

# School of Medical and Allied Sciences

Bachelor of Pharmacy
(B. Pharm.)
Program Code: 12

(2022-2026)

Approved in the 29<sup>th</sup> Meeting of Academic Council Held on 09 August 2022



Registrar ik is, Wangalam University Schila Road, Gurugram, (Haryana)



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#### **PREFACE**

The KRMU envisions all its programs in the best interest of their students and in this endeavour it offers a new vision to all its courses. Through its programs it aims to provide a focused, student-centric syllabus with an agenda to structure the teaching-learning experiences experientially.

The curriculum strengthens students' experiences and prepare the students for both, academia and employability, sustainability and life-long learning.

Each program reflects the promise to accomplish the learning outcomes by studying the courses. The graduate attributes encompass values related to well-being, emotional stability, critical thinking, social justice and also skills for entrepreneurship.

The K.R. Mangalam University hopes the curriculum will help students in making an informed decision at the time of working in the field of pharmacy.

#### ACKNOWLEDGEMENT

The development of the curriculum for Undergraduate degree courses in the School of Medical and Allied Sciences is a result of thoughtful deliberations at various stages of dedicated and specialized experts. This curriculum has been framed to meet the expectations of an academically challenging environment, develop problem-solving skills by students and align with current standards and to enrich the students to make them self-enablers and/or match job requirements on successful completion of their degrees.

I wish to acknowledge all our experts who have been involved in the process of developing this curriculum for B. Pharmacy. I am greatly gratified Ms. Manvi Arora for her supervision contribution, guidance, and support throughout the development of this curriculum. Special thanks and gratitude to Prof. Aditya Mallik Vice Chancellor, K.R. Mangalam University who have been instrumental and encouraging throughout the process of developing this curriculum. Last, but not the least, I also sincerely thanks to all faculty members for preparation of this handbook for B. Pharmacy program.

Dean

**School of Medical and Allied Sciences** 

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#### 1. Introduction

The K.R. Mangalam Group has made a name for itself in the field of education. The K.R. Mangalam story goes back to the chain of schools that offered an alternative option of world-class education, pitching itself against the established elite schools, which had enjoyed a position of monopoly till then. Having blazed a new trail in school education, the focus of the group was aimed at higher education.

K.R. Mangalam University is the fastest-growing higher education institute in Gurugram, India. K. R. Mangalam University was established under the Haryana Private University Act 2006, received the approval of Haryana Legislature vide Amendment Act # 36 of 2013 and consent of the Hon'ble Governor of Haryana on 11th April 2013, which was published in the Gazette notification vide Leg. No.10/2013, dated 3rd May 2013.

Since its inception in 2013, the University has been striving to fulfil its prime objective of transforming young lives through ground-breaking pedagogy, global collaborations, and world-class infrastructure. Resources at K.R Mangalam University have been continuously upgraded to optimize opportunities for the students. Our students are groomed in a truly interdisciplinary environment where they grow up with integrative skills through interaction with students from engineering, social sciences, management and other study streams.

#### 1.1 K. R. Mangalam University is unique because of its

- I. Enduring legacy of providing education to high achievers who demonstrate leadership in diverse fields.
- II. Protective and nurturing environment for teaching, research, creativity, scholarship, social and economic justice.

#### 1.2 Objectives

- 1. To impart undergraduate, post-graduate and Doctoral education in identified areas of higher education.
- 2. To undertake research programs with industrial interface.
- 3. To integrate its growth with the global needs and expectations of the major stake holders through teaching, research, exchange & collaborative programs with foreign, Indian Universities/Institutions and MNCs.
- 4. To act as a nodal center for transfer of technology to the industry.

To provide job oriented professional education to the student community with particular focus on Haryana

#### 2. About School

School of Medical and Allied Sciences mainly focused on training to students for various subjects and practical aspects related to drug formulation and testing along with co-curricular development. School offers Diploma, undergraduate, post graduate courses in pharmacy and Bachelor degree in physiotherapy post. We 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, carrier guidance, coaching for GPAT and other competitive examinations. We encourage students 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. We provide placement assistance to students for getting jobs in various government and private laboratories. We have tie up with various pharmaceutical industries like Dabur Research Foundation, Sun Pharma, Arbo Pharma, Indian Pharmacopeial Commission, Catalyst Clinical Services, Suraksha Pharma, Medicamen Biotech , Mankind Pharma etc. which provide various carrier opportunities in pharmaceutical production, pharmaceutical quality control, quality assurance, pharmaceutical sales & distribution, drug information services, health insurance, medical coding, supply chain management, forensic sciences, pharmacovigilance, product management team, clinical trials, clinical data management and in Indian Pharmacopeia Commission.

#### 3. School Vision

To contribute towards healthcare needs of the society by producing a skilled, motivated and accessible workforce dedicated towards achieving health for all.

#### 4. School Mission

**M1:** To produce self-motivated, self-reliant and socially sensitive young healthcare professionals catering to the needs of academia, industry and research.

**M2:** To create a centre of excellence for learning and research in the field of pharmaceutical and allied health sciences with inter-disciplinary approach in emerging area of science and technology with focus on industry-academia interaction.

**M3:** To nurture transformational research for the benefit of the society.

**M4:** To interlink pharmaceutical and allied health sciences with interdisciplinary life sciences.

### 5. Programs offered by the school

School offers diploma, undergraduate, post-graduate and doctoral Programme in Pharmacy all these programs are designed to impart scientific knowledge to the students and will provide theoretical as well as practical training in their respective fields. The programs offered by the school are approved by Pharmacy Council of India, New Delhi.

### 5.1 B. Pharmacy

School of Medical and Allied Sciences offers B. Pharmacy degree course which is duly approved by the Pharmacy Council of India (F.No.01.109/2020-PCI, minutes of 109thcentral council meeting on 08-09April,2020, Item No. HR-17 /2020-2021). The curriculum has been specifically designed so as to impart latest knowledge and skills relevant to Pharmaceutical Sciences including Industrial Visits / Training / Guest Lectures of Experts from Industry and Academia.

#### **5.2 Eligibility Criteria:**

### 5.2.1 First year B. Pharm:

Candidate shall have passed 10+2 examination conducted by the respective state/central government authorities recognized as equivalent to 10+2 examination by the Association of Indian Universities (AIU) with English as one of the subjects and Physics, Chemistry, Mathematics (P.C.M) and or Biology (P.C.B / P.C.M.B.) as optional subjects individually. Any other qualification approved by the Pharmacy Council of India as equivalent to any of the above examinations.

# **5.2.2** B. Pharm lateral entry (to third semester):

A pass in D. Pharmacy course from an institution approved by the Pharmacy Council of India under section 12 of the Pharmacy Act.

#### **4.2.3** Course Outline:

Inorganic chemistry / Organic chemistry / Pharmaceutics / Analysis / Environmental Sciences / Biochemistry / Pharmaceutical Chemistry / Pharmacology / Pharmacognosy.

# 4.2.4 Career Options:

Opportunities exist in Drug Inspector Drug Analyst Research & Development of Drugs, Cosmetics, Diagnostics and Vaccines, Drug Patents, Medical Writing, Quality Control, Clinical Research, Hospital Pharmacy, Community Pharmacy/Pharmaceutical Marketing, pharmaceutical industries, regulatory education and forensic drug laboratories.

# 4.2.5 Program Duration

The course of study for B. Pharmacy shall extend over a period of eight semesters (four academic years) and six semesters (three academic years) for lateral entry students. The curriculum and syllabi for the program shall be prescribed from time to time by Pharmacy Council of India, New Delhi.

### 4.2.6 Class Timings

The classes will be held from Monday to Friday from 09:10 am to 04:00 pm.

### 5.2.7 Syllabus

The syllabus of B. Pharmacy programs offered by SMAS is as per the norms of Pharmacy Council of India, New Delhi as mentioned below Programme Duration: - 4 Years the maximum period for the completion of the B. Pharmacy Programme offered by the University shall be four years.

# 5. Syllabus and Scheme of Studies of B. Pharmacy Programme

# 6.1 Four year B. Pharmacy Programme at a glance

	Semester I	Semester II	Semester III	Semester IV	Semester V	Semester V I	Semester VII	Semester VIII	Total
Courses	12	10	8	9	9	9	11	6	74
Credits	30	29	24	28	25	22	27	23	208

	Semester-I				
Course code	Course Title	L	T	P	C
BP101T	Human Anatomy and Physiology I– Theory	3	1		4

BP102T	Pharmaceutical Analysis I – Theory	3	1		4
BP103T	Pharmaceutics I – Theory	3	1		4
BP104T	Pharmaceutical Inorganic Chemistry – Theory	3	1		4
BP105T	Communication skills – Theory *	2	-		2
BP106RBT/ BP106RMT	Remedial Biology/ Remedial Mathematics – Theory*	2	-		2
	Human Anatomy and Physiology –				
BP107P	Practical		-	4	2
BP108P	Pharmaceutical Analysis I – Practical		-	4	2
BP109P	Pharmaceutics I – Practical		-	4	2
BP110P	Pharmaceutical Inorganic Chemistry – Practical		-	4	2
BP111P	Communication skills – Practical*		-	2	1
BP112RBP	Remedial Biology – Practical*		-	2	1
	Total	16	4	20	30

	Semester-II					
Course code	Course Title	L	T	P	С	
BP201T	Human Anatomy and Physiology II – Theory	3	1		4	
BP202T	Pharmaceutical Organic Chemistry I – Theory	3	1		4	
BP203T	Biochemistry – Theory	3	1		4	
BP204T	Pathophysiology – Theory	3	1		4	
BP205T	Computer Applications in Pharmacy – Theory *	3	-		3	
BP206T	Environmental sciences – Theory *	3	-		3	
BP207P	Human Anatomy and Physiology II –Practical		-	4	2	
BP208P	Pharmaceutical Organic Chemistry I– Practical		-	4	2	
BP209P	Biochemistry – Practical		-	4	2	
BP210P	Computer Applications in Pharmacy – Practical*		-	2	1	
Total		32	4	14	29	

	Semester-III				
Course code	Course Title	L	T	P	C

Total		12	4	16	24
BP 308P	Pharmaceutical Engineering –Practical		-	4	2
BP307P	Pharmaceutical Microbiology – Practical		-	4	2
BP306P	Physical Pharmaceutics I – Practical		-	4	2
BP305P	Pharmaceutical Organic Chemistry II – Practical		-	4	2
BP304T	Pharmaceutical Engineering – Theory	3	1		4
BP303T	Pharmaceutical Microbiology – Theory	3	1		4
BP302T	Physical Pharmaceutics I – Theory	3	1		4
BP301T	Pharmaceutical Organic Chemistry II – Theory	3	1		4

	Semester-IV				
Course code	Course Title	L	T	P	C
BP401T	Pharmaceutical Organic Chemistry III- Theory	3	1		4
BP402T	Medicinal Chemistry I – Theory	3	1		4
BP403T	Physical Pharmaceutics II – Theory	3	1		4
BP404T	Pharmacology I – Theory	3	1		4
BP405T	Pharmacognosy and Phytochemistry I– Theory	3	1		4
BP406P	Medicinal Chemistry I – Practical		-	4	2
BP407P	Physical Pharmaceutics II – Practical			4	2
BP408P	Pharmacology I – Practical		-	4	2
BP409P	Pharmacognosy and Phytochemistry I – Practical		-	4	2
Total		15	5	16	28

	Semester-V								
Course code	Course Title	L	T	P	C				
BP501T	Medicinal Chemistry II – Theory	3	1		4				
BP502T	Industrial PharmacyI– Theory	3	1		4				
BP503T	Pharmacology II – Theory	3	1		4				
BP504T	Pharmacognosy and Phytochemistry II- Theory	3	1		4				
BP505T	Pharmaceutical Jurisprudence – Theory	3	1		4				
BP506P	Industrial PharmacyI – Practical		0	4	2				
BP507P	Pharmacology II – Practical		0	4	2				
BP508P	Pharmacognosy and Phytochemistry II – Practical		0	4	2				
	Total	15	5	12	26				

	Semester-VI							
Course code	Course Title	L	T	P	C			
BP601T	Medicinal Chemistry III – Theory	3	1		4			
BP602T	Pharmacology III – Theory	3	1		4			
BP603T	Herbal Drug Technology – Theory	3	1		4			
BP604T	Biopharmaceutics and Pharmacokinetics – Theory	3	1		4			
BP605T	Pharmaceutical Biotechnology – Theory	3	1		4			
BP606T	Quality Assurance –Theory	3	1		4			
BP607P	Medicinal chemistry III – Practical		0	4	2			
BP608P	Pharmacology III – Practical		0	4	2			
BP609P	Herbal Drug Technology – Practical		0	4	2			
	Total	18	5	12	30			

	Semester-VII				
Course code	Course Title	L	T	P	C
BP701T	Instrumental Methods of Analysis – Theory	3	1		4
BP702T	Industrial PharmacyII – Theory	3	1		4
BP703T	Pharmacy Practice – Theory	3	1		4
BP704T	Novel Drug Delivery System – Theory	3	1		4
BP705P	Instrumental Methods of Analysis – Practical	4	0		2
BP706PS	Practice School		0	12	6
'otal	1	16	4	12	24

	Semester-VIII				
Course code	Course Title	L	T	P	С
BP801T	Biostatistics and Research Methodology	3	1		4
BP802T	Social and Preventive Pharmacy	3	1		4
BP803ET	Pharma Marketing Management				
BP804ET	Pharmaceutical Regulatory Science				
BP805ET	Pharmacovigilance				
BP806ET BP807ET BP808ET BP809ET BP810ET BP811ET BP812ET	Quality Control and Standardization of Herbals Computer Aided Drug Design Cell and Molecular Biology Cosmetic Science Experimental Pharmacology Advanced Instrumentation Techniques Dietary Supplements and Nutraceuticals	-			
BP813PW	Project Work		-	12	6
Total			4	12	22

## **Programme Educational Objectives (PEO)**

**PEO1:** To produce pharmacy graduates with profound knowledge and high technical skills to meet various aspects in wide areas of Pharmaceutical industry.

**PEO2:** To enable pharmacy graduates to gain theoretical and practical knowledge in various subjects to discover novel formulation for the benefits of the society.

**PEO3:** To prepare entrepreneurs in Pharma sector with effective communication skills, teamwork and ethical attitude with high integrity for the betterment of the community and the society.

**PEO4:** To promote and train the pharmacy graduates towards contribution of health care system and patient counselling for prevention and treatment of diseases.

**PEO5:** To encourage the pharmacy graduates for lifelong learning and highly competent career prospect related to interdisciplinary pharmaceutical sciences.

# **Programme Outcomes**

The entire curriculum of B. Pharmacy is planned to have following Programme outcomes

**PO 1 Pharmacy Knowledge**: Possess the core and basic knowledge associated with the profession of pharmacy.

**PO 2 Thinking Abilities**: Examine issues rationally and logically; shall acquire, evaluate, and synthesize information and knowledge relevant to an identified problem.

**PO3 Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills.

**PO 4 Leadership Skills**: Acquire knowledge of 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 Professional Identity: Understand, analyze and communicate the value of their professional roles in society.

**PO 6 Pharmacy 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.

**PO 7 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

**PO 8 Professional Ethics**: Honor personal values and apply ethical principles in professional and social contexts and take responsibility for the outcomes associated with the decisions.

**PO 9 Individual or teamwork:** Understand the need for leadership and team-building for fulfillment of practice, professional and societal responsibilities.

**PO 10 Communication:** Develop good communication skills so as to communicate effectively with the pharmacy community and with society at large.

**PO 11 Modern & Usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**PO 12 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. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

# **Programme Specific Outcomes (PSO)**

After completion of the program students are able:

**PSO1**. To impart theoretical & Practical knowledge among students in the various fields of pharmaceutical sciences viz., Pharmaceutics, Pharmaceutical Chemistry, Pharmacology, Pharmacology, Pharmaceutical jurisprudence and Pharmaceutical marketing etc.

**PSO2**. To develop the skill acquired in various regulatory aspects related to clinical, preclinical and medical devices used for human use. The students will be able to experience hand on manufacturing, packaging of drugs. After completing this course students will be able to work as a skilled pharmacist in manufacturing of drugs and cosmetics

#### FOUR YEAR B. PHARM PROGRAMME AT A GLANCE

	Semester I	Semester II	Semester III	Semester IV	Semester V
Courses	12	10	8	9	8
Credits	30	29	24	28	26

	Semester V I	Semester VII	Semester VIII	Total
Courses	9	6	13	75
Credits	30	24	22	213

# **Semester-I**

BP 101T	Human Anatomy And Physiology-I	L	Т	P	С

Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Pharmacology				
Co-requisites	Pharmacology				

#### **Course Objectives**

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

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

#### **Course Outcomes (CO)**

#### On completion of this course, the student will be able to:

- CO1. This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body.
- CO2. It also helps in understanding both homeostatic mechanisms
- CO3. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.
- CO4. It enlightens the students about the cells, various types of tissues in human body, skeleton system, skeletal and smooth muscles.

CO5. It also deals with the composition of blood, blood groups, blood coagulation, various disease-causing agents and preventive measures, balanced diet, disorders and treatment involve in nutritional deficiency.

	Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	1	-	-	2	3	1	-	1	-	2	3	3	3
CO2	3	2	-	-	2	3	-	1	1	-	2	2	2	3
CO3	3	1	-	-	3	3	-	2	1	-	2	-	3	3
CO4	3	1	-	-	3	3	-	2	1	-	2	-	3	3
CO5	3	-	-	-	3	3	-	2	-	-	2	-	2	2

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental	needs		Relevance To the Employability/ Entrepreneurship/ Skill Development Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability					SDG	NEP	POE/4 <sup>th</sup> IR			
BP101T	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence	-	-	-	-	SDG 3: Ensure healthy lives and promote well-	NEP (9.1- 9.3)	Student centric Technical Skills that match Industry Needs

							in the students which is done by providing opportunities to students to give presentations and debates in the classroom					being for all at all ages.  SDG 4.4: Skills for Decent Work		
Unit II	-	-	-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the students which is done by providing opportunities to students to give presentations	-	-	-	-	SDG 3: Ensure healthy lives and promote well- being for all at all ages.  SDG 4.4:	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

						and debates in the classroom				Skills for Decent Work		
Unit III		-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the students which is done by providing opportunities to students to give presentations and debates in the classroom	-	-	-	SDG 3: Ensure healthy lives and promote well- being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

Unit IV	-	-	-	-	-	-	Enrichment	-	-	-	-	SDG 3:	NEP (9.1-	Student centric
							of thinking					Ensure	9.3)	Technical Skills
							ability and					healthy		that match Industry
							creativity as					lives		Needs
							well a tool					and		
							for building					promote		
							confidence					well-		
							in the					being		
							students					for all		
							which is					at all		
							done by					ages.		
							providing							
							opportunities							
							to students					SDG		
							to give					4.4:		
							presentations					Skills		
							and debates					for		
							in the					Decent		
							classroom					Work		
Unit V	-	_	_	-	-	_	Enrichment	_	Gender	_	_	SDG 3:	NEP	Student centric
							of thinking		Based			Ensure	21.1-	Technical Skills
							ability and		knowledge			healthy	21.10:	that match Industry
							creativity as		will			lives		Needs
							well a tool		benefit the			and	Adult	
							for building		students to			promote	Education	
							confidence		respect			well-	and	
							in the		and			being	Lifelong	
							students		understand			for all		

which is	the other	at all	Learning
done by providing opportunities	gender in a better way	ages.	
to students to give presentations and debates in the classroom		SDG 4.4: Skills for Decent Work	

BP102T Pharmaceutical Analysis (Theory)	L	Т	P	C
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T	1		4		1								
Version 2.0		3	1	0	4								
<b>Total Contact Hours</b>	Total Contact Hours 45 Hours												
Pre-requisites/Exposure Pharmaceutical Analytical Chemistry													
Co-requisites	Co-requisites Analytical Chemistry												
	Course O	bjective	s										
	course the student should be able to bry of Pharmacopoeia												
2. Understand the pr	inciples of volumetric and electro chemical	analysis	}										
3. Carryout various v	volumetric and electrochemical titrations												
4. Develop analytica	ıl skills												
5. To understand wit	th acid base titration.												
	Course Outc	omes (C	CO)										
On completion of this course, the	he student will be able to:												
CO1. This subject is designed to	impart fundamental knowledge on pharmac	eutical p	preparations.										
CO2. The subject provides the ba	asic knowledge required to understand the v	arious d	isciplines of An	alysis.									
CO3. This subject deals with the	monographs of inorganic drugs and pharma	ceutical	S.										
CO4. Provide Knowledge about	CO4. Provide Knowledge about Indian Pharmacopoeia, British Pharmacopeia and other Regulatory agencies.												
CO5. Carryout various volumetri	CO5. Carryout various volumetric and electrochemical titrations.												
Programme and Course Mapping													

PO

PO11 PO12

**PSO** 

PO8 PO9

PSO 2

PO2 PO3

PO4 PO5 PO6 PO7

CO

PO1

										10			1	
CO1	3	1	-	-	2	3	1	-	1	-	2	3	3	-
CO2	3	2	-	-	2	3	-	1	1	-	2	2	2	-
CO3	3	1	-	-	3	3	-	2	1	-	2	-	3	-
CO4	3	1	-	-	3	3	-	2	1	-	2	-	3	-
CO5	3	-	-	-	3	3	-	1	-	-	3	-	2	-
1=lightly mapped 2= moderately mapped 3=strongly mapped													strongly mapped	

levance to the al, national, gional and global velopmental eds	levance To the aployability/ trepreneurship/ ill Development	levance to the ofessional Ethics, ander, Human llues, vironment & stainability	G.	E/4 <sup>th</sup> IR
Rel loca dev dev nee	Rel Em Ent Ski	Rel Pro Ger Val Env Sus	SD	PO

BP1 02T													
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability		
Unit	Empowerm	Skilled professionals	National	-	-	-	Understan	-	-	-	-	1.b	Update
I	ent of	in pharmaceutical	Drug				ding the					Cre	d
	Local	analysis can	Quality and				principles					ate	Curricu
	Workforce:	contribute to the	Safety:				and					sou	lum
	Developing	development and	Skilled				applicatio					nd	
	skills in	growth of the regional	professional				ns of these					poli	
	pharmaceut	pharmaceutical	s in				techniques					cy	
	ical	industry	pharmaceuti				helps					fra	
	analysis at		cal analysis				develop					me	
	the local		play a vital				expertise					wor	
	level		role in				in					ks	
	empowers		ensuring the				selecting						
	the		quality,				and					(SD	
	workforce		safety, and				applying					G	
	within the		efficacy of				the					1a)	
	community		pharmaceuti				appropriat						
			cal products				e						
							analytical						

							method for							
							different							
							pharmaceu							
							tical							
							compound							
							S.							
Unit	Local	National Drug Quality	Regulatory	Capaci	-	-	Laborator	-	-	-	-	Ens	Qua	Interns
II	Analytical	and Safety: Skilled	Compliance:	ty			у					ure	lity	hip
	Services	professionals in	National	Buildin			Technique					heal	Uni	Progra
	and	pharmaceutical	regulatory	g and			s: The					thy	vers	ms
	Consulting:	analysis play a vital	bodies	Knowl			paragraph					live	ities	
	Skilled	role in ensuring the	responsible	edge			mentions					S	and	
	professiona	quality, safety, and	for drug	Transf			specific					and	Coll	
	ls in	efficacy of	approval and	er:			laboratory					pro	eges	
	pharmaceut	pharmaceutical	oversight	Sharin			techniques					mot	: A	
	ical	products circulating in	can benefit	g			associated					e	Ne	
	analysis	the country.	from	knowle			with each					well	W	
	can offer	·	expertise in	dge			method,					-	and	
	analytical		pharmaceuti	and			such as the					bein	For	
	services		cal analysis.	buildin			constructi					g	war	
	and		·	g			on and					for	d-	
	consulting			capacit			working of					all	look	
	to local			y in			electrodes,					at	ing	
	pharmaceut			pharma			preparatio					all	Visi	
	ical			ceutica			n of					ages	on	
	companies,			1			standard					(SD	for	
	healthcare			analysi			solutions,					G 3)	Indi	
	institutions			s			and						a's	
	, and			globall			handling						Hig	
	research			y			of						her	

	organizatio			enhanc			precipitate						Edu	
	ns.			es the			S						cati	
				capabil									on	
				ities of									Syst	
				develo									em	
				ping									(9.1	
				countri									-	
				es									9.3)	
Unit	Their	Public Health and	Pharmaceuti	Global	-	-	Laborator	-	-	-	-	Skil	Opti	Internat
III	expertise	Patient Safety: Skilled	cal Industry	Collab			у					ls	mal	ional
	enhances	professionals in	Competitive	oration			Technique					for	Lea	Exchan
	local	pharmaceutical	ness: A	s and			s: The					Dec	rnin	ge
	research	analysis play a crucial	strong	Partner			paragraph					ent	g	Student
	capabilities	role in ensuring the	foundation	ships:			mentions					Wor	Env	Progra
	and	quality, safety, and	in	Global			specific					k	iron	ms
	supports	efficacy of	pharmaceuti	experti			laboratory					(SD	men	
	the	pharmaceutical	cal analysis	se in			techniques					G	ts	
	developme	products available in	at the	pharma			associated					4.4)	and	
	nt of new	the country.	national	ceutica			with each						Sup	
	pharmaceut		level can	1			method,						port	
	ical		enhance the	analysi			such as the						for	
	products		competitiven	S			constructi						Stu	
	and		ess of the	facilita			on and						dent	
	technologie		domestic	tes			working of						S	
	S		pharmaceuti	collabo			electrodes,						(12.	
			cal industry.	rations			preparatio						1-	
				and			n of						12.1	
				partner			standard							

				ships			solutions,						0)	
				betwee			and						ŕ	
				n			handling							
				countri			of							
				es,			precipitate							
				acade			S							
				mic										
				institut										
				ions,										
				and										
				pharma										
				ceutica										
				1										
				compa										
				nies										
Unit	Empowerm	Quality Control and	Research	Interna	-	-	Method	-	-	-	-	Safe	Equ	Skill
IV	ent of	Assurance: Skilled	and	tional			Selection					and	ity	Develo
	Local	professionals in	Developmen	Trade			and					Incl	and	pment
	Workforce:	pharmaceutical	t: National	and			Optimizati					usiv	Incl	
	Developing	analysis are crucial for	research	Regula			on: The					e	usio	
	skills in	establishing and	institutions	tion			paragraph					Lear	n in	
	pharmaceut	maintaining quality	and	Compli			introduces					ning	Hig	
	ical	control and assurance	universities	ance:			different					Env	her	
	analysis at	systems.	focusing on	Global			methods					iron	Edu	
	the local		pharmaceuti	experti			and					men	cati	
	level		cal sciences	se in			techniques					ts	on	
	empowers		can benefit	pharma			used in					(SD	(14.	
	the		from	ceutica			analytical					G	1-	
	workforce		expertise in	1			chemistry,					4.a)	14.4	1
	within the		pharmaceuti				providing					· ·		

	community		cal analysis	S			individual						.2)	
				promot			s with a							
				es			broad							
				interna			understand							
				tional			ing of the							
				trade			available							
				and			options for							
				regulat			analysis.							
				ory			-							
				compli										
				ance										
				_										
Unit	Contributio	Regulatory	Pharmacovi	Interna	-	-	Data	-	-	-	-	Prof	Equ	Hands-
V	n to Local	Compliance: National	gilance and	tional			Interpretat					essi	ity	on
	Research	regulatory authorities	Post-	Trade			ion:					onal	and	Experie
	and	responsible for	Marketing	and			Analytical					Dev	Incl	nce
	Innovation:	overseeing the	Surveillance	Regula			chemistry					elop	usio	
	Skilled	pharmaceutical	: Skilled	tion:			involves					men	n in	
	professiona	industry rely on	professional	Knowl			the					t of	Hig	
	ls in	professionals in	s in	edge			interpretati					Tea	her	
	pharmaceut	pharmaceutical	pharmaceuti	and			on of					cher	Edu	
	ical	analysis to enforce	cal analysis	skills			experimen					S	cati	
	analysis at	regulatory standards	can	in			tal data					(SD	on	
	the local	and ensure	contribute to	pharma			and					G	(14.	
	level can	compliance	national	ceutica			drawing					4.c)	1-	
	contribute		pharmacovig	1			conclusion						14.4	
	to research		ilance	analysi			s based on						.2)	
	and		efforts.	S			the results							
	innovation			facilita			obtained.							
	initiatives			te										
	within the			interna										

community		tional					
		trade in					
		pharma					
		ceutica					
		1					
		produc					
		ts.					

BP 103T	Pharmaceutics-I (Theory)	L	Т	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours	1			
Pre-requisites/Exposure	Pharmaceutics				
Co-requisites	Posology				
	Course Object	VAC			

#### **Course Objectives**

# Upon completion of this course the student should be able to

- 1. Know the history of profession of pharmacy
- 2. Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
- 3. Understand the professional way of handling the prescription

- 4. Preparation of various conventional dosage
- 5. Introduction about novel drug delivery system

# **Course Outcomes (CO)**

### On completion of this course, the student will be able to:

- CO1. This subject is designed to impart fundamental knowledge on pharmaceutical preparations.
- CO2. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.
- CO3. It enlightens the students about the dosage, various types of dosage form, NDDS, depot preparation.
- CO4. Provide Knowledge about Indian Pharmacopoeia, British Pharmacopeia and other Regulatory agencies
- CO5. Provide Knowledge about metric system and calculation of dosages.

### **Programme and Course Mapping**

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	-	-	2	3	1	2	1	-	2	3	3	-
CO2	3	2	-	-	2	3	-	1	1	-	2	3	2	-
CO3	3	1	-	-	3	3	-	2	1	-	2	3	3	-
CO4	3	1	-	-	3	3	-	2	1	-	2	3	3	-
CO5	3	-	-	-	3	3	-	1	-	-	3	3	2	-
			ı	1=light	tly map	ped	ı	2= mod	derately	map	ped	3=	strongl	y mapped

Unit	Relevance to the local, national, regional and global	developmental needs			Relevance To the Employability/ Entrepreneursh	ip/ Skill Development	a computation of	Relevance to the	Professional Ethics, Gender.	Human Values,	Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
Unit	It allows pharmacists to provide culturally sensitive care, comply with local regulations, address local healthcare needs, and	This enhances their ability to provide patient-centered care, collaborate with healthcare stakeholders, and contribute to the overall health and well-being of the local	Provides pharmacists with a solid foundation in the evolution of their field, enhances their professional identity, and equips them with the knowledge and skills	! Global	Atilique Ati	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Focus on Employab ility Skills (Local/Re gional and Global)

	actively	population	necessary for		patient care.						
	engage with		safe and								
	the local		effective								
	community		pharmaceutical								
	to improve		practice.								
	healthcare		practice.								
	outcomes.										
	outcomes.										
Unit				Promote	Enhances	 	 	 	Skills	Professional	Focus on
II				harmonizati	employabilit				for	Education	Employab
				on of	y in various				Decent	(17.1-17.5)	ility Skills
				pharmaceut	sectors of				Work		(Local/Re
				ical	the				(SDG		gional
				practices,	pharmaceuti				4.4)		and
				improve	cal industry,						Global)
				patient	including						
				outcomes	manufacturi						
				on a global	ng, quality						
				scale, and	control,						
				advance the	research and						
				developme	development						
				nt and	, regulatory						
				accessibilit	affairs,						
				y of	education,						
				medication	and						
				s	consultancy.						
				worldwide.	It provides a						
					competitive						
					edge and						
					opens up						
					opportunitie						

			s for career						
			advancemen						
			t and						
			specializatio						
			n in the						
			global						
			pharmaceuti						
			cal						
			landscape.						
									_
Unit	 	 This	Various	 	 	 	Skills	Professional	Focus on
III		knowledge	sectors of				for	Education	Employab
		facilitates	the				Decent	(17.1-17.5)	ility Skills
		the	pharmaceuti				Work		(Local/Re
		selection of	cal industry,				(SDG		gional
		appropriate	including				4.4)		and
		excipients,	formulation						Global)
		manufactur	development						
		ing	, quality						
		processes,	control,						
		and quality	manufacturi						
		control	ng,						
		measures to	regulatory						
		meet	affairs,						
		regulatory	research and						
		requiremen	development						
		ts and	and						
		deliver safe	pharmacy						
		and	practice.						
		efficacious							
		pharmaceut							

		ical products to patients.							
Unit		Helps in optimizing drug delivery, formulation stability, patient compliance, and ensuring the safety and efficacy of pharmaceut ical products	Various sectors of the pharmaceuti cal industry, including formulation and development , quality control, regulatory affairs, research and development , clinical practice, and pharmaceuti cal education and training.	-		 	 Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Focus on Employab ility Skills (Local/Re gional and Global)
Unit	 	 It provides	Opens up		 	 	 Skills for	Professional	Focus on
V		experts with the	diverse career				Decent	Education (17.1-17.5)	Employab ility Skills
		knowledge	opportunitie				Work	(17.1 17.3)	(Local/Re

		and	s in			(SDG	gional
		abilities	formulation			4.4)	and
						4.4)	
		required to	development				Global)
		create	, quality				
		stable and	control,				
		effective	research and				
		semisolid	development				
		dosage	, regulatory				
		forms for a	affairs,				
		range of	manufacturi				
		therapeutic	ng,				
		purposes.	dermatology				
			, cosmetics,				
			academia,				
			and research				
			institutions				
			within the				
			pharmaceuti				
			cal industry.				

BP104T	Pharmaceutical Inorganic Chemistry (Theory)	L	Т	P	C
Version 2.0		3	1	0	4

Co-requisites  Corequisites  Chemistry  Course Objectives  Upon completion of this course the student should be able to  1. To Know the history of Pharmacopoeia  2. To know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.  3. Understand the medicinal and pharmaceutical importance of inorganic compounds								
Course Objectives  Upon completion of this course the student should be able to  1. To Know the history of Pharmacopoeia  2. To know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.								
Upon completion of this course the student should be able to  1. To Know the history of Pharmacopoeia  2. To know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.								
<ol> <li>To Know the history of Pharmacopoeia</li> <li>To know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.</li> </ol>								
3 Understand the medicinal and pharmaceutical importance of inorganic compounds								
5. Orderstand the medicinal and pharmaceutical importance of morganic compounds								
4. Preparation of various radio pharmaceutical dosage								
5. Introduction about Antidotes								
Course Outcomes (CO)								
On completion of this course, the student will be able to:								

- CO1. This subject is designed to impart fundamental knowledge on pharmaceutical preparations.
- CO2. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.
- CO3. This subject deals with the monographs of inorganic drugs and pharmaceuticals.
- CO4. Provide Knowledge about Indian Pharmacopoeia, British Pharmacopeia and other Regulatory agencies.
- CO5. Provide Knowledge about metric system and calculation of dosages to understand.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	1	-	-	3	2	-	2	1	-	2	3	3	-
CO2	3	2	-	-	2	3	-	1	1	-	2	3	3	-
CO3	3	1	-	-	3	3	-	2	1	-	2	3	3	-
CO4	3	1	-	-	3	3	-	2	1	-	2	3	3	-
CO5	3	-	-	-	3	3	-	1	-	-	3	3	3	-
		ı	1	ı	1=ligh	tly map	ped		2= mod	erately	y mappe	d	3=st	trongly mapped

Unit	tional, and global nental	ce To the ability/ eneurship/ velopment	ce to the onal Ethics, Human ment & hillity		IR
	Relevan local, na developi needs	Relevan Employ Entrepr Skill De	Relevan Professi Gender, Values, Environ Sustaina	SDG	POE/4 <sup>th</sup>

	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit			Impurities in pharmaceuti cal substances: History of Pharmacopo eia, Sources and types of impurities	Impurit ies in pharma ceutica l substan ces: History of Pharm acopoe ia, Source s and types of impurit ies	Deter mina tion of impu rities in phar maco poeia l subst ance gener ate empl oyme nt.	-	Determina tion of impurities in pharmaco peial substance. Which develop skills	-	)		<b>T</b>	Skil l for dece nt wor k SD G4. 4.	Professional Education (17.1-17.5)	It helps in develop ing technic al skills that industr y require s .And thus helps in creatin g employ ment.

Unit II	-	-	Acids, Bases and Buffers  2.Major extra and intracellular electrolytes  3. Dental products	Acids, Bases and Buffers  2.Majo r extra and intracel lular electrol	Prod uctio n of acid base, Elect rolyt e soluti on, denti	Produ ction of acid base, Electr olyte solutio n, dentifr ices the	-	-	-	-	-	Skil ls for Dec ent Wor k (SD G 4.4)	Professional Education (17.1-17.5)	Skill Develo pment It helps in develop ing technic al skills that
				ytes 3. Dental produc ts	frices the globe provi des a lot of empl oyme nt.	globe provid es a lot of emplo yment.								industr y require sand thus helps in creatin g employ ment

Unit		Synthesis, reactions and medicinal uses of following compounds/ derivatives  Gastric acidifiers, antacid and and cathartics	Synthe sis, reactio ns and medici nal uses of followi ng compo unds/d erivati ves  Gastric acidifie rs, antacid and and	hesis, reacti ons and medi cinal uses of follo wing comp ound s/deri vativ es Gastr ic acidi	Synthesis of HCl, Magnesiu m sulphate, Sodium hydrogen carbonate, combined antacid preparatio n helps in honing the technical skill and expertise in production		-	Skil ls for Dec ent Wor k (SD G 4.4)	Prof essi onal Edu cati on (17. 1- 17.5 )	Skill Develo pment  It helps in develop ing technic al skills that industr y require sand thus helps in creatin g employ
		antacid and and	unds/d erivati ves Gastric acidifie rs, antacid and	wing comp ound s/deri vativ es Gastr ic	preparatio n helps in honing the technical skill and expertise in					industr y require sand thus helps in creatin g

Unit	-	-	Synthesis,	Synthe	Synt	-	Synthesis	-	-	-	Skil	Prof	Skill
IV			reactions	sis,	hesis,		of				ls	essi	Develo
			and	reactio	reacti		Haematini				for	onal	pment
			medicinal	ns and	ons		cs, Anti				Dec	Edu	
			uses of	medici	and		dotes,				ent	cati	It helps
			following	nal	medi		expectoran				Wor	on	in
			compounds/	uses of	cinal		ts				k	(17.	develop
			derivatives	followi	uses		preparatio				(SD	1-	ing
			F	ng	of		n helps in				G	17.5	technic
			Expectorants	compo	follo		honing the				4.4)	)	al skills
			, emetics, antidotes,	unds/d	wing		technical						that industr
			Haematinics	erivati	comp		skill and						
			Haemaumes	ves	ound		expertise						y require
				Expect	s/deri		in						s and
				orants,	vativ		production						thus
				emetic	es								helps in
				s,	Expe								creatin
				antidot	ctora								g
				es,	nts,								employ
				Haema	emeti								ment
				tinics	cs,								
					antid								
					otes,								
					Hae								
					mitin								
					ics								
					1 1								
					globe .								
					provi								
					des a								

Unit	-	-	Radiopharm aceuticals	Radiop harmac eutical s Produc tions	lot of empl oyme nt.  Radi opha rmac eutic als	-	-	:	-	-	Skil ls for Dec ent Wor k (SD G 4.4)	Prof essi onal Edu cati on (17. 1- 17.5)	Skill Develo pment It helps in develop ing technic al skills that industr y require s and thus helps in creatin
													g employ ment

BP-105T	Communication Skills (Theory)	L	Т	P	С							
Version 2.0 3 0 0 2												
Total Contact Hours 30 Hours												
Pre-requisites/Exposure Communication Skills												
Co-requisites Communication Skills												
Course Objectives												
Upon completion of this course the student should be able to 1. Communicate effectively (Verbal and Non-Verbal) 2. Effectively manage the team as a team player												

# Course Outcomes (CO)

### On completion of this course, the student will be able to:

- CO1. Understand the behavioural needs for a pharmacist to function effectively in the areas of pharmaceutical operation
- CO2. Develop interview skills
- CO3. Develop Leadership qualities and essentials
- CO4. Develop confidence in pursuing interdisciplinary

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	1	3	2	1	3	1	1	3	3	1	2	-	-
CO2	3	1	2	2	1	3	1	1	2	3	1	2	-	-
CO3	1	1	2	2	1	3	1	1	2	3	1	2	-	-
CO4	1	1	1	2	1	3	1	1	1	3	1	2	-	-
					1=ligh	tly ma	pped		2= mo	derate	ely mapp	ed	3=	estrongly mapped

Unit	Relevance to the local, national, regional and global developmental	needs			Relevance To the	Entrepreneurship/ Skill Development		Relevance to the Professional Ethics,	Values,	Environment &	Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			

Unit	-	-	-	Awarin	-	-	Knowledge	-	-	-	-	Skill	Profes	Skill
I &				g			of different					s for	sional	Devel
II				student			communicat					Dece	Educat	opmen
				s about			ion styles,					nt	ion	t
				commu			barrier,					Wor	(17.1-	
				nicatio			elements					k	17.5)	
				n skill,			(face to					(SD		
				barrier			face, verbal					G		
				in			,nonverbal					4.4)		
				commu			communicat							
				nicatio			ion will							
				ns and			help in							
				styles			communicat							
							ing to the							
							world							
Unit	_	-	_	Globall	_		Knowledge	_	_	_	_	Tech	Focus	Skill
III	_	-	_		_		of writing	_	_	-	_	nolo	on	Devel
1111				y aware			emails and						Emplo	opmen
				student			listening					gy Use	yabilit	t
				s about			will help					&	уаотт	ι
				listenin			students in					Integ	y Skills	
				g skills			expression					ratio	(Local	
				and			their					n	/Regio	
				writing			views/com					(23.1	nal	
				emails			municating					-	and	
				Cilialis			through					23.1	Global	
							writing					3)	)	
							witting					3)	,	

Unit IV	-	-	-	Fulfils the need for intervi ew skills	-	Knowledge of interview skills will help in building confidence to face interview	-	-	-	-	Skill s for Dece nt Wor k (SD G 4.4)	Focus on Emplo yabilit y Skills (Local /Regio nal and Global	Skill Devel opmen t
Unit	-	-	-	Globall y aware about commu nicatio n skills used in group discuss ion	-	Knowledge of group methods, their do's and don'ts will help in facing interview rounds	-	-		-	Tech nolo gy Use & Integ ratio n (23.1 - 23.1 3)	Focus on Emplo yabilit y Skills (Local /Regio nal and Global )	Emplo yabilit y, Skill Devel opmen t

BP106 RBT	Remedial Biology (Theory)	L	Т	P	С
Version 2.0		2	0	0	2
<b>Total Contact Hours</b>	30 Hours				
Pre-requisites/Exposure	Biology				
Co-requisites	Biology	011 4			

#### **Course Objectives**

#### Upon completion of this course the student should be able to

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

# Course Outcomes (CO)

#### On completion of this course, the student will be able to:

- CO1. To learn and understand the components of living world, structure and functional system of plant kingdom (leaf, root, stem).
- CO2. To learn and understand the components Composition of blood, blood groups, coagulation of blood.
- CO3. It provides knowledge about structure and function of heart.
- CO4. It provides knowledge about Digestive system, Reproductive system.
- CO5. It helps in understanding the concept of Respiration system.

