**Biologicals**	**2 hr**
	Definition, types of biological agents	1
	Indications of biological agents with examples	1
		75 hrs

Learning Experience

- **Experimental Design:** Develop skills in designing and conducting experiments to study drug effects and interactions.

- **Analytical Methods:** Use laboratory techniques such as chromatography, spectrophotometry, and bioassays to analyze drug properties and effects

Textbooks

1. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
2. Pharma Satoskar, R.S. and Bhandarkar, S.D. Pharmacology and Pharmacotherapeutics

Suggested Readings

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale‟s Pharmacology,.Churchil Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill

Open Educational Resources (OER)

1. PubMed research papers related to disease/ pathway

Evaluation Scheme:

	Evaluation Component	Duration	Weightage (%)	Date
1	Sessional examination-I, II and III	90Minutes	20	
2	End Term Examination (Written Examination)	180 Minutes	80	
Total			100	

Year :2					
ER2021 P	Pharmacology – Practical	**L**	**T**	**P**	**C**
Version	2.0	**0**	**0**	**2**	**0**
Category of Course	Core				
Total Contact Hours	50				
Pre-Requisites/ Co-Requisites	Human Anatomy and Physiology				

Course Perspective

The practical pharmacology learning experience enhances students' technical skills in lab techniques and equipment use, teaches them experimental design and data analysis, and deepens their understanding of drug mechanisms. Through hands-on practice, students observe drug interactions with biological systems, explore dose-response relationships, and apply pharmacological principles to real-world scenarios.

Course Outcomes

Upon completion of the course the learner will be able to:

CO1: Studying and reporting the local anesthetic, mydriatic, and miotic effects of the given drug on the rabbit eye.

CO 2: Choosing an appropriate animal experiment model to study the effects of drugs acting on the central nervous system and submitting the report.

CO 3 Performing experiments with given (simulated) tissues on isolated organs/tissues and interpreting the results.

CO 4: Interpreting the dose-dependent responses of drugs in various animal experiment models.

Course Content

- Introduction to experimental pharmacology
- Study of laboratory animals (a) Mice; (b) Rats; (c) Guinea pigs; (d) Rabbits
- Commonly used instruments in experimental pharmacology
- Different routes of administration of drugs in animals
- Types of pre-clinical experiments: In-Vivo, In-Vitro, Ex-Vivo, etc. 6. Techniques of blood collection from animals
- Study of local anaesthetics on rabbit eye
- Study of Mydriatic effect on rabbit eye
- Study of Miotic effect on rabbit eye
- Effect of analgesics using Analgesiometer
- Study of analgesic activity by writhing test
- Screening of anti-convulsant using Electro Convulsiometer
- Screening of Muscle relaxants using Rota-Rod apparatus

- Screening of CNS stimulants and depressants using Actophotometer
- Study of anxiolytic activity using elevated plus maze method
- Study of effect of drugs (any 2) on isolated heart
- Effect of drugs on ciliary motility on frog's buccal cavity
- Pyrogen testing by rabbit method

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. Introduction to Allergy Testing

2. Introduction to Toxicity Studies

3. Drug Facts Labels of US FDA

4. Pre-clinical studies in new drug development

5. Medicines and meals: Before or After food

6. Pre-clinical studies in new drug development

7. Drugs available as paediatric formulations

8. Drug information apps

Textbooks

1. K. D. Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
2. Pharma Satoskar, R.S. and Bhandarkar, S.D. Pharmacology and Pharmacotherapeutics

Suggested Readings

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale‟s Pharmacology,.Churchil Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill

Open Educational Resources (OER)

PubMed research papers related to disease/ pathway

Learning Experience

A. Drug Mechanisms:

- **Pharmacodynamics:** Understand how drugs exert their effects on the body, including receptor interactions, signal transduction pathways, and the molecular basis of drug action.

- **Pharmacokinetics:** Learn about the processes of drug absorption, distribution, metabolism, and excretion (ADME), and how these processes affect drug efficacy and safety.

