



Children's Education Society (Regd.)

# The Oxford College of Pharmacy

(Recognized by the Govt. of Karnataka, Affiliated to Rajiv Gandhi University of Health Science, Karnataka;

Approved by Pharmacy Council of India, New Delhi)

Accredited by NAAC and International Accreditation Organization (IAO)

## COURSE OUTCOME REPORT

### Link for the B. Pharm Syllabus RGUHS.

[http://www.rguhs.ac.in/courses\\_rguhs/pharmacy\\_syllabus/Syllabus\\_B\\_Pharm-280818-415pm%20\(3\)%20\(1\).pdf](http://www.rguhs.ac.in/courses_rguhs/pharmacy_syllabus/Syllabus_B_Pharm-280818-415pm%20(3)%20(1).pdf)

### Link for the Pharm D Syllabus RGUHS.

<http://www.rguhs.ac.in/Authoritysection/2017/PharmD%20Regulations%20edited%20January%2019%202017.pdf>

### Link for the M. Pharm Syllabus

[http://www.rguhs.ac.in/courses\\_rguhs/pharmacy\\_syllabus/THIRD%20SEMESTER%20mpharma%20syllabus%20for%20research%20methodology-280818%20\(1\)%20\(1\).pdf](http://www.rguhs.ac.in/courses_rguhs/pharmacy_syllabus/THIRD%20SEMESTER%20mpharma%20syllabus%20for%20research%20methodology-280818%20(1)%20(1).pdf)

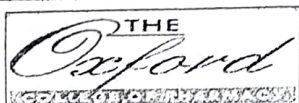
### Link for the Pharm D (PB) Syllabus

[http://www.rguhs.ac.in/cdc/2013-14/PharmD-PB-Revised-A-effective\\_form\\_2012-2013.pdf](http://www.rguhs.ac.in/cdc/2013-14/PharmD-PB-Revised-A-effective_form_2012-2013.pdf)

*P. Padma*  
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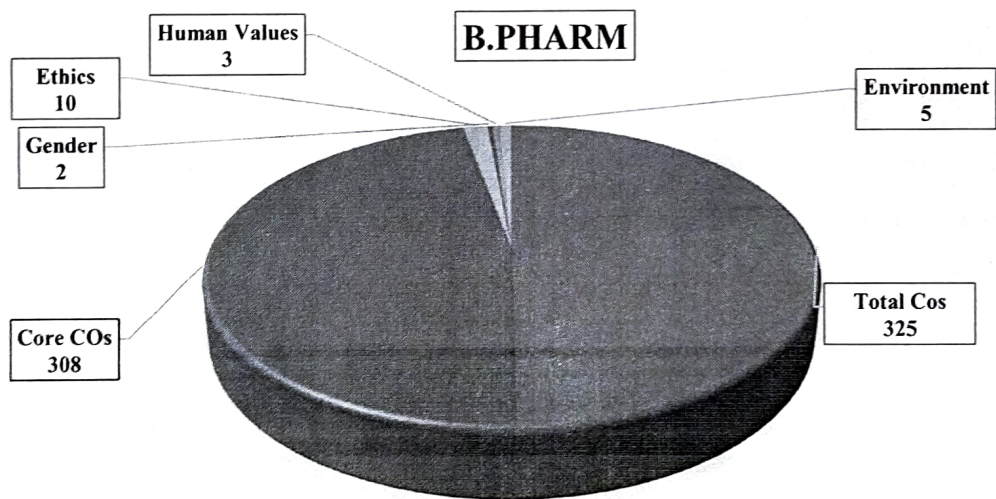
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Departmental wise - Course Outcome's (COs) with Cross cutting Issues –  
Academic year-2023-2024

Department	Total Cos	Core COs	Ethics	Gender	Human Values	Environment
B. Pharm	325	308	10	2	3	5
M. Pharm	80	65	9	0	3	3
Pharm D	124	97	7	0	1	0
<b>TOTAL</b>	<b>529</b>	<b>470</b>	<b>26</b>	<b>2</b>	<b>7</b>	<b>8</b>