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	-	-	3	2	-	-	-	-	2	3	3	3
CO2	3	2	•	-	2	3	-	-	-	•	2	3	3	3
CO3	3	2	-	-	3	3	-	-	-	-	2	3	3	3
CO4	3	2	-	-	3	3	-	-	-	-	2	3	3	3
CO5	3	2	-	-	3	3	-	-	-	-	3	3	3	3
				•	1=lig	htly ma	apped		2= m	oderat	ely map	ped	3	=strongly mapped

Unit	Relevance to the local, national, regional and global	Relevance To the	Relevance to the	SD	NE	POE/4 <sup>t</sup>
	developmental needs	Employability/	<b>Professional Ethics</b> ,	G	P	<sup>h</sup> IR
		Entrepreneurship/ Skill	Gender, Human Values,			
		Development	<b>Environment &amp;</b>			
			Sustainability			

	Local	Regi	National	Global	Em	Entrepr	Skill	Pr	Gender	Н	Enviro			
		onal			plo	eneursh	Developm	ofe		u	nment			
					yabi	ip	ent	ssi		m	&			
					lity	1		on		an	Sustai			
								al		V	nabilit			
								Et		al	y			
								hic		ue				
								S		S				
Unit I				Student will be able to			Remedial		Remedi			(SD	(9.1	Global
				understand importance			Biology		al			G	-	Educati
				of the living world on a			Remedial		Biology			4.4)	9.3)	on
				global scale allows for			Biology		provide					Knowle
				informed decision-			provides a		s a					dge,
				making and actions			strong		foundat					Skill
				aimed at promoting the			foundation		ional					Develo
				coexistence of humans			for various		underst					pment,
				and nature while			careers		anding					Employ
				preserving the planet's			and areas		of the					ability
				ecological integrity.			related to		human					
							health,		body,					
							fitness,		includi					
							and		ng its					
							medical		structur					
							sciences.		es and					
							The		functio					
							knowledge		n for					

Unit	-		Student will be able to know Body fluids and circulation, as well as digestion and absorption, have broad implications for global water resources, nutrient cycling, agricultural practices, food security, and waste management. By understanding and managing these processes sustainably, we can contribute to a more balanced and environmentally conscious global system.	gained can enhance critical thinking, problem- solving skills, and the ability to apply scientific principles to practical situations, contributin g to skill developme nt in these fields.	both gender		(SD G 4.4)	(9.1 - 9.3)	Global Educati on Knowle dge, Skill Develo pment, Employ ability
Unit III	-	-	Knowledge of respiratory mechanisms,				(SD G	(9.1	Global Educati
			urinary system				4.4)	9.3)	on
			functions, endocrine						Knowle
			system basics, and						dge,
			reproductive system						Skill
			disorders, students can play a significant role in						Develo
			analysing, addressing,						pment, Employ

	and finding solutions to global issues related to respiratory disorders, urinary disorders, endocrine disorders like diabetes, and reproductive system-related disorders.					ability
Unit IV	By understanding and managing the mineral nutrition of plants, we can enhance these global impacts and promote a sustainable and thriving planet.			(SD G 4.4)	(9.1 - 9.3)	Global Educati on Knowle dge, Skill Develo pment, Employ ability
Unit	Understanding and harnessing the potential of these processes is essential for addressing global challenges and promoting a sustainable future.			(SD G 4.4)	(9.1 - 9.3)	Global Educati on Knowle dge, Skill Develo pment, Employ ability

BP106 RMT	Remedial Mathematics (Theory)	L	Т	P	С
Version 2.0		2	0	0	2
<b>Total Contact Hours</b>	30 Hours				
Pre-requisites/Exposure					
Co-requisites					
	Course	Objectiv	ves .		

#### Upon completion of this course the student should be able to

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

# Course Outcomes (CO)

#### On completion of this course, the student will be able to:

CO1. To learn and understand the advance mathematics and its implementation in pharmacy

CO2. It provides knowledge of fraction and its implementation in pharmacy

CO3. It provides knowledge of analytical geometry and calculus

CO4. It helps in understanding the matrices and determinant

PO1

3

3

3

 $\mathbf{CO}$ 

CO1

CO<sub>2</sub>

**CO3** 

CO<sub>4</sub>

PO2 PO3

3

3

3

3

2

2

2

2

#### 

- - - - - 2 3 -- - - - 2 3 -

1=lightly mapped 2= moderately mapped 3=strongly mapped

BP107P	Human Anatomy and Physiology (HAP) – Practical	L	Т	P	C
Version 2.0		0	0	4	2

<b>Total Contact Hours</b>	60 Hours
Pre-requisites/Exposure	HAP-1 Practical
Co-requisites	Experimental Pharmacology

# **Course Objectives**

#### Upon completion of this course the student should be able to

- 1. Practical physiology is complimentary to the theoretical discussions in Physiology.
- 2. Practical allows the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings.
- 3. This is helpful for developing an insight into human anatomy and physiology.

#### **Course Outcomes (CO)**

#### On completion of this course, the student will be able to:

- CO1. To learn and understand the components of living world, structure and functional system of plant kingdom.
- CO2. It provides knowledge about blood, their composition, function and coagulation factor.
- CO3. To learn the about bones with special reference to human.
- CO4. Provide practical knowledge of biological system and human anatomy

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	2	2	3	2	-	2	2	2	3	3	3	3

Unit	Relevance to the	local, national, recional and clobal	nental			Relevance To the	Employability/ Entrepreneurship/ Skill Develonment			Relevance to the Professional Ethics, Gender, Human	Values, Environment &	Sustainability		543	500	NEP	POE/4 <sup>th</sup> IR	
CO2	3	3	3	2	2	2	-	1	2	2	3	3	3	3				_
CO3	3	3	2	2	3	2	-	2	2	2	3	3	3	3				
CO4	3	2	2	2	3	2	-	2	2	2	3	3	3	3				
			•		1=lightl	y mappe	ed	2= m	oderate	ly mapped		3=stro	ongly ma	apped				

BP107P														
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I Practica 11-3		-	The concepts once imbibed will help the students to use the practical information in providing better health services to the nation as a whole	-	-	-	Enrichment of thinking ability and creativity. The practical knowledge of the topic will help them to understand the physiology of skin and diseases related to the system in a better	-	-	-	-	SDG 3: Ensure healthy lives and promote well- being for all at all ages.  SDG 4.4: Skills for Decent	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

							way and					Work		
							they will be							
							able to							
							correlate							
							the							
							knowledge							
							and							
							information							
							gathered in							
							their day-							
							to-day life							
							and future							
							job							
							prospective							
							also							
Unit II	_	_	The	_	_	-	Enrichment	_	_	_	_	SDG 3:	NEP	Student
1				_	_			_	_					
Practica			concepts	_	_		of thinking		-			Ensure	(9.1-	centric
Practica 14-6			concepts once	-	-		of thinking ability and					Ensure healthy		centric Technical
			concepts once imbibed		-		of thinking ability and creativity.					Ensure healthy lives	(9.1-	centric Technical Skills
			concepts once imbibed will help		-		of thinking ability and creativity. The					Ensure healthy lives and	(9.1-	centric Technical Skills that
			concepts once imbibed will help the		-		of thinking ability and creativity. The practical					Ensure healthy lives and promote	(9.1-	centric Technical Skills that match
			concepts once imbibed will help the students to		-		of thinking ability and creativity. The practical knowledge					Ensure healthy lives and promote well-	(9.1-	centric Technical Skills that match Industry
			concepts once imbibed will help the students to use the				of thinking ability and creativity. The practical knowledge of the topic					Ensure healthy lives and promote well- being	(9.1-	centric Technical Skills that match
			concepts once imbibed will help the students to use the practical				of thinking ability and creativity. The practical knowledge of the topic will help					Ensure healthy lives and promote well- being for all	(9.1-	centric Technical Skills that match Industry
			concepts once imbibed will help the students to use the practical information				of thinking ability and creativity. The practical knowledge of the topic will help them to					Ensure healthy lives and promote well- being	(9.1-	centric Technical Skills that match Industry
			concepts once imbibed will help the students to use the practical information in				of thinking ability and creativity. The practical knowledge of the topic will help them to understand					Ensure healthy lives and promote well- being for all	(9.1-	centric Technical Skills that match Industry
			concepts once imbibed will help the students to use the practical information in providing				of thinking ability and creativity. The practical knowledge of the topic will help them to understand the					Ensure healthy lives and promote well- being for all at all	(9.1-	centric Technical Skills that match Industry
			concepts once imbibed will help the students to use the practical information in providing better				of thinking ability and creativity. The practical knowledge of the topic will help them to understand the physiology					Ensure healthy lives and promote well- being for all at all	(9.1-	centric Technical Skills that match Industry
			concepts once imbibed will help the students to use the practical information in providing				of thinking ability and creativity. The practical knowledge of the topic will help them to understand the					Ensure healthy lives and promote well- being for all at all	(9.1-	centric Technical Skills that match Industry

			the nation				related to					4.4:		
			as a whole				the system					Skills		
							in a better					for		
							way and					Decent		
							they will be					Work		
							able to							
							correlate							
							the							
							knowledge							
							and							
							information							
							gathered in							
							their day-							
							to-day life							
							and future							
							job							
							prospective							
							also							
Unit III	_	_	The	_	_	-	Enrichment	_	-	_	_	SDG 3:	NEP	Student
Practica	_	_		-	-	-	of thinking	_	_	_	_	Ensure	(9.1-	centric
17-9			once				ability and					healthy	9.3)	Technical
1 7-9			imbibed				creativity.					lives	9.3)	Skills
			will help				The					and		that
			the				practical					promote		match
			students to				knowledge					well-		Industry
			use the				of the topic					being		Needs
			practical				will help					for all		110005
			information				them to					at all		
			in				understand					ages.		
			providing				the					ugos.		
			providing				шс							

			better				physiology							
			health				of skin and							
			services to				diseases					SDG		
			the nation				related to					4.4:		
			as a whole				the system					Skills		
							in a better					for		
							way and					Decent		
							they will be					Work		
							able to							
							correlate							
							the							
							knowledge							
							and							
							information							
							gathered in							
							their day-							
							to-day life							
							and future							
							job							
							prospective							
							also							
							<b></b>							
Unit IV	-	-	The	-	-	-	Enrichment	-	The practical	-	-	SDG 3:	NEP	Student
Practica			concepts				of thinking		knowledge			Ensure	(9.1-	centric
110-12			once				ability and		of the			healthy	9.3)	Technical
			imbibed				creativity.		contraceptive			lives		Skills
			will help				The		methods and			and		that
			the				practical		related topics			promote		match
			students to				knowledge		will enrich			well-		Industry
			use the				of the topic		the			being		Needs
			practical				will help		knowledge			for all		

			information				them to		of the			at all		
			in				understand		students in			ages.		
			providing				the		the field					
			better				physiology							
			health				of skin and					SDG		
			services to				diseases					4.4:		
			the nation				related to					Skills		
			as a whole				the system					for		
							in a better					Decent		
							way and					Work		
							they will be							
							able to							
							correlate							
							the							
							knowledge							
							and							
							information							
							gathered in							
							their day-							
							to-day life							
							and future							
							job							
							prospective							
							also							
Unit V	_	_	The	_	-	_	Enrichment	_	The practical	-	_	SDG 3:	NEP	Student
Practica			concepts		=		of thinking		knowledge		, i	Ensure	(9.1-	centric
1 13-15			once				ability and		of the			healthy	9.3)	Technical
			imbibed				creativity.		contraceptive			lives	7.57	Skills
			will help				The		methods and			and		that
			the				practical		related topics			promote		match
							ractions		151atea topies			Promote		

	students to	knowledge	will enrich	well-	Industry
	use the	of the topic	the	being	Needs
	practical	will help	knowledge	for all	
	information	them to	of the	at all	
	in	understand	students in	ages.	
	providing	the	the field		
	better	physiology			
	health	of skin and		SDG	
	services to	diseases		4.4:	
	the nation	related to		Skills	
	as a whole	the system		for	
		in a better		Decent	
		way and		Work	
		they will be			
		able to			
		correlate			
		the			
		knowledge			
		and			
		information			
		gathered in			
		their day-			
		to-day life			
		and future			
		job			
		prospective			
		also			

BP 108P	Pharmaceutical Analysis (Practical)	L	Т	P	C						
Version 2.0		0	0	4	2						
<b>Total Contact Hours</b>	60 hrs										
Pre-requisites/Exposure	Pharmaceutical Analysis										
Co-requisites Pharmaceutical Chemistry											
	Course C	Objectiv	es								

# Upon completion of this course the student should be able to

- 1. To Know the history of Pharmacopoeia
- 2. Understand the principles of volumetric and electro chemical analysis
- 3. Carryout various volumetric and electrochemical titrations
- 4. Develop analytical skills

# Course Outcomes (CO)

# On completion of this course, the student will be able to:

- CO1. This subject is designed to impart fundamental knowledge on pharmaceutical preparations.
- CO2. The subject provides the basic knowledge required to understand the various disciplines of Analysis.
- CO3. This subject deals with the monographs of inorganic drugs and pharmaceuticals.
- CO4. Provide Knowledge about Indian Pharmacopoeia, British Pharmacopeia and other Regulatory agencies.
- CO5. Provide Knowledge about metric system and calculation of dosages.

СО	PO1	PO2	PO3	PO4	PO5	PO6	<b>PO7</b>	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	2	2	3	2	-	2	2	2	3	3	3	-
CO2	3	3	3	2	2	2	•	1	2	2	3	3	3	-
CO3	3	3	2	2	3	2		2	2	2	3	3	3	-
CO4	3	3	2	2	3	2		2	2	2	3	3	3	-
CO5	3	3	2	2	3	2	-	1	2	2	3	3	3	-
	•	•	•		1=lig	ntly ma	pped	•	2= ma	oderate	ly mapp	ed	3=	strongly mapped

Unit	the ll, global al	y/ rship/ ment	the Ethics, nan &		
	ance to nationa opments	ance To loyability spreneur Develop	ance to ssional ] er, Hun ss, onment inability	4 <sup>th</sup> IR	<b>:</b>
	Relev local, develon needs	Relev Empl Entre Skill ]	Relev Profe Gend Value Envir Susta	SDG NEP POE/	ì

Unit I	' Local	Regional	To Perform Quality control of marketed formulations	To analyse the impurit y in API by limit test	' Employability	Entrepreneurship	Analysis of impurities helps in quality control of Drugs	Professional Ethics	Gender	Human Values	Environment & Sustainability	Skil ls for Dec ent Wor k (SD G 4.4)	Pro mot ing Hig h-qual ity rese arch (18. 1-18.9),	Skill Develo pment, Employ ability
Unit	-	-	To Perform	То	-	-	Standardiz	-	-	-	-	Skil	Pro	Skill
II			the	determ			ation of					ls	mot	Develo
			standardizati	ine the			solution					for	ing	pment,
			on of different	concen			will help					Dec	Hig	Employ
				tration of			in assay of					ent	h-	ability
			solutions for				Drugs					Wor	qual	
			further	solutio								k	ity	
			synthesis									(SD	rese	

			use and	n						G	arch	
			analysis							4.4)	(18.	
											1-	
											18.9	
											),	
Unit	_	_	To Perform	То	_	_	Assay of			Skil	Tec	Skill
III			Quality	analyse			Drugs			ls	hnic	Develo
			control of	the			helps in			for	al	pment,
			marketed	import			Quality			Dec	Skil	Employ
			formulations	sample			control of			ent	ls	ability
				by			Drugs			Wor	that	
				followi						k	mat	
				ng						(SD	ch	
				differe						G	Ind	
				nt						4.4)	ustr	
				assay							У	
				method							Nee	
				S							ds	
Unit	-	-	То	То	_	_	Standardiz		-	Skil	Tec	Hands-
IV			determine	determ			ation of			ls	hnic	on
			the	ine the			solution			for	al	Experie
			normality of	concen			will help			Dec	Skil	nce
			drugs during	tration			in assay of			ent	ls	
			quality	of			Drugs			Wor	that	
			check of	solutio						k	mat	
			product	n						(SD	ch	
										G	Ind	
										4.4)	ustr	
											У	

						Nee	
						ds	

BP 109P	Pharmaceutics-I (Practical)	L	T	P	С
Version 2.0		0	0	4	2
<b>Total Contact Hours</b>	60 Hours				
Pre-requisites/Exposure	Pharmaceutics				
Co-requisites	Pharmaceutics				
	Course	e Objectiv	/es		

#### Upon completion of this course the student should be able to

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

### **Course Outcomes (CO)**

### On completion of this course, the student will be able to:

CO1. This subject is designed to impart fundamental knowledge on pharmaceutical preparations.

CO2. The subject provides the basic knowledge required to understand the various disciplines of Pharmacy.

CO3. It enlightens the students about the dosage, various types of dosage form, NDDS, depot preparation.

CO4. Provide Knowledge about Indian Pharmacopoeia, British Pharmacopeia and other Regulatory Agencies.

CO5. Provide Knowledge about metric system and calculation of dosages.

# **Programme and Course Mapping**

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	2	2	3	2	-	2	2	2	3	3	3	-
CO2	3	2	3	2	2	2	1	1	2	2	3	3	3	-
CO3	3	3	2	2	3	2	•	2	2	2	3	3	3	-
CO4	3	2	2	2	3	2	•	2	2	2	3	3	3	-
CO5	3	3	2	2	3	2	-	1	2	2	3	3	3	-

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national,	regional and global	developmental	Singa	Relevance To the	Entrepreneurship/ Entrepreneurship/ Skill Development		Relevance to the	Professional Ethics,	Gender, Human Values	Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
Unit I	Local	Regional	National	Syrups and elixirs contribute globally by offering a palatable and easily administered liquid dosage form, ensuring widespread accessibility to medications, particularly for children and individuals with swallowing difficulties. They enhance patient compliance and contribute to improved global healthcare outcomes.	Employability	Syrups and elixirs contribute to entrepreneurship by providing opportunities for formulation innovation and niche market creation in the pharmaceutical industry. Entrepreneurs can leverage these liquid dosage forms to develop unique and specialized medication solutions,	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability	Ski lls for De cen t Wo rk (S DG 4.4	Pro mot ing Hig h-qual ity rese arch (18. 1-18.9	Focus on Employ ability Skills (Local/ Region al and Global)

						catering to specific patient needs and establishing their own successful ventures.						)	)	
Unit II	-	-	-	Linctus and solutions contribute globally by offering convenient and precise delivery of medications, improving patient compliance and access to treatment. They play a crucial role in global healthcare, particularly in the management of respiratory conditions, cough, and other ailments.		Linctus and solutions provide entrepreneurial opportunities by enabling the development of unique formulations and specialized products for specific market segments. Entrepreneurs can capitalize on these liquid medication options to address specific patient needs and create innovative solutions, establishing successful ventures in the pharmaceutical industry.	-		-	-	-	Ski lls for De cen t Wo rk (S DG 4.4	Pro mot ing Hig h-qual ity rese arch (18. 1-18.9)	Focus on Employ ability Skills (Local/ Region al and Global)
Unit III	-	-	-	Suspensions and emulsions contribute globally by providing versatile formulations for the delivery of poorly soluble drugs, enhancing their bioavailability and therapeutic effectiveness. They offer diverse applications in pharmaceuticals, food, and cosmetic industries, driving innovation and improving global	-	Suspensions and emulsions offer entrepreneurial opportunities by enabling the development of unique formulations and product lines, catering to specific market needs. Entrepreneurs can	-	-	-	-	-	Ski lls for De cen t Wo rk (S	Pro mot ing Hig h- qual ity rese arch	Focus on Employ ability Skills (Local/ Region al and

				access to effective medications and		leverage these versatile						DG	(18.	Global)
				consumer products.		dosage forms to create						4.4	1-	
				_		innovative solutions,						)	18.9	
						establish niche brands, and							)	
						tap into the growing								
						demand for specialized								
						suspensions and emulsion-								
						based products.								
Unit IV	-	-	-	Powders and granules, suppositories,	-	Powders and granules,	-	-	-	-	-	Ski	Pro	Focus
				gargles, and mouthwashes contribute		suppositories, gargles, and						lls	mot	on
				globally by offering versatile and		mouthwashes offer						for	ing	Employ
				accessible dosage forms for		entrepreneurial						De	Hig	ability
				medication administration, providing		opportunities through the						cen	h-	Skills
				convenience, targeted treatment, and		development of						t	qual	(Local/
				improved patient outcomes in diverse		specialized formulations						Wo	ity	Region
				healthcare settings worldwide. They		and niche product lines.						rk	rese	al and
				address specific needs such as ease of		Entrepreneurs can						(S	arch	Global)
				administration, localized therapy, and		leverage these unique						DG	(18.	
				oral hygiene, contributing to global		dosage forms to create						4.4	1-	
				healthcare accessibility and improved		innovative healthcare						)	18.9	
				quality of life.		products, cater to specific							)	
						market segments, and								
						establish successful								
						ventures in the								
						pharmaceutical and								
						personal care industries.								
Unit v	-	-	-	Suppositories, semisolids, gargles,	-	Entrepreneurs may explore	-	-	-	-	-	Ski	Pro	Focus
				and mouthwashes have global		the development and						lls	mot	on
				significance as they play crucial roles		manufacturing of						for	ing	Employ

in healthcare by delivering	innovative suppository	De	Hig	ability
medications rectally, providing	formulations, semisolid	cen	h-	Skills
topical treatments for various skin	products, or oral hygiene	t	qual	(Local/
conditions, and promoting oral	solutions, aiming to	Wo	ity	Region
hygiene, respectively, thereby	address unmet needs,	rk	rese	al and
improving patient outcomes and	improve existing	(S	arch	Global)
enhancing overall well-being.	formulations, or introduce	DG	(18.	
	novel approaches to	4.4	1-	
	medication delivery and	)	18.9	
	personal care. By		)	
	leveraging their			
	knowledge of these			
	healthcare products,			
	entrepreneurs can create			
	businesses that contribute			
	to the advancement of			
	medical treatments, patient			
	care, and overall wellness.			

BP 110P	Pharmaceutical Inorganic Chemistry (Practical)	L	Т	P	C
Version 2.0		0	0	4	2
<b>Total Contact Hours</b>	60 Hours	1			1

Pre-re	equisit	es/Exp	osure		Inorga	nic che	mistry							
Co-re	quisite	es			Pharm	aceutic	al chem	istry						
									Cours	se Obje	ctives			
1							lent sho	ould be	able to					
1.				•	armaco	1	.1 1 .	1 .	1	,			. 1	
2. To know the sources of impurities and methods to determine the impurities in pharmaceuticals														
3. Understand the medicinal and pharmaceutical importance of inorganic compounds														
4.	Prepa	ration	of diffe	erent ca	tegory o	of pharm	naceutic	al inorg	ganic co	mpound	ls			
<ul><li>4. Preparation of different category of pharmaceutical inorganic compounds</li><li>5. Analysis of pharmaceutical compounds</li></ul>														
								(	Course	Outcom	es (CO)	)		
On co	mnleti	ion of t	his cor	ırse th	e stude	nt will	be able	to:						
									on pha	rmaceut	ical pre	arations		
		J	υ		1			δ	1		1 1			
CO2.	Provid	e Knov	vledge	about I	ndian P	harmaco	opoeia, l	British 1	Pharma	copeia a	nd other	Regulat	ory Age	encies.
		_												
CO3.	Provid	de pract	ical lea	arning o	of impur	ity test	in pharr	naceuti	cals					
CO4	Drovid	o Vnov	uladaa	of color	ilotion i	nyolyo	d pharm	occutica	al ahami	atry auh	vioot			
CO4.	FIOVIG	e Kilov	vieuge	or carci	11411011 1	11001060	т рнанн	aceunca	ai Cheim	ish y suc	ect .			
								Pro	gramm	e and C	Course N	<b>Tapping</b>	<u> </u>	
										PO			PSO	
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	10	PO11	PO12	1	PSO 2
CO1	3	3	2	2	3	2		2	2	2	3	3	3	

CO2	3	2	3	2	2	2	-	1	2	2	3	3	3	-
CO3	3	3	2	2	3	2	-	2	2	2	3	3	3	-
CO4	3	2	2	2	3	2	-	2	2	2	3	3	3	-
					1=ligh	tly map	pped	2	= mode	rately m	apped		3=stron	igly mapped

Unit	Relevance to the local, national, regional and global	developmental needs			Relevance To the Employability/ Entrepreneurship/	Skill Development		Relevance to the	Professional Ethics,	Gender, Human Values	Environment &	SDG	NEP	POE/4 <sup>th</sup> IR
Unit I	' Local	' Regional	limit tests for following ions Chloride, Sulphate, Iron,	Limit tests for following ions Chloride, Sulphate, Iron,	Employability	' Entrepreneurship	Limit test helps to meet industry demand in production of pure API	Professional Ethics	Gender	Human Values	h s s g n d Environment &	Skills for Decent Work (SDG 4.4), Ensure sustainable consumptio	Technical Skills that match Industry Needs	Employ

		Arsenic	Arsenic							О	n		
										u			
										1	and		
										d	production		
											patterns		
										b	(SDG 12)		
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Unit II	_	Identifica	Identifica	-	-	Identification	_	-	-	_	Skills for	Practical	Skill
		tion test	tion test			test helps to					Decent	Courses from	Develo
						meet industry					Work	Industry/Alumn	pment,
						demand in					(SDG 4.4)	i	Employ
		Magnesiu	Magnesiu			production of					(520 7.7)	1	ability
		m	m										aumty
						pure API							

		hydroxide  Ferrous sulphate  Sodium bicarbonat e  Calcium gluconate	hydroxide Ferrous sulphate Sodium bicarbonat e Calcium gluconate									
		Copper sulphate	Copper sulphate									
Unit III	-	Test for purity  Swelling power of Bentonite	Test for purity  Swelling power of Bentonite	_	-	Determination of physicochemic al properties of Drugs assist in Preformulation studies	-	1	1	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1- 18.9), Practical Courses from Industry/Alumn i	Skill Develo pment, Employ ability
		Neutralizi ng capacity of aluminium hydroxide	Neutralizi ng capacity of aluminium hydroxide									

	gel .	gel					
Unit	on of inorganic pharmace uticals  Boric acid a	Preparati on of inorganic pharmace uticals  Boric acid  Potash alum			Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1- 18.9), Practical Courses from Industry/Alumn i	Skill Develo pment, Employ ability

BP111P	Communication skills (Practical)	L	Т	P	C				
Version 2.0		0	0	2	1				
<b>Total Contact Hours</b>	30 Hours		l						
Pre-requisites/Exposure	Communication Skills								
Co-requisites	Communication Skills								

## Upon completion of this course the student should be able to

- 1. Communicate effectively (Verbal and Non-Verbal)
- 2. Effectively manage the team as a team player

## Course Outcomes (CO)

## On completion of this course, the student will be able to:

CO1. Understand the behavioral needs for a pharmacist to function effectively in the areas of pharmaceutical operation

CO2. Develop interview skills

# **Programme and Course Mapping**

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	2	2	3	2	-	2	2	2	3	3	3	-
CO2	3	2	3	2	2	2	-	1	2	2	3	3	3	-

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit ud global utal	To the ility/eurship/lopment	to the al Ethics, uman ent & iity	
Relevance to ocal, nation egional and levelopmen needs	Relevance T Employabil Entreprene Skill Develo	televance t rofessiona fender, Hu alues, nvironmel ustainabili	SDG NEP POE/4 <sup>th</sup> IR

BP111 P	Jocal	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability		
Unit I	This course is designed to give basic communicati on skills with a focus on local relevance and development al needs.	This course is designed to give basic communication skills with a focus on regional relevance and developmental needs.	This course is designed to give basic communication skills with a focus on national relevance and developmenta l needs.	This course is designed to give basic communication skills with a focus on global relevance and develop mental needs.	meant to teach effecti ve comm unicat ion skills, which are essent ial for emplo yment .	meant to teach effecti ve comm unicat ion skills, which are essent ial for Entre prene urship	Effecti ve Comm unicati on /Writi ng Skills /Effect ive Writin g /Interv iew Handli ng Skills /E-	yes	)	1 ,	-	1.a Ens ure sign ifica nt mob iliza tion of reso urce s fro m a vari ety of	Techni cal Skills that match Industr y&osul tancy Needs/ Soft Skills/S kill Develo pment

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tation		
Skills,		
		T. 1 :
Unit II This course is This course is This course is This meant Effecti yes 1.a		Techni
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teach Pronunciation, a teach designed teach teach Comm ure		Skills
Pronunciatio fundamental Pronunciation to teach effecti effecti unicati sig		that
n, a communication , a Pronunci ve ve on ific	a	match
fundamental skill with fundamental ation, a comm comm /Writi nt		Industr
communicati regional communicatio fundame unicat unicat ng mo	b	y&osul
on skill with relevance and n skill with ntal ion ion Skills iliz	a	tancy
local developmental national communi skills, skills, /Effect tion	1	Needs/
relevance and requirements. relevance and cation which which ive of		Soft
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							Skills,							
Unit III	This course is	This course is	This course is	This	meant	meant	Effecti	yes	_	_	_	1.a	_	Techni
	designed to	designed to teach	designed to	course is	to	to	ve	yes				Ens		cal
	teach	Effective	teach	designed	teach	teach	Comm					ure		Skills
	Effective	Communication	Effective	to teach	effecti	effecti	unicati					sign		that
	Communicati	/Writing Skills	Communicati	Effective	ve	ve	on					ifica		match
	on /Writing	/Effective	on /Writing	Commun	comm	comm	/Writi					nt		Industr
	Skills	Writing	Skills	ication	unicat	unicat	ng					mob		y&
	/Effective	/Interview	/Effective	/Writing	ion	ion	Skills					iliza		cosulta
	Writing	Handling Skills	Writing	Skills	skills,	skills,	/Effect					tion		ncy
	/Interview	/E-Mail Etiquette	/Interview	/Effectiv	which	which	ive					of		Needs/
	Handling	Presentation	Handling	e Writing	are	are	Writin					reso		Soft
	Skills /E-	Skills, which are	Skills /E-Mail	/Intervie	essent	essent	g					urce		Skills/S
	Mail	fundamental	Etiquette	w	ial for	ial for	/Interv					s		kill
	Etiquette	communication	Presentation	Handling	emplo	Entre	iew					fro		Develo
	Presentation	skills with	Skills, which	Skills /E-	yment	prene	Handli					m a		pment
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	are	relevance and	fundamental	Etiquette			Skills					ety		
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	on skills with		national	Skills,			Etique					ces		
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	development		requirements.	fundame			tation							
	requirements.			ntal			Skills,							
				communi										
				cation										

		skills with global relevanc e and develop ment requirem ents.					
Unit IV						1.a Ens ure sign ifica nt mob iliza tion of reso urce s fro m a vari ety of sour ces	Techni cal Skills that match Industr y&osul tancy Needs/ Soft Skills/S kill Develo pment

Unit v  I.a Techni Ens ure Skills sign ifica nt Industr mob jiza tancy tion of reso Skills/S urce kill s Develo fro ma a vari ety of sour ces cal  Skills Skills Skills Soft reso urce kill s Obevelo fro ma ob sour ces cel cal ware skills below sour ces cel							·		
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Ens ure Skills sign that ifica match nt Industr mob y&osul iliza tancy tion Needs/ of Soft reso Skills/S urce kill s Develo fro ma vari ety of sour ces	Unit v						1.a	-	Techni
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BP 112RBP	Remedial Biology (Practical)	L	Т	P	С
Version 2.0		0	0	2	1
<b>Total Contact Hours</b>	30 Hours	<b>'</b>			
Pre-requisites/Exposure	Remedial Biology				
Co-requisites	Biology				

## Upon completion of this course the student should be able to

- 1. Microscopic study and identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower
- 2. To knowledge of blood, their function and study of bones with special reference to human
- 3. Understand the basic components of anatomy & physiology of plant
- 4. Know understand the basic components of anatomy & physiology animal with special reference to human.

# Course Outcomes (CO)

- CO1. To learn and understand the components of living world, structure and functional system of plant kingdom.
- CO2. It provides knowledge about blood, their composition, function and coagulation factor.
- CO3. To learn the about bones with special reference to human.

								Pı	rogran	ıme a	nd Cou	rse Map	ping	
со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	2	2	3	2	-	2	2	2	3	3	3	3
CO2	3	2	3	2	2	2	-	1	2	2	3	3	3	3
CO3	3	3	2	2	3	2	-	2	2	2	3	3	3	3
CO4	3	2	2	2	3	2	-	2	2	2	3	3	3	3

Unit	Relevance to the local, national, regional and global	Relevance To the	Relevance to the	SD	NE	POE/4 <sup>t</sup>
	developmental needs	Employability/	Professional Ethics,	G	P	<sup>h</sup> IR
		Entrepreneurship/ Skill	Gender, Human Values,			
		Development	Environment &			
			Sustainability			

BP11 2RBT	Local	Regi onal	National	Global	Em plo yabi lity	Entrepr eneursh ip	Skill Developm ent	Pr ofe ssi on al Et hic s	Gender	H u m an V al ue s	Enviro nment & Sustai nabilit y			
Unit I				The study of microscopy, including sample preparation, section cutting, mounting, staining, and permanent slide preparation, contributes to our understanding of various scientific disciplines. It enables researchers to investigate microscopic details, identify structures, analyze cellular and tissue components, and make important observations that impact global scientific			These experimen ts and techniques contribute to our knowledge of biology, have practical applications in healthcare and forensic investigations, and play a role		Remedial Biology provide s a foundat ional underst anding of the human body, includi ng its structur es and functio n for			(SD G 4.4)	(9.1 - 9.3)	Global Educati on Knowle dge, Skill Develo pment, Employ ability

Unit	-	knowledge and advancements  These studies provide essential knowledge for advancing scientific research, addressing global challenges, improving human health, promoting sustainable practices, and ensuring the preservation of our natural world.	in global research and understand ing of living organisms.	both gender	(SD G 4.4)	(9.1 - 9.3)	Global Educati on Knowle dge, Skill Develo pment, Employ ability
Unit III		By advancing our knowledge of plant tissues through microscopic study and identification, we gain insights into plant biology, ecology,			(SD G 4.4)	(9.1 - 9.3)	Global Educati on Knowle dge, Skill Develo pment, Employ ability
Unit IV		The determination of blood group has significant implications in various medical settings, forensic			(SD G 4.4)	(9.1 - 9.3)	Global Educati on Knowle dge,

		investigations, and anthropological studies. It plays a crucial role in ensuring safe transfusions, successful organ transplantations, managing prenatal care, aiding forensic investigations, and advancing our						Skill Develo pment, Employ ability
		knowledge of human populations globally.						
Unit		The determination of				(SD	(9.1	Global
v		tidal volume is valuable				G	-	Educati
		in assessing respiratory				4.4)	9.3)	on
		health, guiding						Knowle
		mechanical ventilation,						dge,
		understanding exercise						Skill
		physiology, monitoring						Develo
		occupational and						pment,
		environmental						Employ
		exposures, and						ability
		enhancing sports						
		performance. These						
		applications have global						
		relevance in healthcare,						
		occupational safety,						
		environmental						
		protection, and sports						

		medicine.					

# **Semester-II**

BP201T	Human Anatomy And Physiology-II (Theory)	L	Т	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Human Anatomy & Physiology-I				
Co-requisites	Pathophysiology and Biology				
	Course Objectiv	ves			

## Upon completion of this course the student should be able to

- 1. Explain the gross morphology, structure and functions of various organs of the human body.
- 2. Describe the various homeostatic mechanisms and their imbalances.
- 3. Identify the various tissues and organs of different systems of human body.
- 4. Perform hematological tests like blood cell counts, hemoglobin estimation, bleeding/clotting time etc and record blood pressure, heart rate, pulse and respiratory volume.
- 5. Appreciate coordinated working pattern of different organs of each system.
- 6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

## **Course Outcomes (CO)**

- CO1. Understand fundamental knowledge related to the structure of brain and its functions in the human body.
- CO2. Explain basic knowledge related to digestive system.
- CO3. Explain basic knowledge required to understand the respiratory system.
- CO4. Explain basic knowledge required to understand the reproductive system.
- CO5. Explain the basic knowledge required to understand the hormonal system.

								P	rogran	nme and Cou	rse Mappir	ng		
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	1			2	2		2		3	2	3	2	
CO2	3	1			2	2		2		2	2	3	2	
CO3	3	1			1	2		2		2	2	3	2	
CO4	3	1			2	2		2		2	2	3	2	
CO5	3	1			2	2		2		2	2	3	2	
				•	1=ligl	htly ma	pped		2= mc	derately map	ped	3=strongly mapp	ed	

Unit	Relevance to the local, national, regional and global				Relevance To the Employability/	Entrepreneurship/ Skill Development		Relevance to the Professional Ethics, Gender, Human	Values, Environment & Sustainability			SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the	-	-	-	-	SDG 3: Ensure healthy lives and promote well- being	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

					students which is done by providing opportunities to students to give presentations and debates in the classroom				for all at all ages.  SDG 4.4: Skills for Decent Work		
Unit II -		-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the students which is done by providing opportunities to students to give presentations and debates in the classroom		-	-	SDG 3: Ensure healthy lives and promote well- being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

Unit			-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the students which is done by providing opportunities to students to give presentations and debates in the			-	-	SDG 3: Ensure healthy lives and promote well- being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs
Unit IV	-	-	-	-	-	-	classroom  Enrichment of thinking ability and creativity as well a tool for building confidence in the students which is done by	-	-	-	-	SDG 3: Ensure healthy lives and promote well- being for all at all ages.	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

						providing opportunities to students to give presentations and debates in the classroom			SDG 4.4: Skills for Decent Work		
Unit V		-	-	-	-	Enrichment of thinking ability and creativity as well a tool for building confidence in the students which is done by providing opportunities to students to give presentations and debates in the classroom	Gender Based knowledge will benefit the students to respect and understand the other gender in a better way	-	SDG 3: Ensure healthy lives and promote well- being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP 21.1- 21.10: Adult Education and Lifelong Learning	Student centric Technical Skills that match Industry Needs

BP202T	Pharmaceutical Organic Chemistry –I (Theory)	L	Т	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Organic chemistry				
Co-requisites	Chemistry				
	Course Objective		·		

## Upon completion of this course the student should be able to

- 1. Write the structure, name and the type of isomerism of the organic compound.
- 2. Write the reaction, name the reaction and orientation of reactions.
- 3. Account for reactivity/stability of compounds.
- 4. Identify/confirm the identification of organic compound.