B. Drug Classification and Use:

- **Drug Classes:** Study different classes of drugs, their therapeutic uses, mechanisms of action, and side effects.
- **Therapeutic Applications:** Gain knowledge about how drugs are used to treat various diseases and conditions, including their indications, contraindications, and potential interactions.

Evaluation Scheme:

	Evaluation Component	Duration	Weightage (%)	Date
1	Mid Term Examination (Written Examination)	90Minutes	20	
2	End Term Examination (Written Examination)	180 Minutes	80	
Total			100	

ER20-22T	Community Pharmacy & Management – Theory	L	T	P	C
Version 2.0		3	1	0	0
Category of Course	Core				
Total Contact Hours	75 hrs				
Pre-Requisites/ Co-Requisites	Pharmaceutics				

Course Perspective

This course provides the essential skills needed to excel in community pharmacy practice, emphasizing patient care, communication, and operational management. It focuses on developing leadership, ethical compliance, and practical pharmacy skills. The training prepares for managing pharmacy operations, delivering personalized patient care, and contributing to public health. Upon completion, readiness for successful careers in community pharmacy and healthcare administration is achieved.

Course Outcomes

Upon completion of the course the learner will be able to:

CO1: Understanding the professional responsibilities of pharmacists and principles of Good Pharmacy Practice.

CO2: Applying effective prescription handling, labelling, and dispensing processes in community pharmacy.

CO3: Analysing communication skills, patient counselling techniques, and strategies for improving medication adherence.

CO4: Evaluating community pharmacy management practices, including legal, financial, and operational considerations.

Course Content

UNIT 1 **2 hours**

Community Pharmacy Practice – Definition, history and development of community pharmacy – International and Indian scenarios

UNIT 2 **3 hours**

Professional responsibilities of community pharmacists

Introduction to the concept of Good Pharmacy

Practice and SOPs**.**

UNIT 3 **7 hours**

Prescription and prescription handling

Definition, parts of prescriptions, legality of prescriptions, prescription handling, labeling 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

UNIT 4 **6 hours**

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

UNIT 5 **10 hours**

Patient counseling -

Definition and benefits of patient counseling

Stages of patient counseling - Introduction, counseling content, counseling process, and closing the

Counseling session

Barriers to effective counseling - Types and strategies to overcome the barriers

Patient counseling 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

UNIT6 **2 hours**

Medication Adherence

Definition, factors influencing non- adherence, strategies to overcome non-adherence

UNIT7 **5 hours**

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

UNIT8 **15 hours**

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)

UNIT9 **25 hours**

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 softwares – usefulness and availability

Customer Relation Management (CRM)

Audits in Pharmacies

SOP of Pharmacy Management

Introduction to Digital Health, mHealth and Online pharmacies

Learning Experience

➢ Practical Training: Hands-on experience in community pharmacy settings, learning medication dispensing, patient counselling, and pharmacy operations through real-world scenarios and simulations.

➢ Clinical Placement: Internships or co-op programs in pharmacies, providing practical experience in medication management, patient interaction, and application of pharmaceutical knowledge in clinical environments.

➢ Management Skills: Understanding pharmacy management techniques, including inventory control, financial planning, and regulatory compliance, with practical applications in pharmacy operations and administration disease.

Textbooks

1. Health Education and Community Pharmacy by N.S. Parmar.
2. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical Press
3. Comprehensive Pharmacy Review – Edt. Leon Shargel. Lippincott Williams and Wilkins.

Suggested Readings

1. Good Pharmacy Practices Training Manual by IPA/CDSCO/WHO India
2. Training Module for Community Pharmacists in TB Care and Control/ by MoH/IPA
3. Hand Book of PharmaSoS, Drugs in Special population- Pregnancy and Lactation, Tobacco free future- Choice is yours: KSPC Publications.
4. Responsible Use of Medicines: A Layman's Handbook, www.ipapharma.org /publications
5. Community Pharmacy Practice around the Globe: Part One: www.ipapharma.org /publications

Open Educational Resources (OER)

1. **https://www.news-medical.net/health/Community-Pharmacy.aspx**
2. **https://www.sciencedirect.com/topics/medicine-and-dentistry/community-pharmacy**
3. **https://ipapharma.org/community-pharmacy-division/**

