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Pimpri Chinchwad Education Trust's

Pimpri Chinchwad University

School of Pharmacy

Sate, Pune – 412106, Maharashtra, India

(Established under Maharashtra Act No V of 2023)

Rules, Structure and Syllabus for First Year

Diploma in Pharmacy

(Batch: 2024-2026)

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

Effective from Academic Year 2024-25

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Preamble

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

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

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

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Vision and Mission of Program:

Vision:

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

Mission:

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

Program Educational Objectives:

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

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

Program Outcome

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

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

Program Specific Objectives

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

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Competencies for the Indian D. Pharm Holders

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

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

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

1. **Review the Prescriptions:** The student should receive and handle the prescriptions in a professional manner and be able to check for its completeness and correctness. Also, the prescribers should be contacted for any clarifications and corrections in the prescriptions with suggestions if any.

2. **Dispense Prescription / Non-Prescription Medicines:** The student should be able to dispense the various scheduled drugs / medicines as per the implications of the Drug & Cosmetics Act and Rules thereunder. Also, the non-prescription medicines (over-the-counter drugs) should be dispensed judicially to the patients as required.

3. **Provide Patient Counselling / Education:** The student should able to effectively counsel / educate the patients / caretakers about the prescription / non-prescription medicines and other health related issues. Effective communication includes using both oral and written communication skills and various communication techniques.

4. **Hospital and Community Pharmacy Management:** The student should be able to manage the drug distribution system as per the policies and guidelines of the hospital pharmacy, good community pharmacy practice and the recommendations of regulatory agencies. Also, be able to manage the procurement, inventory and distribution of medicines in hospital / community pharmacy settings.

5. **Expertise on Medications:** The student should be able to provide an expert opinion on medications to the health care professionals on safe and effective medication-use, relevant policies and procedures based on available evidences.

6. **Proficiency on Pharmaceutical Formulations:** The student should be able to describe the chemistry, characteristics, types, merits and demerits of both drugs and excipients used in the pharmaceutical formulations based on her/his knowledge and scientific resources.

7. **Entrepreneurship and Leadership:** The student should be able to acquire the entrepreneurial skills in the dynamic professional environments. Also, be able to achieve leadership skills through teamwork and sound decision making skills.

8. **Deliver Primary and Preventive Healthcare:** The student should be able to contribute to various healthcare programs of the nation including disease prevention initiatives to improve public health. Also contribute to the promotion of national health policies.

9. **Professional, Ethical and Legal Practice:** The student should be able to deliver professional services in accordance with legal, ethical and professional guidelines with integrity.

10. **Continuing Professional Development:** The student should be able to recognize the gaps in the knowledge and skills in the effective delivery of the professional services from time to time and be self-motivated to bridge such gaps by attending continuing professional development programs.

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

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

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ER-2020 D. Pharm Syllabus – An Overview

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

1. **Scope:** These are broader statements on the purpose of the course in the curriculum, key contents of the course that will contribute to the specific knowledge and or skill developments. The teacher is expected to orient the students about the scope of the particular course at the beginning and intermittently.

2. **Course Objectives:** The course objectives describe the key topics that are intended by the teacher to be covered in the course. In general, these are more specific than the scope and broader than the course outcomes. The teacher is expected to discuss the objectives of the course with the students and break-down the course objectives into micro levels as objectives of a specific topic / objectives of a specific lecture, etc. Such an exercise shall make the students to understand the significance of the course / topic / lecture and enhance their attention on the course / topic / lecture.

3. **Course Outcomes:** The course outcomes are more specific than the course objectives describe that describe the abilities of the students to perform/act, upon successful completion of the course. Hence, conventionally the course outcomes are described with verbs that are measurable or observable actions. The teacher is expected to describe the desired outcomes of the particular course, so that the students shall understand the various assessment criteria, modalities and parameters. This also serves as a broader guideline for the teachers for preparing the assessment plan. A well-structured assessment plan associated with the course outcomes shall enable to mapping with the professional competencies and their attainment levels that are attributed to the program outcomes.

4. **Theory Courses:** The theory courses basically provide concepts and explain the relationships between the concepts. Understanding of the theoretical courses enable the students to identify the problems in real life situation and make a plan for addressing such problems. Also, the theory course helps to understand what is not known and thus is the tool for accumulation of knowledge. The syllabus of the theory courses has been systematically and logically described as different chapters and the minimum number of hours to be spent on teaching are mentioned chapter wise and course wise. The teachers shall further distribute the total hours of any given chapter among the sub-topics as required by the subject matter.

5. **Practical Courses:** The practical courses are designed for applying the theoretical knowledge in the given experimental / simulated conditions. The practical courses deepen the understanding of theories, develop the skills, hone professional competencies, provide opportunities to observe, think and analyse problem solving methods. Further, they help to gain experience with the real things in practice. The teachers shall train the students in actual / simulated practical conditions.

6. **Tutorials:** The purpose of the tutorial hour is typically to engage the students in smaller groups in order to pay a closer attention on their learning process. This is an opportunity for the students to complete their assignments, develop specific skills, discuss any problems in the study topics in a less formal way. During the tutorial hour,

the students shall exchange their ideas within the small group, and learn to accept constructive criticism and listen to others. Also, the tutorial hour enables the teachers to closely monitor the progress of the individual student and provide additional academic support to individuals, if necessary.

7. **Assignments:** The purpose the assignments are to encourage the students for self- directed learning. Further, the assignments will provoke the critical thinking, enhance the skills such as literature search, data mining, data interpretation, report formatting, time-management and written communication. This is also a mode of self-assessment for the student about the level understanding the concepts of a particular course. The teachers shall apply their knowledge and wisdom in choosing the assignment topics at micro level in alignment with the topics given in the syllabus. The assignments shall be evaluated against a set of criteria. A typical format for the assessment of an assignment is given in Appendix -1.

8. **Field Visits:** The purpose of field visits is to provide the real-world experience to the students. The field visits will help them to realize that what they learn within the walls of the classroom / laboratory can help them solve the problems they see in the world around them. Also, this is helpful to the teachers to widen their horizons of knowledge and broadening the scope of the syllabus. Every student shall submit a report describing their objectives, experience, learning points, etc. pertaining to the field trip in the typical format given in Appendix-2.

9. **Practical Training:** The goal of the practical training for the students is to provide a real-time, supervised experience on the professional tasks emphasised in their course of study. Further, it helps them to apply their acquired knowledge and skills in the professional working environment. The practical training intensively prepares the students with adequate competencies and qualifications required for the career opportunity in the future.

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

The summary of the curriculum, courses and other activities and their metrics across the ER-2020 D. Pharm program (Part I, II & III) are given here.

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

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GUIDELINES FOR THE CONDUCT OF THEORY EXAMINATIONS

Sessional Exams:

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

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

Internal assessment:

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

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

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

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GUIDELINES FOR THE CONDUCT OF PRACTICAL EXAMINATIONS

Sessional Exams:

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

I. Synopsis	=	10
II. Experiments	=	50*
III. Viva voce	=	10
IV. Practical Record Maintenance	=	10
	Total =	80 marks

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

Internal assessment:

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

Actual performance in the sessional examination	= 10 marks Assignment
marks (Average of three)	= 5 marks* Field Visit
Report marks (Average for the reports)	= 5 marks$
Total	= 20 marks

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

Note:

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

Final Board / University Exams:

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

I. Synopsis	=	10
II. Experiments	=	60*
III. Viva voce	=	10
Total	=	80 marks

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

COURSE STRUCTURE

ER-2020 D. Pharm Syllabus – Part I

Sr. No.	Course Code	Name of the Course	Total Theory / Practical Hours	Total Tutorial Hours	Theory / Practical Hours per Week	Tutorial Hours per Week
1	ER20-11T	Pharmaceutics Theory	75	25	3	1
2	ER20-11P	Pharmaceutics Practical	75	-	3	-
3	ER20-12T	Pharmaceutical Chemistry Theory	75	25	3	1
4	ER20-12P	Pharmaceutical Chemistry Practical	75	-	3	-
5	ER20-13T	Pharmacognosy –Theory	75	25	3	1
6	ER20-13P	Pharmacognosy –Practical	75	-	3	-
7	ER20-14T	Human Anatomy & Physiology –Theory	75	25	3	1
8	ER20-14P	Human Anatomy & Physiology – Practical	75	-	3	-
9	ER20-15T	Social Pharmacy – Theory	75	25	3	1
10	ER20-15P	Social Pharmacy – Practical	75	-	3	-
11	UFL201	German A1.1/Japanese B1.1*	30	-	-	

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

Foreign Languages:

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

ADD ON COURSES FOR D. PHARM EFFECTIVE FROM A. Y. 2025-26
For First Year D. Pharm

Sr. No.	Name of the Course	No. of Hours/Week	Credit Points
1	Introduction to Artificial Intelligence (AI)	13	0
2	Introduction to Chemistry: Reactions and Ratios	18*	0
3	Pharmacy Medication and Safety	11	0
4	Communication skill (spoken English)	10	0
5	Cosmetic Formulation Science	3	0
Total Hours		**55**	**Nil**

****Approximately***

OURSE CURRICULUM

Name of the Program:		D. Pharm		Annual Pattern		Level: Diploma	
Course Name		Pharmaceutics (Theory)		Course Code/ Course Type		ER20-11T	
Course Pattern		2024		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (Annual Assessment)	Practical/Oral
3	----	1	--	75	20	80	-
Pre-Requisite: Nil							
Course Objectives (CO):		The objectives of Pharmaceutics are: 1. To know the history of profession of pharmacy. 2. To study different Packaging materials and pharmaceutical aids used in pharmaceutical preparation. 3. To study different manufacturing operations in pharmaceutical preparation. 4. To describe about the different dosage forms, their formulation aspects, basic quality control tests, concepts of quality assurance 5. To learn about the principles and importance of Good Manufacturing Practices in ensuring the quality of pharmaceutical products and novel drug delivery system.					
Course Learning Outcomes (CLO):		Students would be able to: 1. Know the history of profession of pharmacy. 2. Study different Packaging materials and pharmaceutical aids used in pharmaceutical preparation. 3. Illustrate different manufacturing operations in pharmaceutical preparation. 4. Describe about the different dosage forms formulation, basic quality control tests, concepts of quality assurance. 5. Describe good manufacturing practices aspects, along with basics of novel drug delivery system.					

Course Contents/Syllabus:

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

Descriptors/Topics	CLOs	Hrs
Chapter 1		
• 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	**CLO 1**	**07**

features of Indian Pharmacopoeia		
Chapter 2		
• Packaging materials: Types, selection criteria, advantages and disadvantages of glass, plastic, metal, rubber as packaging materials	**CLO 2**	**05**
Chapter 3		
• Pharmaceutical aids: Organoleptic (Colouring, flavouring, and sweetening) agents • Preservatives: Definition, types with examples and uses	**CLO 3**	**03**
Chapter4		
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	**CLO 4**	**09**
Chapter 5		
• **Tablets** – coated and uncoated, various modified tablets (sustained release, extended-release, fast dissolving, multi-layered, etc.)	**CLO 5**	**08**
• **Capsules** - hard and soft gelatine capsules		**04**
• **Liquid oral preparations** - solution, syrup, elixir, emulsion, suspension, dry powder for reconstitution		**06**
• **Topical preparations** - ointments, creams, pastes, gels, liniments and lotions, suppositories, and pessaries		**08**
• **Nasal preparations, Ear preparations**		**02**
• **Powders and granules** - Insufflations, dusting powders, effervescent powders, and effervescent granules		**03**
• **Sterile formulations** – Injectable, eye drops and eye ointments • Immunological products: Sera, vaccines, toxoids, and their manufacturing methods.		**10**
Chapter 6		
• **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	**CLO 5**	**05**
Chapter 7		
• **Novel drug delivery systems:** Introduction, Classification with examples, advantages, and challenges	**CLO5**	**05**

Learning Resource:

Text Reading:

1. D Pharmacy 1st year Pharmaceutics text book by R.M. Mehta (Nirali Prakashan)
2. D Pharmacy 1st year Pharmaceutics text book by N.K Jain

References:

1. The Theory and Practice of Industrial Pharmacy by Lachman and Lieberman - 4th Edition
2. Responsible Use of Medicines - A Layman's Handbook by Indian Pharmaceutical Association

Online resource/ E-learning resource:

1. https://pharmonly.net/d-pharm-first-year-books/
2. https://www.tmv.edu.in/pdf/Library/Pharmacy%20Books%20Cupboard.pdf
3. https://pharmaedu.in/d-pharm-pharmaceutics-books-pdf/
4. https://www.researchgate.net/publication/374583768_PHARMACEUTICS-_I_Diploma_in_Pharmacy_Ist_Year
5. https://pharmacyinfoline.com/d-pharm-pci-syllabus/

COURSE CURRICULUM

Name of the Program:	D. Pharm	Annual pattern	Level: Diploma

Course Name		Pharmaceutics-(Practical)		Course Code/ Course Type		ER20-11P	
Course Pattern		2024		Version		1	
Teaching Scheme						Assessment Scheme	
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (Annual Assessment)	Practical/Oral
-	3	-	-	75	20	80	-
Pre-Requisite:				Nil			
Course Objectives (CO):				The objectives for Pharmaceutics practical are : 1. To know the handling and referring of the official references for manufacturing pharmaceutical preparation. 2. To calculate working formula from the official master formula for pharmaceutical preparation 3. To formulate dosage forms based on working formula for pharmaceutical preparation 4. To design and create appropriate Packaging and labelling requirements for pharmaceutical preparation. 5. To evaluate pharmaceutical preparation for basic quality control tests.			
Course Learning Outcomes (CLO):				Students would be able to: 1. Know the handling and referring of the official references for manufacturing pharmaceutical preparation. 2. Calculate working formula from the official master formula for pharmaceutical preparation 3. Formulate dosage forms based on working formula for pharmaceutical preparation 4. Design and create appropriate Packaging and labelling requirements for pharmaceutical preparation. 5. Evaluate pharmaceutical preparation for basic quality control tests.			

Course Contents/Syllabus:
(All the Practical's carry equal weightage in Summative Assessment and equal engagement)

Practical Plan:

Assignment/ Practical/ Activity Number	Assignment/ Practical/ Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1: Handling and referring the official references	Week 1/Turn 1	Handling and referring the official references: Pharmacopoeias, Formularies, etc.	**CLO1**	**03**
2	Practical 2: Liquid Orals	Week2 /Turn1	Preparation of simple syrup Preparation of Piperazine citrate elixir Aqueous Iodine solution	**CLO1,2,3,4,5**	**03**
3	Practical 3: Emulsion	Week 3/Turn1	Preparation of Castor oil emulsion	**CLO1,2,3,4,5**	**03**
4	Practical 4: Emulsion	Week4 /Turn1	Preparation of Cod Liver Oil emulsion	**CLO1,2,3,4,5**	**03**
5	Practical 5: Suspension	Week5 /Turn1	Preparation of Calamine lotion Preparation of Magnesium Hydroxide mixture	**CLO1,2,3,4,5**	**03**
6	Practical 6: Ointment Cream	Week6 /Turn1	Preparation of Simple ointment Preparation of Cetrimide cream	**CLO1,2,3,4,5**	**03**
7	Practical 7: Gel	Week7 /Turn1	Preparation of Sodium alginate gel	**CLO1,2,3,4,5**	**03**
8	Practical 8: Liniment	Week 8/Turn1	Preparation of Turpentine Liniment Preparation of White Liniment	**CLO1,2,3,4,5** **CLO1,2,3,4,5**	**03**
9	Practical 9: Dry powder	Week 9/Turn1	Effervescent powder granules	**CLO1,2,3,4,5**	**03**
10	Practical 10: Dry powder	Week10 /Turn1	Dusting powder	**CLO1,2,3,4,5**	**03**
11	Practical 11: Sterile Injection:	Week11 /Turn1	Normal Saline,	**CLO1,2,3,4,5**	**03**
12	Practical 12: Injection	Week12 /Turn1	Calcium gluconate Injection	**CLO1,2,3,4,5**	**03**
13	Practical 13: Hard Gelatine Capsule:	Week13 /Turn1	Tetracycline capsules	**CLO1,2,3,4,5**	**03**
14	Practical 14: Tablet	Week14 /Turn1	Preparation of Paracetamol Tablet	**CLO1,2,3,4,5**	**03**
15	Practical 15: Cosmetic preparations	Week15 /Turn1	Preparation of Shampoo	**CLO1,2,3,4,5**	**03**
16	Practical 16: Cosmetic preparations	Week16 /Turn1	Preparation of Cold cream	**CLO1,2,3,4,5**	**03**
17	Practical 17: Cosmetic preparations	Week17 /Turn1	Preparation of Vanishing cream	**CLO1,2,3,4,5**	**03**