## **Course Outcomes (CO)**

- CO1. Explain fundamental knowledge on isomerism.
- CO2. Explain fundamental knowledge of alkanes and alkenes and their stability.
- CO3. Explain the Structure, reactions and function of alkyl halides.
- CO4. Explain the nucleophilic addition reactions.
- CO5. Explain the structure, reaction and effect of various groups acid derivatives

								Pro	ogram	me and Cour	se Mapping			
CO	PO1	PO2	PO3	PO4	PO5	<b>PO6</b>	<b>PO7</b>	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2

CO1	3	1		2	2		2		3	2	3	2	2
CO2	3	1		2	2		2		2	2	3	2	2
CO3	3	1		1	2		2		2	2	3	2	2
CO4	3	1		2	2		2		2	2	3	2	2
CO5	3	1		2	2		2		2	2	3	2	2
				1=light	ly map	ped		2= mod	lerately mappe	ed :	B=strongly map	ped	

Unit	Relevance to the local, national, regional and global	developmental needs			Relevance To the Employability/	Entrepreneurship/ Skill Development		Relevance to the Professional	Human Values,	Environment &	Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	To know standar d	-	-	Knowledge of nomenclatur e will help in naming	-	-	-	-	Skill s for Dece nt	Profes sional Educat ion	Skill Devel opmen t

				IUPAC nomen		unknown compounds					Wor k	(17.1- 17.5)	
				clature		-					(SD		
				of							Ġ		
				compo							4.4)		
				unds									
Unit		-	-	Fulfils		Knowledge	-	-	-	-	Skill	Profes	Skill
II				underst		of basic					s for	sional	Devel
				anding		Elimination, substitution					Dece	Educat ion	opmen
				of		reactions					nt	(17.1-	t
				basic		will help in					Wor	17.5)	
				Elimin		synthesis of					k	ŕ	
				ation,		new					(SD		
				substit		unknown compounds					G		
				ution		compounds					4.4)		
				reactio									
				n for further									
				synthes									
				is									
Unit	_	-	_		_	Study of	_	_	_	_	Skill	Promo	Skill
III				y		alkyl halide					s for	ting	Devel
				aware		and alcohol					Dece	High-	opmen
				about		compound					nt	quality	t
				synthes		will help in					Wor	researc h	
				is of		synthesis of					k	(18.1-	
				alkyl		drugs					(SD	18.9)	
				halide		containing					G		
				and		alkyl halide					4.4)		
				alcohol		and alcohol							

						and their derivatives.							
Unit	-	-	-	Globall y aware about synthes is of carbon yl compo und and their determ ination	-	Study of carbonyl compound will help in synthesis of drugs containing carbonyl group and their derivatives.		_	-	-	Skill s for Dece nt Wor k (SD G 4.4)	Promo ting High-quality researc h (18.1-18.9)	Skill Devel opmen t
Unit v	-	-	-	Globall y aware about synthes is of carbox ylic compo und and	-	Study of carboxylic compound will help in synthesis of drugs containing carboxylic group and their derivatives.	-			-	Prof essio nal Educ ation (17.1 - 17.5)	Promo ting High-quality researc h (18.1-18.9)	Skill Devel opmen t

		their					
		determ					
		ination					

BP203T	Biochemistry (Theory)	L	Т	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Chemistry				
Co-requisites	Chemistry and biology				

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

- 1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
- 2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
- 3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

## **Course Outcomes (CO)**

- CO1. Explain fundamental information related to the structure, function and significance of bio molecules.
- CO2. Explain various metabolic pathways based on glucose.
- CO3. Explain lipids oxidation, catabolism, anabolism and related diseases.
- CO4. Explain biosynthesis and catabolism of purine and pyrimidine nucleotide.
- CO5. Explain enzyme kinetics and its various applications.

								Pr	rogram	me and Cours	se Mapping			
СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	1			2	2		2		3	2	3	2	2

CO2	3	1		2	2		2		2	2	3	2	2
CO3	3	1		1	2		2		2	2	3	2	2
CO4	3	1		2	2		2		2	2	3	2	2
CO5	3	1		2	2		2		2	2	3	2	2
				1=ligh	tly maj	pped		2= mo	derately mappe	ed 3=st	rongly mapped		

Unit	Relevance to the local, national, regional and global developmental needs	Relevance to the local, national, regional and globs developmental needs						Relevance to the Professional Ethics,	Gender, Human Values, Fregiconment &	Sustainability		SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Underst and the importa nce of nutrient molecul es in physiol	-	-	helps students to get familiar with real- world problems	-	-	-	-	Give basic knowledge about biomolecu les (SDG 4.2 & SDG 4.4); Subject	Profess ional Educat ion (17.1- 17.5)	Hands- on Experie nce Employ ability Skill Develo

				ogical			so that					help to		pment
				and			they can					acquire		
				patholo			brainstor					basic idea		
				gical			m new					about		
				conditi			ideas to					Relationsh		
				ons.			address					ip between		
							them					free		
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												enthalpy		
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												entropy;		
												Redox		
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												nergy rich		
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												s (SDG 7)		
Unit II	-	-	-	Carboh	-	-	This	-	-	-	-	Ensure	Profess	Techni
				ydrate			basic					healthy	ional	cal
				metabol			knowled					lives and	Educat	Skills
				ic			ge helps,					promote	ion	that
				pathwa			students					well-being	(17.1-	match
				ys			would					for all at	17.5)	Industr
				knowle			find					all ages		у
				dge hel			themselv					(SDG 3)		Needs;
				to			es more					"		Skill
				develop			confident					Skills for		Develo
				antidiab			and					Decent		pment
				etics			ready for					Work		
				drug			their					(SDG 4.4)		
				discove			careers.							
				ry and										
				develop										
				ment										

Unit III	Help to know	_	_	_	T_	Τ_	biochemi	l _	l _	_	I _	Skills for	Profess	Techni
	about balance	_		_	-		sts may	-	_	_		Decent	ional	cal
	diet and						work to					Work	Educat	Skills
	importance						develop					(SDG 4.4)	ion	that
	Importance						new					(practical	(17.1-	match
							medical					training in	17.5)	Industr
							products					lab)	17.5)	y
							that help					"Ensure		Needs;
							prevent					healthy		Skill
							diseases					lives and		Develo
							such as					promote		pment
							atheroscl					well-being		pinent
							erosis,					for all at		
							heart					all ages		
							diseases					(SDG 3)		
							anscases					"		
Unit IV	_	_	_	Underst	_	_	Purine	_	_	_	_	Skills for	Profess	Techni
				anding			metaboli					Decent	ional	cal
				the			С					Work	Educat	Skills
				structur			pathways					(SDG 4.4)	ion	that
				e and			knowled					(practical	(17.1-	match
				functio			ge help					training in	17.5)	Industr
				n of			to					lab)	,	y
				DNA			develop					"Ensure		Needs;
				has			gout					healthy		Skill
				revoluti			drug					lives and		Develo
				onised			discover					promote		pment
				the			y and					well-being		r
				study			develop					for all at		
				of			ment					all ages		
				disease								(SDG 3)		
				pathwa								_ ii		
				ys,										
				evaluati										
				on of a										

				person' s genetic predisp osition to particul ar disease										
				s, diagnos is of genetic abnorm alities, and develop ment of new medicat ions.										
Unit v	-	-	-	Help in drug discove ry & develop ment by inhibiti ng enzyme s	-	-	Enzymes knowled ge helps us in drug designin g	-	-	-	-	Skills for Decent Work (SDG 4.4) (practical training in lab)	Profess ional Educat ion (17.1- 17.5)	Techni cal Skills that match Industr y Needs; Skill Develo pment

BP204T	Pathophysiology (Theory)	L	T	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Cellular and molecular Biology				
Co-requisites	Chemistry and biology				

## Upon completion of this course the student should be able to

- 1. Describe the aetiology and pathogenesis of the selected diseases.
- 2. Understanding of various types of injuries encountered during life.
- 3. Know the causatives organism of various diseases.
- 4. Study about STDs

## **Course Outcomes (CO)**

- CO1. Learn about the basic principles of Cell injury and Adaptation.
- CO2. Understand the Pathophysiology of heart disease and their complication.
- CO3. Understand the Pathophysiology of disease related to respiratory and endocrine system.
- CO4. Understand the Pathophysiology of Disease related to gastrointestinal, Alzheimer's and cancer disease.
- CO5. Understand the Pathophysiology of Sexually transmitted diseases.

								Pro	ogramı	me and Cour	se Mapping				
CO	CO   PO1   PO2   PO3   PO4   PO5   PO6   PO7   PO8   PO9   PO 10   PO11   PO12   PSO 1   PSO 2														
CO1	3	1			2	2		2		3	2	3	2		
CO2	3	1			2	2		2		2	2	3	2		
CO3	3	1			1	2		2		2	2	3	2		
CO4	3	1			2	2		2		2	2	3	2		

CO5	3	1		2	2	2		2		2	3		2		
				1=light	ly map	,	2 = mod		ed	3=	strongly	mapp	ed		

Unit	Relevance to the local, national, regional and global developmental	needs			Relevance To the Employability/	Entrepreneurship/ Skill Development		Relevance to the	Professional Ethics, Gender. Human	Values,	Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
BP2 04T														
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	To understand the studies related to basic principles	-	-	In gaining basic knowledge	-	-	-	-	Ensure healthy lives	Pro mot	Global educati
				of cell injury and			related to cell					and promote well-being	ing	on
				adaptation of cell that helps in creating baseline			injury and its adaptation					for all at all	Hig h-	knowle dge
				knowledge								ages SDG 3	qual	

Unit	-	-	-	To emphasize on the pathophysiology of diseases of cardiovascular, respiratory and renal system	-	-	Understanding basics of pathophysiologica I mechanism of diseases of cardiovascular, respiratory and renal system  In gaining basic	-		-	Ensure healthy lives and promote well-being for all at all ages SDG 3	ity rese arch (18. 1-18.9) Prof essi onal edu cati on (17. 1-17.5) Prof essi onal edu cati on (17. 1-17.5) Prof essi onal edu cati on (17. 1-17.5) Prof	Global educati on knowle dge
III		-	_	the pathophysiology of diseases of haematological, endocrine, nervous and gastrointestinal system	-	-	knowledge on pathophysiologica l mechanism of diseases of haematological, endocrine, nervous and	-	-	-	healthy lives and promote well-being for all at all ages SDG 3	essi onal edu cati on (17.	educati on knowle dge

							gastrointestinal system						17.5	
Unit IV	-	-	-	To emphasize the pathophysiology of diseases of inflammatory bowel, bones and joints, and principles of cancer.	-	-	Understanding basics of pathophysiologica I mechanism of diseases of inflammatory bowel diseases, bones and joints, and principles of cancer.	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Professional education (17.1-17.5)	Global educati on knowle dge
Unit v	-	-	-	To emphasize the pathophysiology of infectious diseases as well as sexually transmitted diseases.	-	-	In gaining basic knowledge of pathophysiologica l mechanism of infectious diseases as well as sexually transmitted diseases.	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Professional education (17.1-17.5)	Global educati on knowle dge

BP205T	Computer Applications in Pharmacy (Theory)	L	T	P	C
Version 2.0		3	0	0	3
<b>Total Contact Hours</b>	25 Hours				

Pre-requisites/Exposure Comp	puter sciences
Co-requisites Comp	aputer sciences

### **Course Objectives**

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

- 1. Know the various types of application of computers in pharmacy.
- 2. Know various types of databases.
- 3. Know various applications of databases in pharmacy.

#### **Course Outcomes (CO)**

- CO1. Learn about the basics of computer applications in pharmacy.
- CO2. Understand various types of databases.
- CO3. Understand the applications of different types of databases in pharmacy.
- CO4. Explain the role of computers for data analysis in Pre clinical development.

	Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2	
CO1	1	2	2		2	2				3	2	3	2		
CO2	1	1	2		2	2				2	2	3	2		
CO3	1	1	2		1	2				2	2	3	2		
CO4	1	2	2		2	2				2	2	3	2		
				1	=lightl	y mapp	ed	2	= mode	rately mappe	ed 3=	strongly mapp	ed		

BP206T	Environmental Sciences (Theory)	L	Т	P	C						
Version 2.0		3	0	0	3						
<b>Total Contact Hours</b>	30 Hours										
Pre-requisites/Exposure	Environment studies										
Co-requisites Social and cultural factors											
	Course Objectives										

#### Course

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

- 1. Create the awareness about environmental problems among learners.
- 2. Impart basic knowledge about the environment and its allied problems.
- 3. Develop an attitude of concern for the environment.
- 4. Motivate learner to participate in environment protection and environment improvement.
- 5. Acquire skills to help the concerned individuals in identifying and solving environmental

#### **Course Outcomes (CO)**

- CO1. To study of the environmental system and the status of its inherent or induced changes on organisms.
- CO 2. Strive to attain harmony with Nature
- CO3. Motivate learner to participate in environment protection and environment improvement.
- CO 4. To Impart basic knowledge about the environment and its allied problems

								Pı	ogram	me and Cour	se Mapping			
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2						1							
CO2										3				1
CO3				3										
CO4							1					3	1	
	1=lightly mapped 2= moderately mapped 3=strongly mapped													

Unit	Relevance t and global o	,		, .	Releva Emplo Entrep Develo	yabili preneu	ty/ rship/ Skill	Ethics	s, Gen	der, Hı	rofessional ıman Values, ıstainability	SDG	NEP	POE/4 <sup>th</sup> IR
Unit	Local	Regional	National	Awareness about different natural resources, i.e. renewable/n on-renewable energy resources & etc	Employability	' Entrepreneurship	Familiar and identification and knowledge of different environmental resources and their components.	Professional Ethics	Gender	Human Values	Reduction of threat on natural resources.	Ensure healthy lives and promote wellbeing for all at all ages (SDG 3)  Ensure access to	Globa l Educa tion Know ledge	Consultin g Field Projects, Projects

				off and ala	
				affordab	
				le,	
				reliable,	
				sustaina	
				ble and	
				modern	
				energy	
				for all	
				(SDG 7)	
				Promote	
				Promote	
				sustaine	
				d,	
				inclusiv	
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				sustaina	
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				growth	
				growth, full and	
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				and	
				decent	
				work for	
				all	
				(SDG	
				8),	
				Take	
				urgent	
				action to	
				combat	
				climate	

	T T	<u> </u>	change
			change
			and its
			impacts (SDG
			(SDG
			13),
			Protect,
			restore
			and
			promote
			sustaina
			ble use
			of
			terrestria
			ecosyste
			ms,
			sustaina
			bly
			manage
			forests,
			combat
			desertifi
			cation,
			and halt
			and
			reverse
			land
			degradat
			ion and
			halt
			biodiver
			sity loss
			(SDG
			15)

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Unit		-	-	knowledge	Best				Protect,	Prom	
II				of different	Com				restore	oting	
				ecological	merci				and	Highj	Case
				systems,	al				promote	-	Competiti
				their	utiliz				sustaina	qualit	ons
				structure	ation				ble use	y	
				and	of				of	resear	
				functions	natur				terrestria	ch	
					al				1	(18.1-	
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									manage		
									forests,		
									combat		
									desertifi		
									cation,		
									and halt		
									and		
									reverse		
									land		
									degradat		
									ion and		
									halt		
									biodiver		
									sity loss		
									(SDG		
									15)		
									13)		
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Unit	_	_	Know about					Promote		Teamwork
III			factors					peaceful		, skill
111			affecting					and		developm
			components					inclusiv		ent,
			of					e		Case
			environment					societies		Competiti
			& their					for		ons
			adverse					sustaina		Olis
			effect on					ble		
			individual					develop		
			health.					ment,		
			Introduction					provide		
			of Public					access to		
			awareness					justice		
			programmes					for all		
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			and					build		
			implementat					effective		
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			& Acts					, accounta		
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						develop	
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						(Role of	
						all	
						Schools,	
						KRMU)	
						(SDG	
						17)	

BP207P	Human Anatomy And Physiology-I (Practical)	L	T	P	С
Version 2.0		0	0	4	2
<b>Total Contact Hours</b>	60 Hours				
Pre-requisites/Exposure	Pharmacology				
Co-requisites	Pathophysiology				

#### **Course Objectives**

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

- 1. Practical physiology is complimentary to the theoretical discussions in Physiology.
- 2. Practical allow the verification of physiological processes discusses in theory classes through experiments on living tissue, intact animals or normal human beings.
- 3. This is helpful for developing an insight on the human anatomy and physiology subject.

#### **Course Outcomes (CO)**

- CO1. This subject is designed to impart practical knowledge on the in-theory classes through experiments on living tissue, intact animals or normal human beings.
- CO2. The subject provides the basic knowledge required to understand the digestive system

CO3. The subject provides the basic knowledge required to understand the nervous system.

CO4. The subject provides the basic knowledge required to understand the respiratory system and endocrine system

CO5. The subject provides the basic knowledge required to understand reproductive system.

	Programme and Course Mapping														
СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2	
CO1	3	1			2	2		2		3	2	3	2	2	
CO2	3	1			2	2		2		2	2	3	2	2	
CO3	3	1			1	2		2		2	2	3	2	2	
CO4	3	1			2	2		2		2	2	3	2	2	
CO5	CO5         3         1         2         2         2         2         2         3         2         2														
				1=	=lightly	mappe	ed	2=	moder	ately mapped	3=strong	gly mapped			

Unit
Relevance to the local, national, regional and global developmental needs
Relevance To the Employability/ Entrepreneurship/ Skill Development
Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability
SDG
NEP
POE/4 <sup>th</sup> IR

BP207P														
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I Practical 1-3	-	-	The concepts once imbibed will help the students to use the practical information in providing better health services to the nation as a whole	-	-	-	Enrichment of thinking ability and creativity. The practical knowledge of the topic will help them to understand the physiology of skin and diseases related to the system in a better way and they will be able to	-	-	-	-	SDG 3: Ensure healthy lives and promote well- being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

							corelate the							
							knowledge							
							and							
							information							
							gathered in							
							their day-to-							
							day life and							
							future job							
							prospectives							
							also							
Unit II	-	-	The	-	-	-	Enrichment	-	-	_	-	SDG 3:	NEP	Student
Practical			concepts				of thinking					Ensure	(9.1-	centric
4-6			once				ability and					healthy	9.3)	Technical
			imbibed				creativity.					lives		Skills
			will help				The					and		that
			the				practical					promote		match
			students to				knowledge					well-		Industry
			use the				of the topic					being		Needs
			practical				will help					for all		
			information				them to					at all		
			in				understand					ages.		
			providing				the							
			better				physiology					SDG		
			health				of skin and					4.4:		
			services to				diseases					Skills		
			the nation				related to					for		
			as a whole				the system					Decent		
							in a better					Work		
							way and							
							they will be							
							able to							
							correlate the							
							knowledge							
							and							
							information							

Unit III Practical 7-9	-	-	The concepts once imbibed will help the students to use the	-	-	-	gathered in their day-to-day life and future job prospective also Enrichment of thinking ability and creativity. The practical knowledge of the topic	-	-	-	-	SDG 3: Ensure healthy lives and promote well- being	NEP (9.1- 9.3)	Student centric Technical Skills that match Industry Needs
	-	-	The	-	-	-		-	-	-	-			
			concepts											
7-9			once				ability and					healthy	9.3)	Technical
			imbibed				creativity.					lives		Skills
			will help				The					and		that
			the				practical					promote		match
			students to				knowledge					well-		Industry
			use the				of the topic					being		Needs
			practical				will help					for all		
			information				them to					at all		
			in				understand					ages.		
			providing				the					_		
			better				physiology					SDG		
			health				of skin and					4.4:		
			services to				diseases					Skills		
			the nation				related to					for		
			as a whole				the system					Decent		
							in a better					Work		
							way and							
							they will be							
							able to							
							correlate the							
							knowledge							
							and							
							information							
							gathered in							
							their day-to-							
							day life and							
							future job							

						prospective also					
Unit IV Practical 10-12		The concepts once imbibed will help the students to use the practical information in providing better health services to the nation as a whole	-	-	-	Enrichment of thinking ability and creativity. The practical knowledge of the topic will help them to understand the physiology of skin and diseases related to the system in a better way and they will be able to correlate the knowledge and information gathered in their day-to-day life and future job prospective also	The practical knowledge of the contraceptive methods and related topics will enrich the knowledge of the students in the field	-	SDG 3: Ensure healthy lives and promote well- being for all at all ages.  SDG 4.4: Skills for Decent Work	NEP (9.1-9.3)	Student centric Technical Skills that match Industry Needs

	1	1	1	ı	1	1	1	1			1	I	I	1
Unit V	-		The	-	-	-	Enrichment	-	The practical	-	-	SDG 3:	NEP	Student
Practical			concepts				of thinking		knowledge			Ensure	(9.1-	centric
13-16			once				ability and		of the			healthy	9.3)	Technical
			imbibed				creativity.		contraceptive			lives		Skills
			will help				The		methods and			and		that
			the				practical		related topics			promote		match
			students to				knowledge		will enrich			well-		Industry
			use the				of the topic		the			being		Needs
			practical				will help		knowledge			for all		
			information				them to		of the			at all		
			in				understand		students in			ages.		
			providing				the		the field					
			better				physiology					SDG		
			health				of skin and					4.4:		
			services to				diseases					Skills		
			the nation				related to					for		
			as a whole				the system					Decent		
							in a better					Work		
							way and							
							they will be							
							able to							
							correlate the							
							knowledge							
							and							
							information							
							gathered in							
							their day-to-							
							day life and							
							future job							
							prospective							
							also							

BP208P	Pharmaceutical Organic Chemistry –I (Practical)	L	T	P	C						
Version 2.0		0	0	4	2						
<b>Total Contact Hours</b>	60 Hours										
Pre-requisites/Exposure	Organic chemistry (Practical										
Co-requisites	Chemistry										
	Course Objectives		·								

#### **Course Objectives**

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

- 1. Write the reaction, name the reaction and orientation of reactions
- 2. Account for reactivity/stability of compounds,
- 3. Identify/confirm the identification of organic compound

#### **Course Outcomes (CO)**

- CO1. Explain fundamental knowledge on isomerism.
- CO2. Explain fundamental knowledge of alkanes and alkenes and their stability.
- CO3. Explain the nucleophilic addition reactions.

	Programme and Course Mapping													
CO	CO   PO1   PO2   PO3   PO4   PO5   PO6   PO7   PO8   PO9   PO 10   PO11   PO12   PSO 1   PSO 2													
CO1	CO1 3 1 2 2 2 3 2 3 2 2													
CO2	3	1			2	2		2		2	2	3	2	2
CO3	3	1			1	2		2		2	2	3	2	2
			•	1=1	ightly	mapped	i	2=	modera	tely mapped	3=str	ongly mapped		•

Unit	Relevance to the local, national, regional and global	Relevance to the local, national, regional and global developmental needs				Skin Development		Relevance to the	Professional Ethics, Gender, Human	Values,	Environment &	SDG	NEP	POE/4 <sup>th</sup> IR
BP208 P	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Fulfils the need for Drug Develop ment globally	-	-	Knowledge of Physicochemic al properties of Drugs helps in Preformulation studies	-	-	-	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Develo pment
Unit II		-	-	Fulfils the need for determin ation of different groups	-	-	Knowledge of determination of unknown compounds will help in identification of new synthesized	-	-	-	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Develo pment

							compounds							
Unit III	-	-	-	Fulfils the need for Drug Develop ment globally	-	-	Knowledge of synthesis of different derivatives helps in synthesis of new moieties	-	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1- 18.9),	Skill Develo pment, Employ ability

BP209P	Biochemistry (Practical)	L	Т	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	60 Hours				
Pre-requisites/Exposure	Chemistry				
Co-requisites	Chemistry and biology				
	Course Objectiv	res			

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

- 1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
- 2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
- 3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

### **Course Outcomes (CO)**

CO1. Learn about the basic principles of Biochemistry

CO2. Understand the Pathophysiology of Urine.

CO3. Understand the basics about Protein Carbohydrate, Fats

								P	rogran	me and Cou	rse Mapping	3		
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	1	-	-	2	2	-	2		3	2	3	2	
CO2	3	1	-	-	2	2		2		2	2	3	2	
CO3	3	1	-	-	1	2		2		2	2	3	2	
1=lightly mapped 2= moderately mapped 3=strongly mapped										pped				

Unit	Relevance to the	rocal, national, regional and global	developmental needs		Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics,	Gender, Human Values,	Environment & Sustainability		SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Suctainability			

Unit	Experiments involving		A	-	-	-	-	Sustai	Quality	Global
I	laboratory techniques like		knowledge					nable	Universitie	Educati
	recrystallization, steam		able					Devel	s and	on
	distillation is important part of		individual					opme	Colleges: A	Knowle
	pharmaceutical sciences		in organic					nt and	New and	dge
	experiment. These experiments		chemistry					Globa	Forward-	Practic
	are usually conducted all over		aids in the					1	looking	al
	the world.		synthesis					Citize	Vision for	Course
			of drugs					nship	India's	s from
			and their					(SDG	Higher	Industr
			intermedia					4.7)	Education	y/Alum
			tes.						System	ni
								Schol	(9.1-9.3)	Techni
								arship	Professiona	cal
								s for	1 Education	Skills
								Highe	(17.1-17.5)	that
								r	Promoting	match
								Educa	High-	Industr
								tion	quality	y
								(SDG	research	Needs
								4.b)	(18.1-18.9)	Focus
								Revita	Technology	on
								lize	Use &	Employ
								the	Integration	ability
								global	(23.1-	Skills
								partne	23.13)	(Local/
								rship		Region
								for		al and
								sustai		Global)
								nable		Interns
								devel		hip
								opme		Progra
								nt		ms
								(SDG		Consult
								17)		ing

								Field Project s Entrepr eneursh ip Progra m through Innovat ion System
Unit	The determination of acid/saponification/iodine value of fats and oils has a significant global impact by ensuring quality, stability, and functionality in various industries, promoting sustainability, and facilitating international trade.	A knowledge able individual in organic chemistry aids in the synthesis of drugs and their intermedia tes		-	-	Sustai nable Devel opme nt and Globa l Citize nship (SDG 4.7) Schol arship s for Highe r Educa tion (SDG 4.b) Revita lize the	Quality Universitie s and Colleges: A New and Forward- looking Vision for India's Higher Education System (9.1- 9.3) Professiona 1 Education (17.1-17.5) Promoting Highj- quality research (18.1-18.9) Technology Use &	Global Educati on Knowle dge Practic al Course s from Industr y/Alum ni Techni cal Skills that match Industr y Needs Focus on Employ

									global	Integration	ability
									partne	(23.1-	Skills
									rship	23.13)	(Local/
									for		Region
									sustai		al and
									nable		Global)
									devel		Interns
									opme		hip
									nt		Progra
									(SDG		ms
									17)		Consult
											ing
											Field
											Project
											S
											Entrepr
											eneursh
											ip
											Progra
											m
											through
											Innovat
											ion
T T 14	Cl			<b>A</b>					C4-:	O1:4	System
Unit III		emical, drug, and		A	-	-	-	-	Sustai	Quality	Global
1111		ermediate preparation is a key		knowledge able					nable	Universitie	Educati
		t of the pharmaceutical sector		able individual					Devel	s and Colleges: A	on Knowle
	giot	bally.		in organic					opme nt and	New and	dge
				chemistry					Globa	Forward-	Practic Practic
				aids in the					1	looking	al
				synthesis					Citize	Vision for	Course
				of drugs					nship	India's	s from
				and their					(SDG	Higher	Industr
				intermedia					4.7)	Education	y/Alum
				memedia					4.1)	Education	y/Aiuiii

			tes			Schol	System	ni
						arship	(9.1-9.3)	Techni
						s for	Professiona	cal
							1 Education	Skills
						r	(17.1-17.5)	that
							Promoting	match
						tion	Highj-	Industr
						(SDG	quality	y
						4.b)	research	Needs
						Revita	(18.1-18.9)	Focus
						lize	Technology	on
						the	Use &	Employ
						global	Integration	ability
						partne	(23.1-	Skills
						rship	23.13)	(Local/
						for		Region
						sustai		al and
						nable		Global)
						devel		Interns
						opme		hip
						nt		Progra
						(SDG		ms
						17)		Consult
								ing
								Field
								Project
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								Entrepr
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								ip
								Progra
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								through
								Innovat
								ion

						System

# **Semester-III**

BP 301T	Pharmaceutical Organic Chemistry –II (Theory)	L	Т	P	С						
Version 2.0		3	1	0	4						
Total Contact Hours 45 Hours											
Pre-requisites/Exposure											
Co-requisites -											
Course Objectives											
Upon completion of this of	course the student should be able to:										
1. Write the structure,	name and the type of isomerism of the organic compound										
2. Write the reaction,	name the reaction and orientation of reactions										
3. Account for reactivity/stability of compounds,											
4. Prepare organic compounds											
	Course Outcomes (CO)										

### On completion of this course, the student will be able to:

CO1. This subject deals with general methods of preparation and reactions of some organic compounds.

CO2. Reactivity and mechanism deal with organic compounds are studied here.

CO3. The syllabus emphasizes on orientation of reactions and application.

CO4.	Chemis	stry of	fats and	l oils are	also de	scribed l	nere.							
CO5.	Applic	ation a	nd purit	y of fats	and oils	s also dis	scussed i	in this su	ıbjects.					
								Progra	mme an	d Course	Mapping	g		
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	-	1	1	-	-	-	-	-	-	-	1	1	1	-
CO2	-	1	1	-	-	-	-	-	-	-	1	1	1	-
CO3	-	1	1	-	-	-	-	-	-	-	1	1	1	-
CO4	-	1	1	-	-	-	-	-	-	-	1	1	1	-
CO5	-	1	1	-	-	-	-	-	-	-	1	1	1	-
		1	I		1=lightl	y mappe	d	2= m	oderatel	y mapped	1	3=stron	gly mappe	ed .

Relevance to the local, national, regional and global developmental needs  Relevance To the Employability/ Entrepreneurshi p/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability SDG	POE/4 <sup>th</sup> IR
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BP3											8			
01T											7			
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment			
Unit				The knowledge of general			A	-	-	-	-	Sustai	Quality	Global
I				methods of preparation and			knowledge					nable	Universitie	Educati
				reactions of Benzene and its			able					Devel	s and	on
				derivatives has global			individual					opme	Colleges: A	Knowle
				importance			in organic					nt and	New and	dge
							chemistry					Globa	Forward-	Practic
							aids in the					1	looking	al
							synthesis					Citize	Vision for	Course
							of drugs					nship	India's	s from
							and their					(SDG	Higher	Industr
							intermedia					4.7)	Education	y/Alum
							tes.					Schol	System	ni To a c
												arship	(9.1- 9.3)	Techni
												s for	Professiona	cal
												Highe	1 Education	Skills
												r	(17.1-17.5)	that
												Educa	Promoting	match
												tion	Highj-	Industr
												(SDG	quality	у
												4.b)	research	Needs
												Revita	(18.1-18.9)	Focus

the global Integration partne (23.1-rship for sustainable developme	& Employ ability Skills (Local/Region al and Global) Interns
partne rship for sustai nable devel	Skills (Local/ Region al and Global)
rship for sustai nable devel	(Local/ Region al and Global)
for sustai nable devel	Region al and Global)
sustai nable devel	al and Global)
nable devel	Global)
devel	, , , , , , , , , , , , , , , , , , ,
	Interns
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	Entrepr
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	through
	Innovat
	ion
	System
Unit   The exploration of qualitative   A Sustai Quality	Global
II analysis, general methods of knowledge nable University	e Educati
	nd on
phenols, acids and amines is an inorganic opme Colleges	A Knowle

essential part of the	chemistry	nt and	New and	dge
pharmaceutical sciences and has	aids in the	Globa	Forward-	Practic
global importance.	synthesis	1	looking	al
Broom importante.	of drugs	Citize	Vision for	Course
	and their	nship	India's	s from
	intermedia tes	(SDG	Higher	Industr
	tes	4.7)	Education	y/Alum
		Schol	System	ni
		arship	(9.1- 9.3)	Techni
		s for	Professiona	cal
		Highe	1 Education	Skills
		r	(17.1-17.5)	that
		Educa	Promoting	match
		tion	Highj-	Industr
		(SDG	quality	у
		4.b)	research	Needs
		Revita	(18.1-18.9)	Focus
		lize	Technology	on
		the	Use &	Employ
		global	Integration	ability
		partne	(23.1-	Skills
		rship	23.13)	(Local/
		for		Region
		sustai		al and
		nable		Global)
		devel		Interns
		opme		hip
		nt		Progra
		(SDG		ms
		17)		Consult

Unit				The global importance of studying fats and oils lies in their role in human nutrition, food industry development, agriculture, industrial applications, and environmental sustainability.			A knowledge able individual in organic chemistry aids in the synthesis of drugs and their intermedia tes	-	-	-	-	Sustai nable Devel opme nt and Globa l Citize nship (SDG 4.7) Schol arship s for Highe r Educa	Quality Universitie s and Colleges: A New and Forward- looking Vision for India's Higher Education System (9.1- 9.3) Professiona 1 Education (17.1-17.5) Promoting	ing Field Project s Entrepr eneursh ip Progra m through Innovat ion System Global Educati on Knowle dge Practic al Course s from Industr y/Alum ni Techni cal Skills that match
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						tion	Highj-	Industr
						(SDG	quality	у
						4.b)	research	Needs
						Revita	(18.1-18.9)	Focus
						lize	Technology	on
						the	Use &	Employ
						global	Integration	ability
						partne	(23.1-	Skills
						rship	23.13)	(Local/
						for		Region
						sustai		al and
						nable		Global)
						devel		Interns
						opme		hip
						nt		Progra
						(SDG		ms
						17)		Consult
								ing
								Field
								Project
								Entrepr
								eneursh
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								Progra
								m
								through
								Innovat
								ion
								System

Unit	The knowledge of general		A	-	-	-	-	Sustai	Quality	Global
IV	methods of preparation and		knowledge					nable	Universitie	Educati
	reactions of Polynuclear		able					Devel	s and	on
	hydrocarbons has global		individual					opme	Colleges: A	Knowle
			in organic					nt and	New and	dge
	importance.		chemistry					Globa	Forward-	Practic
			aids in the					1	looking	al
			synthesis					Citize	Vision for	Course
			of drugs					nship	India's	s from
			and their					(SDG	Higher	Industr
			intermedia					4.7)	Education	y/Alum
			tes					Schol	System	ni
								arship	(9.1- 9.3)	Techni
								s for	Professiona	cal
								Highe	1 Education	Skills
								r	(17.1-17.5)	that
								Educa	Promoting	match
								tion	Highj-	Industr
								(SDG	quality	y
								4.b)	research	Needs
								Revita	(18.1-18.9)	Focus
								lize	Technology	on
								the	Use &	Employ
								global	Integration	ability
								partne	(23.1-	Skills
								rship	23.13)	(Local/
								for		Region
								sustai		al and
								nable		Global)
								devel		Interns
								opme		hip
								nt		Progra
								(SDG		ms
								<u>1</u> 7)		Consult
								,		ing

									Field Project s Entrepr eneursh ip Progra m through Innovat ion System
Unit V		The knowledge of general chemistry, methods of preparation and reactions of Cyclo alkanes has global importance.		A knowledge able individual in organic chemistry aids in the synthesis of drugs and their intermedia tes	-		Sustai nable Devel opme nt and Globa l Citize nship (SDG 4.7) Schol arship s for Highe r Educa tion (SDG 4.b) Revita lize the	Quality Universitie s and Colleges: A New and Forward- looking Vision for India's Higher Education System (9.1- 9.3) Professiona 1 Education (17.1-17.5) Promoting Highj- quality research (18.1-18.9) Technology Use &	Global Educati on Knowle dge Practic al Course s from Industr y/Alum ni Techni cal Skills that match Industr y Needs Focus on Employ

 1		1	,				,
					global	Integration	ability
					partne	(23.1-	Skills
					rship	23.13)	(Local/
					for		Region
					sustai		al and
					nable		Global)
					devel		Interns
					opme		hip
					nt		Progra
					(SDG		ms
					17)		Consult
					17)		ing
							Field
							Project
							S
							Entrepr
							eneursh
							ip Progra
							Progra
							m through
							through
							Innovat
							ion
							System

BP 302T	Physical Pharmaceutics-I (Theory)	L	Т	P	С
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure					

Co-rec	quisites										-												
								Cou	ırse Ob	jective	s												
Upon	comple	tion of	this cou	ırse the	studer	nt shoul	d be al	ole to:															
1.	Unders	stand va	rious pl	hysicoc	hemical	proper	ties of c	drug mo	lecules	in the d	lesigning	the dosaş	ge forms										
2.	Know	the prin	ciples o	of chem	ical kin	etics &	to use t	hem for	stabilit	y testin	g and det	erminatio	on of exp	iry date of formulations									
3.	Demoi	ıstrate u	ise of pl	hysicoc	hemical	proper	ties in t	he form	ulation	develop	ment and	d evaluati	ion of do	sage forms.									
								Cours	e Outc	omes (C	<b>CO</b> )												
On co	mpletio	n of thi	is cours	se, the s	tudent	will be	able to	:															
CO 1.	The co	urse dea	ls with	the vari	ous phy	ysicoche	emical p	properti	es														
CO 3. develo	The the pment.  It helps	eory and	l practic	cal com	ponents ous tecl	of the	subject and me	helps the	nvolved	ent to ge	et a better	_		ous areas of formulation research and									
							P	rogram	me and	d Cours	se Mappi	ing											
СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2									
CO1	2	-	1	-	2	2	-	-	-	-	-	1	2	2									
CO2	2	-	1	-	2	2	-	-	-	-	-	1	2										
~ ~ ~		_	1	_	2	2.	_	_	_	_	_												

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	•	1	-	2	2	-	•	•	-	-	1	2	2
CO2	2	-	1	-	2	2	-	-	1	-	-	1	2	2
CO3	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO4	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO5	2	-	1	-	2	2	-	-	-	-	-	1	2	2
				1=li	ghtly m	apped		2= mo	derately	mappe	d	3=stro	ngly ma	pped

Unit	Relevance to the local, national, regional and global developmental	needs			Relevance To the Employability/	Entrepreneurship/ Skill Development		Relevance to the Professional Ethics, Gender, Human	Values, Environment &	Sustainability		SDG	NEP	POE/4 <sup>th</sup> IR
Unit	Local	Regional	National	Global Health care Needs. It will increas e the solubili ty of poorly soluble drugs.	Employability	Entrepreneurship	It will bring preformul ation knowhow in the students	Professional Ethics	' Gender	Human Values	Environment & Sustainability	Ens ure heal thy live s and pro mot e well	Prof essi onal Edu cati on (17. 1-17.5)	Techni cal Skills that match Industr y Needs

							bein g for all at all ages (SD G 3)		
Unit		Global Health care Needs. It will detail physio chemic al needs in the new lyform ulated drug produc ts		It will create the analytical knowhow among the students		-	Ens ure heal thy live s and pro mot e well - bein g for all at all ages (SD G 3)	Professional Education (17.1-17.5)	Techni cal Skills that match Industr y Needs

TT *:		1	C1 1 1	1	T. '11	I	ı		I	Б	D C	m 1 ·
Unit	-	-	Global		It will	-	-	-	-	Ens	Prof	Techni
III			Health		improve					ure	essi	cal
			care		the skill of					heal	onal	Skills
			Needs.		developin					thy	Edu	that
			It will		g different					live	cati	match
			create		biphasic					S	on	Industr
			the		dosage					and	(17.	y
			dosage		forms and					pro	1-	Needs
			form		the					mot	17.5	
			develo		remedies					e	)	
			pment		to					well		
			in		overtake					-		
			differe		the					bein		
			d		problems.					g		
			forms							g for		
			with							all		
			differe							at		
			d							all		
			release							ages		
			propert							(SD		
			ies.							G 3)		
			105.									
Unit	-	_	Global		It will	_	_	_	_	Ens	Prof	Techni
IV			Health		generate					ure	essi	cal
1			care		the					heal	onal	Skills
			Needs.		technical					thy	Edu	that
			It will		knowhow					live	cati	match
			increas		among the					S	on	Industr
			e the		students					and	(17.	y
			pharma		towards						1-	Needs
			cokinet		the animal					pro mot	17.5	riccus
			ics		and human						17.3	
			basis		studies.					e well		
					studies.					well		
			among							- 1 : - :		
			the							bein		

	clinical trials of differe d drugs among the dtudent s.		g for all at all ages (SD G 3)
Unit	Global Health care Needs. It will be highly helpful to student s to prepare the differe d medias and buffers used in the industr y.	It will bring the skill among the students to work in the research & developme nt labs.	Ens prof Techni ure essi cal heal onal Skills thy Edu that live cati match s on Industr and (17. y pro 1- Needs mot 17.5 e ) well bein g for all at all ages (SD G 3)

BP 303T	Pharmaceutical Microbiology (Theory)	L	T	P	C
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Versio	n 2.0										3	1		0	4
	Contac	t Hours	}	45 Ho	urs							_		ı v	<u> </u>
	quisite			10 220											
	quisites										_				
	1							Cou	ırse Ob	jectives					
Upon	comple	tion of	this cou	ırse the	studen	t shoul	d be ab			J					
									rvation	of vario	us micro	organism	S		
2.	To unc	lerstand	the im	portance	and im	plemen	tation o	of sterili	zation i	n pharm	aceutical	processi	ng and in	ndustry	
3.	Learn	sterility	testing	of phar	maceuti	cal prod	lucts.								
4.	Carrie	d out mi	icrobiol	ogical s	tandard	ization	of Phari	maceuti	cals.						
5.	Unders	stand th	e cell cı	ılture te	chnolog	gy and i	ts applic	cations	in pharr	naceutic	cal indust	ries.			
5. Understand the cell culture technology and its applications in pharmaceutical industries.  Course Outcomes (CO)															
On completion of this course, the student will be able to:															
CO1. This subject is designed to study the morphology, classification of microorganisms like bacteria, fungi and virus.															
CO2.				os the u	ndersta	nding o	f bacter	ia using	g stainir	ng techn	iques (si	mple, Gr	ram's &	Acid-fast	staining) and biochemical
~~^		MViC)			2 .										
CO3.		-								products		2 11 1			
CO4.														mins and	amino acids.
CO5.	It also	deals w	ith the	microbia	al spoila	ige, typ	es, sour	ces and	method	ls in pha	ırmaceuti	cal indus	stry.		
											3.7 .				
	l			1			Pı	rogram	me and	1	e Mappii	ng	DCO	T	
CO	PO1	PO2	PO3	PO4	PO5	PO6	<b>PO7</b>	PO8	PO9	PO 10	PO11	PO12	PSO 1		PSO 2
CO1	-	-	-	-	-	1	1	1	-	-	-	1	1		-
CO2	-	-	-	-	-	1	1	1	-	-	-	1	1		-
CO3	-	-	-	-	-	1	1	1	-	-	-	1	1		-

CO4

CO5	-	-	-	-	-	1	1	1	-	-	-	1	1		•
				1=lig	ghtly m	apped		2= mod	derately	mapped	1	3=stro	ngly map	ped	

Unit	vance to the national, nal and global opmental	'ance To the loyability/ epreneurship/ Development	elevance to the rofessional Ethics, ender, Human alues, nvironment & ustainability			4 <sup>th</sup> IR
	Releva local, n regiona develop needs	Releva Employ Entrep Skill D	Releva Profess Gender Values Enviro Sustair	SDG	NEP	POE/4

BP303T											stainability			
	Local	Regional	National	Global	Employability	Entrepreneurship		Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I			Its shown a remarkable opportunity to improve the standard of national pharmacy practice.	Antibiotic control programs growing globally, essential to effective and forward-looking for society.	-		Many tools to facilitate, microbiology learning objects or lab-related and data-driven exercises.			Z o		"Ma ke citie s and hum an settl eme nts incl usiv e, safe , resil ient and sust aina ble	Pro mot ing Hig hj- qual ity rese arch (18. 1- 18.9)	Global Educati on Knowle dge

Unit II	_	_	Imparts	Current and future	_	-	Apply to a wide	_	_	_	_	(SD G 11)"	Pro	Global
			knowledge in various aspects of marketing and its applications.	generation skilling globally requires staining and sterilization.			variety of problems affecting the overall human condition.					"Ma ke citie s and hum an settl eme nts incl usiv e, safe , resil ient and sust aina ble (SD G 11)"	mot ing Hig hj- qual ity rese arch (18. 1- 18.9	Educati on Knowle dge

Unit III	Aids in under tanding the varies of micror gander ms and fung	fundamental understandin g of the variety of creatures and forms of algae.	Develop the concepts of origin, continuity, complexity of molecular life activities, and cytological aspects of growth and development.			Recognise the significance of micro methods in plant anatomy.					"Ma ke citie s and hum an settl eme nts incl usiv e, safe , resil ient and sust aina ble (SD G	Pro mot ing Hig hj-qual ity rese arch (18. 1-18.9)	Global Educati on Knowle dge
Unit IV	Aid Encors in rages lear physining al an abo cogn ut ve the healt biol ogic	national protection from food poisoning.	Provides protection against food poisoning globally.	-	-	Apply to a wide variety of problems affecting the overall human condition.	-	-	-	-	"Ma ke citie s and hum an settl eme	Pro mot ing Hig hj-qual ity rese arch	Global Educati on Knowle dge

	al, mec hani cal, and phy sical proc esse s that mai ntai n hum an heal th and well bein g.											nts incl usiv e, safe , resil ient and sust aina ble (SD G 11)"	(18. 1- 18.9 )	
Unit v		-	Improves Human Health and wellbeing .	Environmental concerns, ecological preservation, sustainable living, and the defence of human rights.	-	-	Develops research aptitude	-	-	-	-	"Ma ke citie s and hum an settl eme nts incl usiv e,	Pro mot ing Hig h-qual ity rese arch (18. 1-18.9)	Global Educati on Knowle dge

					safe	
					,	
					resil	
					ient	
					and	
					sust	
					aina	
					ble	
					(SD	
					G	
					11)"	

BP 304T	Pharmaceutical Engineering (Theory)	L	T	P	С								
Version 2.0		3	1	0	4								
<b>Total Contact Hours</b>	45 Hours												
Pre-requisites/Exposure													
Co-requisites -													
Course Objectives													
Upon completion of this coul	Upon completion of this course the student should be able to:												
1. To know various unit opera	tions used in pharmaceutical industries.												
2. To understand the material	handling techniques.												
3. To perform various process	es involved in pharmaceutical manufacturing process.												
4. To carry out various test to	prevent environmental pollution.												
5. To appreciate and comprehe	end significance of plant lay out design for optimum use	of resour	ces										

6. To appreciate the various preventive methods used for corrosion control in pharmaceutical industries.

## **Course Outcomes (CO)**

## On completion of this course, the student will be able to:

CO 1. This course is designed to impart a fundamental knowledge on the art and science of various unit operations used in pharmaceutical industry.