Evaluation Scheme

Evaluation Scheme:				
	Evaluation Component	**Duration**	**Weightage (%)**	**Date**
1	Sessional examination-I, II and III	90 Minutes	20	
2	End term examination	180 Minutes	80	
Total			**100**	

ER20-22P	**Community Pharmacy & Management – Practical**	**L**	**T**	**P**	**C**
Version 2.0		**0**	**0**	**3**	**0**
Category of Course	Practical				
Total Contact Hours	75 hrs				
Pre-Requisites/ Co-Requisites	Pharmaceutics				

Course Perspective

This practical course offers hands-on experience essential for excelling in community pharmacy practice. Emphasizing real-world applications, it focuses on developing skills in patient care, communication, and operational management. Participants engage in activities that foster leadership and ethical compliance while honing practical pharmacy skills. This training prepares individuals to effectively manage pharmacy operations, provide personalized patient care, and contribute to public health. Completion of this practical experience ensures readiness for successful careers in community pharmacy and healthcare administration.

Course Outcomes

Upon completion of the course the learner will be capable of

CO1: Understanding the principles of handling and reviewing prescriptions for accuracy and safety.

CO2: Applying knowledge of patient health assessment techniques to monitor and record vital signs.

CO3: Analyzing potential drug interactions and taking appropriate actions to ensure patient safety.

CO4: Evaluating the effectiveness of medication use and counselling in improving patient health outcomes**.**

Course Content

1. Handling of prescriptions with professional standards, reviewing prescriptions, checking for legal compliance and completeness (minimum 5)
2. Identification of drug-drug interactions in the prescription and follow-up actions (minimum 2)
3. Preparation of dispensing labels and auxiliary labels for the prescribed medications (minimum 5)
4. Providing the following health screening services for monitoring patients / detecting new patients (one experiment for each activity) Blood Pressure Recording, Capillary Blood Glucose Monitoring, Lung function assessment using Peak Flow Meter and incentive spirometer, recording capillary oxygen level using Pulse Oximeter, BMI measurement.
5. Providing counselling to simulated patients for the following chronic diseases / disorders including education on the use of devices such as insulin pen, inhalers, spacers, nebulizers, etc. where appropriate (one experiment for each disease) Type 2 Diabetes Mellitus, Primary Hypertension, Asthma, Hyperlipidaemia, Rheumatoid Arthritis
6. Providing counselling to simulated patients for the following minor ailments (any three) Headache, GI disturbances (Nausea, Vomiting, Dyspepsia, diarrhoea, constipation), Worm infestations, Pyrexia, Upper Respiratory Tract infections, Skin infections, Oral and dental disorders.
7. Appropriate handling of dummy dosage forms with correct administration techniques - oral liquids with measuring cup/cap/dropper, Eye Drops, Inhalers, Nasal drops, Insulin pen, nebulizers, different types of tablets, patches, enemas, suppositories
8. Use of Community Pharmacy Software and digital health tools

Learning Experience

- Prescription Handling: Review and verify prescriptions for accuracy, completeness, and compliance with legal standards.
- Drug Interactions: Identify and address drug-drug interactions, implementing necessary follow-up actions to ensure patient safety.
- Patient Counselling: Provide effective counselling for managing chronic diseases (e.g., diabetes, hypertension) and minor ailments (e.g., headaches, GI issues).
- Dosage Form Handling: Demonstrate correct techniques for administering various dosage forms, including liquids, tablets, and inhalers.

Textbooks

1. Health Education and Community Pharmacy by N.S. Parmar.
2. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical Press
3. Comprehensive Pharmacy Review – Edt. Leon Shargel. Lippincott Williams and Wilkins.