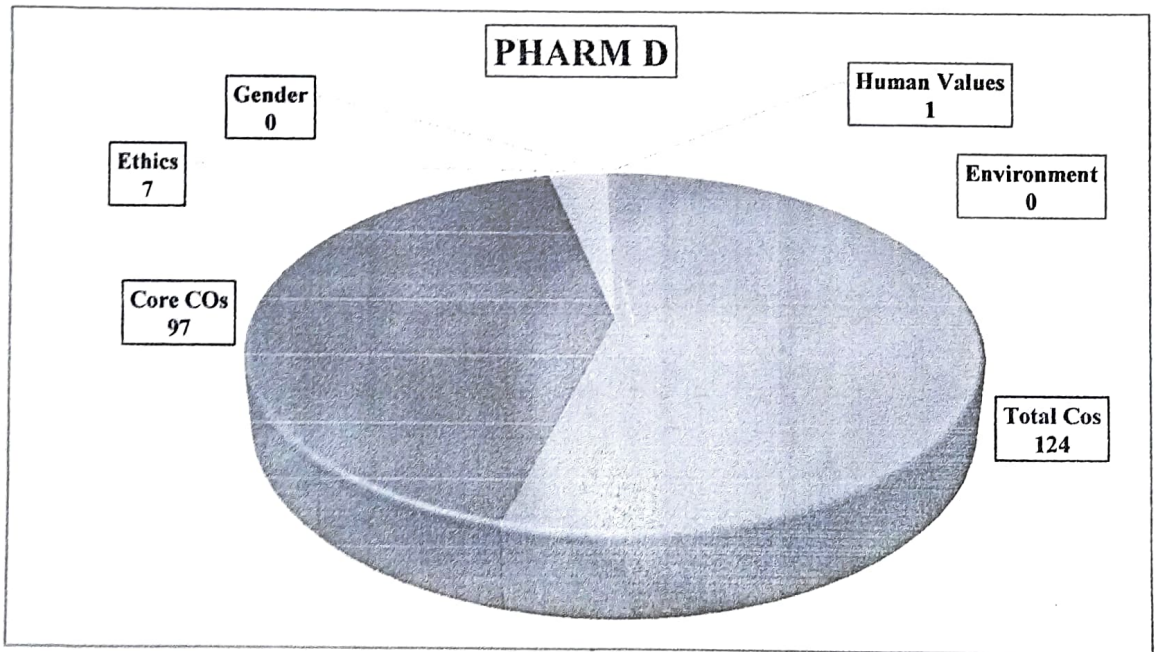
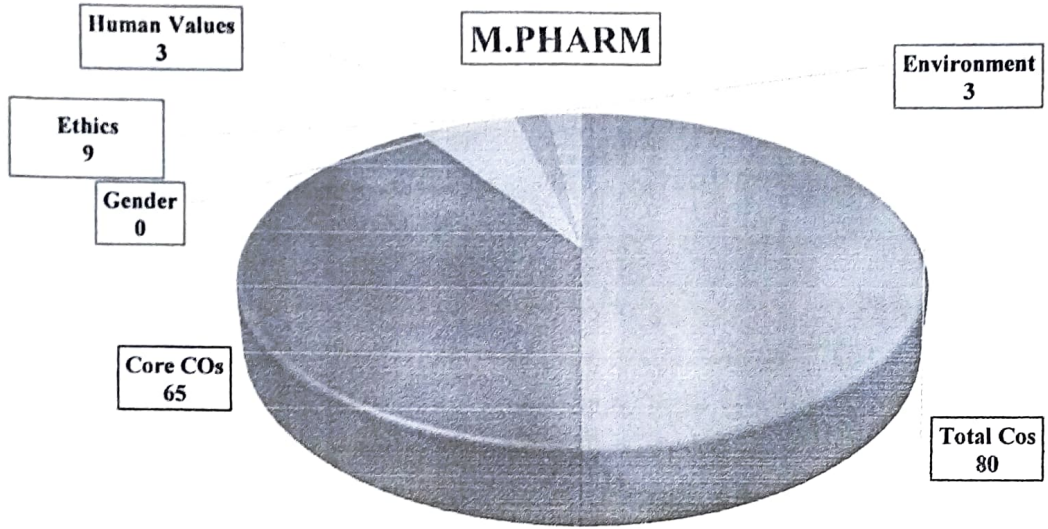




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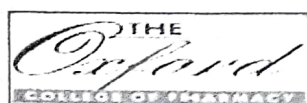
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The Oxford College of Pharmacy has a well-defined Course Outcomes for all course as per RGUHS Guideline. For the Academic Year 2023-2024 there is no change in the COs. Those Course Outcomes (COs) are what the student should be able to do at the end of a course. The most important aspect of those COs are that it should be observable and measurable.