CO 2. This subject also deals with the various manufacturing process and material handling techniques.

**CO 3.** It helps in understanding significance of plant layout design for optimum use of resources.

CO 4. It also dealt with various preventive methods for corrosion control in pharmaceutical industries.

CO 5. It also helps in understanding the different measures to prevent environmental pollution.

							Pro	gramm	e and C	Course M	apping			
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	-	2	-	3	3	•	2	•	-	3	2	3	2
CO2	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO3	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO4	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO5	3	-	2	-	3	3	-	2	-	-	3	2	3	2
				1=lig	htly ma	pped	2	= mode	rately m	apped	3=	strongly	mapped	

Unit	Relevance to the	local, national, regional and global	developmental needs		Relevance To the Employability/ Entrepreneurship/ Skill Development		ı	Relevance to the	Froiessional Ethics, Gender,	Human Values,	Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
Unit	l Local	Regional	National	It enables optimization of processes, quality control, and efficient utilization of resources, leading to improved product performance and operational efficiency.	Making individuals well-suited for roles in industries where fluid handling, particle analysis, and process optimization are critical.	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			Focus on Employ ability Skills (Local/ Region al and Global)
Unit II				This knowledge is valuable for designing efficient systems, optimizing processes, ensuring product quality, and improving energy efficiency.	It enhances employability in industries such as chemical engineering, process engineering, energy management, and manufacturing.									Focus on Employ ability Skills (Local/ Region

								al and Global)
Unit III	 	 Helps working in industries where drying and mixing play a critical role in product development, quality control, and manufacturing efficiency.	Enhance employability in process engineering, product development, quality assurance, manufacturing, research and development, technical sales, and consulting roles across various industries.	 	 	 	 	Focus on Employ ability Skills (Local/ Region al and Global)
Unit IV	 	 Provides essential knowledge and skills applicable to industries involving separation processes, purification, particle removal, and fluid clarification	Valuable in sectors such as pharmaceuticals, biotechnology, chemical engineering, water treatment, and food processing, where efficient separation techniques are critical for product quality, safety, and process optimization	 	 	 	 	Focus on Employ ability Skills (Local/ Region al and Global)
Unit v	 	 Crucial for ensuring the selection of appropriate materials, preventing material degradation and failure, and optimizing material flow and handling processes in pharmaceutical plant operations. This knowledge contributes to the safe, efficient, and compliant functioning of pharmaceutical manufacturing facilities.	Provides diverse range of employment opportunities in the pharmaceutical industry, including roles in engineering, operations, quality assurance, research and development, and environmental health and safety.	 	 	 	 	Focus on Employ ability Skills (Local/ Region al and Global)

BP 305P	Pharmaceutical Organic Chemistry II – Practical	L	T	P	C
Version 2.0		0	0	4	2
<b>Total Contact Hours</b>	60 Hours				
Pre-requisites/Exposure					
Co-requisites					

### **Course Objectives**

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

- 1. Write the structure, name and the type of isomerism of the organic compound
- 2. Write the reaction, name the reaction and orientation of reactions
- 3. Account for reactivity/stability of compounds, 4. prepare organic compounds
- 4. Prepare organic compounds

#### **Course Outcomes (CO)**

#### On completion of this course, the student will be able to:

CO1 Recall the basic knowledge of method of preparation, reactions and properties of Benzene and its derivatives

CO2 Demonstrate a high-level understanding of method of preparation, reactions and properties of phenols, aromatic amines and aromatic acids

CO3 Develop basic knowledge of fats and oils and their analytical constants

CO4 Analyse the synthesis, different reactions, properties, structure and medicinal uses of polynuclear hydrocarbons and substituted alkanes

CO5 Assess the stabilities, theory of strain less rings and reactions of cyclo alkanes

## **Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	-	1	1	-	-	-	-	-	-	-	1	1	1	-
CO2	•	1	1	-	-	-	•	-	-	-	1	1	1	-
CO3	-	1	1	-	-	-	-	-	-	-	1	1	1	-

CO4	-	1	1	-	-	-	-	-	-	-	1	1	1	-
CO5	-	1	1	-	-	-	-	-	-		1	1	1	-
	1=lightly map						2=	= modera	ately ma	pped	3=st	trongly n	napped	

Unit	Relevance to the	regional and global	developmental needs		Relevance To the Employability/ Entrepreneurship/ Skill Development	T	ī	Relevance to the Professional Ethics,	Gender, Human Values,	Environment & Sustainability		SDG	NEP	POE/4 <sup>th</sup> IR
Unit	Local	Regional	National	Experiments involving laboratory techniques like recrystallization, steam distillation is important part of pharmaceutical sciences experiment. These experiments are usually conducted all over the world.	Employability	Entrepreneurship	A knowledge able individual in organic chemistry aids in the synthesis of drugs and their	Professional Ethics	Gender	Human Values	Environment &	Sustai nable Devel opme nt and Globa l Citize nship (SDG	Quality Universitie s and Colleges: A New and Forward- looking Vision for India's Higher	Global Educati on Knowle dge Practic al Course s from Industr

			intermedia			4.7)	Education	y/Alum
			tes.			ŕ	System	ni
						Schol	(9.1- 9.3)	Techni
						arship	Professiona	cal
						s for	1 Education	Skills
						Highe	(17.1-17.5)	that
						r	Promoting	match
						Educa	Highj-	Industr
						tion	quality	y
						(SDG	research	Needs
						4.b)	(18.1-18.9)	Focus
						Revita	Technology	on
						lize	Use &	Employ
						the	Integration	ability
						global	(23.1-	Skills
						partne	23.13)	(Local/
						rship		Region
						for		al and
						sustai		Global)
						nable		Interns
						devel		hip
						opme		Progra
						nt		ms
						(SDG		Consult
						17)		ing
								Field
								Project
								s
								Entrepr
								eneursh
								ip
								Progra
								m
								through
								Innovat

							ion System
Unit	The determination of acid/ saponification/ iodine value of fats and oils has a significant global impact by ensuring quality, stability, and functionality in various industries, promoting sustainability, and facilitating international trade.	A knowledge able individual in organic chemistry aids in the synthesis of drugs and their intermedia tes			Sustai nable Devel opme nt and Globa l Citize nship (SDG 4.7) Schol arship s for Highe r Educa tion (SDG 4.b) Revita lize the global partne rship for sustai nable devel opme	Quality Universitie s and Colleges: A New and Forward- looking Vision for India's Higher Education System (9.1- 9.3) Professiona 1 Education (17.1-17.5) Promoting Highj- quality research (18.1-18.9) Technology Use & Integration (23.1- 23.13)	Global Educati on Knowle dge Practic al Course s from Industr y/Alum ni Techni cal Skills that match Industr y Needs Focus on Employ ability Skills (Local/ Region al and Global) Interns hip

									nt		Drogro
									nt		Progra
									(SDG		ms
									17)		Consult
											ing
											Field
											Project
											S
											Entrepr
											eneursh
											ip
											Progra
											m
											through
											Innovat
											ion
											System
Unit		Chemical, drug, and		A	-	-	-	-	Sustai	Quality	Global
III		intermediate preparation is a key		knowledge					nable	Universitie	Educati
		part of the pharmaceutical sector		able					Devel	s and	on
		globally.		individual					opme	Colleges: A	Knowle
		<i>,</i>		in organic					nt and	New and	dge
				chemistry					Globa	Forward-	Practic
				aids in the					1	looking	al
				synthesis					Citize	Vision for	Course
				of drugs					nship	India's	s from
				and their					(SDG	Higher	Industr
				intermedia					4.7)	Education	y/Alum
				tes					Schol	System	ni
									arship	(9.1- 9.3)	Techni
									s for	Professiona	cal
									Highe	l Education	Skills
									r	(17.1-17.5)	that
									Educa	Promoting	match
									tion	Highj-	Industr
									(SDG	quality	
			1		Ì			1	(SDG	quanty	y

						1 b)	rasaarah	Needs
						4.b)	research	
							(18.1-18.9)	Focus
						lize	Technology	on
						the	Use &	Employ
							Integration	ability
							(23.1-	Skills
						rship	23.13)	(Local/
						for		Region
						sustai		al and
						nable		Global)
						devel		Interns
						opme		hip
						nt		Progra
						(SDG		ms
						17)		Consult
								ing Field
								Field
								Project
								S
								Entrepr
								eneursh
								ip
								Progra
								m
								through
								Innovat
								ion
								System

BP 306P	Physical Pharmaceutics-I (Practical)	L	T	P	C
Version 2.0		0	0	4	2
<b>Total Contact Hours</b>	60 Hours				
Pre-requisites/Exposure					

Co-re	quisite	·S										-		
	_								Cou	rse Obje	ctives			
Upon	compl	etion o	f this c	course t	he stu	lent sh	ould be	able to	0:					
1. Uno	derstan	d vario	us phys	sicoche	mical p	ropertie	s of dr	ug mole	ecules i	nvolved i	n the des	signing o	f dosage	forms
2. Kno	2. Know the principles of chemical kinetics and to use them for stability testing and determination of expiry date of formulations.													
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms														
Course Outcomes (CO)														
On completion of this course, the student will be able to:														
CO 1. The course deals with the study of various physicochemical properties, and principles involved in manufacturing dosage forms/formulations.														
CO 2.	Practi	cal con	ponent	ts of the	subjec	t help t	he stud	ent to g	et a bet	tter insigh	nt into va	rious are	eas of forr	nulation research and development,
CO 3.	It also	helps	n unde	rstandir	ng prind	ciples o	f chemi	ical kin	etics an	nd to use	them in o	letermini	ing stabili	ty of pharmaceutical dosage forms.
CO 4.	Demo	nstrate	use of	physico	chemic	al prop	erties i	n the fo	rmulati	ion devel	opment a	and evalu	ation of c	losage forms.
CO 5.	This s	ubject	also hel	lps in le	arning	physio	chemica	al prope	erties of	f individu	al dosag	e forms.		
								Pr	ogram	me and (	Course N	<b>Mapping</b>	<u> </u>	
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO2	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO3	2	-	1	-	2	2	-	-	-	-	-	1	2	2

								FI	ogram	me anu v	Jourse I	Mapping	,	
CO	PO1	PO2	PO3	PO4	PO5	<b>PO6</b>	<b>PO7</b>	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	ı	1	•	2	2	-	-	•	•	-	1	2	2
CO2	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO3	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO4	2	-	1	-	2	2	-	-	-	-	-	1	2	2
CO5	2	-	1	-	2	2	-	-	-	-	-	1	2	2

1=lightly mapped 2= moderately mapped 3=strongly mapped	
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Unit	Relevance to the	local, national, regional and global	developmental needs		Relevance To the	Entrepreneurship/	- Skiii Developineiii	Relevance to the	-Frofessional Ethics, Gender,	Human Values,	Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
Unit	l Local	Regional	National	Contribute globally in the field of solubility and pKa determination by conducting research, sharing knowledge, and collaborating with scientists worldwide to advance understanding and develop innovative methodologies.	Employability	Entrepreneurship	Contribute to skill development in solubility and pKa determination using Half Neutralization/Henderson-Hasselbalch by conducting workshops and training programs to educate researchers and scientists on the principles, techniques, and applications of these methods, fostering their expertise and advancement in the field. Additionally, develop online resources and interactive	Professional Ethics	o Z Gender	Human Values	Environment & Sustainability	(SD G4. 1)	(18. 1- 18.9 )	Focus on Employ ability Skills (Local/ Region al and Global)

				platforms to facilitate self- learning and knowledge sharing, promoting skill development globally.					
Unit		 Contribute globally in the field of partition coefficient and % composition determination of NaCl in a phenol-water solution by conducting research, developing accurate CST methods, and sharing findings to enhance scientific understanding and promote global collaboration in this area.	-	 Contribute to skill development in the field of partition coefficient and % composition determination of NaCl in a phenol-water system by offering training programs, workshops, and hands-on practical sessions to empower researchers and scientists with the necessary techniques and expertise. Additionally, develop educational resources and online platforms for knowledge sharing to reach a wider audience and promote skill development in this area.	 N o	 	(SD G4. 1)	(18. 1- 18.9 )	Focus on Employ ability Skills (Local/ Region al and Global)
Unit III	 	 By conducting research, creating standardised protocols, and working with scientists around the world, you can make a significant global contribution to the field of surface tension and the calculation of Hydrophilic-Lipophilic Balance (HLB), helping to advance knowledge, enhance measurement methods, and foster international harmony in surface tension and HLB determination.	-	 Contribute to skill development in the field of surface tension and determination of Hydrophilic-Lipophilic Balance (HLB) by providing training programs, hands-on workshops, and educational resources that empower researchers and scientists with the necessary knowledge and techniques for accurate measurement and interpretation of surface tension and HLB values. Additionally, foster collaboration and	 N o	 	(SD G4. 1)	(18. 1- 18.9 )	Focus on Employ ability Skills (Local/ Region al and Global)

				knowledge-sharing platforms to enhance skill development and exchange of expertise in these areas.					
Unit IV	 	 Contribute globally to the field of stability constant determination and donor-acceptor ratio calculation of PABA-Caffeine and Cupric-Glycine complexes by conducting research, developing standardized solubility and pH titration methods, and sharing findings to enhance global understanding, promote accurate characterization of complex formation, and facilitate collaboration among scientists worldwide.	-	 By providing training programmes, workshops, and hands-on sessions that concentrate on the solubility method and pH titration method, you can help researchers and scientists develop their skills and advance in their field while also making a contribution to the field of stability constant determination and donor-acceptor ratio calculation of PABA-Caffeine and Cupric-Glycine complexes.	 N o	 	(SD G4. 1)	(18. 1- 18.9 )	Focus on Employ ability Skills (Local/ Region al and Global)
Unit v	 	 Important for guaranteeing the choice of suitable materials, avoiding material degradation and failure, and improving material flow and handling procedures in pharmaceutical plant operations. The safe, effective, and legal operation of pharmaceutical production facilities is facilitated by this information.	-	 	 N o	 	(SD G4. 1)	(18. 1- 18.9 )	Focus on Employ ability Skills (Local/ Region al and Global)

BP 307P	Pharmaceutical Microbiology (Practical)	L	T	P	C
Version 2.0		0	0	4	2
<b>Total Contact Hours</b>	60 Hours				

Pre-re	equisit	es/Exn	osure											
	quisite		osure								-			
	1								Cours	se Object	ives			
Upon	compl	etion o	f this c	ourse t	he stud	lent sh	ould be	able to						
										f various :	microorg	ganisms		
2. To	underst	and the	e impor	tance a	nd impl	ementa	tion of	steriliza	ation in	pharmace	eutical pr	ocessing	and indu	stry
3. Lea	ırn steri	lity tes	ting of	pharma	ceutica	l produ	cts.							
4. Car	4. Carried out microbiological standardization of Pharmaceuticals.													
5. Uno	5. Understand the cell culture technology and its applications in pharmaceutical industries.													
	Course Outcomes (CO)													
	On completion of this course, the student will be able to:													
CO	CO1. These subjects deal with the study of all categories of microorganisms like bacteria and fungi and virus.													
CO2. It helps in learning of different techniques of sterilization, BOD detection.														
CO							y study							
		•	•			•			olation of	of culture.	•			
C	O5. It	also de	als the	sterility	testing	g, Bioch	emical	assay						
								Pro	gramm	e and Co	ourse Ma	npping		
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	_	_	_	_	_	1	1	1	_	_	_	1	1	
						1		_				1	1	
CO2	-	-	-	-	-	1	1	1	-	-	-	1	1	-
CO3 1 1 1 1 1 1 1														
CO4	-	-	-	-	-	1	1	1	-	-	-	1	1	-
CO5	-	-	-	-	-	1	1	1	-	-	-	1	1	-

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit	Relevance to the local, national, regional and global develonmental	reeds		Relevance To the Employability/	Entrepreneurship/	Skill Development	Relevance to the Professional Ethics, Gender, Human	Values, Environment &	Sustainability		SDG	NEP	POE/4 <sup>th</sup> IR
Unit I	Local Regional	It has shown a wonderful chance to raise the bar for national pharmacy practise.	Antibiotic control programmes are expanding globally and are crucial for society to be effective and forward-thinking.	' Employability	<b>.</b> Entrepreneurship	Apply to a wide range of issues affecting people's general well-being.	Professional Ethics	Gender	Human Values	Environment & Sustainability	Sust aina ble Dev elop men t and Glo bal Citi zens hip (SD	Pro mot ing Hig hj-qual ity rese arch (18. 1-18.9)	Global Educati on Knowle dge

											G 4.7)		
Unit II	-	Imparts knowledge in various aspects of marketing and its applications.	Staining and sterilisation are necessary for current and future generations to be skilled globally.			Apply to a wide range of issues affecting people's general well-being.		-	-		Sust aina ble Dev elop men t and Glo bal Citi zens hip (SD G 4.7)	Pro mot ing Hig hj- qual ity rese arch (18. 1- 18.9)	Global Educati on Knowle dge
Unit III	Aids in under tandin g the variet of micro rganis ms and fungu	g of the variety of creatures and forms of algae.	Develop the concepts of origin, continuity, complexity of molecular life activities, and cytological aspects of growth and development.	-	-	Recognise the significance of micro methods in plant anatomy	-	-	-	-			

Unit IV	Hel	Encou	Provides	Provides protection								Sust	Pro	Global
	ps	rages	nationwide	against food								aina	mot	Educati
	stud	physic	protection	poisoning globally.								ble	ing	on
	ents	al and	from	poisoning globally.								Dev	Hig	Knowle
	gain	cogniti										elop	hj-	dge
	kno	ve	illness.									men	_	uge
	wle	health	IIIIIESS.										qual ity	
		neam										t		
	dge											and	rese	
	of											Glo	arch	
	the											bal	(18.	
	biol											Citi	1-	
	ogic											zens	18.9	
	al,											hip	)	
	mec											(SD		
	hani											G		
	cal,											4.7)		
	and													
	phy													
	sical													
	syst													
	ems													
	that													
	kee													
	p													
	peo													
	ple													
	heal													
	thy													
	and													
	hap													
T.T., 14 .	py.		T	II	1		D1					C 1	D.	C1-1 1
Unit v	-	-	Improves	Human rights	-	-	Develops	-	-	-	-	Sust	Pro	Global
			Human	protection, ecological			research aptitude					aina	mot	Educati
			Health and	preservation,								ble	ing	on
			well being.	environmental issues,								Dev	Hig	Knowle

and sustainable life.				elop	hj-	dge
				men	qual	
				t	ity	
				and	rese	
				Glo	arch	
				bal	(18.	
				Citi	1-	
				zens	18.9	
				hip	)	
				(SD		
				G		
				4.7)		
				ŕ		

BP 308P	Pharmaceutical Engineering (Practical)	$\mathbf{L}$	T	P	C					
Version 2.0		0	0	4	2					
<b>Total Contact Hours</b>	60 Hours									
Pre-requisites/Exposure										
Co-requisites										
Course Objectives										
Upon completion of this course the student should be able to:										
1 To know various unit operations used in Pharmaceutical industries										

- 1. To know various unit operations used in Pharmaceutical industries.
- 2. To understand the material handling techniques.
- 3. To perform various processes involved in pharmaceutical manufacturing process.
- 4. To carry out various test to prevent environmental pollution.
- 5. To appreciate and comprehend significance of plant lay out design for optimum use of resources
- 6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries

# **Course Outcomes (CO)**

# On completion of this course, the student will be able to:

CO1. To imparts fundamental knowledge of various unit operations used in pharmaceutical industry.

CO	D2. It	deals	with the	e detern	nination	of radi	ation co	onstant	of diffe	rent metal	s and pai	ints.		
CO	)3. It	also h	elps to	underst	and the	steam c	distillati	on proc	ess and	heat trans	sfer cons	tant.		
CO	)4. It	is also	applic	able for	the cor	structio	on of dr	ying cu	rves (Ps	sychometr	ric charts	).		
CO	O5. T	his sub	ject als	so usefu	ıl for ur	nderstan	ding si	ze redu	ction m	ethods, si	ze analys	sis and st	udy indus	trial instruments used in unit operation
	p	rocesse	es.											
								Prog	ramme	and Cou	rse Map	ping	T. T	
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO2	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO3	3	-	2	-	3	3	-	2	-	-	3	2	3	2
CO4	CO4 3 - 2 - 3 3 - 2 - 3 2 3													
CO5	3	-	2	-	3	3	-	2	-	-	3	2	3	2
					l=lightl	y mappe	ed	2=	modera	ately map	ped	3=s1	trongly ma	apped

vance to the harional, onal and global lopmental	vance To the bloyability/ epreneurship/ Development	vance to the essional cs, Gender, nan Values, ironment & ainability
Releva local, region develo needs	Relevi Emple Entrej Skill I	Releva Profese Ethics Huma Envir Sustai NEP

Unit	l Local	Regional	National	It provides process optimisation, quality assurance, and resource-efficient resource use, which improves product performance and operating efficiency.	Enabling people to perform well in positions in sectors where fluid handling, particle analysis, and process optimisation are essential.	Entrepreneurship	Skill Development	Professional Ethics	o Z Gender	Human Values	Environment & Sustainability	SD G 6)	(18. 1- 18.9 )	Focus on Employ ability Skills (Local/ Region al and Global)
Unit II				This knowledge is valuable for designing efficient systems, optimizing processes, ensuring product quality, and improving energy efficiency.	It increases one's employability in sectors including manufacturing, energy management, chemical engineering, and process engineering.					1		SD G 6)	(18. 1- 18.9 )	Focus on Employ ability Skills (Local/ Region al and Global)

TT 1.			Letter 1	1	1	1	1		an	(10	-
Unit	 	 Aids those who operate in fields	The improvement of					 	SD	(18.	Focus
III		where drying and mixing are	employability in process						G 6)	1-	on
		essential for product development,	engineering, product							18.9	Employ
		quality assurance, and production	development, quality control,							)	ability
		effectiveness.	manufacturing, R&D, technical								Skills
			sales, and consulting								(Local/
			professions across many								Region
			industries.								al and
											Global)
Unit	 	 Provides essential knowledge and	Valuable in sectors such as					 	SD	(18.	Focus
IV		skills applicable to industries	pharmaceuticals,						G 6)	1-	on
		involving separation processes,	biotechnology, chemical							18.9	Employ
		purification, particle removal, and	engineering, water treatment,							)	ability
		fluid clarification	and food processing, where								Skills
			efficient separation techniques								(Local/
			are critical for product quality,								Region
			safety, and process								al and
			optimization								Global)
Unit	 	 Important for guaranteeing the	Provides diverse range of					 	SD	(18.	Focus
v		choice of suitable materials,	employment opportunities in						G 6)	1-	on
		avoiding material degradation and	the pharmaceutical industry,							18.9	Employ
		failure, and improving material	including roles in engineering,							)	ability
		flow and handling procedures in	operations, quality assurance,							ŕ	Skills
		pharmaceutical plant operations.	research and development, and								(Local/
		The safe, effective, and legal	environmental health and								Region
		operation of pharmaceutical	safety.								al and
		production facilities is facilitated									Global)
		by this information.									<b> </b>

# **Semester-IV**

BP401T	Pharmaceutical Organic Chemistry-III (Theory)	L	T	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Organic Chemistry				
Co-requisites	Pharmaceutical Organic Chemistry-III				

### **Course Objectives**

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

- 1. Understand the methods of preparation and properties of organic compounds
- 2. Explain the stereo chemical aspects of organic compounds and stereo chemical reactions
- 3. Know the medicinal uses and other applications of organic compounds

## **Course Outcomes (CO)**

# On completion of this course, the student will be able to:

- CO1. Able to explain chemistry of important heterocyclic compounds.
- CO2. To describe detailed mechanisms for common naming reactions.
- CO3. It imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions.
- CO4. To acquire the knowledge and understanding of medicinal and other uses of organic compounds.

## **Programme and Course Mapping**

								0			11	0		
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3					3		1						
CO2			3									1		
CO3		1			3				1					
CO4										1				1

1=lightly mapped 2= moderately mapped	3=strongly mapped	
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Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human	Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR		
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	[		-	Nomen clature of optical isomer s and separat ion is used	Syn thes is and sep arat ion of opti	-	There are four methods to separation of isomers. Which develop skills	Usage of any medicin e especiall y isomers is based on	-	-	[	Skil l for dece nt wor k SD G4. 4.	Prof essi onal Edu cati on (17. 1- 17.5	It helps in develop ing technic al skills that industr y

		globall y	cal iso mer gen erat e emp loy men t.			appropri ate professi onal ethics.			)	require s and thus helps in creatin g employ ment.
Unit		Geome trical isomeri sm Nomen clature of geomet rical isomer s (Cis Trans, EZ, Syn Anti system s	Pro duct ion of geo met ric iso mer s acro ss the glo be pro vide s a lot of emp loy men t.	Product ion of Geomet ric isomers across the globe provide s a lot of employ ment.	A Geometric isomer developed synthetical ly, helps in honing the technical skill and expertise in production			Skil ls for Dec ent Wor k (SD G 4.4)	Professional Education (17.1-17.5)	Skill Develo pment

Unit				Synthe sis, reactions and medicinal uses of following compounds/derivatives Pyrrole, Furan, and Thiophene Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene	Syn thes is of dru gs cont aini ng Pyrr ole, fura n and Thi oph en glo be pro vide s a lot of emp loy men t.		Synthesis of furan thiophene and Pyrrole, helps in honing the technical skill and expertise in production			-	Skil ls for Dec ent Wor k (SD G 4.4)	Professional Education (17.1-17.5)	Skill Develo pment
Unit IV	-	-	-	Pyrazo le, Imidaz	Syn thes is	-	Synthesis of furan Quinoline	-	-	-	Skil ls for	Prof essi onal	Skill Develo pment

				ole,	of		Iso			Dec	Edu	
				Oxazol	dru		quinoline,			ent	cati	
				e and	gs		acridine			Wor	on	
				Thiazo	cont		helps in			k	(17.	
				le.	aini		honing the			(SD	1-	
				Pyridin			technical			G	17.5	
				e,	ng Pyri		skill and			4.4)	)	
				Quinol	dine		expertise			,	,	
				ine, Iso			in					
				quinoli	, Qui		production					
				ne,	noli		production					
				Acridi	ne							
				ne and	Iso							
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Unit	-	-	-	Fulfils	Opp	-	Docking	 -	1	Skil	Prof	Skill
v				the	ena		techniques			ls	essi	Develo
				need	uer-		helps in			for	onal	pment
				for	oxi		acing			Dec	Edu	
				Reacti	dati		technical			ent	cati	
				ons of	on		skill,			Wor	on	

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		ic	Dak		-oxidation			(SD	1-	
		import	in		and Dakin			G 4.4)	17.5	
		ance	reac		reaction.			4.4)	)	
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		y	Bec		S					
		coding	Вес		rearrange					
		dockin	kma		ment and					
		g ta alami a	nns		Schmidt					
		techniq	rear		rearrange					
		ues.	ran		ment.					
			gem		Claisen-					
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BP402T	Medicinal Chemistry-I (Theory)	L	T	P	С
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Chemistry of drugs				
Co-requisites					

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

- 1. Understand the chemistry of drugs with respect to their pharmacological activity
- 2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
- 3. Know the Structural Activity Relationship (SAR) of different class of drugs
- 4. Write the chemical synthesis of some drugs

## **Course Outcomes (CO)**

## On completion of this course, the student will be able to:

- CO1. To understand the chemistry of drugs with respect to their pharmacological activity.
- CO2. To understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
- CO3. To know the structural activity relationship of different class of drugs.
- CO4. Well acquainted with the synthesis of some important class of drugs.

## **Programme and Course Mapping**

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	1													
CO2				1	1			2		3			3	

CO3	1					3	3				3
CO4	1	1	2		2	2					
			1=ligh	tly map	pped	2= mo	derately	mapped	l	3=str	ongly mapped

Unit	Relevance to the local, national, regional and global	needs			Relevance To the Employability/ Entrepreneurship/	Skiii Development		Relevance to the	Professional Ethics, Gender, Human	Values,	Environment &	SDG	NEP	POE/4 <sup>th</sup> IR
Unit I	Local	Regional	- National	Fulfils the need for Drug Develop ment globally	<b>'</b> Employability	' Entrepreneurship	Knowledge of Physicochemic al properties of Drugs helps in Preformulation studies	Professional Ethics	Gender	Human Values	Environment & Sustainability		Professional Education (17.1-17.5)	Skill Develo pment

Unit II		-		Fulfils the need for Develop ment of Drug acting on ANS (Sympat hetic)		-	Study of SAR and synthesis of drugs acting on Sympathetic nervous system helps in New drug synthesis and Drug development	-	_	_	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Develo pment
Unit		-	-	globally Fulfils the need for Develop ment of Drug acting on ANS (parasy mpatheti c) globally	-	-	study of SAR and synthesis of drugs acting on Parasympatheti c nervous system helps in new drug synthesis and Drug development process	-	_	-	-	Skills for Decent Work (SDG 4.4)	Professional Education (17.1-17.5)	Skill Develo pment
Unit IV		-	-	Fulfils the need for Develop ment of Drugs acting on CNS globally	-	-	Understand the chemistry of drugs with respect to their pharmacologic al activity	-	-	-	-	Youth and Adult Literacy (SDG 4.6)	Adult Education and Lifelong Learning (21.1-21.10)	Skill Develo pment
Unit V	-	-	-	Globally Aware youth	-	-	It imparts fundamental knowledge on	-	-	-	-	Youth and Adult Literacy	Adult Education and Lifelong	Skill Develo pment

		about		the structure,			(SDG 4.6)	Learning (21.1-	
		uses and		chemistry,				21.10)	
		side		SAR,					
		effect of		Synthesis and					
		Narcotic		therapeutic					
		S		value of drugs					
				acting on CNS					
				which helps in					
				generating new					
				drug					
				molecules.					

BP403T	Physical Pharmaceutics-II (Theory)	L	T	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Pharmaceutics				
Co-requisites	Physical Pharmaceutics				

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

- 1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
- 2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
- 3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

## **Course Outcomes (CO)**

## On completion of this course, the student will be able to:

CO1. State the physicochemical properties of drug molecules

CO2. Analyze the chemical stability tests of various drug products and determination of expiry date of formulations.

CO3. Have basic knowledge of physicochemical properties in the formulation development and evaluation of dosage forms.

								Pr	ogram	me and	Course 1	Mapping	3	
CO	PO1	PO2	PO3	PO4	PO5	<b>PO6</b>	<b>PO7</b>	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	1				2									
CO2		1								3		3		
CO3			1			2		3					1	
					1=ligh	ntly ma	pped		2= mo	derately r	napped		3=strong	gly mapped

	Unit
ocal	Relevance to the local, national, regional and global developmental
Regional	needs
National	
Global	
Employability	Relevance To the Employability/
Entrepreneurship	Entrepreneurship/ Skill Development
Skill Development	
Professional Ethics	Relevance to the
Gender	Gender, Human
Human Values	Values, Environment &
Environment & Sustainability	Sustainability
	SDG
	NEP
	POE/4 <sup>th</sup> IR

Unit I	Knowledge about physicochemical properties colloidal dispersions enables pharmaceutical professionals to develop effective drug	Knowledge about the physicochemical properties of colloidal dispersions skill development in areas of optimal drug delivery systems and contribute to		SDG 3 SDG 9	Professi onal Educati on (17.1- 17.5)	Technica I Skills that match Industry Needs/ Skill
	delivery systems, improve drug stability and bioavailability.	the advancement of pharmaceutical technologies and patient care.				Develop ment
Unit	Knowledge about rheology enables understanding of flow behaviour, stability, and bioavailability of pharmaceutical formulations globally.	Knowledge about rheology enhances skills in formulation development, process optimization, and quality control, enabling professionals to design effective drug delivery systems and ensure product stability and performance		SDG 3 SDG 9	Professi onal Educati on (17.1- 17.5)	Technica 1 Skills that match Industry Needs/ Skill Develop ment
Unit	Learning the physicochemical properties of coarse dispersion is crucial for understanding and optimizing the formulation and delivery of suspensions, emulsions, and other coarse dispersions, ensuring effective drug delivery and stability of	Understanding the physicochemical properties of coarse dispersion develops skills in formulating stable suspensions and emulsions, optimizing drug delivery systems, and ensuring proper dosage administration, thereby enhancing expertise in pharmaceutical		SDG 3 SDG 9	Professi onal Educati on (17.1- 17.5)	Technica I Skills that match Industry Needs/ Skill Develop ment

	pharmaceutical products	formulation development and product quality control				
Unit IV	Learning the concept of micrometrics in is crucial for understanding and controlling particle size, shape, and surface properties, enabling formulation optimization and efficient drug delivery systems, ensuring product efficacy and patient safety.	Understanding the concept of micrometrics in pharmaceutical sciences develops skills in particle characterization, formulation optimization, and drug delivery system design, enhancing expertise in quality control and process development for effective pharmaceutical products.		SDG 3 SDG 12	Professi onal Educati on (17.1- 17.5)	Technica I Skills that match Industry Needs/ Skill Develop ment
Unit	Having knowledge about drug stability is crucial for formulating safe and effective pharmaceutical products, ensuring their quality and shelf life, and minimizing the risk of drug degradation and loss of potency. It enables regulatory compliance and supports patient safety by providing reliable and stable medications.	Having knowledge about drug stability develops skills in formulating stable and reliable pharmaceutical products, conducting quality control tests to assess stability, and implementing strategies to mitigate degradation risks, enhancing expertise in ensuring product quality and patient safety.		SDG 3 SDG 9	Professi onal Educati on (17.1- 17.5)	Technica I Skills that match Industry Needs/ Skill Develop ment

BP404T	Pharmacology-I (Theory)	L	Т	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Human anatomy and Physiology				
Co-requisites	Pathophysiology				

# Upon completion of this course the student should be able to

- 1. Understand the pharmacological actions of different categories of drugs
- 2. Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.
- 3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
- 4. Observe the effect of drugs on animals by simulated experiments.
- 5. Appreciate correlation of pharmacology with other bio medical sciences.

#### **Course Outcomes (CO)**

## On completion of this course, the student will be able to:

- CO1. Students would have understood the pharmacological actions of different categories of drugs
- CO2. They would have studied in detailed about mechanism of drug action at organ system/sub cellular/ macromolecular levels.
- CO3. They would have understood the application of basic pharmacological knowledge in the prevention and treatment of various diseases.
- CO4. They would get an idea about correlation of pharmacology with other bio medical sciences.

#### **Programme and Course Mapping** PO **PSO** PO9 **PO12** CO **PO1** PO<sub>2</sub> PO<sub>3</sub> PO4 PO<sub>5</sub> **PO6 PO7 PO8** PO11 PSO<sub>2</sub> 10 1 CO<sub>1</sub> CO<sub>2</sub> 3 **CO3 CO4** 3

1=lightly mapped 2= moderately mapped 3=strongly mapped

Unit	Relevance to the local, national, regional and global developmental needs  Local Regi National Global				Emp Entr	vance To t loyability/ epreneurs lopment	1	Relevance Professiona Gender, Hi Environme Sustainabil	SD G	NE P	POE/4 <sup>t</sup> h IR	
	Local	Regional	National	Global	Em plo yabi lity	Entrepr eneursh ip	Skill Developm ent					
Unit I				Student will be able to understand General Pharmacology special context Pharmacokinetics which will help to understand disease mechanism and drug action			Pharmacol ogy as a discipline has significant ly contribute d to skill developme nt in			(SD G 4.4)	(9.1 - 9.3)	Global Educati on Knowle dge, Skill Develo pment, Employ ability
Unit II		-		Student will be able to know general pharmacology is crucial for ensuring the safe,			various aspects of drug therapy. It			(SD G 4.4)	(9.1 - 9.3)	Global Educati on Knowle

Unit	 effective, and rational use of drugs globally. It informs drug regulation, promotes rational drug use, contributes to pharmacovigilance efforts, supports global health initiatives, informs pharmacoeconomic evaluations, and fosters international collaborations and research in pharmacology.  The global impact of drugs targeting the peripheral nervous system is vast, with	has provided the knowledge , education, and training necessary for healthcare profession als to understand drug actions, make informed therapeuti	(SD G 4.4)	(9.1 - 9.3)	dge, Skill Develo pment, Employ ability Global Educati on Knowle
	applications in treating autonomic disorders, anaesthesia, neuromuscular disorders and research, allowing healthcare professionals to optimize patient outcomes by leveraging their pharmacological properties.	c decisions, ensure drug safety, and contribute to patient care. Skill developme nt in			dge, Skill Develo pment, Employ ability
Unit IV	 The pharmacology of drugs acting on the central nervous system has profound various global applications such as neurological and	pharmacol ogy continues through lifelong learning	(SD G 4.4)	(9.1 - 9.3)	Global Educati on Knowle dge, Skill

	psychiatric disorders,	and			Develo
	pain management sleep	interdiscip			pment,
	disorders, substance	linary			Employ
	abuse, neuroprotection	collaborati			ability
Unit	The global impact of	on,	(SD	(9.1	Global
V	drugs acting on the	enabling	G	_	Educati
	central nervous system is	profession	4.4)	9.3)	on
	vast, addressing	als to			Knowle
	neurological and	adapt to			dge,
	psychiatric disorders	new			Skill
		developme			Develo
		nts and			pment,
		improve			Employ
		patient			ability
		outcomes.			