18	Practical 18: Cosmetic preparations	Week18 /Turn1	Preparation of Face powder	**CLO1,2,3,4,5**	**03**
19	Practical 19: Cosmetic preparations	Week19 /Turn1	Preparation of Toothpaste	**CLO1,2,3,4,5**	**03**
		Week19 /Turn2	Face wash		
20	Practical 20: Demonstration	Week20 /Turn1	Tablet manufacturing process	**CLO1,2,3,4,5**	**03**
21	Practical 21: Demonstration	Week21 /Turn1	Use & storage of all dosage forms including special dosage such as different types of inhalers, spacers, insulin pens	**CLO1,2,3,4,5**	**03**
22	Practical 22: Demonstration	Week22 /Turn1	Demonstration of Quality control tests and evaluation of tablets as per the monograph	**CLO1,2,3,4,5**	**03**
23	Practical 23: Demonstration	Week23 /Turn1	Demonstration of Quality control tests and evaluation of capsules as per the monograph	**CLO1,2,3,4,5**	**03**
24	Practical 24: Demonstration	Week24 /Turn1	Demonstration of Quality control tests and evaluation of emulsion as per the monograph	**CLO1,2,3,4,5**	**03**
25	Practical 25: Demonstration	Week25 /Turn1	Demonstration of Quality control tests and evaluation of Sterile injection as per the monograph	**CLO1,2,3,4,5**	**03**

Learning resources:

Practical Textbooks:

1. Practical handbook of Pharmaceutics Dr Atamaram Pawar
2. Practical handbook of Pharmaceutics Dr P.D .Choudhari

Reference Books:

1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams and Walkins, New Delhi.
2. Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
3. M.E. Aulton, Pharmaceutics, The Science& Dosage Form Design, Churchill Livingstone, Edinburgh.
4. Indian pharmacopoeia.
5. British pharmacopoeia.
6. Lachmann. Theory and Practice of Industrial Pharmacy, Lea& Febiger Publisher, The University of Michigan.

Online Resources/E-Learning Resources:

1. https://jru.edu.in/studentcorner/lab-manual/dpharm/1st-year/Pharmaceutics.p
2. https://pharmacyinfoline.com/bp109p-pharmaceutics-i-practical/
3. https://drive.google.com/file/d/1azhRS42lMfbot8HYqCHT5Dq6Cu0vOMOD/view

Assignments:

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

1. Various systems of measures commonly used in prescribing, compounding and dispensing practices.

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

Field Visit:

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

COURSE CURRICULUM

Name of the Program:	**D. Pharm**	**Annual Pattern**	**Level: Diploma**
Course Name	**Pharmaceutical Chemistry (Theory)**	**Course Code/ Course Type**	**ER20-12T**
Course Pattern	**2024**	**Version**	**1.0**

Teaching Scheme					Assessment Scheme		
Theory	**Practical**	**Tutorial**	**Total Credits**	**Hours**	**CIA (Internal Assessment)**	**ESA (End Semester Assessment)**	**Practical/Oral**
3	-	1	-	75	20	80	-

Pre-Requisite:	**Nil**
Course Objectives (CO):	The objectives of Pharmaceutical Chemistry are to discuss the following aspects of the chemical substances used as drugs and pharmaceuticals for various disease conditions 1. Impurity testing and basic quality control tests. 2. Introduction to nomenclature of organic chemical systems 3. Chemical classification, chemical name, chemical structure. 4. Pharmacological uses, doses, stability and storage conditions. 5. Different types of formulations / dosage form available and their brand names.
Course Learning Outcomes (CLO):	Students would be able to: 1. Describe the quantitative and qualitative analysis, impurity testing of the chemical substances given in the official monographs. 2. Perform nomenclature of organic chemical systems. 3. Describe the chemical class, structure and chemical name of the commonly used drugs and pharmaceuticals of both organic and inorganic nature. 4. Discuss the pharmacological uses, dosage regimen, stability issues and storage conditions of all such chemical substances commonly used as drugs. 5. Identify the dosage form & the brand names of the drugs and pharmaceuticals popular in the marketplace.

Course Contents/Syllabus:
(All the units carry equal weightage in Summative Assessment and equal engagement)

Descriptors/Topics	CLO	Hours
Chapter 1		
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	**CLO 1**	**08**

Pharmacopoeial substances, importance of limit test, Principle and procedures of Limit tests for chlorides, sulphates, iron, heavy metals and arsenic.		
Chapter 2		
Volumetric analysis: Fundamentals of volumetric analysis, Acid-base titration, non-aqueous titration, precipitation titration, complexometric titration, redox titration **Gravimetric analysis:** Principle and method.	**CLO 1**	**08**
Chapter 3		
Inorganic Pharmaceuticals: Pharmaceutical formulations, market preparations, storage conditions and uses of **Haematinics:** Ferrous sulphate, Ferrous fumarate, Ferric ammonium citrate, Ferrous ascorbate, Carbonyl iron **Gastro-intestinal Agents:** Antacids :Aluminium hydroxide gel, Magnesium hydroxide, Magaldrate, Sodium bicarbonate, Calcium Carbonate, Acidifying agents, Adsorbents, Protectives, Cathartics **Topical agents:** Silver Nitrate, Ionic Silver, Chlorhexidine Gluconate, Hydrogen peroxide, Boric acid, Bleaching powder, Potassium permanganate **Dental products:** Calcium carbonate, Sodium fluoride, Denture cleaners, Denture adhesives, Mouth washes **Medicinal gases:** Carbon dioxide, nitrous oxide, oxygen	**CLO 3,4,5**	**07**
Chapter 4		
Introduction to nomenclature of organic chemical systems with particular reference to heterocyclic compounds containing up to Three rings	**CLO 2**	**02**
Chapter 5		
Drugs Acting on Central Nervous System **Anaesthetics:** Thiopental Sodium*, Ketamine Hydrochloride*, Propofol **Sedatives and Hypnotics:** Diazepam*, Alprazolam*, Nitrazepam, Phenobarbital* **Antipsychotics:** Chlorpromazine Hydrochloride*, Haloperidol*, Risperidone*, Sulpiride*, Olanzapine, Quetiapine, Lurasidone **Anticonvulsants:** Phenytoin*, Carbamazepine*, Clonazepam, Valproic Acid*, Gabapentin*, Topiramate, Vigabatrin, Lamotrigine **Anti-Depressants:** Amitriptyline Hydrochloride*, Imipramine Hydrochloride*, Fluoxetine*, Venlafaxine, Duloxetine, Sertraline, Citalopram, Escitalopram, Fluvoxamine, Paroxetine	**CLO 3,4,5**	**09**
Chapter 6		
Drugs Acting on Autonomic Nervous System **Sympathomimetic Agents:** ***Direct Acting:*** Nor Epinephrine*, Epinephrine, Phenylephrine, Dopamine*, Terbutaline, Salbutamol (Albuterol), Naphazoline*, Tetrahydrozoline. ***Indirect Acting Agents:*** Hydroxy Amphetamine, Pseudoephedrine. Agents With Mixed Mechanism: Ephedrine, Metaraminol **Adrenergic Antagonists:** Alpha Adrenergic Blockers: Tolazoline, Phentolamine Phenoxybenzamine, Prazosin. Beta Adrenergic Blockers: Propranolol*, Atenolol*, Carvedilol **Cholinergic Drugs and Related Agents:** Direct Acting Agents: Acetylcholine*, Carbachol, And Pilocarpine. Cholinesterase Inhibitors: Neostigmine*, Edrophonium Chloride, Tacrine Hydrochloride, Pralidoxime Chloride, Echothiopate Iodide **Cholinergic Blocking Agents:** Atropine Sulphate*, Ipratropium Bromide	**CLO 3,4,5**	**09**