Suggested Readings

1. Good Pharmacy Practices Training Manual by IPA/CDSCO/WHO India
2. Training Module for Community Pharmacists in TB Care and Control/ by MoH/IPA
3. Hand Book of PharmaSoS, Drugs in Special population- Pregnancy and Lactation, Tobacco free future- Choice is yours: KSPC Publications.
4. Responsible Use of Medicines: A Layman's Handbook, www.ipapharma.org /publications
5. Community Pharmacy Practice around the Globe: Part One: www.ipapharma.org /publications

Open Educational Resources (OER)

4. https://www.news-medical.net/health/Community-Pharmacy.aspx
5. https://www.sciencedirect.com/topics/medicine-and-dentistry/community-pharmacy
6. https://ipapharma.org/community-pharmacy-division/

Evaluation Scheme

Evaluation Scheme:

	Evaluation Component	Duration	Weightage (%)	Date
1	Sessional examination-I, II and III	180 Minutes	20	
2	End term examination	180 Minutes	80	
Total			**100**	

ER 20-23T	Biochemistry and Clinical Pathology – Theory	L	T	P	C
Version:		**3**	**1**	**0**	**0**
Category of Course	Theory				
Total Contact Hours	75				
Pre-Requisites/ Co-Requisites	Pharmaceutical Chemistry				

Course Perspective

This course provides a comprehensive understanding of the biochemical foundations of life, emphasizing the role of biomolecules in health and disease. The knowledge gained enables informed decision-making based on biochemical principles. It fosters critical thinking and analytical skills essential for careers in healthcare and research. The course provides insights in real-world contexts, contributing to advancements in health and disease management.

Course Outcomes (COs)

Upon completion of the course the learner will be capable of

CO1: Understanding the fundamental principles of biochemistry, including the structure and function of biomolecules and their role in biological processes.

CO2: Applying theoretical knowledge to interpret laboratory findings related to biochemical principles and their significance in clinical contexts.

CO3: Evaluating the impact of biochemical processes on health and disease, demonstrating an understanding of their implications in clinical practice.

CO4: Analyzing theoretical case studies to identify biochemical factors influencing health outcomes, proposing evidence-based insights for understanding disease management.

Course Content

1. Introduction to biochemistry 2hr

Scope of biochemistry in pharmacy; Cell and its biochemical organization.

2. Carbohydrates 5hr

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

3. Proteins 5 hr

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.

4. Lipids 5 hr

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

5. Nucleic acids 4 hr

- Definition, purine and pyrimidine bases
- Components of nucleosides and nucleotides with examples
- Structure of DNA (Watson and Crick model), RNA and their functions

6. Enzymes **5** hr

Definition, properties and IUB and MB classification
Factors affecting enzyme activity
Mechanism of action of enzymes, Enzyme inhibitors
Therapeutic and pharmaceutical importance of enzymes

7. Vitamins **7** hr

Definition and classification with examples
Sources, chemical nature, functions, coenzyme form, recommended dietary requirements, deficiency diseases of fat-and water-soluble vitamins

8. Metabolism (Study of cycle/pathways without chemical structures) **20** hr

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

9. Minerals: **5** hr

Functions, Deficiency diseases, recommended dietary requirements of calcium, phosphorus, iron, sodium and chloride

10. Water and Electrolytes **5** hr

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

11. Introduction to Biotechnology **01**hr

12. Organ function tests **6** hr

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

13. Introduction to Pathology of Blood and Urine 6 hr

Lymphocytes and Platelets, their role in health and disease
Erythrocytes - Abnormal cells and their significance
Normal and Abnormal constituents of Urine and their significance

Learning Experience

This course will be conducted through a blend of lectures, hands-on laboratory sessions during practical course, and interactive group work to provide a comprehensive learning experience. Instructional methods will include detailed lectures on qualitative analysis of biomolecules, reinforced by multimedia presentations and virtual lab simulations to illustrate complex concepts. Students will engage in hands-on experiments, such as qualitative analysis of biomolecules and metabolites of urine and blood, to apply theoretical knowledge practically. Group activities, including case studies and collaborative problem-solving exercises, will enhance peer learning and teamwork skills. Assignments will involve real-world applications, challenging students to analyze data and draw meaningful conclusions.