BP405T	Pharmacognosy and Phytochemistry-I (Theory)	L	T	P	C				
Version 2.0		3	1	0	4				
<b>Total Contact Hours</b>	45 Hours								
Pre-requisites/Exposure	Pharmacognosy								
Co-requisites	Pharmacognosy								
	Course Objectives								

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

- 1. To know the techniques in the cultivation and production of crude drugs
- 2. To know the crude drugs, their uses and chemical nature
- 3. Know the evaluation techniques for the herbal drugs
- 4. To carry out the microscopic and morphological evaluation of crude drugs

# **Course Outcomes (CO)**

# On completion of this course, the student will be able to:

CO1. Student will be aware of the techniques in the cultivation and production of crude drugs

CO2. Have Knowledge of the crude drugs, their uses and chemical nature

CO3. Know the evaluation techniques for the herbal drugs

CO4. Able to carry out the microscopic and morphological evaluation of crude drugs

	Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2	
CO1															
CO2	1		2		3			3		3				1	
CO3				2											
CO4		1	2			3	3								
1=lightly mapped 2= moderately mapped 3=strongly mapped															

	Unit
Jocal	Relevance to the local, national, regional and global developmental
Regional	secos
National	
Global	
Employability	Relevance To the Employability/
Entrepreneurship	Entrepreneurship/ Skill Development
Skill Development	
Professional Ethics	Relevance to the Professional Ethics, Gender, Human
Gender	values, Environment &
Human Values	Sustainability
Environment & Sustainability	
<b>9</b> 4	SDG
	NEP
	POE/4 <sup>th</sup> IR

Unit	_	_	_	Introdu		Skills	В	Skil	Prof	Global
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				Pharm		Pharmaco	te	for	onal	on
				acogno		gnosy &	r	Dec	Edu	Knowle
				sy &		Phytoche	Q	ent	cati	dge
				Phytoc		mistry	ua	Wor	on	Techni
				hemistr		fields	lit	k	(17.	cal
				у		would be	y	(SD	1-	Skills
						developed	of	G	17.5	that
							he	4.4)	)	match
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				plant	production	vi	for	onal	on
				tissue	of plants	ro	Dec	Edu	Knowle
				culture	through	n	ent	cati	dge
					tissue	m	Wor	on	Techni
					culture	en	k	(17.	cal
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					enhanced.	ns	4.4)	)	match
						er			Industr
						va			y
						ti			Needs,
						О			Skill
						n			Develo
									pment
Unit	-	-	-	Role of	Skills	Tr	Skil	Prof	Global
IV				Pharm	related to	ad	ls	essi	Educati
				acogno	principle	iti	for	onal	on
				sy in	and	О	Dec	Edu	Knowle
				allopat	practice of	na	ent	cati	dge
				hy and	traditional	1	Wor	on	Techni
				traditio	medicines	k	k	(17.	cal
				nal	would be	n	(SD	1-	Skills
				system	developed	0	G	17.5	that
				s of		W	4.4)	)	match
				medici		le			Industr
				ne		d			y Naada
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									Develo
Unit				knowle	Skills	N	Skil	Prof	pment Global
									Educati
V				dge of various	related to	e	ls for	essi onal	on
				various	production	W	101	onal	OII

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		ary		metabolite		gs	k	(17.	cal
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						m	4.4)	)	match
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						1			Skill
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BP406P	Medicinal Chemistry-I (Practical)	L	T	P	C				
Version 2.0		0	0	4	2				
<b>Total Contact Hours</b>	60 Hours								
Pre-requisites/Exposure	Medicinal Chemistry								
Co-requisites Medicinal Chemistry									
	C Oh!	4		_					

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

- 1. Understand the chemistry of drugs with respect to their pharmacological activity
- 2. Understand the synthetic procedure and therapeutic value of drugs
- 3. Know the mechanism of reaction and Structural Activity Relationship (SAR) of different class of drugs
- 4. Understand methods and basics required for the assay of some drugs.

# **Course Outcomes (CO)**

# On completion of this course, the student will be able to:

- CO1. It imparts the knowledge of synthesizing, characterization and purification of medicinal compounds and intermediates.
- CO2. To analyse the selected drugs, present in dosage forms and to determine the percentage purity.
- CO3. Able to study physiochemical properties of drug.

								Pro	gramn	ne and C	ourse M	apping		
CO	PO1	PO2	PO3	PO4	PO5	<b>PO6</b>	<b>PO7</b>	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	201 1 1													
CO2														
CO3														
	1=lightly mapped 2= moderately mapped 3=strongly mapped													

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	Jnit
Local	Relevance to the local, national, regional and global
Regional	needs
National	
Global	
Employability	Relevance To the Employability/Entrepreneurship/
Entrepreneurship	Skin Development
Skill Development	
Professional Ethics	Relevance to the
Gender	Professional Ethics, Gender, Human
Human Values	Values,
Environment & Sustainability	Environment &
	SDG
	NEP
	POE/4 <sup>th</sup> IR

Unit I	-	-	To synthesise API to meet Nation need	To synthesise API for export purpose	-	-	Synthesis of Drugs and Intermediate helps to meet industry demand in production of API	-	-	-	-	Skills for Decent Work (SDG 4.4), Ensure sustainable consumptio n and production patterns (SDG 12)	Technical Skills that match Industry Needs	Employ ability
Unit II		-	To Perform Quality control of marketed formulatio ns	To analyse the import sample by following different assay methods	-	-	Assay of Drugs helps in Quality control of Drugs	-	-	-	-	Skills for Decent Work (SDG 4.4)	Practical Courses from Industry/Alumn i	Skill Develo pment, Employ ability
Unit III		-	To determine Physicoch emical properties, require in Research and developm ent Departme nt of Pharma Industries.			-	Determination of physicochemic al properties of Drugs assist in Preformulation studies	-	-	-	-	Skills for Decent Work (SDG 4.4)	Promoting High-quality research (18.1- 18.9), Practical Courses from Industry/Alumn i	Skill Develo pment, Employ ability

BP407P	Physical Pharmaceutics-II (Practical)	L	T	P	C						
Version 2.0		0	0	4	2						
<b>Total Contact Hours</b>	0 Hours										
Pre-requisites/Exposure	Physical Pharmaceutics- I										
Co-requisites	Pharmaceutics										

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

- 1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
- 2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
- 3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms

## **Course Outcomes (CO)**

## On completion of this course, the student will be able to:

- CO1. State the physicochemical properties of drug molecules
- CO2. Analyse the chemical stability tests of various drug products and determination of expiry date of formulations
- CO3. Have basic knowledge of physicochemical properties in the formulation development and evaluation of dosage forms.

#### **Programme and Course Mapping PO1** PO<sub>2</sub> PO<sub>3</sub> PO4 PO<sub>5</sub> **PO6 PO7** PO8 PO9 PO 10 PO11 | PO12 | PSO 1 PSO 2 CO **CO1** CO<sub>2</sub> 2 **CO3** 3 3 1 1 1=lightly mapped 2= moderately mapped 3=strongly mapped

Unit	Relevance to the local, national,	regional and global developmental	Singa		Relevance To the Employability/	Entrepreneurship/ Skill Development	Ι	Relevance to the Professional Ethics, Gender, Human	values, Environment &	Sustainability		SDG	NEP	POE/4 <sup>th</sup> IR
Unit I	Local	Regional	National	By providing essential knowledge and approaches for recognising and understanding the physical properties of particulate materials, such as particle size, shape, surface area, and porosity, micromeritics contributes to society. This information is crucial for the creation and optimisation of a wide range of products and processes in industries including medicine,	· Employability	Entrepreneurship	Micromeritics assists in the development of profession al skills by instructing profession als in particle characterization techniques	Professional Ethics	' Gender	Human Values	Environment & Sustainability	Skil ls for Dec ent Wor k (SD G 4.4)	Pro mot ing Hig h-qual ity rese arch (18. 1-18.9)	Global Educati on Knowle dge

chemicals, and materials	, data		I	
science, where innovation is	interpretati			
promoted, and product	on, and			
performance is enhanced on a	particulate			
worldwide scale.	material			
	optimisati			
	on. These			
	skills			
	allow			
	individual			
	s to			
	participate			
	in process			
	optimisati			
	on, quality			
	assurance,			
	and			
	product			
	developme			
	nt			
	Mastering			
	these skills			
	enables			
	profession			
	als to			
	address			
	complex			
	formulatio			
	n			
	challenges			
	and drive			
	innovation			
	in various			
	industries.			

Unit II	Ī -	_	_	Through a greater		Rheology	_	-	_	-	Skil	Pro	Global
				understanding of flow		fosters					ls	mot	Educati
				behaviour and viscosity		expertise					for	ing	on
				management, rheology		in					Dec	Hig	Knowle
				contributes to the world by		measuring					ent	hj-	dge
				enhancing the design and		and					Wor	qual	
				performance of many items		interpretin					k	ity	
				and activities, including paints,		g flow					(SD	rese	
				cosmetics, food, and oil		behaviour,					G	arch	
				drilling. It provides effective		viscosity,					4.4)	(18.	
				production, quality control,		and						1-	
				and optimisation, which		deformatio						18.9	
				promotes improved product		n						)	
				development and global		properties							
				economic progress.		of							
						materials,							
						enabling							
						profession							
						als in							
						sectors							
						like							
						cosmetics,							
						polymers,							
						and							
						pharmaceu							
						ticals to							
						optimise							
						formulatio							
						ns, solve							
						problems,							
						and invent							
						with							
						advanced							
						materials,							
						improving							

					their							
					career							
					prospects							
					and							
					industry							
					contributio							
					ns.							
Unit III	-	-	To improve the functionality,		The ability	-	-	-	-	Skil	Pro	Global
			appearance, and performance		to					ls	mot	Educati
			of diverse products including		specialise					for	ing	on
			paints, coatings, and		in methods					Dec	Hig	Knowle
			emulsions, coarse dispersions		including					ent	h-	dge
			enable the integration of		mixing,					Wor	qual	
			insoluble or immiscible		emulsifica					k	ity	
			components.		tion, and					(SD	rese	
					particle					Ğ	arch	
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					reduction						1-	
					through						18.9	
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					of							
					formulatio							
					n creation							
					and							
					process optimisati							
					on. By							
					mastering							

Unit IV	-	-	By facilitating the administration of poorly soluble medications and increasing their bioavailability and therapeutic potency, colloidal dispersions benefit society. Additionally, colloidal dispersions are used in a variety of industries, such as	_	-	these abilities, people can develop a variety of industries and contribute to the productive production of high-quality goods.  Micromeritics assists in the development of profession al skills by instructing profession	-	-	_	-	Skil ls for Dec ent Wor k (SD G	Pro mot ing Hig h-qual ity rese arch	Global Educati on Knowle dge
			colloidal dispersions benefit society. Additionally, colloidal dispersions are used in a			profession al skills by instructing					Wor k (SD	qual ity rese	dge

							person's							
							-							
							career							
							prospects,							
							and							
							industry							
							contributio							
							ns are							
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							and							
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							industries							
							including							
							materials							
							engineerin							
							g,							
							cosmetics,							
							and							
							medicines.							
Unit v	-	-	-	Drug stability makes a	-	-	By giving	-	-	-	No	Skil	Pro	Global
				difference by preserving the			profession					ls	mot	Educati
				quality, safety, and efficacy of			als					for	ing	on
				pharmaceutical products over			informatio					Dec	Hig	Knowle
				the course of their shelf lives.			n and					ent	h-	dge
				It makes it possible for people			competenc					Wor	qual	
				all over the world to have			e in					k	ity	
		l		an over the world to have			C 111		l	l	l	11	ııy	

access to safe and effective	stability		(SD	rese	
pharmaceuticals, encourages	testing		Ġ	arch	
regulatory compliance, and	procedures		4.4)	(18.	
supports global standards,	,		ŕ	1-	
ultimately leading to an	degradatio			18.9	
improvement in patient	n			)	
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	medicatio				
	n stability				
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	These				
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BP408P	Pharmacology-I (Practical)	L	T	P	C
Version 2.0		0	0	4	2
<b>Total Contact Hours</b>	60 Hours				
Pre-requisites/Exposure	Pharmacology				
Co-requisites	Pathophysiology				

# Upon completion of this course the student should be able to

- 1. Understand the pharmacological actions of different categories of drugs.
- 2. Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.
- 3. Observe the effect of drugs on animals by simulated experiments.

# **Course Outcomes (CO)**

On completion of this course, the student will be able to:

CO1. Knowledge of the practical aspect of general pharmacological techniques.

CO2. Understand the effect of drugs acting on CNS and PNS using animal simulator.

	Programme and Course Mapping													
СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1 1	PSO 2
CO1														
CO2	2							3			3			
	1=lightly mapped 2= moderately mapped 3=strongly mapped													

Uni	ance to the national, all and glob	spaau			Relevance To the Employability/	Entrepreneurship/ Skill Development		Relevance to the Professional Ethics, Gender, Human	Values, Environment &	Sustainability		SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			

Unit			Pre-	In	Skill		Skil	Prof	Skill
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		clinical studies					
Unit		Globall y, Glauco ma, catarac t and other eye disorde rs are increas ing to many folds, thus trained the student s and make them availab le as skilled researc hers	In this, students will learn about the different drugs available and their effect on rabbit eye				Skill Develo pment
Unit v		Globall	In skeletal muscle		Skil ls	Prof essi	Employ ability
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BP409P	Pharmacognosy and Phytochemistry-I (Practical)	L	T	P	C
Version 2.0		0	0	4	2
<b>Total Contact Hours</b>	60 Hours				

Pre-requisites/Exposure	Remedial Biology Practical
Co-requisites	Pharmacognosy

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

- 1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
- 2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
- 3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

## **Course Outcomes (CO)**

## On completion of this course, the student will be able to:

- CO1. State the physicochemical properties of drug molecules
- CO2. Analyze the chemical stability tests of various drug products and determination of expiry date of formulations
- CO3. Have basic knowledge of physicochemical properties in the formulation development and evaluation of dosage forms.

	Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	1											
CO2	3	2												
CO3	3	3	2											
1=lightly mapped							2= moderately mapped 3=strongly mapped							

Unit	vance to the , national, onal and global lopmental s	vance To the oloyability/ epreneurship/ Development	vance to the essional Ethics, der, Human tes, ironment & ainability			//4 <sup>th</sup> IR
	Releval local, n regiona develop needs	Relevan Employ Entrep		SDG	NEP	POE/4 <sup>t</sup>

	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit		-	-	Globall ly it will in underst anding the various moder n analyti cal techniq ues to authent icate and quality control of crude drugs.	-	-	to know the crude drugs, their uses and chemical nature					Skil l for dece nt wor k (SD G 4.4)	Professional education (17.1-17.5)	Global educati on knowle dge

Unit	-	-	_	_	_	Medici	To know	_	_	_	_	Qua	Prof	Techni
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		techniq ues to authent icate and quality control of crude drugs.						1- 21.1 0)	
Unit		Pharm acogno sy is used by pharma ceutica l compa nies to test, charact erise, and develo p new drugs for the treatme nt of human sicknes s.		to know the crude drugs, their uses and chemical nature		-	Qua lity pri mar y/se con dary edu cati on for all (SD G 4.1)	Equitable and Inclusive Education: Learning for all (6.1 - 6.20)	Global educati on knowle dge

Unit			-	It will help people compre hend the many contem porary analyti cal approa ches to authent icate and control the quality of crude pharma ceutica ls on a global scale.			to know the techniques in the cultivation and production of crude drugs			-		Skil l for dece nt wor k (SD G 4.4)	Adu lt edu cati on and lifel ong lear ning (21. 1- 21.1 0)	Technical skills that match Industry needs
Unit X	-	-	-	Globall y it will in underst anding the various moder	-	-	to understand the microscop ic and morpholog ical evaluation	-	ı	-	-	Qua lity pri mar y/se con dary edu	Equitable e and Inclusive Edu	Techni cal skills that match Industr y needs

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# **Semester-V**

BP501T	Medicinal Chemistry-II (Theory)	L	T	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Medicinal Chemistry				
Co-requisites	Chemical Synthesis				

# **Upon completion of the course the student shall be able to:**

- 1. Understand the chemistry of drugs with respect to their pharmacological activity
- 2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
- 3. Know the Structural Activity Relationship of different class of drugs
- 4. Study the chemical synthesis of selected drugs

#### **Course Outcomes (CO)**

# On completion of this course, the student will be able to:

- CO1. Get familiar with the chemistry and synthesis of medicinal substances.
- CO2. Understand the concept of structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs.
- CO3. Learn about hormone related drugs.
- CO4. To impart fundamental knowledge on the structure, chemistry, and therapeutic value of drugs.
- CO5. Acquire knowledge regarding Cardiovascular drugs and their structures

								Pro	gramn	ne and C	ourse M	<b>Lapping</b>		
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	1													
CO2		2												
CO3		1			2					2		2		
CO4	2		1											
CO5	2					2								
					1=light	ly mapı	oed	2	= mode	erately ma	apped		3=strongl	y mapped

Unit	Relevance to the local, national, regional and global developmental	needs			Relevance To the Employability/	Entrepreneurship/ Skill Development		Relevance to the Professional Ethics, Gender, Human	Values, Environment &	Sustainability		SDG	NEP	POE/4 <sup>th</sup> IR
Unit	Local	Regional	• National	Antihis taminic agents and anticancer agents are used globall y to tackle the menac	The product ion of these drugs can gen erate a lot	' Entrepreneurship	The production and quality control of these drugs helps in developin g and honing technical skills.	Usage and quality control of these drugs requires a lot of professi onal ethics.	The se ty pe s of dr u gs ar e us ed	Human Values	Environment & Sustainability	The se type s of drug s ensu re heal thy live s and pro	-	The product ion and quality control of these drugs helps in develop ing a lot of technic al skills and

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Unit	_	-	_	Anti-	The	_	The	Usage	Т	_	_	The	_	The
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Unit				Antiarrhyth mic and antihyperli pidemi c drugs used globall y to treat the arrhym ia and high chloest erol disorde rs.	The pro duct ion of these e dru gs c an gen erat e a lot of emp loy men t.		The production and quality control of these drugs helps in developin g and honing technical skills.	Usage and quality control of these drugs requires a lot of professi onal ethics.	The se ty pe s of dr u gs ar e us ed fo r ev er y ty pe of ge n de r			The se type s of drug s ensu re heal thy live s and pro mot es well bein g of peo ples acro ss all ages .SD G3		The product ion and quality control of these drugs helps in develop ing a lot of technic al skills and generat ing a lot employ ment across the globe.
Unit IV	-	-	-	Steroid al and thyroid	The pro duct	-	The production and	Usage and quality	T he se	-	-	The se type	1	The product ion and

				drugs	ion		quality	control	ty			s of		quality
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				globall	e		drugs	requires	of			ensu		drugs
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Unit	-	-	-	Anti -	The	-	The	Usage	T	-	-	The	-	The
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				globall	an		g and	onal	gs			thy		ing a
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BP502T	Industrial Pharmacy-I (Theory)	L	T	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Pharmaceutics				
Co-requisites	Industrial Pharmacy				

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

- 1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
- 2. Know various considerations in development of pharmaceutical dosage forms.
- 3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their Quality.

#### **Course Outcomes (CO)**

# On completion of this course, the student will be able to:

CO1: To understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.

CO2: To get familiar with Pre formulation studies

CO3: To know formulation and evaluation of solid dosage form like tablets, capsules

CO4: To get familiar with aseptic conditions and formulation of parenteral preparation.

CO5: To understand various considerations in development of cosmetics.

	Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1			1		1		3		3		3			
CO2	1													3
CO3		1				2						3		
CO4			1		2			3		3				
CO5														
	1=lightly mapped 2= moderately mapped 3=strongly mapped													

Unit	Relevance to the local, national.	regional and global developmental needs			Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the	Gender, Human	Values, Fuxironment &	Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
Unit I	Local	Regional	National '	Preformulation studies play a vital role in drug development by investigating the physicochemical properties of drug substances, aiming to understand their behaviour and stability. By providing valuable data and insights, preformulation	Preformulation studies offer a valuable opportunity for skill development in the pharmaceutical industry, enhancing knowledge and expertise in the characterization and analysis of	Entrepreneurship	Skill Development	Professional Ethics	' Gender	Human Values	Environment & Sustainability	"En sure heal thy live s and pro mot e well - bein g	Pro mot ing Hig hj-qual ity rese arch (18. 1-18.9)	Global Educati on Knowle dge

			studies contribute globally to the development of safe and effective pharmaceutical products.	drug substances, formulation development, and optimization techniques. By actively engaging in preformulation studies, individuals can acquire practical skills that are highly relevant for a successful career in pharmaceutical research and development.						for all at all ages (SD G 3)		
Unit II	-	-	Tablets contribute globally by providing a convenient, portable, and easily administered dosage form, facilitating widespread access to medication and improving patient compliance, thereby positively impacting public health on a global scale.	Tables can contribute to employability by providing a platform for organizing and presenting information in a structured manner, enabling individuals to showcase their skills, qualifications, and experiences effectively.	Tables can support entrepren eurship by aiding in business planning, financial analysis, and data organizat ion, empower ing entrepren	-	-	N C		"En sure heal thy live s and pro mot e well - bein g for all at	Pro mot ing Hig hj-qual ity rese arch (18. 1-18.9)	Global Educati on Knowle dge

		eurs to make informed decisions , communi cate their ideas, and drive the growth of their			all ages (SD G 3)		
Unit III -	Liquid orals contribute globally by providing a more accessible and user-friendly medication option, especially for vulnerable populations like children and the elderly. Their ease of administration and accurate dosing improve patient compliance, leading to better health outcomes worldwide.	ventures.  Liquid orals contribut e to entrepren eurship by offering opportun ities for formulati on develop ment, product innovatio n, and niche market creation, allowing entrepren	-	N o	"En sure heal thy live s and pro mot e well bein g for all at all ages (SD G 3) "	Pro mot ing Hig hj-qual ity rese arch (18. 1-18.9)	Global Educati on Knowle dge

Unit IV	Capsules contribute globally by providing an efficient and versatile dosage form, allowing for precise and convenient drug delivery. They offer flexibility in formulation, ease of swallowing, and compatibility with various active	Capsules contribute to employability by creating job opportunities in pharmaceutical manufacturing, formulation development, quality control, and regulatory affairs, requiring	eurs to tap into the growing demand for liquid medicati ons and establish their own pharmac eutical ventures.	_	-	_	N o	-	"En sure heal thy live s and pro mot e well -	Pro mot ing Hig hj-qual ity rese arch (18. 1-18.9	Global Educati on Knowle dge
	compatibility with	and regulatory								1-	
	and improved patient compliance.	use of capsules also increases demand for							all at all		
		professionals in sales, marketing, and distribution, further							ages (SD G 3)		

				enhancing employability in the pharmaceutical industry.						
Unit V		-	They play a critical role in emergency care, disease treatment, and patient management, thereby improving healthcare outcomes on a global scale.	The specialized knowledge and expertise required in parenteral preparation offer diverse career prospects in pharmaceutical manufacturing, clinical research, and healthcare settings, enhancing employability in the pharmaceutical industry.		-	- N	"En sure heal thy live s and pro mot e well bein g for all at all ages (SD G 3) "	Pro mot ing Hig hj-qual ity rese arch (18. 1-18.9)	Global Educati on Knowle dge

BP503T	Pharmacology-II (Theory)	L	T	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Pharmacology-I				
Co-requisites	HAP-II and Pathophysiology				

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

- 1. Understand the mechanism of drug action and its relevance in the treatment of different diseases
- 2. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments
- 3. Demonstrate the various receptor actions using isolated tissue preparation
- 4. Appreciate correlation of pharmacology with related medical sciences

# **Course Outcomes (CO)**

## On completion of this course, the student will be able to:

- CO1. To impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on different systems of body.
- CO2. To emphasis on the basic concepts of bioassay.
- CO3. Apprise the students with the various effects of drugs on human body.
- CO4. Acquire knowledge about Metabolism & excretion of drugs, principles of Clinical Pharmacokinetics.
- CO5. Understand the pharmacology of CVS.

	Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	1			2			3							
CO2		1				2					3			
CO3			1		2				3			3		3
CO4		1	1	2										

CO5											
			1=ligh	tly ma	pped	2= mod	acraicry.	mapped	3=stron	gly mapped	

Unit	Relevance to the local, national, regional and global developmental	Relevance to the local, national, regional and global developmental needs						Relevance to the Professional Ethics	Gender, Human	Values, Environment &	Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
Unit	Local	Regional	National	Studies related to the mechanism of drug action and its relevance in the treatment of diseases related to cardiovascular system	' Employability	Entrepreneurship	Understanding basics of drug related to cardiovascular system	Professional Ethics	Gender	Human Values	Environment & Sustainability	Ensure healthy lives and promote well-being for all at all ages SDG 3 and Skills for Decent	Prof essi onal edu cati on( 17.1	Global educati on knowle dge

												Work SDG 4.4	17.5	
Unit II	-	-	-	Emphasize on general principles related to drugs used in therapy of shock, hemtinics, coagulants, anticoagulants, fibrinolytics, anti-platelet and plasma volume expanders as well as on urinary system	-	-	The basic pharmacology of drug therapy of shock, hemtinics, coagulants, anticoagulants, fibrinolytics, anti-platelet and plasma volume expanders as well as on urinary system	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Prof essi onal edu cati on( 17.1 - 17.5	Global educati on knowle dge
Unit III		-	-	Studies related to autocoids and related drugs plays an important role in creating awareness on mechanism and pharmacological action of these drugs			Understanding basics of drug related to autocoids and related drugs	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3 and Skills for Decent Work SDG 4.4	Professional education(17.1-17.5)	Global educati on knowle dge
Unit IV	-	-	-	Emphasize to drugs acting on endocrine system plays an important role in creating awareness on mechanism and pharmacological action of drugs			Understanding basics of drug acting on endocrine system	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Prof essi onal edu cati on( 17.1	Global educati on knowle dge

												- 17.5 )	
Unit	-	-	-	Understanding of general principles, applications and principles related to bioassay		To understand the basic knowledge related to bioassay	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3 and Skills for Decent Work SDG 4.4	Professional education(17.1-17.5)	Global educati on knowle dge

BP504T	Pharmacognosy and Phytochemistry II— Theory	L	Т	P	C				
Version 2.0		3	1	0	4				
<b>Total Contact Hours</b>	45 Hours								
Pre-requisites/Exposure	Pharmacognosy & Phytochemistry-I	armacognosy & Phytochemistry-I							
Co-requisites	Remedial Biology								

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

- 1. To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
- 2. To understand the preparation and development of herbal formulation.
- 3. To understand the herbal drug interactions
- 4. To carryout isolation and identification of phytoconstituents.

## **Course Outcomes (CO)**

# On completion of this course, the student will be able to:

CO1. Impart the students the knowledge of how the secondary metabolites are produced in the crude drugs.

- CO2. Get familiar with isolation and identification and industrially production of secondary metabolites.
- CO3. Understand study of producing the plants and phytochemicals through plant tissue culture.
- CO4. To give knowledge about application of latest analytical techniques.
- CO5. To understand basic principles of traditional system of medicine.

	Programme and Course Mapping													
СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	1			2				2						1
CO2									2					
CO3		1	1	2	2							2		2
CO4			1				2							
CO5	CO5													
	1=lightly mapped 2= moderately mapped 3=strongly mapped													

Unit	evance to the ll, national, conal and global elopmental ds	evance To the ployability/ repreneurship/ Il Development	evance to the fessional Ethics, der, Human ues, ironment & tainability	75	d	E/4 <sup>th</sup> IR
	Releval, local, develoral, needs	Relev Empl Entre Skill	Relev Profe Gend Value Envii Susta	SDG	NEP	POE/

Unit	' Local	Regional	National	Rnowl edge of Format ion of Second ary metabo lites	Employability	Entrepreneurship	Skills enhanced with respect to production of secondary metabolite s	Professional Ethics	Gender	an la values Human Values	Environment & Sustainability	Skil ls for Dec ent Work (SD G 4.4)	Prof essi onal Edu cati on (17. 1-17.5)	Global Educati on Knowle dge Techni cal Skills that match Industr y Needs, Skill Develo
Unit II	_	-	-	Knowl edge of Medici nal import			Skills enhanced with respect to usage of			M ed ic in al		Skil ls for Dec ent	Prof essi onal Edu cati	Global Educati on Knowle dge

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BP505T	Pharmaceutical Jurisprudence (Theory)	L	Т	P	С							
Version 2.0		3	1	0	4							
<b>Total Contact Hours</b>	45 Hours											
Pre-requisites/Exposure	Jurisprudence											
Co-requisites Rules and Regulation												
	Course Objectives											

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

- 1. The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
- 2. Various Indian pharmaceutical Acts and Laws.
- 3. Regulatory authorities & agencies governing the manufacture & sale of Pharmaceuticals.
- 4. The code of ethics during the pharmaceutical practice

#### **Course Outcomes (CO)**

## On completion of this course, the student will be able to:

- CO1. This subject is designed to impart fundamental knowledge on Various Act.
- CO2. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.
- CO3. This subject deals with MTP act.
- CO4. Provide Knowledge about Indian Pharmacopoeia, British Pharmacopeia and other Regulatory agencies.
- CO5. Provide Knowledge about Narcotic and Psychotropic substance act.

								I	Prograi	mme a	nd Cou	rse Map	ping	
СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1			2		2		2				3			
CO2	1		1	2		3			2		3			
CO3									2					
CO4	3		1			3					1	3		
CO5		2			2		1		1					
					1=lig	htly ma	apped		2= m	oderate	ly mapp	ed	3=5	strongly mapped

Unit	Relevance to the local, national, regional and global developmental	Reecus			Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human	Values, Environment &	Sustainability		SDG	NEP	POE/4 <sup>th</sup> IR
BP5 05T	ocal	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I			To regulate the import, manufacture, distribution and sale of drugs & cosmetics through licensing. Manufactur e, distribution and sale of drugs and cosmetics by qualified persons only. To prevent substandard in drugs, presumably for maintaining high		Pharmaceutical jurisprudence provides professionals with valuable legal and regulatory knowledge, enhancing employability in various sectors of the pharmaceutical industry.			The integrati on of pharmac eutical jurispru dence and professi onal ethics enhance s employa	-	-		(SD G 1.2, 4.4)	Prof essi onal Edu cati on (17. 1- 17.5 ), Tra nsfo rmi ng	Employ ability, Global Educati on Knowle dge, Techni cal Skills that match Indust

Unit	-	Packaging and labelling directly impact sales and profits as they offer detailed information on the price, quality, quantity, usage, ingredients, and features of the products. They also display the brand logo and message that help the	Understanding the legal frameworks, compliance requirements, and ethical considerations within the field positions individuals for success in roles that require adherence to regulations, protection of intellectual property, and	bility by equippin g individu als with the knowled ge, skills, and values necessar y to make ethical decision s,	the Reg ulat ory Syst em (20. 1- 20.1 5)	ry Needs
Unit III	-	customer find the product easily by creating a recall value.  An Act to regulate the profession of pharmacy. Whereas it is expedient to make better provision for the regulation of the profession and practice of pharmacy and for that purpose to constitute Pharmacy Councils".	ethical decision-making.	comply with regulatio ns, and prioritiz e patient welfare. Employ ers seek professi onals who can navigate the complex ethical		

Unit	-	The global impact of		landscap			
IV		these acts and		e of the			
		regulations lies in		pharmac			
		promoting public		eutical			
		health, ensuring the		industry,			
		safety and efficacy		building			
		of pharmaceutical		trust,			
		products, protecting		and			
		animal welfare, and		maintain			
		enhancing access to		ing high			
		essential medicines.		standard			
		They establish		s of			
		guidelines and		professi			
		standards that		onalism.			
		influence healthcare					
		practices, research					
		ethics, and pricing					
		policies not only					
		within the country of					
		origin but also					
		potentially in					
		international					
		contexts. These					
		regulations					
		contribute to the					
		overall well-being of					
		individuals, animals,					
		and healthcare					
		systems globally.					
Unit		The global impact of					
V		these legislations is					
		significant. They					
		ensure the safety,					
		quality, and					
		accessibility of					

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pharmaceutical					
products, promote					
ethical practices,					
protect patient rights,					
influence healthcare					
policies, and					
stimulate research					
and development in					
the pharmaceutical					
sector. These					
legislations					
contribute to					
improved healthcare					
outcomes,					
innovation, and the					
overall well-being of					
individuals globally.					

BP506P Industrial Pharmacy (Practical)		L	T	P	C					
Version 2.0		0	0	4	2					
<b>Total Contact Hours</b>	Total Contact Hours 60 Hours									
Pre-requisites/Exposure Pharmaceutics										
Co-requisites	Pharmaceutics									
	Course Objectives									
<b>Upon completion of this o</b>	course the student should be able to:									
1. To get familiarize wit	h technology and production of pharmaceutical dosage for	rm.								
	Course Outcomes (CO)									
On completion of this cou	rrse, the student will be able to:									

CO1: Get familiarize with technology and production of pharmaceutical dosage form.

CO2: Learn Elementary Idea on Quality control test of (as per IP) marketed tablets and capsules Inorganic Qualitative Analysis.

CO3: Learn to prepare and evaluate tablets, capsule, cold / vanishing cream, ointment.

CO4: Learn to test containers.

CO5: Learn to prepare eye drops and eye ointment.

	Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO1 2	PSO 1	PSO 2
CO1	1					1						3		
CO2		1		2				2						
CO3							1				3			
CO4		1			1								1	
CO5	2					3		2						
	1=lightly mapped 2= moderately mapped 3=strongly mapped													

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i	levand local ional ional bal relopr	vane ploys repr / Ski	ler, lan es,		4 <sup>th</sup>
t	elevan e loca ntiona giona obal velop	telev he Ampl Antre hip/ B	ender luman alues,	ರ	E/
	Rel nat reg glol dev	Re the En En En En	Ge Ge	SD	

Local Negional Ivational	Global	Employability	Entrepreneurship	экин реуелоринени	Octides	пинан уансэ			
U n i t I	Preformulation studies play a vital role in drug development by investigating the physicochemical properties of drug substances, aiming to understand their behaviour and stability. By providing valuable data and insights, preformulation studies contribute globally to the development of safe and effective pharmaceutical products.	Preformulation studies offer a valuable opportunity for skill development in the pharmaceutical industry, enhancing knowledge and expertise in the characterization and analysis of drug substances, formulation development, and optimization techniques. By actively engaging in preformulation studies, individuals can acquire practical skills that are highly relevant for a successful career in pharmaceutical research and development.	-			-	SDG 3: Good Health and Well-being: Parenteral formulations, such as injections and infusions, play a critical role in delivering medications and treatments for various health conditions. They help ensure access to essential medicines and healthcare, contributing to the goal of achieving good health and well-being for all.	Promoti ng High- quality research (18.1- 18.9) [Rheolo gy being a importa nt compon ent in formulat ion develop ment leads to conducti on of	Sk ill E m be dd ed Co urs es De vel op me nt

U n i t I	- 1 -		Tablets contribute globally by providing a convenient, portable, and easily administered dosage form, facilitating widespread access to medication and improving patient compliance, thereby positively impacting public health on a global scale.  Capsules contribute	Tables can contribute to employability by providing a platform for organizing and presenting information in a structured manner, enabling individuals to showcase their skills, qualifications, and experiences effectively.	Tables can support entrepreneurship by aiding in business planning, financial analysis, and data organization, empowering entrepreneurs to make informed decisions, communicate their ideas, and drive the growth of their ventures.	-	-				SDG 3: Good Health and Well-being: Parenteral formulations, such as injections and infusions, play a critical role in delivering medications and treatments for various health conditions. They help ensure access to essential medicines and healthcare, contributing to the goal of achieving good health and wellbeing for all.	research work]  Promoting High-quality research (18.1-18.9) [Rheology being a important component in formulation development leads to conduction of research work]	Sk ill E m be dd ed Co urs es De vel op me nt
			_ <u>*</u>								• • • • • • • • • • • • • • • • • • • •		
n .	-   -	-   -	globally by providing an	for the preparation and	-	-	-	-	-	-	Innovation, and	ng	ill
i			efficient and versatile	evaluation of Tetracycline							Infrastructure: The	High-	Е
t			dosage form, allowing for	capsules, ensuring their				1			development and	quality	m

IIIII	precise and convenient drug delivery. They offer flexibility in formulation, ease of swallowing, and compatibility with various active ingredients, contributing to global access to medication and improved patient compliance.	quality and compliance with established standards. The quality control tests performed on marketed capsules help assess their employability and suitability for use in clinical practice.		production of parenteral formulations require robust pharmaceutical industry infrastructure and innovative manufacturing processes. Meeting the demand for parenteral formulations can drive technological advancements, promote research and development, and enhance manufacturing capabilities, thereby contributing to SDG 9.	research (18.1- 18.9) [Rheolo gy being a importa nt compon ent in formulat ion develop ment leads to conducti on of research work]	be dd ed Co urs es De vel op me nt
U n i t	The global need for the preparation of eye drops and eye ointments is driven by the necessity to provide appropriate and effective treatments for ocular conditions, thereby improving patient comfort, visual health, and overall quality of life.	The role of Unit IV in the employability of individuals lies in providing them with specialized skills and knowledge related to the preparation of Calcium Gluconate injections, Ascorbic Acid injections, and Eye drops/Eye ointments. These skills		SDG 3: Good Health and Well-being: Parenteral formulations, such as injections and infusions, play a critical role in delivering medications and treatments for various health conditions. They help ensure access to essential medicines and healthcare, contributing to	Promoti ng High- quality research (18.1- 18.9) [Rheolo gy being a importa	Sk ill E m be dd ed Co urs es De

		open up opportunities for employment in various sectors of the pharmaceutical industry, ensuring a steady demand for professionals who can effectively and safely prepare these pharmaceutical formulations.  Unit V enhances the	the goal of achieving good health and wellbeing for all.	nt compon ent in formulat ion develop ment leads to conducti on of research work]	vel op me nt
U n i t	Unit V addresses the global need for the preparation of creams (cold/vanishing cream) and the evaluation of glass containers. Professionals trained in these areas contribute to meeting the demand for effective skincare formulations and ensuring the safety and integrity of pharmaceutical products during storage and transportation.	employability of individuals by providing them with specialized skills and knowledge in the preparation of creams (cold/vanishing cream) and the evaluation of glass containers. The global need for effective skincare products and reliable pharmaceutical packaging creates numerous employment opportunities in various sectors of the pharmaceutical industry for individuals trained in	SDG 3: Good Health and Well-being: Parenteral formulations, such as injections and infusions, play a critical role in delivering medications and treatments for various health conditions. They help ensure access to essential medicines and healthcare, contributing to the goal of achieving good health and well-being for all.	ng High- quality research (18.1- 18.9) [Rheolo gy being a importa nt compon ent in formulat ion develop ment	Sk ill E m be dd ed Co urs es De vel op me nt

		these areas.		ĺ	ĺ	leads to	
						conducti	
						on of	
						research	
						work]	

BP507P	Pharmacology-II (Practical)	L	T	P	C						
Version 2.0		0	0	4	2						
<b>Total Contact Hours</b>	60 Hours										
Pre-requisites/Exposure	Pre-requisites/Exposure Pharmacology-I (Practical)										
Co-requisites	HAP										
	C OL:	4:									

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

This subject will apprise the students with the following:

- 1. To get familiar with various effects of drugs on human body.
- 2. To demonstrate laboratory techniques and animal experiments by simulated experiments by softwares and videos

#### **Course Outcomes (CO)**

- CO1. Apprise the students with the various effects of drugs on human body.
- CO2. Use of computer simulated CDs or Video cassettes for pharmacology practical.
- CO3. Learn about different routes of administration of drugs in mice/rats.
- CO4. Learn to do bioassay of various drug.
- CO5. Know about *in-vitro* pharmacology and physiological salt solutions.