Synthetic Cholinergic Blocking Agents: Tropicamide, Cyclopentolate Hydrochloride, Clidinium Bromide, Dicyclomine Hydrochloride*		
Chapter 7		
Drugs Acting on Cardiovascular System **Anti-Arrhythmic Drugs**: Quinidine Sulphate, Procainamide Hydrochloride, Verapamil, Phenytoin Sodium*, Lidocaine Hydrochloride, Lorcainide Hydrochloride, Amiodarone and Sotalol **Anti-Hypertensive Agents**: Propranolol*, Captopril*, Ramipril, Methyldopate Hydrochloride, Clonidine Hydrochloride, Hydralazine Hydrochloride, Nifedipine, **Antianginal Agents**: Isosorbide Dinitrate	**CLO 3,4,5**	**05**
Chapter 8		
Diuretics: Acetazolamide, Frusemide*, Bumetanide, Chlorthalidone, Benzthiazide, Metolazone, Xipamide, Spironolactone	**CLO 3,4,5**	**02**
Chapter 9		
Hypoglycemic Agents: Insulin and Its Preparations, Metformin*, Glibenclamide*,Glimepiride,Pioglitazone, Repaglinide, Gliflozins, Gliptins	**CLO 3,4,5**	**03**
Chapter 10		
Analgesic And Anti-Inflammatory Agents: Morphine Analogues, Narcotic Antagonists; ***Nonsteroidal Anti Inflammatory Agents (NSAIDs)*** - Aspirin*,Diclofenac, Ibuprofen*, Piroxicam, Celecoxib, Mefenamic Acid, Paracetamol*, Aceclofenac	**CLO 3,4,5**	**03**
Chapter 11		**08**
Anti-Infective Agents **Antifungal Agents:** Amphotericin-B, Griseofulvin, Miconazole, Ketoconazole*, Itraconazole, Fluconazole*, Naftifine Hydrochloride **Urinary Tract Anti-Infective Agents:** Norfloxacin, Ciprofloxacin, Ofloxacin*, Moxifloxacin, **Anti-Tubercular Agents:** INH*, Ethambutol, Para Amino Salicylic Acid, Pyrazinamide, Rifampicin, Bedaquiline, Delamanid, Pretomanid* **Antiviral Agents:** Amantadine Hydrochloride, Idoxuridine, Acyclovir*, Foscarnet, Zidovudine, Ribavirin, Remdesivir, Favipiravir **Antimalarials:** Quinine Sulphate, Chloroquine Phosphate*, Primaquine Phosphate, Mefloquine*, Cycloguanil, Pyrimethamine, Artemisinin **Sulfonamides:** Sulfanilamide, Sulfadiazine, Sulfamethoxazole, Sulfacetamide*, Mafenide Acetate, Cotrimoxazole, Dapsone*	**CLO 3,4,5**	
Chapter 12		
Antibiotics: Penicillin G, Amoxicillin*, Cloxacillin, Streptomycin, ***Tetracyclines:*** Doxycycline, Minocycline, ***Macrolides:*** Erythromycin, Azithromycin, ***Miscellaneous:*** Chloramphenicol* Clindamycin	**CLO 2,3,4**	**08**
Chapter 13		
Anti-Neoplastic Agents: Cyclophosphamide*, Busulfan, Mercaptopurine, Fluorouracil*, Methotrexate, Dactinomycin, Doxorubicin Hydrochloride, Vinblastine Sulphate, Cisplatin*, Dromostanolone Propionate	**CLO 2,3,4**	**03**
Total Hours		**75**

Learning resources

Textbooks:

1. Fundamentals of Pharmaceutical Chemistry by Dr. Prashik B Dudhe, Mr. Hitesh V. Shahare, Mr. Mayuresh K. Raut, Everest Publishing House Pune.
2. Textbook of Pharmaceutical Inorganic Chemistry-Theory & Practical by V.N. Rajasekaran, CBS Publishers & Distributors, Second Edition.

Reference Books:

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

Online Resources/E-Learning Resources

1. https://www.youtube.com/watch?v=cA0fGIfALxI
2. https://www.youtube.com/watch?v=ruKyDMKqsXc
3. https://www.youtube.com/watch?v=yrvV85H737o
4. Sulphonamides: https://www.youtube.com/watch?v=xkWAsIy5p9U
5. Diuretics: https://www.youtube.com/watch?v=4aMEi9nygSA
6. Antibiotics: https://www.youtube.com/watch?v=5GGKtlAaFrE

COURSE CURRICULUM

Name of the Program:		D. Pharm		Annual Pattern		Level: Diploma	
Course Name		Pharmaceutical Chemistry (Practical)		Course Code/ Course Type		ER20-12P	
Course Pattern		2024		Version		1.0	
Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA	ESA (End Semester	Practical/Oral

					(Internal Assessment)	Assessment)	
-	3	-	-	75	20	80	-
Pre-Requisite:							
Course Objectives (CO):				The objectives of Pharmaceutical Chemistry are: 1. Limit tests and assays of selected chemical substances as per the monograph. 2. Volumetric analysis of the chemical substances. 3. Basics of preparatory chemistry and their analysis. 4. Synthesize the selected chemical substances. 5. Systematic qualitative analysis for the identification of the chemical drugs.		
Course Learning Outcomes (CLO):				Students would be able to: 1. Perform the limit tests for various inorganic elements and report. 2. Prepare standard solutions using the principles of volumetric analysis. 3. Test the purity of the selected inorganic and organic compounds against the monograph standards. 4. Synthesize the selected chemical substances as per the standard synthetic scheme. 5. Perform qualitative tests to systematically identify the unknown chemical substances.		

Course Contents/Syllabus:
(All the Practical's carry equal weightage in Summative Assessment and equal engagement)
Practical Plan

Assignment/ Practical/ Activity Number	Assignment/Practical/Activity Title	Week Number/Turn	Details	CLO	Hours

1	Practical 1: Limit test for Chloride	Week 1/ Turn 1	perform Limit test for Chloride on given sample	**CLO1**	**03**
2	Practical 2: Limit test for Sulphate	Week 2/ Turn 1	To perform Limit test for Sulphate on given sample	**CLO1**	**03**
3	Practical 3: Limit test for Iron	Week 3/ Turn 1	To perform Limit test for Iron on given sample	**CLO1**	**03**
4	Practical 4: Limit test for Heavy Metals	Week 4/Turn 1	To perform Limit test for Heavy Metals on given sample	**CLO1**	**03**
5	Practical 5: Identification test for anions	Week 5/ Turn 1	To perform Identification test for anions	**CLO3**	**03**
6	Practical 6: Identification test for cations	Week 6/ Turn 1	To perform Identification test for cations	**CLO3**	**03**
7	Practical 7: Preparation and standardization	Week 7/ Turn 1	To Prepare and standardize Sodium Hydroxide as per I.P	**CLO2**	**03**
8	Practical 8: Preparation and standardization	Week 8/ Turn 1	To Prepare and standardize Potassium permanganate as per I.P	**CLO2**	**03**
9	Practical 9: Assay	Week9/ Turn 1	To perform assay of Ferrous Sulphate as per I.P	**CLO3**	**04**
10	Practical 10: Assay	Week10/ Turn1	To perform assay Calcium gluconate as per I.P	**CLO3**	**03**
11	Practical 11: Assay	Week11/ Turn 1	To perform assay of Sodium Chloride as per I.P	**CLO3**	**03**
12	Practical 12: Assay	Week12/ Turn 1	To perform assay of Ascorbic acid per I.P	**CLO3**	**03**
13	Practical 13: Assay	Week13/ Turn 1	To perform assay of Ibuprofen as per I.P	**CLO3**	**03**
14	Practical 14: Fundamentals of preparative organic chemistry	Week14/ Turn 1	To determine Melting Point of given compound	**CLO3**	**03**
15	Practical 15: Fundamentals of preparative organic chemistry	Week15/ Turn 1	To determine Boiling Point of given compound	**CLO3**	**03**
16	Practical 16: Preparation of organic compound	Week16/ Turn 1	To synthesize Benzoic acid from Benzamide	**CLO4**	**03**
17	Practical 17: Preparation of organic compound	Week17/ Turn 1	To synthesize Picric acid from Phenol	**CLO4**	**03**
18	Practical 18: Identification and test for purity of pharmaceuticals	Week18/ Turn 1	To perform and report identification test on given sample of Aspirin as per I.P	**CLO5**	**03**
19	Practical 19: Identification and test for purity of pharmaceuticals	Week19/ Turn 1	To perform and report identification test on given sample of Caffeine as per I.P	**CLO5**	**03**
20	Practical 20: Identification and test for purity of pharmaceuticals	Week20/ Turn 1	To perform and report identification test on given sample of Paracetamol as per I.P	**CLO5**	**03**

21	Practical 21: Identification and test for purity of pharmaceuticals	Week21/ Turn 1	To perform and report identification test on given sample of Sulfanilamide as per I.P	**CLO5**	**03**
22	Practical 22: Systematic qualitative analysis	Week22/ Turn 1	To identify the given unknown organic compound by systematic qualitative analysis	**CLO5**	**03**
23	Practical 23: Systematic qualitative analysis	Week23/ Turn 1	To identify the given unknown organic compound by systematic qualitative analysis	**CLO5**	**03**
24	Practical 24: Systematic qualitative analysis	Week24/ Turn 1	To identify the given unknown organic compound by systematic qualitative analysis	**CLO5**	**03**
25	Practical 24: Systematic qualitative analysis	Week25/ Turn 1	To identify the given unknown organic compound by systematic qualitative analysis	**CLO5**	**03**

Learning resources

Textbooks:

1. Laboratory Manual of Pharmaceutical Chemistry by Dr. R J. Dias, Dr. P. D. Argade, Mr. S. S. Pande, Trinity Publishing House, Satara.
2. Laboratory Manual of Pharmaceutical Inorganic Chemistry by Dr. Vidhya K. Bhusari, Dr. Rajesh B. Patil, Dr. Sanjay D. Sawant, Pritam Publications.
3. Inorganic Pharmaceutical Chemistry (Practical) by D.P. Belsare, A.S. Dhake Career Publication.