To support learning, regular feedback through will be provided through assessments, quizzes, and one-on-one consultations. The course in charge will be available for additional guidance, encouraging students to seek help when needed. Collaborative learning will be emphasized, with opportunities for students to work together, exchange ideas, and conduct peer reviews, ensuring a participatory and engaging educational experience.

Text Books

1. Essentials of Biochemistry by U. Satyanarayana, Books and Allied (P) Ltd.
2. Biochemistry By: Rao, P. Gundu
3. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwel

Reference Books/Materials

1. Principles of Biochemistry by Lehninger

Open Educational Resources (OER)

Swayam course: **https://onlinecourses.nptel.ac.in/noc22_cy06/preview**

Evaluation Scheme:

	Evaluation Component	Duration	Weightage (%)	Date, Time & Venue
1	Sessional examination-I, II and III	90 Minutes	20	
4	End term examination	180 Min	80	
Total			**100**	

ER 20-23P	Biochemistry and Clinical Pathology – Practical	L	T	P	C
Version:		**0**	**0**	**2**	**0**
Category of Course	Practical				
Total Contact Hours	50				
Pre-Requisites/ Co-Requisites	Pharmaceutical Chemistry				

Course Perspective

This course aims to enhance understanding and develop skills related to the qualitative testing of various biomolecules, as well as the analysis of biological samples to identify both normal and abnormal constituents.

Course Outcomes:

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

CO1: Understanding the principles of qualitative testing for biomolecules and biological samples.

CO2: Applying knowledge to conduct qualitative tests and interpret results for normal and abnormal constituents.

CO3: Evaluating test results to assess their implications for health and disease.

CO4: Analyzing case studies on qualitative testing to draw evidence-based conclusions.

Course Content

List of Experiments **50 Hrs**

1. Qualitative analysis of carbohydrates (4 experiments)
2. Qualitative analysis of Proteins and amino acids (4 experiments)
3. Qualitative analysis of lipids (2 experiments)
4. Qualitative analysis of urine for normal and abnormal constituents (4 experiments)
5. Determination of constituents of urine (glucose, creatinine, chlorides) (2 experiments)
6. Determination of constituents of blood/serum (simulated) (Creatine, glucose, cholesterol, Calcium, Urea, SGOT/SGPT) (5 experiments)
7. Study the hydrolysis of starch from acid and salivary amylase enzyme (1 experiment)

Learning Experience

This course will be conducted through a blend of lectures, hands-on laboratory sessions during practical course, and interactive group work to provide a comprehensive learning experience. Instructional methods will include detailed lectures on qualitative analysis of biomolecules, reinforced by multimedia presentations and virtual lab simulations to illustrate complex concepts. Students will engage in hands-on experiments, such as qualitative analysis of biomolecules and metabolites of urine and blood, to apply theoretical knowledge practically. Group activities, including case studies and collaborative problem-solving exercises, will enhance peer learning and teamwork skills. Assignments will involve real-world applications, challenging students to analyze data and draw meaningful conclusions.

To support learning, regular feedback through will be provided through assessments, quizzes, and one-on-one consultations. The course in charge will be available for additional guidance, encouraging students to seek help when needed. Collaborative learning will be emphasized,

with opportunities for students to work together, exchange ideas, and conduct peer reviews, ensuring a participatory and engaging educational experience.

Text Books

4. Essentials of Biochemistry by U. Satyanarayana, Books and Allied (P) Ltd.
5. Biochemistry By: Rao, P. Gundu
6. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwel
7. Biochemistry by Kulkarni, M.V. et.al
8. Biochemistry and Clinical Pathology Practical Manual by Kale RR & Kale SR

Reference Books/Materials

2. Principles of Biochemistry by Lehninger

Open Educational Resources (OER)

Swayam course: **https://onlinecourses.nptel.ac.in/noc22_cy06/preview**

Evaluation Scheme:

	Evaluation Component	**Duration**	**Weightage (%)**	**Date, Time & Venue**
1	Sessional examination-I, II and III	120 Minutes	20	
4	End term examination	180 Min	80	
Total			**100**	

ER20-25T	HOSPITAL AND CLINICAL PHARMACY	L	T	P	C
Version		**3**	**1**	**0**	**0**
Category of Course	Theory				
Total Contact Hours	75				
Pre-Requisites/ Co-Requisites	-				

Course Perspective

This course provides essential knowledge and skills for effective participation in hospital and clinical pharmacy services. It highlights the roles and responsibilities of clinical pharmacists within healthcare settings. Through practical experiences with experienced professionals, it helps in gaining insights into pharmacy workflow and patient care.