								Pro	gramn	ne and	Course	Mappin	ıg	
СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	1													
CO2									2		3		3	
CO3				1										
CO4														
CO5	1				1					2				
	•	1=lightly mapped						2	= mode	erately	mapped		3=stro	ngly mapped

Unit	Relevance to the local, national, regional and global developmental	needs			Relevance To the Employability/	Entrepreneurship/ Skill Development		Relevance to the Professional Ethics	Gender, Human	Values, Environment &	Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	To focus on studies related introduction to in-vitro	-	-	Understanding of basics of in-	-	-	-	-	Skills for Decent	Prof essi	Global educati

				pharmacology and physiology salt solutions as well as effect of drugs on frog heart, blood pressure and heart rate of dog			vitro pharmacology and physiology salt solutions as well as effect of drugs on frog heart, blood pressure and heart rate of dog					Work SDG 4.4	onal edu cati on( 17.1 - 17.5	on knowle dge
Unit II	-	-	-	In elaboration of diuretic activity of drugs using rats/mice as well as DRC of acetylcholine using frog rectus abdominis muscle and effect of physostigmine and atropine on DRC of acetylcholine using frog rectus	-	-	To gain basic knowledge related to different models of DRC	-	-	-	1	Skills for Decent Work SDG 4.4	Professional education(17.1-17.5)	Global educati on knowle dge
Unit III		-	-	To understand the basic studies related to bioassay of histamine using guinea pig ileum by matching method, bioassay of oxytocin using rat uterine horn by interpolation method and bioassay of serotonin using rat fundus strip by three point bioassay			To gain understanding basics of bioassay of histamine, oxytocin and serotonin.	-	-	-	1	Skills for Decent Work SDG 4.4	Prof essi onal edu cati on( 17.1 - 17.5	Global educati on knowle dge
Unit IV	-	-	-	It emphasis on studies related to bioassay of acetylcholine using rat ileum/colon by four point			To understanding basics of bioassay and	-	-	-	-	Skills for Decent Work SDG 4.4	Prof essi onal edu	Global educati on knowle

				bioassay, determination of	determination of						cati	dge
				PA2 value of prazosin	PA2 and PD2						on(	
				using rat anococcygeus	value using rat						17.1	
				muscle and determination	anococcygeus						-	
				of PD2 value using guinea	muscle and						17.5	
				pig ileum.	guinea pig						)	
					ileum.							
Unit	-	-	-	It elaborates the effect of	The basic	-	-	-	-	Skills for	Prof	Global
v				spasmogens and	knowledge					Decent	essi	educati
				spasmolytics using rabbit	related to effect					Work SDG	onal	on
				jejunum, anti-	spasmogens and					4.4	edu	knowle
				inflammatory activity of	spasmolytics						cati	dge
				drugs using carrageenan	and anti-						on(	
				induced paw-edema model	inflammatory						17.1	
				and analgesic activity of	and analgesic						-	
				drug using central and	activity of drug						17.5	
				peripheral methods							)	

BP508P	Pharmacognosy and Phytochemistry-II (Practical)	L	Т	P	C								
Version 2.0		0	0	4	2								
<b>Total Contact Hours</b>	60 Hours												
Pre-requisites/Exposure	Pharmacognosy & Phytochemistry-I Practical												
Co-requisites Remedial Biology Practical													
	Course Objectives												

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

- 1. To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
- 2. To understand the preparation and development of herbal formulation.

- 3. To understand the herbal drug interactions
- 4. To carryout isolation and identification of phytoconstituents

#### **Course Outcomes (CO)**

- CO1. Get familiar with the practical aspects of characterization and identification of the herbal drugs and phytoconstituents
- CO2. Learn about isolation and identification of phytoconstituents
- CO3. Learn the preparation and development of herbal formulation.
- CO4. Understand Analysis of crude drugs by chemical tests.
- CO5. Get familiar with TLC of herbal extracts.

	Programme and Course Mapping														
CO PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO 10 PO11 PO12 PSO 1														PSO 2	
CO1															
CO2		3						1							
CO3	1				3			1			2				
CO4														2	
CO5															
		•			1=lightl	y mapp	ed	2=	modera	tely mapp	ed	3=s	trongly r	napped	

Unit	evance to the al, national, ional and global elopmental ds	evance To the ployability/ repreneurship/ II Development	evance to the fessional Ethics, oder, Human ues, vironment & tainability	C	P	E/4 <sup>th</sup> IR
		Relev Empl Entre Skill	Relev Profe Gend Valu Envi Susta	SDG	NEP	POE,

	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	W Human Values	Environment & Sustainability			
Unit				Identifi cation & extracti on of crude drugs			Skills enhanced with respect to extraction of secondary metabolite s			M ed ic in al va lu e		Skil ls for Dec ent Wor k (SD G 4.4)	Professional Education (17.1-17.5)	Global Educati on Knowle dge Practic al Course s from Industr y/Alum ni Techni cal Skills that match Industr y Needs, Skill

									Develo pment
Unit				Isolatio n & Identifi cation of phytoc onstitu ents	Skills enhanced with respect to isolation of secondary metabolite s	M ed ic in al va lu e	Skil ls for Dec ent Wor k (SD G 4.4)	Professional Education (17.1-17.5)	Global Educati on Knowle dge Practic al Course s from Industr y/Alum ni Techni cal Skills that match Industr y Needs, Skill Develo pment
Unit III	-	-	-	Chrom atograp hic evaluat ion of crude drugs	Skills enhanced with respect to chromatog raphic analysis of	M ed ic in al va lu	Skil ls for Dec ent Wor k	Prof essi onal Edu cati on (17.	Global Educati on Knowle dge Practic al

			crude		e	(SD	1-	Course
			drugs			G	17.5	s from
						4.4)	)	Industr
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								pment

# **Semester-VI**

BP601T	Medicinal Chemistry-III (Theory)	L	Т	P	C								
Version 2.0		3 1 0 4											
<b>Total Contact Hours</b>	5 Hours												
Pre-requisites/Exposure	Medicinal Chemistry and Pharmacology	Medicinal Chemistry and Pharmacology											
Co-requisites	QSAR Drug design												
Course Objectives													

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

- 1. Understand the importance of drug design and different techniques of drug design.
- 2. Understand the chemistry of drugs with respect to their biological activity.
- 3. Know the metabolism, adverse effects and therapeutic value of drugs.
- 4. Know the importance of SAR of drugs.

#### **Course Outcomes (CO)**

## On completion of this course, the student will be able to:

- CO 1. Understand fundamental knowledge on the structure, function and significance of Drugs.
- CO 2. discuss various mechanism of action of drugs
- CO 3. Provide knowledge of Synthesis and Metabolism of drugs.
- CO 4. Provide knowledge of Structure Activity Relationships (SAR) therapeutic uses of drugs.
- CO 5. Provide knowledge of marketed preparation.

# **Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												3	
CO2					3									
CO3		2			3	3								1

CO4									3	3			
CO5	2									3			
			1=light	ly mapp	oed	2=	= moder	ately map	ped	3=8	strongly n	napped	

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/	Entrepreneurshi p/ Skill Development		Relevance to the Professional Ethics, Gender,	Human Values,	Environment & Sustainability	•	SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit	-	-	-	Antibi	Pro	-	Antibiotic	Usage of	A	-	-	Ens	-	It helps
I				otics	duct		S	any	nt			ure		in
				are	ion		developed	medicin	ib			heal		develop
				used	of		synthetical	e	io			thy		ing
				globall	anti		ly , helps	especiall	ti			live		technic

				y to	biot	in honir	g y	cs			s for	al skills
				treat	ics	the	antibioti	ar			all	that
				lethal	acro	technical	cs is	e			and	industr
				infecti	SS	skill ar	d based on	us			at	y
				ons.	the	expertise	appropri	ed			all	require
					glo	in	ate	fo			ages	s .And
					be	production	n professi	r			SD	thus
					pro		nonal	ev			G3.	helps in
					vide		ehics.	er				creatin
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					emp			of				
					loy			ge				
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Unit	-	-	-	Antibi	Pro -	Antibioti	Usage of	A	-	-	Ens	It helps
II				otics	duct	s	any	nt			ure	in
				and	ion	develope	l medicin	ib			heal	develop
				antimal	of	synthetic	ıl e	io			thy	ing
				arial	anti	ly , helps	especiall	ti			live	technic
				drugs	biot	in honing		cs			s for	al skills
				are	ics	the	antibioti	an			all	that
				used	acro	technical	cs is	d			and	industr
				globall	SS	skill and	based on	an			at	у
				y to	the	expertise	appropri	ti			all	require
				treat	glo	in	ate	m			ages	s .And
				lethal	be	production	n professi	al			SD	thus
				infecti	pro		nonal	ar			G3.	helps in

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Unit	-	-	-	Antitu	Pro	-	Antituberc	Usage of	A	-	-	Ens	-	It helps
III				bercula	duct		ular and		nt			ure		in
				r and	ion		anti viral		i			heal		develop
				antivir	of		drugs	e	tu			thy		ing
				aldrugs	anti		developed	especiall	be			live		technic
				are	tube		synthetical		rc			s for		al skills
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				treat	anti		technical	appropri	d			all		require
				lethal	vira		skill and	ate	an			ages		s .And
				infecti	1		expertise	professi	ti			SD		thus
				ons	dru		in	nonal	vi			G3.		helps in
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				m	glo				gs					
				tubercu	be				ar					
				lae and	pro				e					
				AIDS	vide				us					
				virus .	s a				ed					
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Unit	-	-	-	Anti	Pro	-	Anti	Usage of	A	-	-	Ens	-	It helps
IV				fungal	duct		fungal	any	nt			ure		in
				drugs	ion		drugs	medicin	i			heal		develop
				are	of		developed	e is	fu			thy		ing
				used	anti		synthetical	based on	n			live		technic

				globall	fun		ly , helps	appropri	ga		s for		al skills
				y to	gal		in honing	ate	ld		all		that
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				lethal	SS		technical	nonal	gs		at		y
				infecti	the		skill and	ehics	ar		all		require
				ons	glo		expertise		e		ages		s .And
				caused	be		in		us		SD		thus
				by	pro		production		ed		G3.		helps in
				various	vide				fo				creatin
				fungus	s a				r				g
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Unit	-	-	-	Conce	Dru	-	Docking	Drug	-	-	Ens	-	It helps
V				pt of	g		techniques	designin			ure		in
				Drug	desi		helps in	g sector			heal		develop
				design	gni		acing	is			thy		ing
				an	ng		technical	complie			live		technic
				Combi	wit		skill,	d with a			s for		al skills
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BP602T	Pharmacology-III (Theory)	L	Т	P	С
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours	1			
Pre-requisites/Exposure	Pharmacology-II				
Co-requisites	HAP-II and Pathophysiology				

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

- 1. Get familiar with the basic biochemical aspects of human body and its relation to diseases.
- 2. Understand various drugs used for various ailments.
- 3. Understand mechanism of action adverse drug reactions.
- 4. Understand the basic strategies to manage the poisoning.

#### **Course Outcomes (CO)**

#### On completion of this course, the student will be able to:

- CO 1. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases
- CO 2. Comprehend the principles of toxicology and treatment of various poisonings
- CO 3. Appreciate correlation of pharmacology with related medical sciences
- CO 4. Know the toxicity of the Drugs and their treatments.
- CO 5. Know the Concepts of Chronopharmacology

#### **Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												3	
CO2					3									
CO3			2		3	3								
CO4			1								3	3	2	
CO5														

1=lightly mapped	2= moderately mapped	3=strongly mapped	

Unit	Relevance to the local, national, regional and global developmental	needs			Relevance To the Employability/	Entrepreneurship/ Skill Development		Relevance to the	Gender, Human	Values, Environment &	Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
Unit	Local	Regional	National	To focus on studies related to drugs acting on respiratory system and gastrointestinal tract plays an important role in creating awareness on mechanism and pharmacological action of drugs	' Employability	- Entrepreneurship	Understanding basics of drug related to respiratory system and gastrointestinal tract	Professional Ethics	Gender	Human Values	Environment & Sustainability	Ensure healthy lives and promote well-being for all at all ages SDG 3 and Skills for Decent Work SDG 4.4	Prof essi onal edu cati on( 17.1 - 17.5 )	Global educati on knowle dge

Unit II	-	-	-	To emphazise general principles related to chemotherapy and antibiotics	-	-	The basic pharmacology of antibiotics and chemotherapy	-	-	_	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Prof essi onal edu cati on( 17.1 - 17.5 )	Global educati on knowle dge
Unit III		-	-	To understand the studies related to drugs acting on anti-tubercular, anti-leprotic, anti-fungal, anti-viral, anthelmintics, anti-malarial and anti-amoebic agents plays an important role in creating awareness on mechanism and pharmacological action of drugs			Elaboration of basics of drug related to antitubercular, antileprotic, antifungal, antiviral, anthelmintics, anti-malarial and antiamoebic agents	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3 and Skills for Decent Work SDG 4.4	Prof essi onal edu cati on( 17.1 - 17.5	Global educati on knowle dge
Unit IV	-	-	-	To emphasize Studies related to drugs acting in urinary tract infections, sexually transmitted diseases and as immunomodulators plays an important role in creating awareness on mechanism and pharmacological action of drugs			Understanding basics of drug related to urinary tract infections, sexually transmitted diseases and as immunomodulat ors	-	-	-	-	Ensure healthy lives and promote well-being for all at all ages SDG 3	Professional education(17.1-17.5)	Global educati on knowle dge
Unit v	-	-	-	To gain knowledge related to general principles related to toxicology and			The basic knowledge related to	-	_	-	-	Ensure healthy lives and promote	Prof essi onal	Global educati on

		chronopharmacology	toxicity studies		well-being	edu	knowle
			as well as		for all at all	cati	dge
			chronopharmaco		ages SDG 3	on(	
			logy		and Skills	17.1	
					for Decent	-	
					Work SDG	17.5	
					4.4	)	

BP603T	Herbal Drug Technology (Theory)	L	T	P	C							
Version 2.0	2.0 3 1 0 4											
<b>Total Contact Hours</b>	Contact Hours 45 Hours											
Pre-requisites/Exposure	Pharmacognosy & Phytochemistry – II (Theory)											
Co-requisites Pharmacognosy & Phytochemistry – I (Theory)												
Course Objectives												

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

- 1. Know to evaluate the quality of raw material.
- 2. Know the guidelines for quality of herbal drug.
- 3. Know about herbal cosmetics, natural sweeteners etc.
- 4. Know about modern concepts such as nutraceuticals

# **Course Outcomes (CO)**

- CO 1. Understand raw material as source of herbal drugs from cultivation to herbal drug product.
- CO 2. Know the WHO and ICH guidelines for evaluation of herbal drugs.
- CO 3. Know the herbal cosmetics, natural sweeteners, nutraceuticals.
- CO 4. Appreciate patenting of herbal drugs, GMP.
- CO 5. Know about the raw materials used in Herbal cosmetics, and the various excipients used in Herbal cosmetics and to know the significance of neutraceuticals.

	Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												1	
CO2					2								1	2
CO3					2	3							3	
CO4								2			3	3		
CO5	3											3		
					l=ligh	tly map <sub>l</sub>	ped	2=	modera	tely mapp	ed		ngly map	ped

Unit	Relevance to the	local, national,	developmental	70	Relevance To the	Entrepreneurship/		Relevance to the	Professional Ethics,	Gender, numan Values,	Environment & Sustainability			/4 <sup>th</sup> IR
	<b>Relev</b>	ocal	level	needs	Relev	Shtr		Relev	rofe	Gender, Values,	Invii Suste	SDG	NEP	POE/4 <sup>th</sup> ]
BP6 03T	Local	Regional	National d	The study of "Herbs as a raw material" provides students with knowledge about the medicinal properties and applications of herbs, enabling them to contribute to the development of natural remedies. Understanding "Biodynamic agriculture" promotes	Employability R	Entrepreneurship E	The study of "Herbs as a raw material" helps students develop skills in identifying, cultivating, and processing medicinal plants, enhancing their knowledge of herbal remedies. "Biodynamic agriculture" provides students	Professional Ethics R		Human Values V	Environment & Sustainability S.	Rev itali ze the glob al part	Pro fess ion al Edu cati on	Techni cal Skills that match Industry
				sustainable farming practices,			with skills in sustainable					ners	<b>(17.</b>	Needs,
				benefiting the environment and human health. Exploring the "Indian system			farming practices, organic cultivation, and holistic					hip for	1- 17.5	Entrepr eneursh
				of medicine" offers students insights			approaches to agriculture. The					sust	)	ip,
				into traditional healing methods,			study of "Indian system of					aina	Pro	Employ
				expanding their understanding of			medicine" equips students with					ble	mot	ability
				healthcare practices worldwide.			knowledge of traditional healing					dev	ing	

			Overall, these studies equip students with diverse perspectives and skills for global health and sustainability.	methods, Ayurvedic principles, and herbal formulations, enhancing their understanding of holistic healthcare practices.		elop men t (Rol e of all Sch ools , KR MU ) (SD G 17)	Hig hj- qua lity rese arc h (18. 1- 18.9	
Unit	-	-	The study of nutraceuticals, herbs in food, and herbs-drugs can greatly benefit students globally by providing them with a comprehensive understanding of natural health and wellness. This knowledge equips students with insights into the potential therapeutic properties of certain foods and herbs, enabling them to make informed dietary choices and explore alternative approaches to healthcare. Such understanding can enhance personal well-being and support their future professional endeavors in fields related to nutrition and holistic medicine.	Studying "Nutraceuticals" and "Herbs-Food & Herbs-Drugs" can help students in skill development by enhancing their understanding of natural remedies and their effects on health. It cultivates knowledge in the fields of nutrition, pharmacology, and herbal medicine, fostering critical thinking, research skills, and the ability to assess the safety and efficacy of these products. This knowledge equips students with valuable expertise in the growing field of alternative medicine.				Global Educati on Knowle dge ,

Unit			The study of herbal cosmetics, herbal	The study of herbal cosmetics,		1.a
III	-	_	The state of the s			Ens
111			excipients, and herbal formulations	herbal excipients, and herbal		
			can benefit students globally by	formulation helps students		ure
			providing them with a comprehensive	develop skills in natural product		sign
			understanding of natural ingredients	development, formulation		ifica
			and their applications in the beauty	design, and understanding of		nt
			and pharmaceutical industries. This	herbal ingredients. It enhances		mob
			knowledge equips students with the	their knowledge of plant-based		iliza
			skills to develop and manufacture	remedies, extraction techniques,		tion
			effective, safe, and sustainable herbal	and quality control. These skills		of
			products, meeting the growing demand	enable students to excel in the		reso
			for natural alternatives worldwide.	field of cosmetic science,		urce
				pharmaceuticals, and herbal		s
				product development,		fro
				contributing to the growing		m a
				demand for natural and		vari
				sustainable beauty and		ety
				healthcare solutions.		of
						sour
						ces
Unit	-	_	The study of "Evaluation of Drug"	Studying the evaluation of	Ens	Tec
IV			helps students globally understand the	drugs, patenting and regulatory	ure	hnol
			process of testing and analysing the	requirements of natural products,	heal	ogy
			effectiveness and safety of drugs,	and regulatory issues helps	thy	Use
			ensuring their quality and efficacy.	students develop essential skills	live	&
			"Patenting and Regulatory	in the pharmaceutical and	S	Inte
			requirements of natural products"	biotechnology fields. These	and	grat
			educates students on legal aspects and	subjects provide knowledge	pro	ion
			protection of natural products.	about the process of evaluating	mot	(23.
			"Regulatory Issues" provides insight	drug efficacy and safety,	e	1-
			into the complex regulations	protecting intellectual property	well	23.1
			governing pharmaceuticals, preparing	rights, and navigating regulatory	_ ~	3)
			students for careers in the global	frameworks. Such skills are	bein	
			students for careers in the global	frameworks. Such skills are	UCIII	

	healthcare industry.	crucial for careers in research, development, and compliance within the healthcare industry.	g for all at all ages (SD G 3) Ens ure sust aina ble cons ump tion and prod ucti on patt erns (SD G
			G 12)
Unit	The study of "Schedule T - Good Manufacturing Practice of Indian systems of medicine" can help students globally by providing them with insights into the manufacturing practices and quality standards followed in the Indian systems of medicine. This knowledge can be beneficial for students pursuing	The study of "Schedule T – Good Manufacturing Practice of Indian systems of medicine" helps students in skill development by providing them with a comprehensive understanding of the manufacturing practices and quality standards specific to	Ens Tec Corpor ure hnol ate sust ogy Allianc aina Use es to ble & provide cons Inte Big ump grat Sister/tion ion Big and (23. Brother

careers in pharmaceuticals, healthcare,	Indian systems of medicine. This	prod 1- Connec
or research, allowing them to	knowledge equips them with the	ucti 23.1 tions
understand and incorporate best	necessary skills to ensure the	on 3)
practices from Indian medicine into	safety, efficacy, and quality of	patt
their own work.	herbal medicines and traditional	erns
	remedies, thereby enhancing	(SD
	their competence in the field.	G
		12)

BP604T	<b>Biopharmaceutics And Pharmacokinetics (Theory)</b>	L	T	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours			<u> </u>	<u>I</u>
Pre-requisites/Exposure	Pharmaceutics				
Co-requisites					
	C Ohi4'				

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

- 1. Understand the basic concepts in Biopharmaceutics and Pharmacokinetics and their significance.
- 2. Understand the use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.
- 3 Understand the concepts of bioavailability and bioequivalence of drug products and their significance.

## **Course Outcomes (CO)**

- CO 1. Understand the basic concepts in Biopharmaceutics and Pharmacokinetics and their significance.
- CO 2. Understand the Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.
- CO 3. Understand the concepts of bioavailability and bioequivalence of drug products and their significance.
- CO 4. Understand various pharmacokinetic parameters, their significance & applications

	Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												3	
CO2					3									2
CO3					3	3								
CO4	3											3		
	1=lightly mapped 2= moderately mapped 3=strongly mapped													

Unit	evance to the al, national, ional and global elopmental ds	evance To the ployability/repreneurship/	evance to the fessional Ethics, nder, Human lues, vironment & stainability	Ŋ	P	E/4 <sup>th</sup> IR
	Relev local, regior develor needs			( ' )	NEP	POE/

	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit				Global Health care Needs. It will give the abosrpt ion of all the oral dosage forms, in order to make the better formul ations	It will brin g emp loya bilit y opp urtu niti es in the CR Os	-					-	Ens ure heal thy live s and pro mot e well - bein g for all at all ages (SD G 3)	Professional Education (17.1-17.5)	Techni cal Skills that match Industr y Needs

			produc ts.										
Unit		-	Global Health care Needs. It will give the distrib ution of all the oral dosage forms, in order to make the better formul ations produc ts.	It will brin g emp loya bilit y opp urtu niti es in the CR Os			-	-	-		Ens ure heal thy live s and pro mot e well - bein g for all at all ages (SD G 3)	Professional Education (17.1-17.5)	Techni cal Skills that match Industr y Needs
Unit III	-	-	Global Health care Needs. It will give the	It will brin g emp loya bilit	-	-	-	-	-	-	Ens ure heal thy live s and	Prof essi onal Edu cati on (17.	Techni cal Skills that match Industr y

			elimina	y							nro	1-	Needs
			tion of								pro mot	17.5	riccus
			all the	opp								17.5	
				urtu							e	)	
			oral	niti							well		
			dosage	es							-		
			forms,	in							bein		
			in	the							g for		
			order	CR							for		
			to	Os							all		
			make								at		
			the								all		
			better								ages		
			formul								ages (SD		
			ations								G 3)		
			produc								·		
			ts.										
Unit	-	-	Global	It	-	-	-	-	-	-	Ens	Prof	Techni
IV			Health	will							ure	essi	cal
			care	brin							heal	onal	Skills
			Needs.	g							thy	Edu	that
			It will	emp							live	cati	match
			give	loya							S	on	Industr
			the	bilit							and	(17.	у
			pharma	y							pro	1-	Needs
			cokinet	opp							mot	17.5	riccus
			ics of	urtu							e	17.5	
			all the	niti							well	,	
			oral								well		
				es									
			dosage	in							bein		
			forms,	the							g for		
			in	CR									
			order	Os							all		
			to								at		
			make								all		
			the								ages		

		better formul ations produc					(SD G 3)		
Unit		ts. Global Health care Needs. It will give the non- linear pharma cokinet ics of all the oral dosage forms, in order to make the better formul ations produc ts.	It will brin g emp loya bilit y opp urtu niti es in the CR Os				Ens ure heal thy live s and pro mot e well bein g for all at all ages (SD G 3)	Prof essi onal Edu cati on (17. 1- 17.5)	Techni cal Skills that match Industry Needs

BP605T	Pharmaceutical Biotechnology (Theory)	L	T	P	С							
Version 2.0		3	1	0	4							
<b>Total Contact Hours</b>	45 Hours											
Pre-requisites/Exposure	Pharmaceutical Microbiology											
Co-requisites Pharmaceutics												
Course Objectives												

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

- 1. Understand the importance of Immobilized enzymes in Pharmaceutical Industries
- 2. Genetic engineering applications in relation to production of pharmaceuticals
- 3. Importance of Monoclonal antibodies in Industries
- 4. Appreciate the use of microorganisms in fermentation technology.

#### **Course Outcomes (CO)**

- CO1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries
- CO2. Applications of genetic engineering and protein engineering in relation to production of pharmaceuticals.
- CO3. Importance of Monoclonal antibodies in Industries.
- CO4. Appreciate the use of microorganisms in fermentation technology.

	Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												3	
CO2					3									
CO3					3	3								
CO4	3											3		
CO5											3	3		

Unit	evance to the al, national, ional and global elopmental ds	evance To the ployability/ trepreneurship/ Il Development	evance to the sfessional Ethics, nder, Human lues, vironment & tainability G	
	Rele loca regi deve neec	Rele Emp Entra Skill	Rele Prof Gen Value Env Suet	

	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit		-		The relevance of immobilized enzymes and genetic engineering in pharmaceutical industries extends globally. Immobilized enzymes offer cost-effective and efficient solutions for pharmaceutical production, benefiting industries worldwide. Genetic engineering enables the development of advanced pharmaceutical products, personalized medicine, and innovative treatments, contributing to global healthcare advancements and addressing diverse patient needs on a global			Develop a range of skills, including scientific and technical skills, critical thinking, laboratory techniques, and knowledge in areas such as immunology, biotechnology, and clinical practices.					"Ensu re health y lives and promo te well-being for all at all ages (SDG 3)"	Towards a More Holistic and Multidisciplinary Education (11.1- 11.13)	Technical Skills that match Industry Needs

		scale.							
Unit II	 	 Globally genetic engineering has revolutionized the understanding and treatment of diseases, paving the way for personalized medicine, targeted therapies, and advancements in healthcare outcomes.	 	Recombinant DNA technology, and applications in medicine can develop skills in molecular biology techniques, genetic engineering, experimental design, and data analysis, which are valuable in various research, medical, and biotechnology fields.	 	 	"Ensu re health y lives and promo te well- being for all at all ages (SDG 3)"	Towards a More Holistic and Multidisciplinary Education (11.1- 11.13)	Technical Skills that match Industry Needs
Unit	 	 Have various applications in research, diagnosis, and therapeutic interventions. Appropriate use of vaccines, toxoids, antitoxins, blood products and plasma substitutes are crucial in healthcare systems worldwide to support patient care and improve outcomes in critical situations.	 	Interdisciplinary thinking, analytical techniques, experimental design, problem-solving, and knowledge of molecular biology and industrial biotechnology. These skills are valuable in research, development, and production roles in the pharmaceutical and biotechnology industries.	 	 	"Ensu re health y lives and promo te well-being for all at all ages (SDG 3)"	Towards a More Holistic and Multidisciplinary Education (11.1- 11.13)	Technical Skills that match Industry Needs

Unit IV	 	 It provides insights into gene regulation, evolutionary processes, biotechnological applications, and the development of diagnostic tools, contributing to advancements in research and disease diagnosis.	 	Develop a range of skills, including laboratory techniques, molecular biology, problem-solving, research design, and biotechnological applications, which are valuable in academic, research, and industry settings	 	 	"Ensu re health y lives and promo te well- being for all at all ages (SDG 3)"	Towards a More Holistic and Multidisciplinary Education (11.1- 11.13)	Technical Skills that match Industry Needs
Unit v	 	 Efficient and safe production of pharmaceuticals, optimizing fermentation processes, understanding the production of specific compounds, and maintaining the quality and availability of blood products for clinical use.	 	Technical proficiency, laboratory techniques, process optimization, quality assurance, problem-solving, attention to detail, research, and data analysis, which are valuable in pharmaceutical and biotechnology industries, research institutions, and regulatory bodies	 	 	"Ensu re health y lives and promo te well-being for all at all ages (SDG 3)"	Towards a More Holistic and Multidisciplinary Education (11.1- 11.13)	Technical Skills that match Industry Needs

l .	I	1	

BP606T	Pharmaceutical Quality Assurance (Theory)	L	T	P	С
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Industrial Pharmacy - I				
Co-requisites	Pharmaceutics				
Course Objectives					
Upon completion of this course the student should be able to:					
1. Understand the cGMP aspects in a pharmaceutical industry					
2. Appreciate the importance of documentation					
3. Understand the scope of quality certifications applicable to pharmaceutical					
4. Understand the responsibilities of QA□□Industries & QC departments					
Course Outcomes (CO)					
On completion of this course, the student will be able to:					
CO 1. Understand the concept of Quality Control and Quality Assurance.					
CO 2. Appreciate the importance of documentation					
CO 3. Understand the scope of quality certifications applicable to pharmaceutical industries					
CO 4. Understand the responsibilities of QA & QC departments					
CO 5. Understand the concept of validation and warehousing practices.					
Programme and Course Mapping					

CO	PO1	PO2	PO3	PO4	PO5	PO6	<b>PO7</b>	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	3											3	
CO2		3			3									3
CO3					3	3								
CO4	3							3				3		
CO5											3	3		
					1=ligh	ntly map	ped	2	2= mode	erately ma	pped	3=	strongly	mapped

Unit	bal	e lip/	ics,			
	II, all gglol	the ski	the Ethinan nan t & t			
	ona ona nd genta	To illity leur lopi	Se m e H			~
	ati ati mu	nce yab; ren evel	non num num num num num num num num num nu			(l <sub>tt</sub>
	iona iona iona iona iona iona de ds	evaj ploj rep	eva fess ide ide riro tain	ر ا	<b>L</b>	E/4
	Rele local region of the l	Rele Emp Entr Skill	Relo	SD(	NE	PO]

	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Quality assurance and quality management concepts, along with Total Quality Management (TQM) principles, contribute globally by ensuring the consistent production of high-quality pharmaceutical products, improving patient safety, and meeting regulatory requirements. Adherence to ICH guidelines harmonizes global standards, facilitating international collaboration and ensuring the safety, efficacy, and quality of pharmaceuticals worldwide.	Professionals with expertise in ensuring compliance, quality control, and continuous improvement of pharmaceutical processes are in high demand in the pharmaceutical industry, enhancing employability and contributing to the success of pharmaceutical companies and their products. These professionals	_	-	Quality assurance and quality managemen t concepts, Total Quality Manageme nt (TQM) principles, and adherence to ICH guidelines contribute to professiona l ethics by promoting a culture of transparenc		_	_	Skil ls for Dec ent Wor k (SD G 4.4)	Pro mot ing Hig hj- qual ity rese arch (18. 1- 18.9)	Techni cal Skills that match Industr y Needs

					should also be			y,					
					familiar with ICH			accountabili					
					guidelines and			ty, and					
					Total Quality			integrity in					
					Management			the					
					(TQM) principles.			pharmaceut					
					(1QM) principles.			ical					
								industry.					
								They					
								ensure the					
								ethical					
								production,					
								testing, and					
								distribution					
								of					
								pharmaceut					
								ical					
								products,					
								safeguardin					
								g patient					
								safety and					
								trust in the					
								global					
								healthcare					
								system.					
Unit II	-	-	-	Efficient organization and personnel	By fostering a	-	-	Effective	-	-	Skil	Pro	Techni
				management contribute globally by	structured and			organizatio			ls	mot	cal
				fostering productivity, collaboration,	productive work			n and			for	ing	Skills
				and employee engagement across	environment,			personnel			Dec	Hig	that
				international teams, leading to	encouraging			managemen			ent	hj-	match
				streamlined operations, effective	teamwork, skill			t contribute			Wor	qual	Industr
				project execution, and a positive	development, and			to			k	ity	y
				work culture, ultimately driving	employee			professiona			(SD	rese	Needs
				global business success and	happiness,			l ethics by			G	arch	

				organisation and			clear					1-	
				personnel			policies,					18.9	
				management			promoting					)	
				contribute to			fair					,	
				employability and			treatment,						
				lead to improved			and						
				productivity,			fostering a						
				professional			culture of						
				progress, and job			integrity,						
				retention rates.			thereby						
							ensuring						
							ethical						
							conduct,						
							respect for						
							diversity,						
							and						
							accountabili						
							ty in the						
							workplace,						
							enhancing						
							trust and						
							upholding						
							ethical						
							standards						
							globally.						
Unit III	_	_	Quality assurance and adherence to	By giving		_	Quality Quality	_	_	_	Skil	Pro	Techni
			Good Laboratory Practices (GLP)	professionals			control and				ls	mot	cal
			contribute globally by ensuring	practical			adherence				for	ing	Skills
			reliable and accurate scientific data,	experience with			to Good				Dec	Hig	that
			promoting reproducibility and	analytical			Laboratory				ent	hj-	match
							Practices				Wor	•	
			credibility in research, development,	methods, data								qual	Industr
			and regulatory assessments. This	interpretation, and			(GLP)				k	ity	y Naoda
			supports global harmonization,	quality assurance			contribute				(SD	rese	Needs
			facilitates knowledge exchange, and	principles, quality			to				G	arch	
			enhances public trust in scientific	control and			professiona				4.4)	(18.	

				findings, driving advancements in various fields and improving global scientific standards.	adherence to Good Laboratory Practises (GLP) contribute to skill development. These abilities promote competence and professional progression in the disciplines of laboratory science and quality management and are crucial for accurate testing, regulatory compliance, and maintaining product safety.			l ethics by promoting accuracy, reliability, and integrity in scientific testing and data reporting. They ensure compliance with ethical standards, prevent fraud and misconduct, and uphold the credibility and trustworthiness of research and laboratory practices					1- 18.9 )	
								laboratory practices globally.						
Unit IV	-	-	-	Effective management of complaints and proper document maintenance in the pharmaceutical industry contributes globally by ensuring transparency, accountability, and continuous improvement in product	Professionals skilled in managing complaints and document maintenance in the	-	-	Proper managemen t of complaints and thorough	-	-	-	Skil ls for Dec ent Wor	Pro mot ing Hig hj- qual	Techni cal Skills that match Industr

BP607P	Medicinal Chemistry-III (Practical)	L	T	P	C
Version 2.0		0	0	4	2
<b>Total Contact Hours</b>	60 Hours				I
Pre-requisites/Exposure	Medicinal Chemistry-III (Practical)				
Co-requisites	Medicinal Chemistry				
	Course Obje	ectives			

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

- 1. Understand the importance of drug design and different techniques of drug design.
- 2. Understand the chemistry of drugs with respect to their biological activity.
- 3. Know the metabolism, adverse effects and therapeutic value of drugs.
- 4. Know the importance of SAR of drugs.

## **Course Outcomes (CO)**

# On completion of this course, the student will be able to:

CO 1. Understand fundamental knowledge on the structure, function and significance of Drugs.

- CO 2. Discuss various mechanism of action of drugs
- CO 3. Provide knowledge of Synthesis and Metabolism of drugs.
- CO 4. Provide knowledge of Structure Activity Relationships (SAR) therapeutic uses of drugs.
- CO 5. Provide knowledge of marketed preparation.

# **Programme and Course Mapping**

			ı				1	1	1	1	1		1	
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												3	
CO2					3									
CO3					3	3								
CO4											3	3		
CO5												3		1
					1=ligh	ntly maj	pped		2= mod	lerately n	napped		3=strong	ly mapped

Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurshi p/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR	
---	--	--	-----	-----	------------------------	--

	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit				The aim of synthesizing medicinally important compounds is to advance drug discovery, development, and healthcare by identifying new therapeutic agents, optimizing drug properties, elucidating structure-activity relationships, and addressing unmet medical needs.	Employ ability in Researc h labs	Entre prene urship in area of drug devel opme nt and resear ch	Hands on training of different techniques, s that students can learn the different synthetic techniques				Learning of chemical hazardous and handling help in environme ntal sustainabil ity	Revitalize the global partnership for sustainable developmen t (Role of all Schools, KRMU) (SDG 17)	Promoting High-quality research (18.1-18.9)	Skill Develo pment
Unit II		1	-	Hands on training of Analytical techniques	Employ ability in Researc h labs	Entre prene urship in area	Hands on training of Analytical techniques					-	- Promoting High-quality research (18.1-18.9)	Skill Develo pment

					of drug devel opme nt and					
					resear					
Unit	-	-	Hands on training of Synthetic techniques	Employ ability in Researc h labs	ch Entre prene urship in area of drug devel opme nt and resear ch	Hands on training of different techniques, s that students can learn the advanced synthetic techniques		Skills for Decent Work (SDG 4.4)	Effective Governance & Leadership (19.1- 19.5)	Skill Develo pment
Unit IV	-	-	In silico drug designing Skill development	Employ ability in Researc h labs	Entre prene urship in area of drug devel opme nt and resear	Hands on training of different in silico techniques		-	-	Skill Develo pment

Unit v		Designing of In silico studies helps the students to get the training on lead optimization Skill development	ability	Entre prene urship in area of	Hands on training of different in silico techniques			Revitalize the global partnership for sustainable developmen	Transforming the Regulatory System (20.1-20.15)	Skill Develo pment
				drug devel opme nt and resear ch				t (Role of all Schools, KRMU) (SDG 17)		

BP608P	Pharmacology-III (Practical)	L	T	P	C							
Version 2.0		0	0	4	2							
<b>Total Contact Hours</b>	60 Hours											
Pre-requisites/Exposure	Pharmacology-II (Practical)											
Co-requisites	Co-requisites HAP-II and Pathophysiology											
	Course Objectives											

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

1. Get familiar with the pre-clinical studies in animals

- 2. Know the animal handling techniques, methods of drugs administration.
- 3. Understand Dose calculation and administration of drug through IM,IV routes
- 4. Able to learn and understand CCSEA guidelines
- 5. Know about the various disease models in order to discover a new drug

## **Course Outcomes (CO)**

### On completion of this course, the student will be able to:

- CO 1. Understanding pharmacology experiments demonstration by simulated experiments / videos.
- CO 2. Understand knowledge of dose calculation and acute oral toxicity in pharmacology experiments
- CO 3. Study various effects of drugs like anti-ulcer, GIT mobility and anti-allergic activity using various assay based on video recordings
- CO 4. Know the biostatistics methods in experimental pharmacology like ANOVA, Chi square test, Wilcoxon Signed Rank test)

# **Programme and Course Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3												3	
CO2		3												2
CO3						3								
CO4												3		

1=lightly mapped

2= moderately mapped

3=strongly mapped

Unit II	-	-	-	To understand the effect of drugs on gastrointestinal motility, agonist and antagonists on guinea pig ileum and estimation of serum biochemical parameters by using semiautoanalyser which helps	-	-	The basic knowledge related to drugs on gastrointestinal motility, agonist and antagonist as well as	-	-	-	-	Skills for Decent Work SDG 4.4	Prof essi onal edu cati on( 17.1	Global educati on knowle dge
				in basic understanding of experimental pharmacology			biochemical parameters						17.5	
Unit III		-	-	Emphasize on studies related to saline purgative on frog intestine, Insulin hypoglycemic effect in rabbit as well as test for pyrogens which enhances basic pharmacological knowledge			Gaining basics of purgative on frog intestine, insulin hypoglycemic effect and pyrogens	-	-	-	-	Skills for Decent Work SDG 4.4	Professional education(17.1-17.5)	Global educati on knowle dge
Unit IV	-	-	-	To focus on studies related to determination of acute oral toxicity (LD50) of a drug and acute skin irritation / corrosion and acute eye irritation / corrosion of a test substance which help in understanding toxicity studies			Understanding basics of toxicity studies related to acute oral toxicity acute skin irritation and acute eye irritation	-	-	-	-	Skills for Decent Work SDG 4.4	Prof essi onal edu cati on( 17.1 - 17.5	Global educati on knowle dge
Unit v	-	-	-	To elaborate the calculation of pharmacokinetic parameters from a given			The basic knowledge related pharmacokinetic	-	-	-	-	Skills for Decent Work SDG 4.4	Prof essi onal edu	Global educati on knowle

	data and biostatistics		S			cati	dge
	methods in experimental					on(	
	pharmacology which helps					17.1	
	in understanding basis					_	
	calculation					17.5	
						)	

BP609P	Herbal Drug Technology (Practical)	L	Т	P	C
Version 2.0		0	0	4	2
<b>Total Contact Hours</b>	60 Hours				
Pre-requisites/Exposure	Pharmacognosy & Phytochemistry – II (Practical)				
Co-requisites	Pharmacognosy & Phytochemistry – I (Practical)				
	Course Objectives				

### **Course Objectives**

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

- 1. Know to evaluate the quality of raw material.
- 2. Know the guidelines for quality of herbal drug.
- 3. Know about herbal cosmetics, natural sweeteners etc.
- 4. Know about modern concepts such as nutraceuticals

# **Course Outcomes (CO)**

# On completion of this course, the student will be able to:

- CO 1. Gain Practical knowledge of Preliminary phytochemical screening of crude drugs.
- CO 2. Carry out Preparation and standardization of Herbal extracts in cosmetic formulation.
- CO 3. Understand & study the monograph of various Herbal drugs.
- CO 4. Determine the content of components like Aldehyde and alcohol
- CO 5. Prepare Ayurvedic formulations

### **Programme and Course Mapping** PO1 PO2 PO3 PO4 PO5 **PO6 PO7** PO8 PO9 PO 10 PO11 **PO12** PSO 1 PSO 2 $\mathbf{CO}$ CO1 3 3 CO<sub>2</sub> 3 CO3 3 CO4 3 CO5 3 1=lightly mapped 2= moderately mapped 3=strongly mapped

Unit	Relevance to the	local, national, regional and global	developmental needs		Relevance To the	Employability/ Entrepreneurship/	Skill Development	Relevance to the Professional Ethics, Gender, Human	values, Environment &	Sustainability		SDG	VEP	POE/4 <sup>th</sup> IR
Unit	Local	Regional	National	The study of preliminary	Employability ]	Entrepreneurship	Skill Development The study of preliminary	Professional Ethics	Gender	Human Values	Environment & Sustainability	Rev	Pro	Techni
I				phytochemical screening of crude drugs helps students globally by providing a foundation for understanding the chemical composition of medicinal plants. This knowledge enables students to identify and isolate bioactive compounds, leading to the development of new drugs and treatments. It contributes to the field of natural medicine, supporting			phytochemical screening of crude drugs helps students in skill development by enhancing their knowledge and understanding of plant-based compounds. It enables them to learn techniques for identifying and analyzing chemical constituents, fostering critical thinking, and developing laboratory skills necessary for pharmaceutical research and drug discovery.					itali ze the glob al part ners hip for sust aina ble dev	fess ion al Edu cati on (17. 1- 17.5 ) Pro mot ing	cal Skills that match Industr y Needs, Entrepr eneursh ip, Employ ability

		global efforts to discover novel therapeutic options and promote sustainable healthcare practices.				elop men t (Rol e of all Sch ools , KR MU ) (SD G 17)	Hig hj- qua lity rese arc h (18. 1- 18.9	
Unit		The study of "Evaluation of excipients of natural origin" benefits students globally by providing them with knowledge and understanding of natural excipients, which are substances used in pharmaceutical formulations. This knowledge allows students to develop safer and more effective drug formulations, promoting sustainable and eco-friendly practices in the pharmaceutical industry. Understanding natural excipients also enables students to explore new possibilities for drug delivery	The study of "Evaluation of excipients of natural origin" helps students in skill development by enhancing their understanding of natural excipients used in pharmaceutical formulations. It allows students to develop critical thinking, analytical skills, and knowledge of quality assessment methods. This knowledge equips them to evaluate, select, and formulate safer and more effective pharmaceutical products, contributing to their overall skill development in the field.					Global Educat ion Knowl edge ,

Unit	-	-	and develop innovative pharmaceutical products.  The study of "Monograph analysis of herbal drugs" helps students globally by providing a comprehensive understanding of the medicinal properties, chemical composition, quality control, and therapeutic applications of herbal medicines. This knowledge equips students with the necessary skills to evaluate, formulate, and recommend herbal remedies, contributing to the advancement of traditional medicine and expanding healthcare options for diverse populations worldwide.  The study of prepared and	The study of "Monograph analysis of herbal drugs" helps students in skill development by enhancing their knowledge of medicinal plants, their properties, and potential uses. It fosters skills in research, critical thinking, and data analysis, while also promoting an understanding of drug formulation and quality control. This knowledge equips students with valuable expertise in the field of herbal medicine and supports their professional growth.		Ens	1.a Ens ure sign ific ant mo bili zati on of reso urc es fro m a vari ety of sou rces  Tec	
IV	-		standardized extracts helps students globally by providing a consistent and reliable basis for learning.	standardized extracts helps students in skill development by providing them with consistent and reliable samples for analysis		ure heal thy live	hno logy Use &	
			These extracts ensure that students have access to	and experimentation. This enables them to understand the		s and	Inte grat	

	accurate and uniform		principles and techniques			pro	ion	
	information, facilitating		involved in extracting and			mot	<b>(23.</b>	
	easier comprehension and		standardizing substances,			e	1-	
	comparability of results		enhancing their scientific			well	23.1	
	across different educational		knowledge and laboratory skills			-	3)	
	institutions. Additionally,		in a controlled and reproducible			bein	,	
	standardized extracts promote		manner.			g		
	transparency and					for		
	reproducibility, fostering a					all		
	shared understanding and					at		
	enhancing collaboration					all		
	among students worldwide.					ages		
	_					(SD		
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Unit	The study of prepared and	Studying prepared and	Er	s Tec	Corpor
v	standardized extract in	standardized extracts in cosmetic	ur ur	e hnol	ate
	cosmetic formulations helps	formulations helps in skill	su	st ogy	Allianc
	students globally by	development by enhancing	aiı	a Use	es to
	providing them with a	knowledge of ingredient	ble	. &	provid
	comprehensive understanding	selection, formulation	co	<b>1</b> Inte	e Big
	of the principles and	techniques, and quality control	su	<b>n</b> grat	Sister/
	techniques involved in	processes. It cultivates expertise	pti		Big
	formulating cosmetics. It	in developing effective and safe	n	(23.	Brothe
	equips them with knowledge	cosmetic products, optimizing	an	d 1-	r
	of selecting and preparing	product stability and efficacy,	pr	23.1	Conne
	standardized extracts for	and meeting regulatory	du du	<b>c</b> 3)	ctions
	cosmetic products, ensuring	requirements. This knowledge	tio	n	
	quality, safety, and efficacy.	contributes to the development	pa	tt	
	This knowledge enables	of advanced formulation skills,	er		
	students to develop	ensuring high-quality and	(S	)	
	innovative and effective	standardized cosmetic			
	cosmetic formulations,	preparations.		)	
	contributing to the				
	advancement of the global				
	cosmetics industry.				