Reference Books:

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

Online Resources/E-Learning Resources

1. Limit test for Chlorides: https://www.youtube.com/watch?v=WcVH1wD3HiE
2. https://www.youtube.com/watch?v=fZVPB0floro
3. Limit test for Sulphate: https://www.youtube.com/watch?v=MElvpW1ilQg

Assignments

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

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

COURSE CURRICULUM

Name of the Program:		D. Pharm		Annual Pattern		Level: Diploma	
Course Name		Pharmacognosy – (Theory)		Course Code/ Course Type		ER20-13T	
Course Pattern		2024		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA	ESA (End	Practical/Oral

					(Continuous Internal Assessment)	Semester Assessment)	
3	---	1	-	75	20	80	-
Pre-Requisite: **Nil**							
Course Objectives (CO):				The objectives of Pharmacognosy are: This course will discuss the following aspects of drug substances derived from natural resources. 1. Occurrence, distribution, isolation, identification tests of common phytoconstituents. 2. Therapeutic activity and pharmaceutical applications of various natural drug substances and phytoconstituents. 3. Biological source, chemical constituents of selected crude drugs and their therapeutic efficacy in common diseases and ailments 4. Basic concepts in quality control of crude drugs and various system of medicines 5. Applications of herbs in health foods and cosmetics		
Course Learning Outcomes (CLO):				Students would be able to: 1. Identify the important/common crude drugs of natural origin. 2. Describe the importance of quality control of drugs of natural origin. 3. Identify and explain the biological sources, chemical constituents, and therapeutic applications of various categories of crude drugs. 4. Discuss the principles of alternative system of medicines along various ayurvedic formulations. 5. Describe the role in national economy, uses of herbs in nutraceuticals and cosmeceuticals.		

Course Contents/Syllabus:
(All the units carry equal weightage in Summative Assessment and equal engagement)

Descriptors/Topics	CLOs	Hrs
Chapter 1		
Definition, history, present status and scope of Pharmacognosy	**CLO1**	**02**
Chapter 2		
Classification of drugs: ●Alphabetical ●Taxonomical ● Morphological ● Pharmacological ● Chemical ● Chemo-taxonomical	**CLO1**	**04**

Chapter 3			
Quality control of crude drugs: ● Different methods of adulteration of crude drugs ● Evaluation of crude drugs		**CLO2**	**06**
Chapter 4			
Brief outline of occurrence, distribution, isolation, identification tests, therapeutic activity and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.		**CLO1, CLO2**	**06**
Chapter 5			
Biological source, chemical constituents and therapeutic efficacy of the following categories of crude drugs.		**CLO3**	**30**
Laxatives	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		
Anti-dysenteric	Ipecacuanha		
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		
Chapter 6			
Plant fibres used as surgical dressings: Cotton, silk, wool and regenerated fibres, Sutures – Surgical Catgut and Ligatures		**CLO3**	**03**
Chapter 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		**CLO4**	**08**
Chapter 8			
Role of medicinal and aromatic plants in national economy and their export potential		**CLO5**	**02**
Chapter 9			

Herbs as health food: Brief introduction and therapeutic applications of: Nutraceuticals, Antioxidants, Pro-iotics, Pre-biotics, Dietary fibres, Omega-3-fatty acids, Spirulina, Carotenoids, Soya and Garlic	**CLO5**	**04**
Chapter 10		
Introduction to herbal formulations	**CLO5**	**04**
Chapter 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	**CLO5**	**04**
Chapter 12		
Phytochemical investigation of drugs	**CLO2**	**02**
Total hours		**75**

Learning Resource:

Text Reading:

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.

References:

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 Text Book of Homeopathic Pharmacy by Dr. D D Banerjee, B Jain Publishers (P) Ltd.

Online resource/ E-learning resource:

1. https://thepharmapedia.com/definition-history-present-status-and-scope-of-pharmacognosy/pharmacy-notes/
2. https://www.ramauniversity.ac.in/online-study material/pharmacy/bpharma/ivsemester/pharmacognosyandphytochemistry-i/lecture-4.pdf
3. https://www.annamalaiuniversity.ac.in/studport/download/engg/pharm/resources/BPHARM_2Y_4S_405T_Pharmacognosy%20&%20Phytochemistry-I.pdf
4. https://noteskarts.com/wp-content/uploads/2022/04/Chapter-6-Pharmacognosy-PLANTS-FIBRES-USED-AS-SURGICAL-DRESSINGS.pdf
5. https://www.slideshare.net/slideshow/basic-principles-involved-in-the-traditional-systems-of-medicine-pdfpdf-96dc/267192745
6. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5198827/
7. https://www.slideshare.net/MdJahangirAlam110/herbs-as-health-foods
8. https://courseware.cutm.ac.in/wp-content/uploads/2022/09/67.-Herbal-formulations.pdf
9. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2825132/
10. https://www.rroij.com/open-access/phytochemical-screening-and-physicochemical-parameters-of-crude-drugs-a-brief-review.pdf

COURSE CURRICULUM

Name of the Program:		D. Pharm		Annual Pattern		Level: Diploma	
Course Name		Pharmacognosy (Practical)		Course Code/ Course Type		ER20-13P	
Course Pattern				Version		1.0	
Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
--	3	--	-	75	20	80	-
Pre-Requisite:							

Course Objectives (CO):	The objectives of Tools for Pharmacognosy are: 1. Identification of the crude drugs based on their morphological characteristics 2. Various characteristic anatomical characteristics of the herbal drugs studied through transverse section 3. Physical and chemical tests to evaluate the crude drugs. 4. Identification and evaluation of crude drugs from anatomical characteristics 5. Describe the details of uses of crude drugs in herbal formulations
Course Learning Outcomes (CLO):	Students would be able to: 1. Perform different types of staining with chemical reagents, using compound microscope. 2. Identify the given crude drugs based on the morphological characteristics 3. Take a transverse section of the given crude drugs 4. Describe the anatomical characteristics of the given crude drug under microscopical conditions 5. Carry out the physical and chemical tests to evaluate the given crude drugs

Course Contents/Syllabus
(All the Practical's carry equal weightage in Summative Assessment and equal engagement)
Practical Plan

Assignment/Practical/Activity Number	Assignment/Practical/ Activity Title	Week Number/Turn	Details	CLO	Hours
1	Practical: Basic Studies of Microscope	Week1/ Turn 1	study the compound microscope	**CLO1**	**03**
2.	Practical: Basic Studies of Chemical reagents	Week 2/ Turn 1	To study the micro-chemical reagents	**CLO1**	**03**

3	Practical: Basic Studies of staining techniques	Week 3/ Turn 1	To study the staining techniques	**CLO1**	**03**
4	Practical: Morphological Identification	Week 4 / Turn 1	To perform morphological identification of Ispaghula, Senna	**CLO2**	**03**
5	Practical: Morphological Identification	Week 5/ Turn 1	To perform morphological identification of Fennel, Coriander,	**CLO2**	**03**
6	Practical: Morphological Identification	Week 6 / Turn 1	To perform morphological identification of Cardamom, Ginger,	**CLO2**	**03**
7	Practical: Morphological Identification	Week 7 / Turn 1	To perform morphological identification of Nutmeg, Black Pepper,	**CLO2**	**03**
8	Practical: Morphological Identification	Week 8 / Turn 1	To perform morphological identification of Cinnamon Clove,	**CLO2**	**03**
9	Practical: Morphological Identification	Week 9 / Turn 1	To perform morphological identification of Ephedra, Rauwolfia	**CLO2**	**03**
10	Practical: Morphological Identification	Week 10 / Turn 1	To perform morphological identification of Gokhru, Punarnava	**CLO2**	**03**
11	Practical: Morphological Identification	Week 11 / Turn 1	To perform morphological identification of Cinchona. Agar	**CLO2**	**03**
12	Practical: Gross anatomical studies (Transverse Section)	Week 12 / Turn 1	To perform gross analytical studies (Transverse section) of Ajwain	**CLO3**	**03**
13	Practical: Gross anatomical studies (Transverse Section)	Week 13 / Turn 1	To perform gross analytical studies (Transverse section) of Datura	**CLO3**	**03**
14	Practical: Gross anatomical studies (Transverse Section)	Week 14 / Turn 1	To perform gross analytical studies (Transverse section) of Cinnamon	**CLO3 CLO4**	**03**
15	Practical: Gross anatomical studies (Transverse Section)	Week 15 / Turn 1	To perform gross analytical studies (Transverse section) of Cinchona	**CLO3 CLO4**	**03**
16	Practical: Gross anatomical studies (Transverse Section)	Week 16 / Turn 1	To perform gross analytical studies (Transverse section) of Coriander	**CLO3 CLO4**	**03**
17	Practical: Gross anatomical studies (Transverse Section)	Week 17 / Turn 1	To perform gross analytical studies (Transverse section) of	**CLO3 CLO4**	**03**
18	Practical: Gross anatomical studies (Transverse Section)	Week 18 / Turn 1	To perform gross analytical studies (Transverse section) of Liquorice	**CLO3 CLO4**	**03**
19	Practical: Gross anatomical studies (Transverse Section)	Week 19 / Turn 1	To perform gross analytical studies (Transverse section) of Clove	**CLO3 CLO4**	**03**
20	Practical: Gross anatomical studies (Transverse Section)	Week 20 / Turn 1	To perform gross analytical studies (Transverse section) of Curcuma	**CLO3 CLO4**	**03**
21	Practical: Gross anatomical studies (Transverse Section)	Week 21 / Turn 1	To perform gross analytical studies (Transverse section) of Nux-vomica	**CLO3 CLO4**	**03**
22	Practical: Gross anatomical studies (Transverse Section)	Week 22 / Turn 1	To perform gross analytical studies (Transverse section) of Vasaka	**CLO3 CLO4**	**03**
23	Practical: Physical and chemical tests for evaluation	Week 23 / Turn 1	To perform identification tests for evaluation of Asafoetida & Benzoin	**CLO5**	**03**
24	Practical: Physical and chemical tests for evaluation	Week 24 / Turn 1	To perform identification tests for evaluation of Pale catechu & Black catechu	**CLO5**	**03**