Course Outcomes

Upon completion of the course the learner will be capable of

CO1: Understanding the essential roles and competencies required for effective pharmacy practice in healthcare settings.

CO2: Applying information resources to enhance patient care and address medication-related challenges.

CO3: Evaluating the efficiency of pharmacy operations to ensure optimal service delivery and patient safety.

Course Content

Chapter	Topic	Hours
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 relationships • Good Pharmacy Practice (GPP) in hospital • Hospital Pharmacy Standards (FIP Basel Statements, AHSP) • Introduction to NAQS guidelines and NABH Accreditation and Role of Pharmacists	**6**
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	**4**
3	**Supply Chain and Inventory Control**	**14**

	• 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 handling, and disposal. Disposal of Narcotics, cytotoxic drugs • Documentation - purchase and inventory	
4	**Drug distribution** • Drug distribution (in- patients and out - patients) – Definition, advantages and disadvantages of individual prescription order method, Floor Stock Method, Unit 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	**7**
5	**Compounding in Hospitals** Bulk compounding, IV admixture services and incompatibilities, Total parenteral nutrition	**4**
6	**Radio Pharmaceuticals -** Storage, dispensing and disposal of radiopharmaceuticals	**2**
7	Application of computers in Hospital Pharmacy Practice, Electronic health records, Softwares used in hospital pharmacy	**2**
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 • Interprofessional collaboration	**12**

	Pharmaceutical care: Definition, classification of drug related problems. Principles and procedure to provide pharmaceutical care **Medication Therapy Management, Home Medication Review**	
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 • Fluid and electrolyte balance • Pulmonary Function Tests	**10**
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	**6**
11	**Pharmacovigilance** • Definition, aim and scope • Overview of Pharmacovigilance	**2**
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	**6**

Learning Experience

- **Lectures and Demonstrations:** Core concepts will be taught through interactive lectures with visual aids and real-life examples.
- **Hands-On Learning:** Practical lab sessions and virtual simulations will provide experiential learning opportunities.
- **Assignments and Assessments:** Regular quizzes, practical assignments, and comprehensive exams will assess understanding and application of course material.
- **Support and Feedback:** Instructors will offer additional support through academic hours, and students will be encouraged to seek help and collaborate with peers.

Textbooks

- A Textbook of Clinical Pharmacy Practice - Essential concepts and skills - Parthasarathi G, Karin Nyfort-Hansen and Milap Nahata. Orient Longman Pvt. Ltd. Hyderabad
- Text Book of Hospital and Clinical Pharmacy by Dr. Pratibha Nand and Dr. Roop K Khar, Birla publications, New Delhi.
- Gupta B.K and Gupta R.N., GPP in Hospital Pharmacy, Vallabh Prakashan.
- Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc
- Australian drug information- Procedure manual. The Society of Hospital Pharmacists of Australia

Open Educational Resources (OER)

- Books
- PPT
- Notes
- Videos

Evaluation Scheme

Evaluation Scheme:

	Evaluation Component	Duration	Weightage (%)	Date, Time & Venue
1	Sessional examination-I, II and III	90 Minutes	20	
4	End term examination	180 Min	80	
Total			**100**	

ER20-25P	HOSPITAL AND CLINICAL PHARMACY -PRACTICAL	L	T	P	C
Version		**0**	**0**	**1**	**0**
Category of Course					
Total Contact Hours	25				
Pre-Requisites/ Co-Requisites	**Biology**				

Course Perspective

This course provides a comprehensive education that combines drug information management and clinical skills with practical techniques. It bridges theoretical knowledge and real-world experience, preparing individuals for challenges in clinical and pharmacy settings. The focus on optimizing drug therapy and managing adverse reactions enhances essential skills for effective healthcare delivery. Emphasizing accuracy in drug administration promotes patient safety and precision in practice.