# **Semester-VII**

BP 701 T	Instrumental Methods of Analysis (Theory)	L	Т	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Analytical Chemistry				

## **Co-requisites**

### **Course Objectives**

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

- 1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
- 2. Understand the chromatographic separation and analysis of drugs.
- 3. Perform quantitative & qualitative analysis of drugs using various analytical instruments.

### **Course Outcomes (CO)**

### On completion of this course, the student will be able to:

- CO1. This subject deals with the application of instrumental methods in qualitative analysis of drugs.
- CO2. This subject deals with the application of instrumental methods in quantitative analysis of drugs.
- CO3. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic techniques.
- CO4. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of chromatographic techniques.
- CO5. This also emphasizes on theoretical knowledge on modern analytical instruments that are used for drug testing.

### **Programme and Course Mapping** CO **PO1** PO<sub>2</sub> PO<sub>3</sub> PO4 **PO5 PO6 PO7 PO8 PO9 PO 10 PO11 PO12** PSO 1 PSO 2 **CO1** 3 2 2 3 3 1 3 2 3 3 3 3 3 CO<sub>2</sub> 3 2 1 2 2 3 3 3 3 **CO3** 3 2 2 1 2 3 3 3 3 **CO4** 3 2 2 2 1 3 3 3 3 **CO5** 3 2 2 2 1=lightly mapped 3=strongly mapped 2= moderately mapped

Unit	Relevance to the local, national, regional and global developmental needs	Ι	I	I	Relevance To the Employability/	Entrepreneursmp/ Skill Development	Ι	Relevance to the Professional Ethics,	Gender, Human Values,	Sustainability		SDG	NEP	POE/4 <sup>th</sup> IR
Unit I	Local	Regional	Charact erizatio n of Drugs help in drug discove ry	Global	' Employability	' Entrepreneurship	With the aid of the UV-visible spectrosc opy technique, scientists may easily ascertain the substanc	Professional Ethics	Gender	Human Values	Environment & Sustainability	Skills for Decent Work; Research- related skills (case study, seminars and hands on training) (SDG 4.4)	Profess ional Educat ion (17.1-17.5); Promot ing Highj-quality researc h (18.1-18.9)	Techni cal Skills that match Industr y Needs/ Hands- on Experie nce

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							concentr							
							ations,							
							examine							
							reaction							
							rates,							
							and							
							derive							
							rate							
							equation							
							s for							
							reactions							
							, which							
							can then							
							be used							
							to							
							suggest a							
							mechanis							
							m.							
Unit II	-	-	-	Learnin	-	-	То	-	-	_	_	Skills for	Profess	Techni
				g of			understa					Decent	ional	cal
				Techni			nd the					Work;	Educat	Skills
				ques			crucial					Research-	ion	that
				help to			function					related	(17.1-	match
				discove			that					skills	17.5);	Industr
							infrared						Promot	
				r drugs								(case study,		y Nasala/
							spectrosc					seminars	ing	Needs/
							opy					and hands	Highj-	Hands-
							plays in					on training)	quality	on
							the					(SDG 4.4)	researc	Experie
							investiga						h	nce
							tion of						(18.1-	
			1				the						18.9)	
							1110						,	
							structure							

					organic molecule s To improve one's						
					ability to identify distinctiv e absorptio						
					n bands To determin e a substanc e's						
					composit ion by analysin g its infrared						
					spectrum						
Unit III	-	Boost the diagnos is, prognos is and treatme nt of medical conditi on	-	-	Chromat ography allows for the purificati on, separatio n, and identification of a mixture's constitue	-	-	-	Skills for Decent Work; Research- related skills (case study, seminars and hands on training) (SDG 4.4)	Profess ional Educat ion (17.1-17.5); Promot ing Highj-quality researc h	Techni cal Skills that match Industr y Needs/ Hands- on Experie nce

Hait IV				Hala in			nt parts for qualitativ e and quantitati ve examinat ion.					Chille for	(18.1- 18.9)	Tashai
Unit IV				Help in drug designi ng	_		HPLC and GLC allows the compone nts of a mixture to be separated, identified, and purified for qualitative and quantitative examinat ion.			-		Skills for Decent Work; Research- related skills (case study, seminars and hands on training) (SDG 4.4)	Profess ional Educat ion (17.1-17.5); Promot ing Highj-quality researc h (18.1-18.9)	Techni cal Skills that match Industr y Needs; Skill Develo pment
Unit v	-	-	-	Ionizab le compou nds are separat ed using	-	-	Learning of analytica l techniqu e make the	-	-	-	-	Skills for Decent Work; Research- related skills (case study,	Profess ional Educat ion (17.1-17.5); Promot	Techni cal Skills that match Industr y

ion	learner	seminars	ing	Needs/
exchan	industry	and hands	Highj-	Hands-
ge	ready	on training)	quality	on
chroma		(SDG 4.4)	researc	Experie
tograph			h	nce
у			(18.1-	
accordi			18.9)	
ng to				
their				
overall				
charge.				

BP 702 T	Industrial Pharmacy-II (Theory)	L	Т	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Pharmaceutics				
Co-requisites					
	Course Objecti	ves			
Upon completion of this o	course the student should be able to:				

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

- Know the process of pilot plant and scale up of pharmaceutical dosage forms
- 2. Understand the process of technology transfer from lab scale to commercial batch
- 3. Know different Laws and Acts that regulate pharmaceutical industry
- 4. Understand the approval process and regulatory requirements for drug

### **Course Outcomes (CO)**

### On completion of this course, the student will be able to:

CO1: This course is designed to impart fundamental knowledge on pharmaceutical product development.

CO2: This course is designed to impart knowledge on final product translation from laboratory to market.

CO3: This subject gives understanding and idea of various technologies applied to development of dosage forms from small scale to large scale.

CO4: This subject gives understanding and idea of Indian Regulatory Requirements.

CO5: This course imparts knowledge to quality management of pharmaceutical products.

								Prog	gramme	and Cou	ırse Map	ping		
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	•	3	•	3	3	•	1	1	-	3	2	3	2
CO2	3	-	3	-	3	3		1	1	-	3	2	3	2
CO3	3	-	3	-	3	3	•	1	1	-	3	2	3	2
CO4	3	•	3	-	3	3	•	1	1	-	3	2	3	2
CO5	3	-	3	-	3	3	-	1	1	-	3	2	3	2
			•		1=light	ly mapp	ed	2=	moder	ately map	ped	3=s	trongly m	napped

Unit	evance to the li, national, ional and global elopmental ds	evance To the ployability/ repreneurship/ Il Development	evance to the fessional Ethics, der, Human ues, rironment & tainability	5 4	E/4 <sup>th</sup> IR
		Relev Emple Entre Skill 1	Relev Profe Gend Value Envir Susta		POE/

BP702T														
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	-	Aiming to understand the process of pilot plant and scale up of pharmaceutical dosage for By providing valuable data studies contribute globally to the development of safe and effective pharmaceutical products. Understand the process of technology transfer from lab scale to commercial batch.	Enhancing knowledge and expertise in the characterization and analysis of drug substances, formulation development, and optimization techniques.			-	-	-	-	(SD G 3)	(18. 1- 18.9 )	Global Educati on Knowle dge
Unit II		-	-	Technology transfer (TT) process of conveying results stemming from scientific and	Technology transfer is important to ensure that the company's			-	-	N O		(SD G 17)	(18. 1- 18.9 )	Dedica ted Career Manag ement

		technological research to the market place and to wider society, along with associated skills and procedures, and is as such an intrinsic part of the technological innovation process.	innovation becomes commercialized. This helps early- stage intellectual property to become tools for research. It can also be used as a base for new products and services for public use.						Centre
Unit III		Globally Understand the approval process and regulatory requirements for drug The competent authority review the application and approve the drug for marketing only if the drug is found to be safe and effective in human being or the drug have more desirable effect as compare to the adverse effect.	Drug companies seeking to sell a drug in the United States must first test it. The company then sends CDER the evidence from these tests to prove the drug is safe and effective for its intended use. A team of CDER physicians, statisticians, chemists, pharmacologists, and other scientists reviews the			N o	(SD G 17)	(18. 1- 18.9 )	Dedica ted Career Manag ement Centre s

					company's data and proposed labeling. If this independent and unbiased review establishes that a drug's health benefits outweigh its known risks, the drug is approved for sale.									
Unit IV				Pharmaceutical Quality Management System (QMS) is a comprehensive collection of policies, processes, and procedures designed to ensure and maintain uniform and high quality in the production of pharmaceutical products.	A QMS supports business leadership, promotes customer focus, improves company culture and the bottom line, manages new innovations, and helps you understand any issues.		-	-	-	N o	-	(SD G 17)	(18. 1- 18.9 )	Dedica ted Career Manag ement Centre s
Unit v	-	-	-	Pharmaceutical regulations, or medicines regulations, have been defined as the combination of legal, administrative, and technical measures that governments take to ensure the safety,	Regulatory affairs is a profession within regulated industries such as pharmaceuticals, biopharmaceutic als, medical devices,	-	-	-	-	N o	-	(SD G 17)	(18. 1- 18.9 )	Dedica ted Career Manag ement Centre s

efficacy, and quality	cosmetics and				
of medicines, as well	consumer health,				
as the relevance and	natural health,				
accuracy of product	and veterinary				
information	products.				

BP 703T	Pharmacy Practice (Theory)	L T		P	C							
Version 2.0		1	0	4								
Total Contact Hours 45 Hours												
Pre-requisites/Exposure												
Co-requisites Co-requisites												
Course Objectives												
<b>Upon completion of this c</b>	Upon completion of this course the student should be able to:											
1. Know various drug	distribution methods in a hospital											
<ol><li>Appreciate the phar</li></ol>	macy stores management and inventory control											
<ol><li>Monitor drug theraj</li></ol>	py of patient through medication chart review and cli	nical revi	iew									
4. Obtain medication	history interview and counsel the patients											
5. Identify drug relate	d problems											
6. Detect and assess a	dverse drug reactions											
7. Interpret selected la	boratory results (as monitoring parameters in therape	eutics) of	specific disease st	tates								
8. Know pharmaceutic												
9. Do patient counseli	ng in community pharmacy.											
10. Appreciate the cond	cept of rational drug therapy.											

### Course Outcomes (CO)

# On completion of this course, the student will be able to:

CO1. The course imparts knowledge of drug distribution in hospitals.

CO2. The course imparts knowledge of drug store management in Hospitals.

CO3. The course imparts knowledge of therapeutic drug monitoring for improved patient care.

CO4. The course imparts knowledge of dispensing of drugs and responding to minor ailments by providing suitable safe medications.

CO5. The course highlights the importance of patient counseling for improved patient care in the community

	Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2	
CO1	3	-	3	-	3	3	-	2	-	-	-	3	3	1	
CO2	3	-	3	-	3	3	-	2	-	-	-	3	3	1	
CO3	3	-	3	-	3	3	-	2	-	-	-	3	3	1	
CO4	3	-	3	-	3	3	-	2	-	-	-	3	3	1	
CO5	3	-	3	-	3	3	-	2	-	-	-	3	3	1	
					1=ligh	tly map	ped		2 = mod	erately m	apped		3=strongly	y mapped	

	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				Traine d the student s for differe nt functio n of hospita ls and staffs			In this Unit, Classificat ion of hospital- Primary, Secondary and Tertiary hospitals, Classificat ion based on clinical and non- clinical basis using ppt and assignmen t					Skil ls for Dec ent Wor k (SD G 4.4) Skil ls for Dec ent Wor k (SD G 4.4)	Professional Education (17.1-17.5)	Skill Develo pment

Unit	_	_	In this,	This unit	Skill		Prof	Employ
II			Studen	based	develop		essi	ability
11			ts will	Dispensin	ment		onal	ability
			learn	g of drugs	ment		Edu	
			about	to			cati	
			the	inpatients,			on	
			dispens	types of			(17.	
			ing of	drug			1-	
			drugs	distributio			17.5	
			as per	n systems,			)	
			the	charging			,	
			standar	policy and				
			ds	labelling,				
			harmo	Dispensin				
			nized	g of drugs				
			globall	to				
			y	ambulator				
				y patients,				
				and				
				Dispensin				
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Unit	-	-	Globall	In this,				Skill
III			y,	students				Develo
			Poisoni	learned				pment
			ng and	and				
			suicide	trained to				
			s are	Drug and				
			challen	Poison				
			ges,	informatio				
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Unit	-	- (	Globall	 In this,			Skill
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			Glauco	will learn			pment
		1	ma,	about the			
			catarac	Concept of			
		1	t and	clinical			
			other	pharmacy,			
		6	eye	functions			
			disorde	and			
			rs are	responsibil			
			increas	ities of			
			ing to	clinical			
			many	pharmacist			
			folds,	, Drug			
			thus	therapy			
			trained	monitorin			
			the	g -			
			student	medicatio			
			s and	n chart			
			make	review,			
			them	clinical			
			availab				
				review,			
			le as	pharmacist			

	skilled	interventio		
	researc	n, Ward		
	hers	round		
	ners	participati		
		on,		
		Medicatio		
		n history		
		and		
		Pharmace		
		utical care.		
Unit		In this	Skil Pro	of Employ
V		unit,	ls ess	
		students	for one	
		will learn	Dec Ed	u
		Organisati	ent cat	i
		on of drug	Wor on	
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		types of	(SD 1-	
		materials	G 17.	5
		stocked	4.4)	
		and		
		storage		
		conditions,		
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		and		
		inventory		
		control:		
		principles,		
		purchase		
		procedure,		
		purchase		
		order,		
		procureme nt and		
		stocking,		

			Economic			
			order			
			quantity,			
			Reorder			
			quantity			
			level, and			
			Methods			
			used for			
			the			
			analysis of			
			the drug			
			expenditur			
			e			

BP 704 T	Novel Drug Delivery System (Theory)	L	Т	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Pharmaceutics				
Co-requisites					
	~ ~ ~				

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

- 1. To understand various approaches for development of novel drug delivery systems.
- 2. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation

#### **Course Outcomes (CO)**

# On completion of this course, the student will be able to:

CO1: This subject is designed to impart basic knowledge on the area of various conventional drug delivery systems.

CO2:	The co	urse im	parts k	nowled	lge on s	sustaine	ed relea	se drug	delive	ery systen	ns.					
CO3:	The co	urse im	parts k	nowled	lge on t	targeted	l drug d	lelivery	systen	ns.						
CO4:	The co	urse im	parts k	nowled	dge on o	organ s	pecific	drug de	elivery	systems.						
CO5:	CO5: The course imparts knowledge on newer drug delivery systems															
	Programme and Course Mapping															
CO	CO PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO 10 PO11 PO12 PSO 1 PSO 2															
CO1	01 3 2 3 - 3 3 - 2 - 2 3 3 1															
CO2	02 3 2 3 - 3 3 - 2 - 2 3 3 1															
CO3																
CO4	3	2	3	-	3	3	-	2	-	-	2	3	3	1		
CO5	3	2	3	-	3	3	-	2	-	-	2	3	3	1		
			I	I	1=lig	htly ma	apped	l	2= m	oderately	mapped		3=stroi	ngly mapped		
Unit	Relevance to the	local, national, regional and global develonmental	needs							Relevance To the	Employablity/ Entrepreneurship/ Skill Development		Relevance to the	Professional Ethics, Gender, Human Values, Environment & Sustainability	NEP	POE/4 <sup>th</sup> IR

BP704 T														
	Jocal	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	This course is intended to provide fundamental information on different conventional drug delivery systems/contr olled drug delivery systems with local relevance and	This course is intended to provide fundamental information on different conventional drug delivery systems/controlle d drug delivery systems with regional relevance and developmental	This course is intended to provide fundamental information on different conventional drug delivery systems/contr olled drug delivery systems with national relevance and	This course is intended to provide fundame ntal informati on on different conventi onal drug delivery systems/	Their pharm aceuti cal indust ry/res earch depart ment (natio nal/int ernati onal) has a	This course knowl edge gives you the ability to build a pharm aceuti cal	This course is design ed to teach basic inform ation on variou s conventiona	This course is designed to teach o n various conventional drug delivery systems/controlle d drug	-	H	<u> </u>	Ens ure heal thy live s and pro mot e well - bein g for	Insti tuti onal Rest ruct urin g and Con soli dati on (10.	Corpor ate/Co mpany Trips/P rojects
	development al requirements. They can	requirements. They can create novel dosage forms.	developmenta l requirements. They can	controlle d drug delivery systems	wide choice of career	medic ation devel oping	l drug delive ry syste	delivery systems with local				all at all	10.1 4)	
	create novel dosage forms.		create novel dosage forms.	with global relevanc	opport unitie s.	firm on a nation	ms/co ntrolle d drug	relevanc e and develop				ages (SD G 3)		

				e and develop mental requirem ents. They can create novel dosage forms.		al and world wide scale.	delive ry syste ms with local releva nce and develo pment needs. They have the ability to develo p unique	ment needs. They have the ability to develop unique dosage formulat ions.						
							e formul							
							ations.							
Unit II	This course is	This course is	This course is	This	Their	This	This	This	-	-	-	Ens	Insti	Corpor
	intended to	intended to	intended to	course is	pharm	course	course	course is				ure	tuti	ate/Co
	provide	provide	provide	intended	aceuti	knowl	is	designed				heal	onal	mpany
	fundamental	fundamental	fundamental	to	cal	edge ·	design	to				thy	Rest	Trips/P
	information	information on	information	provide	indust	gives	ed to	teach o				live	ruct	rojects
	on different	different	on different	fundame	ry/res	you	teach	n				S1	urin	
	Mucosal	Mucosal Drug	Mucosal Drug	ntal	earch	the	basic	various				and	g	
	Drug	Delivery system /Microcapsulatio	Delivery	informati	depart	ability to	inform ation	conventi onal				pro	and Con	
	Delivery system	n/implantable	system /Microcapsula	on on different	ment (natio	to build	on	drug				mot e	soli	
	/Microcapsul	drug delivery	tion/implantab	Mucosal	nal/int	a	variou	delivery				well	dati	
	/ wiiciocapsul	arug derivery	1011/1111prantau	mucosai	mai/mit	u	variou	ach ver y				WCII	uati	

ation/implant able drug delivery system with local relevance and development al requirements. They can create novel dosage forms.	system with regional relevance and developmental requirements. They can create novel dosage forms.	le drug delivery system with national relevance and developmenta l requirements. They can create novel dosage forms.	Drug Delivery system /Microca psulation /implanta ble drug delivery system with global relevanc e and develop mental requirem ents. They can create novel dosage forms.	ernati onal) has a wide choice of career opport unitie s.	pharm aceuti cal medic ation devel oping firm on a nation al and world wide scale.	s conventional drug delivery systems/controlled drug delivery systems with local relevance and development needs.	systems/ controlle d drug delivery systems with local relevanc e and develop ment needs. They have the ability to develop unique dosage formulat ions.		bein g for all at all ages (SD G 3)	on (10. 1- 10.1 4)	
_			e and		wide	syste	They				
			mental requirem		searc.	with local	ability to develop				
			They can create			nce and	dosage formulat				
			dosage			pment	ions.				
			101111			They have					
						the ability to					
						develo p					
						unique dosag e					
						formul ations.					

Unit III	This course is	This course is	This course is	This	Their	This	This	This	_	l <u>-</u>	_	Ens	Insti	Corpor
	intended to	intended to	intended to	course is	pharm	course	course	course is				ure	tuti	ate/Co
	provide	provide	provide	intended	aceuti	knowl	is	designed				heal	onal	mpany
	fundamental	fundamental	fundamental	to	cal	edge	design	to				thy	Rest	Trips/P
	information	information on	information	provide	indust	gives	ed to	teach o				live	ruct	rojects
	on different	different	on different	fundame	ry/res	you	teach	n				S	urin	5
	Transdermal	Transdermal	Transdermal	ntal	earch	the	basic	various				and	g	
	Drug	Drug Delivery	Drug Delivery	informati	depart	ability	inform	conventi				pro	and	
	Delivery	Systems /	Systems /	on on	ment	to	ation	onal				mot	Con	
	Systems /	Gastroretentive	Gastroretentiv	different	(natio	build	on	drug				e	soli	
	Gastroretenti	drug delivery	e drug	Transder	nal/int	a	variou	delivery				well	dati	
	ve drug	systems/	delivery	mal Drug	ernati	pharm	s	systems/				_	on	
	delivery	Nasopulmonary	systems/	Delivery	onal)	aceuti	conve	controlle				bein	(10.	
	systems/	drug delivery	Nasopulmona	Systems	has a	cal	ntiona	d drug				g	Ì-	
	Nasopulmona	system with	ry drug	/	wide	medic	1 drug	delivery				for	10.1	
	ry drug	regional	delivery	Gastroret	choice	ation	delive	systems				all	4)	
	delivery	relevance and	system with	entive	of	devel	ry	with				at		
	system with	developmental	national	drug	career	oping	syste	local				all		
	local	requirements.	relevance and	delivery	opport	firm	ms/co	relevanc				ages		
	relevance and	They can create	developmenta	systems/	unitie	on a	ntrolle	e and				(SD		
	development	novel dosage	1	Nasopul	s.	nation	d drug	develop				G 3)		
	al	forms.	requirements.	monary		al and	delive	ment						
	requirements.		They can	drug		world	ry	needs.						
	They can		create novel	delivery		wide	syste	They						
	create novel		dosage forms.	system		scale.	ms	have the						
	dosage			with			with	ability to						
	forms.			global			local	develop						
				relevanc			releva	unique						
				e and			nce	dosage						
				develop			and	formulat						
				mental			develo	ions.						
				requirem			pment							
				ents.			needs.							
				They can			They							
				create			have							

				novel			the							
				dosage			ability							
				forms.			to							
							develo							
							p							
							unique							
							dosag							
							e							
							formul							
							ations.							
Unit IV	This course is	This course is	This course is	This	Their	This	This	This	-	-	-	Ens	Insti	Corpor
	intended to	intended to	intended to	course is	pharm	course	course	course is				ure	tuti	ate/Co
	provide	provide	provide	intended	aceuti	knowl	is	designed				heal	onal	mpany
	fundamental	fundamental	fundamental	to	cal	edge	design	to				thy	Rest	Trips/P
	information	information on	information	provide	indust	gives	ed to	teach o				live	ruct	rojects
	on different	different	on different	fundame	ry/res	you	teach	n				S	urin	
	Targeted	Targeted drug	Targeted drug	ntal	earch	the	basic	various				and	g	
	drug Delivery	Delivery with	Delivery with	informati	depart	ability	inform	conventi				pro	and	
	with local	regional	national	on on	ment	to	ation	onal				mot	Con	
	relevance and	relevance and	relevance and	different	(natio	build	on	drug				e	soli	
	development	developmental	developmenta	Targeted	nal/int	a	variou	delivery				well	dati	
	al	requirements.	1	drug	ernati	pharm	S	systems/				-	on	
	requirements.	They can create	requirements.	Delivery	onal)	aceuti	conve	controlle				bein	(10.	
	They can	novel dosage	They can	with	has a	cal	ntiona	d drug				g	1-	
	create novel	forms.	create novel	global	wide	medic	l drug	delivery				for	10.1	
	dosage		dosage forms.	relevanc	choice	ation	delive	systems				all	4)	
	forms.			e and	of	devel	ry	with				at		
				develop	career	oping	syste	local				all		
				mental	opport	firm	ms/co	relevanc				ages		
				requirem	unitie	on a	ntrolle	e and				(SD		
				ents.	s.	nation	d drug	develop				G 3)		
				They can		al and	delive	ment						
				create		world	ry	needs.						
				novel		wide	syste	They						
				dosage		scale.	ms	have the						

				forms.			with	ability to						
							local	develop						
							releva	unique						
							nce	dosage						
							and	formulat						
							develo	ions.						
							pment	101101						
							needs.							
							They							
							have							
							the							
							ability							
							to							
							develo							
							p							
							unique							
							dosag							
							e							
							formul							
							ations.							
Unit v	This course is	This course is	This course is	This	Their	This	This	This	-	-	-	Ens	Insti	Corpor
	intended to	intended to	intended to	course is	pharm	course	course	course is				ure	tuti	ate/Co
	provide	provide	provide	intended	aceuti	knowl	is	designed				heal	onal	mpany
	fundamental	fundamental	fundamental	to	cal	edge	design	to				thy	Rest	Trips/P
	information	information on	information	provide	indust	gives	ed to	teach o				live	ruct	rojects
	on different	different Ocular	on different	fundame	ry/res	you	teach	n				S	urin	
	Ocular Drug	Drug Delivery	Ocular Drug	ntal	earch	the	basic	various				and	g	
	Delivery	Systems with	Delivery	informati	depart	ability	inform	conventi				pro	and	
	Systems with	regional	Systems with	on on	ment	to	ation	onal				mot	Con	
	local	relevance and	national	different	(natio	build	on	drug				e	soli	
	relevance and	developmental	relevance and	Ocular	nal/int	a	variou	delivery				well	dati	
	development	requirements.	developmenta	Drug	ernati	pharm	S	systems/				-	on	
	al .	They can create	1	Delivery	onal)	aceuti	conve	controlle				bein	(10.	
	requirements.	novel dosage	requirements.	Systems	has a	cal	ntiona	d drug				g	1-	
	They can	forms.	They can	with	wide	medic	1 drug	delivery				for	10.1	

					1 11			11	1)	
create novel	create novel	global	choice	ation	delive	systems		all	4)	
dosage	dosage forms.	relevanc	of	devel	ry	with		at		
forms.		e and	career	oping	syste	local		all		
		develop	opport	firm	ms/co	relevanc		ages		
		mental	unitie	on a	ntrolle	e and		(SD		
		requirem	S.	nation	d drug	develop		G 3)		
		ents.		al and	delive	ment		ŕ		
		They can		world	ry	needs.				
		create		wide	syste	They				
		novel		scale.	ms	have the				
		dosage			with	ability to				
		forms.			local	develop				
		TOTHIS.			releva	unique				
					nce	dosage				
					and	formulat				
					develo	ions.				
						ions.				
					pment					
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					They					
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					unique					
					dosag					
					e					
					formul					
					ations.					

BP 705 P	Instrumental Methods of Analysis (Practical)	L	T	P	C
Version 2.0		0	0	4	2
<b>Total Contact Hours</b>	60 Hours				
Pre-requisites/Exposure	Analytical Chemistry-I Practical				
Co-requisites					
	Course Object	ives			

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

- 1. Quantitative & Qualitative Analysis of drugs using various analytical instruments.
- 2. Demonstration of HPLC instrument
- 3. Separations of sugars and amino acids by chromatography.

#### **Course Outcomes (CO)**

- CO1. This subject deals with the practical knowledge of application of instrumental methods in qualitative analysis of drugs.
- CO2. This subject deals with the practical knowledge of application of instrumental methods in quantitative analysis of drugs.
- CO3. This subject is designed to impart a practical knowledge on the principles and instrumentation of spectroscopic techniques.
- CO4. This subject is designed to impart a practical knowledge on the principles and instrumentation of chromatographic techniques.
- CO5. This also emphasizes on practical knowledge on modern analytical instruments that are used for drug testing.

								Prog	gramm	e and Co	urse Ma	pping		
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	3	-	2	-	3	3	-	1	ı	•	3	2	3	2
CO2	3	-	2	-	3	3	-	1	-	-	3	2	3	2
CO3	3	-	2	-	3	3	-	1	-	-	3	2	3	2
CO4	3	-	2	-	3	3	-	1	-	-	3	2	3	2

CO5	3	-	2	-	3	3	-	1	-	-	3	2	3	2
					1=light	ly map	ped	2=	= mode	rately maj	pped	3=	strongly	napped

Unit	Relevance to the local, national, regional and global developmental needs				Relevance To the Employability/	Skill Development		Relevance to the Professional Ethics,	Gender, Human Values,	Sustainability		SDG	NEP	POE/4 <sup>th</sup> IR
	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I	-	-	Charact erizatio n of Drugs help in drug discove ry	-	Know ledge of UV spectr oscop y increa se the emplo	-	-	-	-	-	-	Skills for Decent Work; Research- related skills (SDG 4.4)	Profess ional Educat ion (17.1- 17.5); Promot ing Highj-	Techni cal Skills that match Industr y Needs/ Hands-

				yabilit y of the learne r in analyt ical sector like QA depart ment of Pharm aceuti cal comp anies						quality researc h (18.1- 18.9)	on Experie nce
Unit II	-		Learnin g of Techni ques help to discove r drugs	Know ledge of Infra red and colori metry spectr oscop y increa se the emplo yabilit y of		-	-	-	Skills for Decent Work; Research- related skills	Profess ional Educat ion (17.1-17.5); Promot ing Highj-quality researc h (18.1-18.9)	Techni cal Skills that match Industr y Needs/ Hands- on Experie nce

Unit III	-	-	Boost	-	the learne r in analyt ical sector like QA depart ment of Pharm aceuti cal comp anies	-	-	-	-	-	-	Skills for	Profess	Techni
			the diagnos is, prognos is and treatme nt of medical conditi on		ledge of HPLC and GLC increa se the emplo yabilit y of the learne r in analyt ical sector like							Decent Work; Research- related skills (SDG 4.4)	ional Educat ion (17.1- 17.5); Promot ing Highj- quality researc h (18.1- 18.9)	cal Skills that match Industr y Needs/ Hands- on Experie nce

			QA depart ment in metho d devel opme nt and valida tion									
Unit IV		Help in drug estmati on	Know ledge of HPLC increa se the emplo yabilit y of the learne r in analyt ical sector like QA depart ment in metho d devel	-	-	-	-	-	-	Skills for Decent Work; Research- related skills (SDG 4.4)	Profess ional Educat ion (17.1-17.5); Promot ing Highj-quality researc h (18.1-18.9)	Techni cal Skills that match Industr y Needs; Skill Develo pment

			opme nt and valida tion						
Unit v	d d r d n b ii	Help in - drug discove by & develop ment by mhibiting enzyme	Know ledge of GLC increa se the emplo yabilit y of the learne r in analyt ical sector like QA depart ment in metho d devel opme nt and valida tion	-			Skills for Decent Work; Research- related skills (SDG 4.4)	Profess ional Educat ion (17.1-17.5); Promot ing Highj-quality researc h (18.1-18.9)	Techni cal Skills that match Industr y Needs/ Hands- on Experie nce

# **Semester-VIII**

BP801T	Biostatisitcs and Research Methodology (Theory)	L	Т	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure					
Co-requisites	Any analytical Software				
	Course Objectives				

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

- 1. Know the operation of M.S. Excel, SPSS, R and MINITAB ®, DoE (Design of Experiment)
- 2. Know the various statistical techniques to solve statistical problems.
- 3. Appreciate statistical techniques in solving the problems.

#### **Course Outcomes (CO)**

- CO1.To establish a formulation helping to predict one variable in terms of the other that is, correlation and linear regression.
- CO2. To understand of Parametric and Non-Parametric models for developing relevant inferences on associated parameters
- CO3. To know advanced level topics in statistical inference on testing of statistical hypotheses for both randomized and non-randomized tests
- CO4. To use appropriate experimental designs to analyze the experimental data

								Progra	mme a	nd Course	Mappir	ng		
CO	PO1	PO2	PO3	PO4	PO5	PO6	<b>PO7</b>	PO8	PO9	PO 10	PO11	<b>PO12</b>	PSO 1	PSO 2

<b>CO1</b>	2			2	2							2	2	
CO2			2				2		2		2			
CO3	2			2	2							2	2	
CO4		2	2				2							
	1   2   2           2           2           2           2           2           2           2           2           2           2           2           3           3           3           4   <th< td=""><td>[</td><td>3=stro</td><td>ngly map</td><td>ped</td></th<>								[	3=stro	ngly map	ped		

U n i t	Relevance to	the local, national, regional and global developmenta I needs	O ologoon To	the Employability	Entrepreneur ship/ Skill Development	Professional Ethics, Gender, Human	values,	Environment &	SDG	NEP	POE/4 <sup>th</sup> IR
		Global	елиргоуаешту сли ергенеш эшр		Skill Development s	sional Ethics	Genuer Tillian Vanies	mnent & Sustamaonity			
U n i t		By understanding these statistical concepts and their application in addressing global needs, policymakers, researchers, and organizations can make evidence-based decisions, develop		develop solid for statistic techniquapplicat skills ar and can	y Unit I in skill oment provides a undation in al concepts, ues, and their tions. These he transferable benefit uals in various	-	-		SDG 9: Industry, Innovation, and Infrastructure:  The use of statistical techniques and concepts in pharmaceutical	Promoting High-quality research (18.1-18.9) By incorporating Unit 1 into the NEP, educational institutions can promote high-quality research by equipping students with robust research	

	targeted interventions, and monitor progress towards achieving global goals such as poverty reduction, improved healthcare, and sustainable development. Additionally, these concepts can contribute to improving data literacy and fostering critical thinking skills, enabling individuals to better understand and interpret information in an increasingly data-driven world.	professional domains, enabling them to analyze data effectively, make informed decisions, and contribute to evidence-based practices.			research and development supports innovation in the industry. Understanding measures of central tendency, dispersion, and correlation helps identify patterns, trends, and relationships in pharmaceutical data, leading to improved drug development processes, quality control, and innovation in healthcare.	methodologies, advanced data analysis techniques, and interdisciplinary problem-solving skills. This, in turn, fosters a research culture, promotes collaboration between academia and industry, and contributes to the achievement of SDG 18 by driving research excellence and innovation.	
U n i t	By applying these concepts in research, decision-making, and policy formulation, Unit II contributes to addressing global needs by enabling accurate predictions, quantifying uncertainty, making	 Overall, Unit II in skill development enhances individuals' statistical literacy, data analysis skills, and critical thinking abilities. These skills are transferable and valuable in a wide range of professional	-	-	 SDG 3: Good Health and Wellbeing: Biostatistics plays a crucial role in studying health- related outcomes, evaluating interventions, and	Promoting High-quality research (18.1-18.9) By incorporating Unit II into the NEP, educational institutions can promote high-quality research by equipping students with robust research	Sk ill E m be dd ed Co ur

	valid inferences, and		domains, including				monitoring public	methodologies,	se
	facilitating effective		research, healthcare,				health indicators.	advanced data analysis	s
	comparisons. These		finance, marketing, and				Research	techniques, and	De
	statistical tools are		policy analysis. Mastery				methodology helps	interdisciplinary	ve
	essential in fields such		of these concepts				in designing	problem-solving skills.	lo
	as public health,		enables individuals to				studies to assess	This, in turn, fosters a	p
	medicine, social		make evidence-based				health	research culture,	m
	sciences, and		decisions, conduct				interventions,	promotes collaboration	en
	environmental studies,		rigorous analyses, and				understand disease	between academia and	t
	helping tackle complex		contribute to informed				patterns, and	industry, and	
	global challenges and		decision-making				improve	contributes to the	
	improving the well-		processes.				healthcare	achievement of SDG 18	
	being of populations						delivery.	by driving research	
	worldwide.							excellence and	
								innovation.	
	By studying and		Unit III in skill	Maintaining				Promoting High-quality	Sk
	applying the concepts		development enhances	the				research (18.1-18.9)	ill
	covered in Unit III,		individuals' research	uniqueness				By incorporating Unit	E
U	individuals can		skills, data analysis and	and novelity				III into the NEP,	m
n	contribute to addressing		visualization abilities,	in research				educational institutions	be
i	global needs through		critical thinking, and	is of				can promote high-	dd
t	rigorous research, valid		understanding of	importance				quality research by	ed
-   -   -	data analysis, effective -	-	methodological	and ensures	- -	-   -	-	equipping students with	Co
	data presentation, and		considerations. These	ethical				robust research	ur
	the development of		skills are transferable	professionali				methodologies,	se
	ethical and well-		and valuable in various	sm as it				advanced data analysis	s
	designed clinical trials.		professional domains,	doesn't				techniques, and	De
	These skills are		including research,	favour the				interdisciplinary	ve
	essential in fields such		healthcare, academia,	manipulatio				problem-solving skills.	lo
	as healthcare, public		and policy analysis.	n and false				This, in turn, fosters a	p

	health, social sciences, and environmental studies, helping tackle global challenges and improve the well-being of individuals and communities worldwide.	Mastery of these concepts equips individuals to conduct rigorous research, effectively analyze and present data, and contribute to evidence-based decision-making processes.	represantation of data.		research culture, promotes collaboration between academia and industry, and contributes to the achievement of SDG 18 by driving research excellence and innovation.	m en t
U n i t 	By studying and applying the concepts covered in Unit IV, individuals gain skills in experimental design, regression modeling, and statistical analysis using popular software tools. These skills are applicable across various industries and research fields, addressing global needs by enabling more efficient processes, reliable predictions, and evidence-based decision-making. The practical knowledge	Overall, Unit IV contributes to skill development by equipping individuals with the necessary tools and knowledge to design experiments, analyze data, and make evidence-based decisions. These skills have broad applicability across industries and research fields, enabling individuals to address global needs by improving processes, making accurate predictions, and contributing to	-	 SDG 9: Industry, Innovation, and Infrastructure: Non-parametric tests and research methodology play a vital role in promoting innovation and improving infrastructure. By conducting research studies and analyzing data using non- parametric tests, industries can identify trends, patterns, and	Promoting High-quality research (18.1-18.9) By incorporating Unit IV into the NEP, educational institutions can promote high-quality research by equipping students with robust research methodologies, advanced data analysis techniques, and interdisciplinary problem-solving skills. This, in turn, fosters a research culture, promotes collaboration between academia and industry, and	Sk ill E m be dd ed Co ur se s De ve lo p m en t

	gained through this unit equips individuals to tackle complex challenges and contribute to advancements in fields such as manufacturing, healthcare, and environmental sustainability.	advancements in various domains.	relationships, leading to innovation in product development, process optimization, and infrastructure planning.	contributes to the achievement of SDG 18 by driving research excellence and innovation.	
U n i t	By studying and applying the concepts covered in Unit V, individuals gain skills in designing experiments, analyzing complex systems, and optimizing processes. These skills are valuable in addressing global needs by improving efficiency, reducing waste, enhancing product quality, optimizing resource utilization, and finding optimal solutions to complex problems in diverse fields such as manufacturing,	Overall, Unit V in skill development equips individuals with valuable skills in experimental design, analysis, and optimization. These skills are transferable and applicable across various industries and research fields, allowing individuals to address complex problems, optimize processes, and make data-driven decisions. Mastery of these concepts contributes to skill development by fostering critical	SDG 12: Responsible Consumption and Production:  The application of experimental design techniques promotes responsible consumption and production. By using factorial design and response surface methodology, industries can optimize resource utilization, reduce waste, and	Promoting High-quality research (18.1-18.9) By incorporating Unit V into the NEP, educational institutions can promote high-quality research by equipping students with robust research methodologies, advanced data analysis techniques, and interdisciplinary problem-solving skills. This, in turn, fosters a research culture, promotes collaboration between academia and industry, and contributes to the	Sk ill E m be dd ed Co ur se s De ve lo p m en t

healthcare, agriculture, and environmental sustainability.	thinking, problem- solving, and efficiency in experimental design and analysis.	improve the quality and efficiency of production processes, aligning with the principles of sustainable consumption and production.
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BP 802 T	Social and Preventive Pharmacy (Theory)	L	T	P	C						
Version 2.0		3	1	0	4						
<b>Total Contact Hours</b>	45 Hours										
Pre-requisites/Exposure	Pharmacology										
Co-requisites	o-requisites Remedial Biology										
	Course Objectives										

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

- 1. Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
- 2. Have a critical way of thinking based on current healthcare development.
- 3. Evaluate alternative ways of solving problems related to health and pharmaceutical issues

# **Course Outcomes (CO)**

# On completion of this course, the student will be able to:

CO1. The purpose of this course is to introduce to students number of health issues and their challenges.