25	Practical: Physical and chemical tests for evaluation	Week 25 / Turn 1	To perform identification tests for evaluation of Castor oil & Acacia	**CLO5**	**03**
26	Practical: Physical and chemical tests for evaluation	Week 26 / Turn 1	To perform identification tests for evaluation of Tragacanth & Agar	**CLO5**	**03**
27	Practical: Physical and chemical tests for evaluation	Week 27 / Turn 1	To perform identification tests for evaluation of Guar gum & Gelatin	**CLO5**	**03**

Learning resources:

Textbooks:

1. Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae
2. Anatomy of Crude Drugs byM.A. Iyengar
3. Study of crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal
4. Text Book of Pharmacognosy by T.E. Wallis

Reference Books:

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009.
2. Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi
3. Powder crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal.

Online Resources/E-Learning Resources :

1. https://pharmabookbank.wordpress.com/wp-content/uploads/2019/03/14.2.pharmacognosy-by-biren-shahavinash-seth-1.pdf
2. https://jru.edu.in/studentcorner/lab-manual/dpharm/1st-year/Pharmacognosy.pdf
3. https://www.studocu.com/in/document/galgotias-university/ipr-in-pharma-industry/practical-manual-of-pharmacognosy-diploma/53824243
4. https://fdspharmacy.in/pharmacognosy-practical-pdf/

Assignments

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

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

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

Field Visit

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

COURSE CURRICULUM

Name of the Program:		D. Pharm		Annual Pattern		Level: Diploma	
Course Name		Human Anatomy and Physiology-(Theory)		Course Code/ Course Type		ER20-14T	
Course Pattern		2024		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	-	1	-	75	20	80	-
Pre-Requisite:		Nil					

Course Objectives (CO):	The objectives of Human Anatomy and Physiology are: 1. To understand the basic structure the various human body system, cells and tissues. 2. To study the anatomy of various organs of the human body. 3. To study the homeostatic mechanisms and their imbalances in the human body. 4. To know the various vital physiological parameters of the human body and their significances. 5. To know the anatomy of systems of the human body.
Course Learning Outcomes (CLO):	Students would be able to: 1. To understand the basic structure of various human body system, cells and tissues. 2. Study the homeostatic mechanisms, their imbalances in the human body and anatomy of Osseous, Haemopoietic and Lymphatic system. 3. Study the anatomy of Cardiovascular, Respiratory and digestive system. 4. Study the anatomy of skeletal muscles, Nervous system and sense organs. 5. Know the anatomy of urinary, endocrine and reproductive system.

Course Contents/Syllabus:
(All the units carry equal weightage in Summative Assessment and equal engagement)

Descriptors/Topics	**CLOs**	**Hrs**
Unit I		
Scope of Anatomy and Physiology Definition of various terminologies	**CLO 1**	**02**
Unit II		
Structure of Cell: Components and its functions	**CLO 1**	**02**
Unit III		
Tissues of the human body Epithelial, Connective, Muscular and Nervous tissues – their sub-types and characteristics.	**CLO 1**	**04**
Unit IV		
Osseous system	**CLO 2**	**06**

Structure and functions of bones of axial and appendicular skeleton Classification, types and movements of joints, disorders of joints.		
Unit V		
Haemopoietic system Composition and functions of blood, Process of Hemopoiesis, Characteristics and functions of RBCs, WBCs, and platelets, Mechanism of Blood Clotting, Importance of Blood groups	**CLO 2**	**08**
Unit VI		
Lymphatic system Lymph and lymphatic system, composition, function and its formation, Structure and functions of spleen and lymph node.	**CLO 2**	**03**
Unit VII		
Cardiovascular system Anatomy and Physiology of heart, Blood vessels and circulation (Pulmonary, coronary and systemic circulation), Cardiac cycle and Heart sounds, Basics of ECG, Blood pressure and its regulation	**CLO 3**	**08**
Unit VIII		
Respiratory system Anatomy of respiratory organs and their functions, Regulation, and Mechanism of respiration, Respiratory volumes and capacities – definitions	**CLO 3**	**04**
Unit IX		
Digestive system Anatomy and Physiology of the GIT, Anatomy and functions of accessory glands, Physiology of digestion and absorption	**CLO 3**	**08**
Unit X		
Skeletal muscles Histology, Physiology of muscle contraction, Disorder of skeletal muscles	**CLO 4**	**02**
Unit XI		
Nervous system Classification of nervous system, Anatomy and physiology of cerebrum, cerebellum, mid brain, Function of hypothalamus, medulla oblongata and basal ganglia, Spinal cord-structure and reflexes, Names and functions of cranial nerves, Anatomy and physiology of sympathetic and parasympathetic nervous system (ANS).	**CLO 4**	**08**
Unit XII		
Sense organs - Anatomy and physiology of Eye, Ear, Skin, Tongue, Nose	**CLO 4**	**06**
Unit XIII		
Urinary system Anatomy and physiology of urinary system, Physiology of urine formation, Renin - angiotensin system, Clearance tests and micturition.	**CLO 5**	**04**
Unit XIV		
Endocrine system (Hormones and their functions) Pituitary gland, Adrenal gland, Thyroid and parathyroid gland, Pancreas and gonads.	**CLO 5**	**06**
Unit XV		
Reproductive system Anatomy of male and female reproductive system, Physiology of menstruation, Spermatogenesis and Oogenesis, Pregnancy and parturition.	**CLO 5**	**04**
Total hours		**75**

Learning Resource

Text Reading:

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee Brother's medical publishers, New Delhi.
2. Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi.
3. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi.
4. Text book of Medical Physiology- Arthur C, Guyton and John.E. Hall. Miamisburg, OH.

References:

1. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York.
2. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje, Academic Publishers Kolkata.

Online resource/ E-learning resource

1.	Nervous system:	i.	https://en.wikipedia.org/wiki/Nervous_system
		ii.	https://training.seer.cancer.gov/anatomy/nervous/tissue.html
2	Digestive system:	iii.	https://www.niddk.nih.gov/health-information/digestive-diseases/digestive-system-how-it-works
		iv.	https://www.britannica.com/science/human-digestive-system
3	Respiratory System:	v.	https://www.nhlbi.nih.gov/health/lungs/respiratory-system
		vi.	https://www.lung.org/lung-health-diseases/how-lungs-work
4	Urinary System :	vii.	https://www.niddk.nih.gov/health-information/urologic-diseases/urinary-tract-how-it-works
		viii.	https://www.stanfordchildrens.org/en/topic/default?id=anatomy-of-the-urinary-system-85-P01468
5	Endocrine System:	ix.	https://www.healthline.com/health/the-endocrine-system
		x.	https://www.medicalnewstoday.com/articles/endocrine-system-function#organs-and-glands
6	Reproductive System:	xi.	https://www.cancer.gov/publications/dictionaries/cancer-terms/def/reproductive-system
7	Introduction to Genetics	xii.	https://www.ncbi.nlm.nih.gov/books/NBK115568/
		xiii.	https://www.cliffsnotes.com/study-guides/biology/biology/classical-mendelian-genetics/introduction-to-genetics