Course Outcomes

Upon completion of the course the learner will be able to:

CO1: Observing and understanding the integration of drug information management and clinical skills in real-world pharmacy practice.
CO2: Imitating and applying hands-on techniques learned in practical sessions to enhance proficiency in drug administration and patient care.
CO3: Adapting and analysing clinical knowledge and skills to optimize drug therapy and manage adverse drug reactions effectively in various healthcare settings.

Course Content

S. No.	Title of Experiments	Hour/week
1.	A systematic approach to drug information queries using primary / secondary / tertiary resources of information (Case-I)	1
2.	A systematic approach to drug information queries using primary / secondary / tertiary resources of information (Case-II)	1
3.	A systematic approach to drug information queries using primary / secondary / tertiary resources of information (Case-III)	1
4.	Interpretation of laboratory reports to optimize the drug therapy in a given clinical case (Case-I)	1
5.	Interpretation of laboratory reports to optimize the drug therapy in a given clinical case (Case-II)	1
6.	Interpretation of laboratory reports to optimize the drug therapy in a given clinical case (Case-III)	1
7.	Filling up IPC's ADR Reporting Form and perform causality assessments using various scales (Case-I)	1

8.	Filling up IPC's ADR Reporting Form and perform causality assessments using various scales (Case-II)	1
9.	Filling up IPC's ADR Reporting Form and perform causality assessments using various scales (Case-III)	1
10.	Demonstration / simulated / hands-on experience on the identification, types, use / application /administration of Orthopaedic and Surgical Aids such as knee cap, LS belts, abdominal belt, walker, walking sticks, etc.	1
11.	Demonstration / simulated / hands-on experience on the identification, types, use / application /administration of Different types of bandages such as sterile gauze, cotton, crepe bandages, etc.	1
12.	Demonstration / simulated / hands-on experience on the identification, types, use / application /administration of Needles, syringes, catheters, IV set, urine bag, RYLE's tube, urine pots, colostomy bags, oxygen masks, etc.	1
13.	Case studies on drug-drug interactions (Case I)	1
14.	Case studies on drug-drug interactions (Case II)	1
15.	Case studies on drug-drug interactions (Case III)	1
16.	Wound dressing(Case I)	1
17.	Wound dressing(Case II)	1
18.	Wound dressing(Case III)	1
19.	Wound dressing(Case IV)	1
20.	Vaccination and injection techniques (IV, IM, SC) using mannequins (Activity 1)	1
21.	Vaccination and injection techniques (IV, IM, SC) using mannequins(Activity 2)	1
22.	Vaccination and injection techniques (IV, IM, SC) using mannequins(Activity 3)	1
23.	Vaccination and injection techniques (IV, IM, SC) using mannequins(Activity 4)	1
24.	Vaccination and injection techniques (IV, IM, SC) using mannequins(Activity 5)	1
25.	Use of Hospital Pharmacy Software and various digital health tools	1

Learning Experience

- **Resource Utilization:** Learn to systematically use primary, secondary, and tertiary resources for drug information queries, improving research and problem-solving skills.
- **Lab Report Interpretation:** Develop the ability to interpret laboratory reports to optimize drug therapy, enhancing clinical decision-making.
- **ADR Reporting:** Gain expertise in filling out ADR reporting forms and performing causality assessments, crucial for monitoring drug safety.

- **Practical Skills:** Acquire hands-on experience with orthopaedic aids, bandages, and medical equipment for effective patient care.
- **Injection Techniques and Drug Interactions:** Master vaccination and injection techniques, and analyze drug-drug interactions to improve clinical practice and patient safety.

Textbooks

- Gupta B.K and Gupta R.N., GPP in Hospital Pharmacy, Vallabh Prakashan.
- Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc.