CO2. Give information regarding Public health, preventive medicine, social medicine and community medicine their historical background. Giving information about the significance of food and its various components.

CO3. Tounderstand the various principles for the prevention and control of various diseases.

CO4.In this course introduced various National health programs like HIV, AIDS, TB, IDSP, NLCP, NMHP etc. and its objectives, functioning and their outcome

CO5. The roles of the pharmacist in the Community services in rural, urban and school health awareness program.

	Programme and Course Mapping													
СО														PSO 2
CO1														
CO2	CO2 2 2 2 2 2 1 1 1 2 1 1 1 1 1 1 1 1 1 1													
CO3	CO3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2													
CO4	CO4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2													
CO5	CO5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2													
	1=lightly mapped 2= moderately mapped 3=strongly mapped													

vance to the national, national, opmental	rance To loyability/ epreneursh xill lopment	vance to the ssional s. Gender, an Values, ronment & unability		/4 <sup>th</sup> IR
Releva local, 1 region global develo needs	Releva the Emplo Entrey ip/ Ski Develo	Releva Profes Ethics Huma Enviro Sustaii	SDG	NEP POE/4

	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability		
Unit	-		Provides basic understanding of public health, epidemiology, preventive care, and other social health-related ideas.	Become well aware of current difficulties with pharmaceutical s and health worldwide.			Promote the functions played by health professionals in public health initiatives.			Improve public health by providing services that contribute to the prevention, treatment and management of the disease.		Ensure healt hy lives and promote well being for all at all ages (SD G3)	 Global educatio n policy, Skill develop ment
Unit II	-1			Impart the knowledge on prevention and control of diseases along with their preventive and curative medicines available.			Develops the knowledge, skills, abilities, to use medicines in society in a scientific way			Encouraging patients to have healthy lives, advice on stress management and mental health, and they recommend seeking the appropriate medical help when necessary.		Ensu re healt hy lives and pro mote well	 Global educatio n policy, Skill develop ment

Hair		In a control by a control of a		Duin on the material		Duovides actions one	bein g for all at all ages (SD G3)	Clabal
Unit	 	Imparts knowledge about the aims, operations, and results of national health programmes to achieve the objective of Health for all		Brings the potential to solve new global health concerns like managing acute and chronic illnesses and health literacy		 Provides patient care services that optimize the use of medication and promotes health, wellness, and disease prevention	 Ensure healt hy lives and promote well being for all at all ages (SD G3)	 Global educatio n policy, Skill develop ment
Unit IV	 	Create awareness of National health intervention programmes available in India	 	 Develop a critical perspective based on recent advancements in healthcare.	<del></del>	 Helps in equity, dignity, informed decision-making, health and well-being, and social justice	 Ensu re healt hy lives and pro mote well - bein	 Global educatio n policy, Skill develop ment

ages   (SD
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BP 803 ET	Pharmaceutical Marketing Management (Theory)	L	Т	P	C
Version 2.0		3	1	0	4

<b>Total Contact Hours</b>	45 Hours
Pre-requisites/Exposure	Pharmaceutical Marketing
Co-requisites	Marketing

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

- 1. Understanding the marketing concepts and techniques and their applications in the pharmaceutical industry.
- 2. Explain the role of Industry competitive analysis, marketing mix and promotion strategy
- 3. To learn about price strategy, marketing distribution channel, sales distribution concepts in pharma marketing management
- 4. To learn and understand the principle and function of DPCO and NPPA authority for pharmaceutical product

# **Course Outcomes (CO)**

- CO1. In this topic is devoted the general questions of market concepts, including pharmaceutical, also understand the choice of physician and retail pharmacist.
- CO2. To learn and understand the product line and product mix decisions, product life cycle stage, product portfolio analysis; product positioning, marketing mix and promotion mix strategy in companies.
- CO3. To learn and understand the principle and function of DPCO and NPPA authority for better understanding essential commodities act.
- CO4. The knowledge of theoretical based marketing pricing, prices classification, demand, supply and prices and establishment of the price for the goals.

								Prog	gramm	e and Cor	ırse Ma	pping		
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	2			2	2								2
CO2	2	1	2			1	2		2		2			
CO3	2	2			2	2							2	
CO4		2	2				2							
					1=ligh	tly map	ped	2=	= moder	ately mar	ned	3=	strongly mapped	

BP 804 ET	Pharmaceutical Regulatory Science (Theory)	L	T	P	C	
Version 2.0		3	1	0	4	
<b>Total Contact Hours</b>	45 Hours					

<b>Total Contact Hours</b>	45 Hours		•	
Pre-requisites/Exposure	Pharmaceutics			
Co-requisites	Regulatory Sciences			

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

- 1. Know about the process of drug discovery and development
- 2. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
- 3. Know the regulatory approval process and their registration in Indian and International markets

#### **Course Outcomes (CO)**

## On completion of this course, the student will be able to:

CO1. This course is designed to impart the fundamental knowledge on the Origin, development, scope, objectives and nature of Pharmaceutical legislation in India.

CO2.A study of regulatory aspects that affect drug product design, manufacture and distribution in India with special emphasis on the following Acts / Laws (with latest amendments)

CO3.Need Product development stage documentation, factory procedures – Standard operating procedures (SOPs) and standard test Procedures (STPs).

CO4. Regulatory requirements for approval of new drugs, and drug products in regulated markets of India & other countries like US, EU, Japan, Australia, UK etc.

CO5.It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products

						Prog	ramm	e and (	Course	Map	ping			
СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			
CO3	2	2		2	2	2				2			2	
CO4			2	2		2	2	2				2		
CO5		2	2		2	2	2				2			2
	1=lightly mapped 2= moderately mapped 3=strongly mapped													

BP805ET	Pharmacovigilance (Theory)	L	Т	P	С
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Toxicology study				
Co-requisites	ADR				

# **Course Objectives**

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

- 1 Why drug safety monitoring is important?
- 2. History and development of pharmacovigilance

- 3. National and international scenario of pharmacovigilance
- 4. Dictionaries, coding and terminologies used in pharmacovigilance
- 5. Detection of new adverse drug reactions and their assessment problems

# **Course Outcomes (CO)**

- CO1.International standards for classification of diseases and drugs
- CO 2. Adverse drug reaction reporting systems and communication in pharmacovigilance
- CO 3. Methods to generate safety data during pre-clinical, clinical and post approval phases of drugs' life cycle
- CO 4. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation
- CO 5. Pharmacovigilance Program of India (PvPI) requirement for ADR reporting in India

								1	Prograi	mme a	nd Cou	rse Map	ping	
СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			
CO3	2	2		2	2	2				2			2	
CO4	2	2		2	2	2				2			2	
CO5	2	3	2	2	2	2	1			2			2	
		•			1=lig	htly m	apped		2= m	oderat	ely map	oed	3=str	ongly mapped

Unit	Relevance to the local, national, regional and global developmental	needs			Relevance To the Employability/ Entrepreneurship/ Skill Development			Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability				SDG	NEP	POE/4 <sup>th</sup> IR
Unit	Local	Regional	National	Students will be able to understand importance safety monitoring globally and also international terminologies used in this process.	By acquiring knowledge and experience in pharmacovigila nce, individuals can position themselves for a wide range of rewarding career opportunities within the healthcare and pharmaceutical	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability	SD G 3	(11. 1- 11.1 3)	Technical Skills that match Industry Needs/ Employabi lity

				sectors.					
Unit			Students will have understanding of International standards for classification of diseases and drugs, which is essential for pharmacovigilan ce professionals to effectively contribute to drug safety monitoring, regulatory processes, and public health protection on a global scale.	By acquiring proficiency in drug dictionaries, coding systems, and the establishment of pharmacovigila nce programs, individuals can enhance their employability in the field of pharmacovigila nce.			SD G 3	(17. 1- 17.5 )	Technical Skills that match Industry Needs/Co ding
Unit III	-	-	Students will gain necessary knowledge and skills, pharmacovigilan ce education which will contribute to the overall safety and effectiveness	Education and expertise in vaccine safety surveillance, pharmacovigila nce methods, and communication can significantly			SD G3	(17. 1- 17.5 )	Technical Skills that match Industry Needs/ Employabi lity

			of vaccines, thereby protecting public health on a global scale.	enhance employability in the field				
Unit IV	-	-	. Students will expertise methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle & ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilan ce planning	Education in safety data generation and ICH guidelines for pharmacovigila nce enhances employability by ensuring regulatory compliance.	Students will understand ethical considerations related to patient confidentiality, data protection, and the responsible use of information	SDG 3	(17. 1- 17.5 )	Technical Skills that match Industry Needs/ Project
Unit v		Students will have understandi ng CDSCO guidelines and pharmacovi gilance at the national level in India.	Students will understand and will develop skills for Drug safety evaluation in special population, pharmacogenomi cs of ADRs, & and the CIOMS guidelines and forms.	By possessing expertise in pharmacogeno mics, drug safety evaluation in special populations, CIOMS guidelines, CDSCO regulations, and understanding		SDG3	(17. 1- 17.5 )	Technical Skills that match Industry Needs/ Internship

		the differences					7
		in Indian and					
		global					
		pharmacovigila					
		nce					
		requirements,					
		individuals can					
		enhance their					
		employability					
		prospects in					
		various sectors					
		related to					
		pharmacovigila					
		nce					

BP 806 ET	Quality Control And Standardization Of Herbals (Theory)	L	T	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours			I	
Pre-requisites/Exposure	Herbal Drug Technology				
Co-requisites	Pharmacognosy & Phytochemistry				
	Course Objectives				
	ourse the student should be able to: s for quality control of herbal drugs				

- 2. Know Quality assurance in herbal drug industry
- 3. Know the regulatory approval process and their registration in Indian and international markets
- 4. Appreciate EU and ICH guidelines for quality control of herbal drugs

#### **Course Outcomes (CO)**

## On completion of this course, the student will be able to:

CO1.In this subject the student learns about the various methods and guidelines for evaluation and standardization of herbs and herbal drugs like Moisture Content, Ash Values, Determination of Extractive Value, Swelling Index, Hemolytic Activity etc.

CO2. The subject also provides an opportunity for the student to learn the quality assurance of crude drugs in herbal industry and follow the following guide line cGMP, GAP and GLP in traditional system of medicines.

CO3. Knowledge about the Quality control of following guideline like EU and ICH guidelines.

CO4. Knowledge about the stability testing of herbal medicines and application of various chromatographic techniques for evaluation of crude drugs.

CO5. Regulatory requirement for development of herbal medicine as per WHO guide lines.

						Pro	ogramı	ne and	Cours	se Ma	pping			
СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			2
CO3	2	2		2	2	2				2			2	
CO4	2	1	2			1	2		2		2		1	
CO5	2	1	2			1	2		2		2		2	2
			1=light	tly map	ped	2	2= mod	erately	mappe	ed	3=	strongl	y mapp	ed

Unit	Relevance to the	local, national,	developmental	needs	Relevance To the	Entrepreneurship/ Skill Develonment		Relevance to the	Professional Ethics,	Values,	Environment & Sustainability	SDG	NEP	POE/4 <sup>th</sup> IR
BP8 06E T	Local	Regional	National	The study of "Herbs as a raw material" provides students with knowledge about the medicinal properties and applications of herbs, enabling them to contribute to the development of natural remedies. Understanding "Biodynamic agriculture" promotes sustainable farming practices, benefiting the environment and human health. Exploring the "Indian system of medicine" offers students insights into traditional healing methods,	Employability	Entrepreneurship	The study of "Herbs as a raw material" helps students develop skills in identifying, cultivating, and processing medicinal plants, enhancing their knowledge of herbal remedies. "Biodynamic agriculture" provides students with skills in sustainable farming practices, organic cultivation, and holistic approaches to agriculture. The study of "Indian system of	Professional Ethics	Gender	Human Values	Environment & Sustainability	Rev itali ze the glob al part ners hip for sust aina	Prof essi onal Edu cati on (17. 1- 17.5 ) Pro mot	Techni cal Skills that match Industr y Needs, Entrepr eneursh ip, Employ

			expanding their understanding of healthcare practices worldwide. Overall, these studies equip students with diverse perspectives and skills for global health and sustainability.	medicine" equips students with knowledge of traditional healing methods, Ayurvedic principles, and herbal formulations, enhancing their understanding of holistic healthcare practices.		ble dev elop men t (Rol e of all Sch ools , KR MU ) (SD G 17)	ing Hig hj- qual ity rese arch (18. 1- 18.9	ability
Unit	-	-	The study of nutraceuticals, herbs in food, and herbs-drugs can greatly benefit students globally by providing them with a comprehensive understanding of natural health and wellness. This knowledge equips students with insights into the potential therapeutic properties of certain foods and herbs, enabling them to make informed dietary choices and explore alternative approaches to healthcare. Such understanding can enhance personal well-being and support their future professional endeavors in fields related to nutrition and holistic medicine.	Studying "Nutraceuticals" and "Herbs-Food & Herbs-Drugs" can help students in skill development by enhancing their understanding of natural remedies and their effects on health. It cultivates knowledge in the fields of nutrition, pharmacology, and herbal medicine, fostering critical thinking, research skills, and the ability to assess the safety and efficacy of these products. This knowledge equips students with valuable expertise in the growing field of alternative medicine.				Global Educati on Knowle dge ,

Unit			The study of herbal cosmetics, herbal	The study of herbal cosmetics,		1.a
III	_	-	excipients, and herbal formulations	herbal excipients, and herbal		Ens
111			<u> </u>			
			can benefit students globally by	formulation helps students		ure
			providing them with a comprehensive	develop skills in natural product		sign
			understanding of natural ingredients	development, formulation		ifica
			and their applications in the beauty	design, and understanding of		nt
			and pharmaceutical industries. This	herbal ingredients. It enhances		mob
			knowledge equips students with the	their knowledge of plant-based		iliza
			skills to develop and manufacture	remedies, extraction techniques,		tion
			effective, safe, and sustainable herbal	and quality control. These skills		of
			products, meeting the growing demand	enable students to excel in the		reso
			for natural alternatives worldwide.	field of cosmetic science,		urce
				pharmaceuticals, and herbal		S
				product development,		fro
				contributing to the growing		m a
				demand for natural and		vari
				sustainable beauty and		ety
				healthcare solutions.		of
						sour
						ces
Unit	-	-	The study of "Evaluation of Drug"	Studying the evaluation of	Ens	Tec
IV			helps students globally understand the	drugs, patenting and regulatory	ure	hnol
			process of testing and analysing the	requirements of natural products,	heal	ogy
			effectiveness and safety of drugs,	and regulatory issues helps	thy	Use
			ensuring their quality and efficacy.	students develop essential skills	live	&
			"Patenting and Regulatory	in the pharmaceutical and	S	Inte
			requirements of natural products"	biotechnology fields. These	and	grat
			educates students on legal aspects and	subjects provide knowledge	pro	ion
			protection of natural products.	about the process of evaluating	mot	(23.
			"Regulatory Issues" provides insight	drug efficacy and safety,	e	1-
			into the complex regulations	protecting intellectual property	well	23.1
			governing pharmaceuticals, preparing	rights, and navigating regulatory	_	3)
			students for careers in the global	frameworks. Such skills are	bein	
L	 1			2 2 2 2 2 2 2 2		

	healthcare industry.	development, and compliance within the healthcare industry.	g for all at all	
			ages (SD G 3) Ens ure sust	
			aina ble cons ump tion	
			and prod ucti on patt	
			erns (SD G 12)	
Unit	The study of "Schedule T - Good Manufacturing Practice of Indian systems of medicine" can help students globally by providing them with insights into the manufacturing practices and quality standards followed in the Indian systems of medicine. This knowledge can be	Good Manufacturing Practice of Indian systems of medicine" helps students in skill development by providing them with a comprehensive understanding of the manufacturing practices and	Ens Tec ure hnol sust ogy aina Use ble & cons Inte ump grat tion ion	Corpor ate Allianc es to provide Big Sister/ Big
	beneficial for students pursuing	quality standards specific to	and (23.	Brother

careers in pharmaceuticals, healthcare, or research, allowing them to understand and incorporate best practices from Indian medicine into their own work.	Indian systems of medicine. This knowledge equips them with the necessary skills to ensure the safety, efficacy, and quality of herbal medicines and traditional remedies, thereby enhancing their competence in the field.	prod 1- Connec tions on 3) patt erns (SD G
	their competence in the field.	12)

BP 807 ET	Computer aided drug design (Theory)	L	T	P	C					
Version 2.0		3	1	0	4					
<b>Total Contact Hours</b>	45 Hours									
Pre-requisites/Exposure	Computer application									
Co-requisites	Medicinal Chemistry									
	Course Objectives									
<b>Upon completion of this c</b>	ourse the student should be able to:									
1. Design and discovery of	of lead molecules									
2. The role of drug design	n in drug discovery process									
3. The concept of QSAR	and docking									
4. Various strategies to de	evelop new drug like molecules.   The design of new drug	molecules u	sing molecu	ılar modeling	g software					
Course Outcomes (CO)										
On completion of this course, the student will be able to:										
CO 1. The course offers to provide knowledge on history of computers in pharmaceutical research.										

- CO2. The course gives fundamental learning of basic computer skills required in pharmaceutical research and drug development.
- CO 3. This course is designed to impart knowledge on the principles of informatics as applicable to the drug development process.
- CO 4. The subject aims at imparting knowledge on computational modeling, and computer aided biopharmaceutical characterization.
- CO 5. The subject offers to develop an understanding of drug-product performance in

						Progr	amme	and C	ourse l	Mapp	ing			
СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			2
CO3	2	2		2	2	2				2			2	
CO4	2	1	2			1	2		2		2		1	
CO5	2	1	2			1	2		2		2		2	2
1=ligh	1=lightly mapped 2= moderately mapped 3=strongly mapped													

Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	NEP POE/4 <sup>th</sup> IR	
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	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit		-	Drug discovery boost the economy of country		1	-	Activities on online available computational soft wares like autodock		1			Skills for Decent Work; Research- related skills (case study, seminars and hands on training) (SDG 4.4)	Professional Education (17.1-17.5); Promoting Highj- quality research (18.1-18.9)	Technical Skills that match Industry Needs/ Hands-on Experience
Unit II	-	-	-	Learning of Techniques help to discover	-	-	Activities on online available computational soft wares	-	-	-	-	Skills for Decent Work; Research-	Professional Education (17.1-17.5); Promoting	Technical Skills that match Industry

				drugs			like schrodinger, discovery studio					related skills (case study, seminars and hands on training) (SDG 4.4)	Highj- quality research (18.1-18.9)	Needs/ Hands-on Experience
Unit			-	Target identification and validation help in drug discovery	-	-	on online available computational soft wares like schrodinger, discovery studio	-	-	-	-	Skills for Decent Work; Research- related skills (case study, seminars and hands on training) (SDG 4.4)	Professional Education (17.1-17.5); Promoting Highj- quality research (18.1-18.9)	Technical Skills that match Industry Needs/ Hands-on Experience
Unit IV	-	-	Molecular docking fastens the drug discovery for the	-	-	-	on online available computational soft wares like schrodinger, discovery	-	-	-	-	Skills for Decent Work; Research- related skills	Professional Education (17.1-17.5); Promoting Highj- quality	Technical Skills that match Industry Needs; Skill Development

Unit v	-	-	benefit of the country	Help in drug discovery & development by inhibiting enzymes		-	on online available computational soft wares like QSAR toolbox			-	-	(case study, seminars and hands on training) (SDG 4.4) Skills for Decent Work; Research-related skills (case study, seminars and hands on training) (SDG 4.4)	research (18.1-18.9)  Professional Education (17.1-17.5); Promoting Highj-quality research (18.1-18.9)	Technical Skills that match Industry Needs/ Hands-on Experience
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BP 808 ET	Cell and molecular biology (Theory)	L	Т	P	C
Version 2.0		3	1	0	4

<b>Total Contact Hours</b>	45 Hours
Co-requisites	

#### **Course Objectives**

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

- 1. Explain the receptor signal transduction processes.
- 2. Explain the molecular pathways affected by drugs.
- 3. Appreciate the applicability of molecular pharmacology and biomarkers in drug discovery process.
- 4. Demonstrate molecular biology techniques as applicable for pharmacology

#### **Course Outcomes (CO)**

## On completion of this course, the student will be able to:

- CO1. The subject imparts a fundamental knowledge on the structure and functions of cellular components and help to understand the interaction of these components with drugs.
- CO2. The subject also designed to impart knowledge about the various cell death pathways.
- CO3. It helps in detail understaning of molecular biology techniques like western blotting and PCR
- CO4. The students will be able to undesrstand about the cell culture techniques.
- CO5. This information will further help the student to apply the knowledge in drug discovery process.

	Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO	PO11	PO12	PSO	PSO 2
										10			1	
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			3

CO3	2	2		2		2				2			2	
CO4		1			2	1	2		2		2		1	
CO5	2	1	2			1	2		2		2		2	3
			1=light	ly map <sub>l</sub>	ped	2	2= mod	erately	mappe	d	3=	strongly	mapp	ed

Uni	Releva	ance to the	local, nat	ional, regional and	Releva	ance To the Emplo	oyability/	Rel	evance	to	SDG	NE	POE/4 <sup>th</sup> IR
t	global	developm	ental need	ds	Entrepre	neurship/ Skill De	evelopment		the			P	
								Pro	fession	nal			
								I	Ethics,				
									ender,				
									Human				
									/alues,				
									vironm				
									t &				
								Sus	tainabi	ilit			
									у				
	Loca	Region	Nation	Global	Employabili	Entrepreneursh	Skill		Ĭ				
	1	al	al		ty	ip	Development						

Uni		Student will able		Pharmacology		(SD	(9.1	Global
t I		to know general		as a discipline		G	_	Education
		pharmacology is		has		4.4)	9.3)	Knowledge,
		crucial for		significantly				Skill
		ensuring the		contributed to				Developmen
		safe, effective,		skill				t,
		and rational use		development				Employabili
		of drugs		in various				ty
		globally. It		aspects of				
		informs drug		drug therapy.				
		regulation,		It has				
		promotes		provided the				
		rational drug use,		knowledge,				
		contributes to		education, and				
		pharmacovigilan		training				
		ce efforts,		necessary for				
		supports global		healthcare				
		health initiatives,		professionals				
		informs		to understand				
		pharmacoecono		drug actions,				
		mic evaluations,		make				
		and fosters		informed				
		international		therapeutic				
		collaborations		decisions,				
		and research in		ensure drug				
		pharmacology.		safety, and				
Uni		The global		contribute to		(SD	(9.1	Global
t II		impact of drugs		patient care.		G	-	Education
		targeting the		Skill		4.4)	9.3)	Knowledge,
		peripheral		development				Skill

	nervous system		in				Developmen
	is vast, with		pharmacology				t,
	applications in		continues				Employabili
	treating		through				ty
	autonomic		lifelong				
	disorders,		learning and				
	anesthesia,		interdisciplina				
	neuromuscular		ry				
	disorders and		collaboration,				
	research,		enabling				
	allowing		professionals				
	healthcare		to adapt to				
	professionals to		new				
	optimize patient		developments				
	outcomes by		and improve				
	leveraging their		patient				
	pharmacological		outcomes.				
	properties.		_				
Uni	The				(SD	(9.1	Global
t III	pharmacology of				G	-	Education
	drugs acting on				4.4)	9.3)	Knowledge,
	the central						Skill
	nervous system						Developmen
	has profound						t,
	various global						Employabili
	applications such						ty
	as neurological						
	and psychiatric						
	disorders, pain						
	management						

	su no	eep disorders, ubstance abuse, euro-protection						
Uni		ardiovascular				(SD	(9.1	Global
t IV		rugs have				G	-	Education
		xtensive global				4.4)	9.3)	Knowledge,
		pplications and						Skill
		re utilized in the						Developmen
		nanagement of						t,
		ypertension,						Employabili
		chemic heart						ty
		isease, heart						
		ailure,						
		rrhythmias,						
		romboembolic						
		iseases,						
		yslipidemia,						
		ulmonary						
		ypertension,						
		alvular heart						
		isease, and						
		econdary						
		revention						
		rategies. They						
		lay a critical						
		ole in improving						
		ardiovascular						
	he	ealth, reducing						

		morbidity and						
		mortality rates						
		associated with						
		cardiovascular						
		conditions						
Uni		Autacoids used				(SD	(9.1	Global
t v		to address				G	-	Education
		inflammatory				4.4)	9.3)	Knowledge,
		disorders,					1.0)	Skill
		manage pain,						Developmen
		treat						t,
		cardiovascular						Employabili
		disorders,						ty
		alleviate						
		gastrointestinal						
		and respiratory						
		conditions,						
		control allergic						
		and immune						
		responses,						
		address						
		reproductive						
		health issues,						
		and manage						
		renal disorders						

L T P
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BP 809 ET		Cos	metic sci	ence (T	neory)							
Version 2.0									3	1	0	4
Total Contact Hours	45 Hours											1
Herbal Drug Technology												
Co-requisites												
				Cou	rse Ob	jective	S					
Upon completion of this	course the st	udent sho	ould be al	ole to:								
1. Key ingredients used	n cosmetics	and cosme	eceuticals									
2. Key building blocks f	or various for	mulations	S.									
3. Current technologies	in the market											
4. Various key ingredier	ts and basic s	science to	develop c	osmetic	s and co	osmece	uticals	S				
5. Scientific knowledge	to develop co	osmetics a	and cosme	ceutical	s with o	desired	Safety	, stabili	ty, and e	fficacy.		
				Course	Outco	omes (C	<b>CO</b> )					
On completion of this co	ırse, the stud	lent will	be able to	) <b>:</b>								
CO1: To make the student	know about	the variou	s cosmeti	cs produ	cts, the	ir princ	ciples	& formu	ılation.			
CO2 T 1 1 1 1 1	1 , 1,1	c .:		. 11			,•	1		. 1		
CO2:To make the student	understand th	ie functioi	ning of na	turai nei	bs usin	g in co	smetic	es and co	smeceu	ticais		
CO3: To enable the studer	it with the kn	owledge o	of cosmeti	cs as per	Indian	and E	U regu	ılations.				
CO4: To make the student	know about	Principles	of Cosmo	etic Eval	uation.							
Programme and Course	Mapping											

CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			3
CO3	2	2		2		2				2			2	
CO4		1			2	1	2		2		2		1	
			1=light	ly map	ped		2= mod	erately	mappe	d	3=	strongly	mapp	ed

Unit	regio	Relevance to the local, national, regional and global Employability/ developmental needs Entrepreneurship/ Sk Development				eneurship/ Skill	Prof Go Valu	essior ender, es, En	ce to t nal Eth Huma viron inabili	nics, an ment	SDG	NEP	POE/4 <sup>th</sup> IR	
Unit	. Local	' Regional	' National	Ulopal Individual know	Employability	Entrepreneurship	Skill Development wow well about	Professional Ethics	Gender	Human Values	Environment & Sustainability	Revitalize the global	Professional Education	Technical Skills that match
1				Regulation/ provisions for import,			nation & international Regulations for					partnership for sustainable development	(17.1-17.5) Promoting Highj- quality	Industry Needs, Entrepreneurship, Employability

Unit	-	-	manufacture and sale of different cosmetics product know different health related issues, their preventive requirement & their improvement.	import, export, manufacture & sales of cosmoceuticals  scientific knowledge, of different body conditions and their preventive requirement ts.		S	Role of all Schools, KRMU) SDG 17)	research (18.1-18.9)	Global Education Knowledge
Unit	-	-	Individual may know different ingredients used in cosmetic formulation and their properties cosmetics and their requirements	Scientific Knowledge about ingredients, their properties and use in cosmeceuticals.		s: n o fr	.a Ensure ignificant nobilization of resources rom a rariety of ources		
Unit IV	-	-	Proper & best utilization of natural resources in formulating different cosmeceutical	Increase in skill of an individual and personals.		h a w fe a ()	Ensure lealthy lives and promote vell-being for all at all leges SDG 3) Ensure	Technology Use & Integration (23.1- 23.13)	Focus on Employability Skills (Local/Regional and Global)

		products				sustainable consumption and production patterns (SDG 12)		
Unit		Proper & best utilization of natural resources in cosmeceutical.	Better utilization of different Natural resources in health and beauty care.			Ensure sustainable consumption and production patterns (SDG 12)	Technology Use & Integration (23.1- 23.13)	Corporate Alliances to provide Big Sister/Big Brother Connections

BP 810 ET	Experimental Pharmacology (Theory)	L	Т	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours				
Pre-requisites/Exposure	Pharmacology and Toxicology				
Co-requisites	HAP-I				
	Course Objectives				
<b>Upon completion of this c</b>	ourse the student should be able to:				
1. Appreciate the applicat	tions of various commonly used laboratory animals.				

- 2. Appreciate and demonstrate the various screening methods used in preclinical research
- 3. Appreciate and demonstrate the importance of biostatistics and research methodology
- 4. Design and execute a research hypothesis independently

## Course Outcomes (CO)

#### On completion of this course, the student will be able to:

CO1. This subject is designed to impart fundamental knowledge about the pharmacological experiments, animal's handlings and about different animals used in the experimental pharmacology.

CO2.It imparts the practical knowledge on molecular biology techniques

CO3. It helps the students to learn about different roots a drug administration and methods of blood withdrawal

CO4. The subject also designed to impart knowledge about the regulatory bodies governing experiments on animals like CPCSEA.

	Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			2
CO3	2	2		2	2	2				2			2	
CO4	2	1	2			1	2		2		2		1	
1=ligh	tly ma	pped	2= moderat	ely maj	pped	ı	3=stro	ngly m	napped	ı			1	

Unit	Relevance to the local, national, regional and global developmental needs	Relevance To the Employability/ Entrepreneurship/ Skill Development	Relevance to the Professional Ethics, Gender, Human Values, Environment & Sustainability	9ds	NEP	POE/4 <sup>th</sup> IR	
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	Local	Regional	National	Global	Employability	Entrepreneurship	Skill Development	Professional Ethics	Gender	Human Values	Environment & Sustainability			
Unit I				This unit covers the practical approaches of animal experimentation in labs Skill development			Hands on training of different techniques, s that students can learn the in vivo, ex vivo and in vitro techniques					Skills for Decent Work (SDG 4.4)		Soft Skills
Unit II		-	-	Different instruments are used n measurement of BP, Skill development			Hands on training of different techniques					-	-	Soft Skills

Unit III	-	-	-	Hands on training of different techniques	Hands on training of different techniques			Skills Decent (SDG 4.4	for Work )	Effective Governance & Leadership (19.1- 19.5)	Skill Development
Unit IV	-	-	-	Skill development				-		-	Skill Development
Unit v				Designing of In silico studies helps the students to get the training on lead optimization Skill development	Hands on training of different techniques			Revitalize global partnersh sustainab developm (Role of Schools, KRMU) (SDG 17)	ip for le nent of all	Transforming the Regulatory System (20.1-20.15)	Soft Skills

BP 811 ET	Advanced Instrumentation Techniques (Theory)	L	Т	P	C											
Version 2.0		3	1	0	4											
<b>Total Contact Hours</b>	45 Hours				I											
Pre-requisites/Exposure	Pharmaceutical Analysis															
Co-requisites																
	Course Objectives			Course Objectives												

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

- 1. Appreciate the applications of various commonly used laboratory animals.
- 2. understand the advanced instruments used and its applications in drug analysis
- 3. Understand the chromatographic separation and analysis of drugs.
- 4. Understand the calibration of various analytical instruments
- 5. Know analysis of drugs using various analytical instruments.

#### **Course Outcomes (CO)**

## On completion of this course, the student will be able to:

CO1: Theory and practical knowledge of UV spectrophotometer and IR spectrophotometer.

CO2: The analysis of various drugs in single and combination dosage forms by various spectroscopic and chromatographic techniques.

CO3: Understanding NMR and Mass spectroscopy.

CO4: Theoretical and practical skills of the instruments.

	Programme and Course Mapping													
СО	CO PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO PO11 PO12 PSO PSO 2													
CO1	CO1 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2													
CO2	2	1	2			1	2		2		2			2
CO3	2	2		2	2	2				2			2	
CO4	2	1	2			1	2		2		2		1	
			1=light	ly map	ped	2	2 = mod	erately	mappe	d	3=	strongl	y mapp	ed

Ţ	Jnit	Relevance to the	Relevance to the local, national, regional and global developmental needs				Employability/ Entrepreneurship/	Skill Development		Relevance to the	Protessional Ethics, Gender,	Human Values, Environment & Sustainability		SDG	NEP	POE/4 <sup>th</sup> IR
UII	Jnit	' Local	' Regional	National	identification, characterization and quantification of drugs using UV-Visible spectroscopy, IR, Spectroflourimetr y and Flame emission spectroscopy and Atomic absorption	Employability	. Entrepreneurship	Theoretical practical of instruments	skills the	Professional Ethics	' Gender	Right Conduct, Truth Contains values like accuracy, fairness, honesty, justice, quest for knowledge, determination	' Environment & Sustainability	Skills for Decen t Work (SDG 4.4)	Professiona 1 Education (17.1-17.5)	Skill Development

				spectroscopy										
Unit II		-	-	Identification, characterization and quantification of drug using NMR Spectroscopy.	-	-	The analysis of various drugs in single and combination dosage form, Theoretical and practical skills of the instruments	-	-	Right Conduct and Truth	-	Skills for Decen t Work (SDG 4.4)	Professiona 1 Education (17.1-17.5)	Skill Development
Unit III		-	-	Identification, characterization and quantification of drug using Mass Spectroscopy.	-	-	Theoretical and practical skills of the instruments	-	-	Right Conduct and Truth	-	Skills for Decen t Work (SDG 4.4)	Professiona 1 Education (17.1-17.5)	Skill Development
Unit IV		-	-	Quantitative and Qualitative analysis of Drugs using Chromatographic techniques.	-	-	The analysis of various drugs in single and combination dosage form using Chromatographi c techniques.	-	-	Right Conduct, accuracy, fairness, honesty, justice	-	Skills for Decen t Work (SDG 4.4)	Professiona 1 Education (17.1-17.5)	Employabilit y
Unit v	-	-	-	Use of Electrophoresis in		-	Quantitative analysis of	-	-	Right Conduct and	-	Skills for	Professiona 1 Education	Skill Development

	separation and	Drugs	Truth	Decen	(17.1-17.5)	
	Quantitative	21485		t	(17.11.17.10)	Employabilit
	analysis of Drugs			Work		y
				(SDG		
				4.4)		
Unit	Immunological	Develop skills		Skills	Professiona	Skill
-VI	assays in	for diagnosis of		for	1 Education	Development
	diagnosis of	diseases,		Decen	(17.1-17.5)	
	diseases,	therapeutic drug		t		
	therapeutic drug	monitoring,		Work		
	monitoring,	clinical		(SDG		
	clinical	pharmacokinetic		4.4)		
	pharmacokinetic	and				
	and	bioequivalence				
	bioequivalence	studies in drug				
	studies in drug	discovery and				
	discovery and	pharmaceutical				
	pharmaceutical	industries				
	industries.					

BP 812 ET	Dietary supplements and Neutraceuticals (Theory)	L	Т	P	C
Version 2.0		3	1	0	4
<b>Total Contact Hours</b>	45 Hours	I	L		
Pre-requisites/Exposure	Herbal Drug Technology				

Co-requisites	

# **Course Objectives**

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

1. Understand the need of supplements by the different group of people to maintain Healthy life.

## **Course Outcomes (CO)**

On completion of this course, the student will be able to:

- 1. Understand the need of nutrients by the different group of people to maintain Healthy life.
- 2. Understand the outcome of deficiencies in dietary supplements.
- 3. Appreciate the components in dietary supplements and the application.
- 4. Appreciate the regulatory and commercial aspects of dietary supplements including health claims

	Programme and Course Mapping													
СО	PO1	PO2	PO3	PO4	PO5			PO8			PO11	PO12	PSO 1	PSO 2
CO1	2	2		1	2	2		2		2			2	2
CO2	2	1	2			1	2		2		2			2
CO3	2	2		2	2	2				2			2	
CO4	2	1	2			1	2		2		2		1	
1=ligh	1=lightly mapped 2= moderately mapped 3=strongly mapped													

Unit	Relevance to the local, national, regional and global developmental	eeds			Relevance To the Employability/	Entrepreneurship/ Skill Development		Relevance to the Professional Ethics, Gender, Human	values, Environment &	Sustainability		SDG	NEP	POE/4 <sup>th</sup> IR
Unit	Local	Regional	National	Unders tand the need of nutrien ts by the differe nt group of people to maintai	Employability	Entrepreneurship	Skills related to Appreciate the componen ts in dietary supplemen ts and the application	Professional Ethics	Gender	B et e r Q a lit y of he rb al D ru	Environment & Sustainability	Skil ls for Dec ent Wor k (SD G 4.4)	Professional Education (17.1-17.5)	Global Educati on Knowle dge Techni cal Skills that match Industr y Needs, Skill

				n Health y life			gs			Develo pment
Unit				regulat ory and comme rcial aspects of dietary supple ments includi ng health claims			B et te r yi el d	Skil ls for Dec ent Wor k (SD G 4.4)	Professional Education (17.1-17.5)	Global Educati on Knowle dge Techni cal Skills that match Industr y Needs, Skill Develo pment
Unit III	-	-	-	-			E n vi ro n m en t co ns er vi ti o	Skil ls for Dec ent Wor k (SD G 4.4)	Professional Education (17.1-17.5)	Global Educati on Knowle dge Techni cal Skills that match Industr y Needs, Skill

							n			Develo pment
Unit IV	-	-	-				Tr ad	Skil ls	Prof essi	Global Educati
							iti	for	onal	on
							О	Dec	Edu	Knowle
							na	ent	cati	dge Techni
							l k	Wor	on (17.	cal
							n	k (SD	1-	Skills
							0	G	17.5	that
							w	4.4)	)	match
							le			Industr
							d			y
							ge			Needs,
										Skill
										Develo pment
Unit							N	Skil	Prof	Global
V							e	ls	essi	Educati
							w	for	onal	on
							er	Dec	Edu	Knowle
							dr	ent	cati	dge
							u	Wor	on	Techni
							gs fr	k	(17.	cal
							o l	(SD G	1- 17.5	Skills that
							m	4.4)	)	match
							na	/	'	Industr
							tu			y
							ra			Needs,

					1		Skill
					re		Skill Develo
					so		pment
					ur		
					ce		
					S		

BP 813 PW	Project work	L	Т	P	С
Version 2.0		0	0	12	6
<b>Total Contact Hours</b>	45 Hours				
Herbal Drug Technology					
Co-requisites					