COURSE CURRICULUM

Name of the Program:		**D. Pharm**		**Annual Pattern**		**Level: Diploma**	
Course Name		**Human Anatomy and Physiology (Practical)**		**Course Code/ Course Type**		**ER20-14P**	
Course Pattern		**2024**		**Version**		**1.0**	
Teaching Scheme					**Assessment Scheme**		
Theory	**Practical**	**Tutorial**	**Total Credits**	**Hours**	**CIA (Continuous Internal Assessment)**	**ESA (End Semester Assessment)**	**Practical/Oral**
-	3	-	0	75	20	80	-
Pre-Requisite:		**Nil**					

Course Objectives (CO):	The objectives of Human Anatomy and Physiology are: 1. To study of compound microscope, blood collection and microscopic examinations of the various tissues permanently mounted in glass slides. 2. To study of skeletal system and perform the hematological tests in human subjects and interpret the results. 3. To carry out various hematological assessments and interpreting the results 4. To record, monitor and document the vital physiological parameters of human subjects and interpret the results. 5. To study various systems and organs with the help of chart, models, and specimens.
Course Learning Outcomes (CLO):	Students would be able to: 1. Study of compound microscope, blood collection and microscopic examinations of the various tissues permanently mounted in glass slides. 2. Study of skeletal system and perform the hematological tests in human subjects and interpret the results. 3. Carrying out various hematological assessments and interpreting the results 4. Record, monitor and document the vital physiological parameters of human subjects and interpret the results. 5. Study various systems and organs with the help of chart, models, and specimens.

Course Contents/Syllabus:
(All the units carry equal weightage in Summative Assessment and equal engagement)

Assignment/Practical/Activity Number	Assignment/Practical/ Activity Title	Week Number/Turn	Details	CLO	Hours
1	Practical 1: Compound microscope.	Week1/ Turn 1	1.1 Study of compound microscope.	**CLO 1**	**03**
2.	Practical 2: collection of blood	Week 2/ Turn 1	2.1 Study of General techniques for the collection of blood	**CLO 1**	**03**
3	Practical 3: Epithelial and Cardiac muscle	Week 3/ Turn 1	3.1 Microscopic study of Epithelial and Cardiac muscle	**CLO 1**	**03**

4	Practical 4: Smooth muscle, Skeletal muscle	Week 4 / Turn 1	4.1 Microscopic study of Smooth and Skeletal muscle	**CLO 1**	**03**
5	Practical 5: Connective tissue, and Nervous tissue	Week 5/ Turn 1	5.1 Microscopic study of Connective and Nervous tissue	**CLO 1**	**03**
6	Practical 6: Axial bones	Week 6 / Turn 1	6.1 Identification of axial bones	**CLO 2**	**03**
7	Practical 7: Appendicular bones	Week 7/ Turn 1	7.1 Identification of appendicular bones	**CLO 2**	**03**
8	Practical 8: Blood groups	Week 8 / Turn 1	8.1 Determination of blood groups	**CLO 2**	**03**
9	Practical 9: Erythrocyte sedimentation rate (ESR)	Week 9 / Turn 1	9.1 Determination of erythrocyte sedimentation rate	**CLO 2**	**03**
10	Practical 10: Haemoglobin content	Week 10 / Turn 1	10.1 Estimation of haemoglobin content	**CLO 2**	**03**
11	Practical 11: Bleeding time	Week 11 / Turn 1	11.1 Determination of bleeding time	**CLO 3**	**03**
12	Practical 12: Clotting time	Week 12 / Turn 1	12.1 Determination of clotting time	**CLO 3**	**03**
13	Practical 13: WBC count	Week 13 / Turn 1	13.1 Determination of WBC count	**CLO 3**	**03**
14	Practical 14: red blood corpuscles (RBC) count	Week 14 / Turn 1	14.1 Determination of total red blood corpuscles (RBC) count	**CLO 3**	**03**
15	Practical 15: Differential count of blood	Week 15 / Turn 1	15.1 Determination of Differential count of blood	**CLO 3**	**03**
16	Practical 16: Blood Pressure	Week 16 / Turn 1	16.1 Recording of Blood Pressure	**CLO 4**	**03**
17	Practical 17: Body temperature, pulse rate, heart rate and respiratory rate	Week 17 / Turn 1	17.1 Recording of Body temperature, pulse rate, heart rate and respiratory rate	**CLO 4**	**03**
18	Practical 18: Pulse Oxygen	Week 18 / Turn 1	18.1 Recording of Pulse Oxygen	**CLO 4**	**03**
19	Practical 19: Force of air expelled using Peak Flow Meter	Week 19 / Turn 1	19.1 Recording force of air expelled using Peak Flow Meter	**CLO 4**	**03**
20	Practical 20: Height, weight, and BMI	Week 20 / Turn 1	20.1 Measurement of height, weight, and BMI	**CLO 4**	**03**
21	Practical 21: Cardiovascular and Respiratory system	Week 21 / Turn 1	21.1 Study of Cardiovascular and Respiratory system	**CLO 5**	**03**
22	Practical 22: Digestive, Urinary system	Week 22 / Turn 1	22.1 Study of Digestive, Urinary system	**CLO 5**	**03**
23	Practical 23: Endocrine and Reproductive system	Week 23 / Turn 1	23.1 Study of Endocrine and Reproductive system	**CLO 5**	**03**
24	Practical 24: Nervous system and Eye	Week 24 / Turn 1	24.1 Study of Nervous system and Eye	**CLO 5**	**03**
25	Practical 25: Ear and skin	Week 25 / Turn 1	25.1 Study of Ear and skin	**CLO 5**	**03**

Learning Resource:

Text Reading:

1. Practical Anatomy and Physiology by R. K. Goyal and N. M. Patel, B. S. Shah Prakashan Ahemedabad.
2. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
3. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi.
4. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

References:

1. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York.
2. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
3. Human Physiology (volume 1 and 2) by Dr. C.C. Chatterrje, Academic Publishers Kolkata.

Online resource/ E-learning resource:

1. https://www.slideshare.net/slideshow/to-study-of-compound-of-microscopepdf/254049263
2. https://open.oregonstate.education/aandp/chapter/4-1-types-of-tissues/
3. https://www.slideshare.net/slideshow/hap-i-p-lab-manual/178802701
4. https://courseware.cutm.ac.in/wp-content/uploads/2020/06/Microscopic-study-of-epithelial-and-connective-tissue.pdf
5. https://www.youtube.com/watch?v=aGz-p4u6FU8

COURSE CURRICULUM

Name of the Program:		**D. PHARM**		**Annual Pattern**		**Level: Diploma**	
Course Name		**Social Pharmacy (Theory)**		**Course Code/ Course Type**		**ER 20-15T**	
Course Pattern		**2024**		**Version**		**1.0**	
Teaching Scheme					**Assessment Scheme**		
Theory	**Practical**	**Tutorial**	**Total Credits**	**Hours**	**CIA (Continuous Internal Assessment)**	**ESA (End Semester Assessment)**	**Practical/Oral**
3	-	1	-	75	20	80	--
Pre-Requisite:			**Nil**				
Course Objectives (CO):				The objectives of Social Pharmacy are: 1. To aware students about the public health and National Health Programs 2. To learn about the preventive healthcare.			

	3. To identify the food and nutrition related health issue 4. To understand and help in health promotion and health education. 5. To learn the role and responsibilities of pharmacist in public health.
Course Learning Outcomes (CLO):	Students would be able to: 1. Understand the role of pharmacist in National Health Program and in public health. 2. Describe the role of pharmacist in family planning, Environmental health and in abuse &misuse of drugs. 3. Apply knowledge on food and nutrition related health issue. 4. Describe the various source of health hazards and diseases preventive measure. 5. Design promotional materials for public health awareness and impart the knowledge on Pharmacoeconomic.