Open Educational Resources (OER)

- Books
- PPT
- Videos

Evaluation Scheme:

	Evaluation Component	Duration	Weightage (%)	Date, Time & Venue
1	Sessional examination-I, II, and III	180 Minutes	20	
4	End term examination	180 Minutes	80	
Total			**100**	

ER 20-26T	Pharmacy Law and Ethics (Theory)	L	T	P	C
Version		**3**	**1**	**0**	**0**
Category of Course	Pharmacy Law and ethics				
Total Contact Hours	75 Hours				
Pre-Requisites/Co-Requisites	-				

Course Perspective

This course provides a foundational understanding of the legal and ethical principles essential for pharmacy professionals. It emphasizes on the skills to navigate regulations and make informed decisions impacting patient care. By emphasizing critical thinking and ethical reasoning, it prepares participants for real-world challenges in their careers and fosters a commitment to integrity and professionalism in the pharmacy field.

Course Outcomes

Upon completion of the course the learner will be capable of

CO1: Understanding key principles that guide professional behaviour in pharmacy.
CO2: Applying the knowledge gained to address practical challenges in healthcare.
CO3: Analysing ethical situations and formulate effective responses.
CO4: Evaluating systems and standards that promote safe and responsible practice.

Course Content

Chapter 1: General Principles of Law, History and various Acts related to Drugs and Pharmacy:

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

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.

Chapter 4: Narcotic Drugs and Psychotropic Substances Act 1985 and Rules: Objectives, Definitions, Authorities and Officers, Prohibition, Control and Regulation, Offences and Penalties.

Chapter 5: Drugs and Magic Remedies (Objectionable Advertisements) Act 1954: Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties.

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.

Chapter 7: Poisons Act-1919: Introduction, objective, definition, possession, possession for sales and sale of any poison, import of poisons

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

Chapter 9: 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)

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

Chapter 11: Medical Termination of Pregnancy Act and Rules: Basic understanding, salient features, and Amendments

Chapter 12: Role of all the government pharma regulator bodies – Central Drugs Standards Control Organization (CDSCO), Indian Pharmacopoeia Commission (IPC)

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

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

Chapter 15: Blood bank – basic requirements and functions

Chapter 16: Clinical Establishment Act and Rules – Aspects related to Pharmacy

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

Chapter 18: Bioethics - Basic concepts, history and principles. Brief overview of ICMR's National Ethical Guidelines for Biomedical and Health Research involving human participants

Chapter 19: Introduction to the Consumer Protection Act

Chapter 20: Introduction to the Disaster Management Act

Chapter 21 Medical Devices – Categorization, basic aspects related to manufacture and sale

Learning experience

The course on Regulatory Affairs and Ethics in Pharmacy is designed to foster a dynamic and engaging learning experience through various innovative instructional methods. It incorporates interactive lectures with multimedia tools, expert insights, and facilitated discussions to deepen understanding of complex legal and ethical concepts. Students will engage in practical learning through case studies, simulations, and hands-on activities, enhancing their problem-solving skills and ethical decision-making capabilities. Additionally, the course emphasizes collaboration through group projects and peer reviews, complemented by industry visits and guest lectures to provide real-world perspectives. Continuous assessment and feedback will ensure students stay engaged and supported throughout their learning journey.

Textbooks

1. Text book of Forensic Pharmacy by B.M. Mithal
2. Forensic Pharmacy by B. Suresh
3. A text book of Forensic Pharmacy by N.K. Jain

Suggested Readings

1. A text book of Forensic Pharmacy by N.K. Jain
2. Text book of Forensic Pharmacy by B.M. Mithal

Open Educational Resources (OER)

1. https://www.indiacode.nic.in/bitstream/123456789/6838/1/pharmacy_act_1948.pdf
2.https://cdsco.gov.in/opencms/export/sites/CDSCO_WEB/Pdfdocuments/acts_rules/2016DrugsandCosmeticsAct1940Rules1945.pdf
3. https://www.indiacode.nic.in/bitstream/123456789/13675/1/the_poisons_act_1919.pdf

Evaluation Scheme

Evaluation Scheme:

	Evaluation Component	Duration	Weightage (%)	Date, Time & Venue
1	Sessional examination-I, II, and III	90 Minutes	20	
4	End term examination	180 Minutes	80	
Total			**100**	