Course Contents/Syllabus:
(All the units carry equal weightage in Summative Assessment and equal engagement)

Descriptors/Topics"	**CLO**	**Hours**
UNIT I		
Introduction to Social Pharmacy • Definition and Scope. Social Pharmacy as a discipline and its scope in improving the public health. Role of Pharmacists in Public Health. • Concept of Health -WHO Definition, various dimensions, determinants, and health indicators. • National Health Policy – Indian perspective • Public and Private Health System in India, National Health Mission • Introduction to Millennium Development Goals, Sustainable Development Goals, FIP Development Goals (1) (gross structure, functions of afferent and efferent nerve tracts, reflex activity)	**CLO 1**	**09**
UNIT II		
Preventive healthcare – Role of Pharmacists in the following •Demography and Family Planning • Mother and child health, importance of breastfeeding, ill effects of infant milk	**CLO 2**	**18**

substitutes and bottle feeding • Overview of Vaccines, types of immunity and immunization • Effect of Environment on Health – Water pollution, importance of safe drinking water, waterborne diseases, air pollution, noise pollution, sewage and solid waste disposal, occupational illnesses, Environmental pollution due to pharmaceuticals • Psychosocial Pharmacy: Drugs of misuse and abuse – psychotropic, narcotics, alcohol, tobacco products. Social Impact of these habits on social health and productivity and suicidal behaviours		
UNIT III		
Nutrition and Health • Basics of nutrition – Macronutrients and Micronutrients • Importance of water and fibers in diet • Balanced diet, Malnutrition, nutrition deficiency diseases, ill effects of junk foods, calorific and nutritive values of various foods, fortification of food • Introduction to food safety, adulteration of foods, effects of artificial ripening, use of pesticides, genetically modified foods • Dietary supplements, nutraceuticals, food supplements – indications, benefits, Drug-Food Interactions	**CLO 3**	**10**
UNIT IV		
Introduction to Microbiology and common microorganisms (1) 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 • Intestinal infections – poliomyelitis, viral hepatitis, cholera, acute diarrheal diseases, typhoid, amebiasis, worm infestations, food poisoning • Arthropod-borne infections - dengue, malaria, filariasis and, chikungunya • Surface infections – trachoma, tetanus, leprosy • STDs, HIV/AIDS	**CLO 4**	**28**
UNIT V		
Introduction to health systems and **all ongoing National Health programs** in India, their objectives, functioning, outcome, and the role of pharmacists. **Pharmacoeconomics** – Introduction, basic terminologies, importance of pharmacoeconomics	**CLO5**	**10**
Total Hours		**75**

Learning resources

Textbooks:

1. A text book of Social Pharmacy by Dr.Vikas Jogpal ,All India Book house publishers
2. Social Pharmacy by Dr. S.B Bhise, Nirali Prakashan
3. Essential of Social Pharmacy by Dr. Irfan Aziz,R Narain Publishers and Distributors

Reference Books:

1. Social Pharmacy by VN Raje, CBS Publishers and Distributors Pvt.Ltd.
2. Social Pharmacy by Dr.Lata Kanak,Vaju eductation of India publishers
3. Social Pharmacy by Dr. Annes Ahmed Siddiqui ,Birla Publications Pvt.Ltd

Online Resources/E-Learning Resources:

1. https://ihip.mohfw.gov.in/#!/programmes
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4992376/
3. https://www.physio-pedia.com/Communicable_Diseases

COURSE CURRICULUM

Name of the Program:		**D. Pharm**		**Annual Pattern**		**Level: Diploma**	
Course Name		**Social Pharmacy (Practical)**		**Course Code/ Course Type**		**ER20-15P**	
Course Pattern				**Version**		**1.0**	
Teaching Scheme				**Assessment Scheme**			
Theory	**Practical**	**Tutorial**	**Total Credits**	**Hours**	**CIA (Continuous Internal Assessment)**	**ESA (End Semester Assessment)**	**Practical/Oral**
--	3	--	-	75	20	80	-
Pre-Requisite:							
Course Objectives (CO):				The objectives of Social Pharmacy are: 1. To aware students about the roles and responsibilities of pharmacists in various National health programs. 2. To promote and aware about the materials for public health awareness. 3. To know various health hazards including microbial sources. 4. To identify preventive measures for various diseases.			

	5. To make student aware about the first aid for various emergency conditions.
Course Learning Outcomes (CLO):	Students would be able to: 1. To learn about the various health program. 2. To understand family planning its devices 3. To understand how to use microscope and its applications 4. Describe the various source of health hazards and diseases preventive measure 5. Design promotional materials for public health awareness.

Course Contents/Syllabus
(All the Practical's carry equal weightage in Summative Assessment and equal engagement)
Practical Plan

Assignment/Practical/Activity Number	Assignment/Practical/ Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Practical 1: To study about National immunization schedule for children, adult vaccine schedule, Vaccines which are not included in the National Immunization Program.	Week01/ Turn 1	understand the immunization schedule for children and adults	**CLO1**	**03**
2	Practical 2: To study about RCH – reproductive and child health – nutritional aspects, relevant national health programmes.	Week 02/ Turn 1	Study about the health and health programmes.	**CLO1**	**03**
3	Practical 3: To study about Family planning devices	Week 03/ Turn 1	Study of family planning devices	**CLO2**	**03**

4	Practical 4: To Study about the Microscopical observation of different microbes through readymade slides.	Week 04/ Turn 1	To study about different microbes with the help of microscope	**CLO3**	**03**
5	Practical 5: To Study & Understand the Oral Health & Hygiene, Menstrual Hygiene and its products.	Week 05/ Turn 1	To study oral and health hygiene	**CLO4**	**03**
6	Practical 6: To Learn Hand Washing technique.	Week 06/ Turn 1	To understand hand washing technique	**CLO4**	**03**
7	Practical 7: To Learn a Standard Operating Procedure to Wear the PPE Kit.	Week 07/ Turn 1	To understand how to Wear the PPE Kit	**CLO5**	**03**
8	Practical 8: To Learn how to Wear & Dispose Masks	Week 08/ Turn 1	To understand how to wear the dispose masks	**CLO5**	**03**
9	Practical 9: To study different types of Disinfectant, anti-viral agent & Marketed Preparation.	Week 09/ Turn 1	To understand different type of marketed preparation	**CLO5**	**03**
10	Practical 10: To Study Antiseptic, fumigating agent, mosquito repellents & Marketed Products.	Week 10/ Turn 1	To study antiseptic and marketed products	**CLO5**	**03**
11	Practical 11 : To Study about the role of pharmacist in disaster management	Week 11/ Turn 1	To study about the responsibility of pharmacist in disaster management	**CLO2**	**03**
12	Practical 12 : To demonstrate on First aid through training /audio visual	Week 12/ Turn 1	Understand and learn first aid technique.	**CL05**	**03**
13	Practical 13: To learn about basic of first aid	Week 13/ Turn 1	To understand first aid treatment	**CLO4**	**03**
14	Practical 14: To study emergency treatment for Snakebite	Week 14/ Turn 1	To understand emergency treatment of snakebite	**CLO5**	**03**
15	Practical 15: To study emergency treatment of burns	Week 15/ Turn 1	To understand emergency treatment of burns	**CLO5**	**03**
16	Practical 16: To study awareness on COVID 19	Week 16/ Turn 1	Awareness on COVID-19	**CLO5**	**03**
17	Practical 17: To study awareness on Hepatitis	Week 17/ Turn 1	Awareness on Hepatitis	**CLO5**	**03**
18	Practical 18: To study awareness on Malaria	Week 19/ Turn 1	Awareness on Malaria	**CLO5**	**03**
19	Practical 19: To study awareness on Tuberculosis	Week 19/ Turn 1	Awareness on Tuberculosis	**CLO5**	**03**
20	Practical 20: To study emergency treatment for dog bite, insecticide poisoning ,fracture and epilepsy	Week 20/ Turn 1	Understand about emergency treatment of Dog bite, insecticide poisoning,	**CLO4**	**03**

21	Practical 21: To make a power point presentation on 5 different communicable diseases	Week 21/ Turn 1	Awareness on 5 different communicable diseases	**CLO5**	**03**
22	Practical 22: Preparation of various charts on nutrition, sources of various nutrients from Locally available foods, calculation of caloric needs of different group	Week 22/ Turn 1	Awareness on nutrition and source of nutrition from locally foods	**CLO5**	**03**
23	Practical 23: To demonstrate on the tobacco cessation, counselling, identifying various tobacco containing products through charts/pictures	Week 23/ Turn 1	Awareness on tobacco cessation and its products	**CLO5**	**03**
24	Practical 24: To Counselling children on junk foods, balanced diets.	Week 24/ Turn 1	Awareness on junk food and balanced diets	**CLO5**	**03**
25	Practical 25: To demonstrate on Water purification techniques by using water testing kit, calculation of Content/percentage of KMnO4, bleaching powder to be used for wells/tanks	Week 25/ Turn 1	To understand water purification technique	**CLO5**	**03**

Learning resources

Textbooks:

1. Social Pharmacy by Varun Dutt Sharma, CBS Publishers and Distributors Pvt. Ltd
2. Social Pharmacy by Dr. Jasbir Singh,PV Publication.
3. Social Pharmacy by Dr. Vivek Kahale, Pritam Publication

Reference Books:

1. Social Pharmacy by Dr. Shahbaz khan, Nirali Prakashan
2. Social Pharmacy by Dr. Akhil A Nagar, Everest Publishing House
3. Laboratory Manual of Social Pharmacy by Dr. V. N Jagtap, Nirali Prakashan

Online Resources/E-Learning Resources:

1. https://broghtmedico.com
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6510098/
3. https://iris.who.int/bitstream/handle/10665/204464/B4508.pdf
4. https://pubmed.ncbi.nlm.nih.gov/7815041/