Each COs are assessed by using Direct assessment tools that reflect the knowledge level and skills of the students based on their performance in Continuous Assessment Test, Assignments, Tutorials, Concept Test etc. This Direct assessment is taken to attain individual Course Outcomes (COs) as per the university guidelines. As University has not given any POs so partial attainment only done and no weightage attainment is calculated.

When assessing student learning, two of the most common approaches followed by college are formative and summative assessments. The uses of a formative assessment is to gauge student understanding and identify knowledge gaps that may need extra work. Summative assessments are conducted at the end of a defined learning period and often represent the final grade for the course.



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## Summary on Crosscutting Institution integrates crosscutting issues relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability into the Curriculum

The Oxford College of Pharmacy in Bangalore has incorporated a variety of courses into its curriculum, some of which aim to improve professional competencies and others of which aim to instil general competencies such as social ethical values, human values, environmental sensitivity, and so on, resulting in students' holistic development.

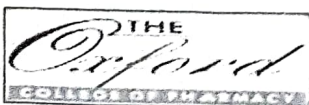
**Ethics** in education supports in educational system management and ensures that these behaviours contribute favourably to human well-being. The college has worked hard to provide value-based education to students in order to help them understand moral values and professional ethics, with the goal of strengthening values for a better citizen. Students in all pharmacy programmes are taught a variety of courses in order to instil and practise human values and professional ethics. Human values and professional ethics are addressed through the course "Pharmaceutical jurisprudence" offered in the V semester of UG programme.

**Gender equality** safeguards women and girls from harm. It is required for economic growth. The institution, imparting quality education to shape global leaders has firm belief in gender equity which is indispensable to ensure sustainable development of a country. To provide counselling to students, promote gender equity among students, and handle issues impacting the safety and security of female students, employees, and professors, the college has a Women's Grievance Cell.

**To enhance awareness of environmental and sustainability issues**, a variety of activities were organised for students from all programmes, including seminars, workshops, guest lectures, industry visits, and field excursions. The issues of Environment and Sustainability are addressed through the course "Environmental Studies" offered to Pharmacy students in the V semester as well.

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## SYLLABUS CROSS CUTTING

### B. PHARMACY

#### Semester I

Course code	Name of the course	No. of hours	Tutorial	Credit points
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
BP107P	Human Anatomy and Physiology- 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
<b>Total</b>		<b>32/34<sup>s</sup>/36<sup>#</sup></b>	<b>4</b>	<b>27/29<sup>s</sup>/30<sup>#</sup></b>

#### Semester II

Course Code	Name of the course	No. of hours	Tutorial	Credit points
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
<b>Total</b>		<b>32</b>	<b>4</b>	<b>29</b>

#### Semester III

*P. Padua*



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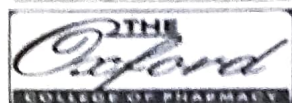
Course code	Name of the course	No. of hours	Tutorial	Credit points
BP301T	Pharmaceutical Organic Chemistry II – Theory	3	1	4
BP302T	Physical Pharmaceutics I – Theory	3	1	4
BP303T	Pharmaceutical Microbiology – Theory	3	1	4
BP304T	Pharmaceutical Engineering – Theory	3	1	4
BP305P	Pharmaceutical Organic Chemistry II – Practical	4	-	2
BP306P	Physical Pharmaceutics I – Practical	4	-	2
BP307P	Pharmaceutical Microbiology – Practical	4	-	2
BP 308P	Pharmaceutical Engineering – Practical	4	-	2
<b>Total</b>		<b>28</b>	<b>4</b>	<b>24</b>

## Semester IV

Course code	Name of the course	No. of hours	Tutorial	Credit points
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
<b>Total</b>		<b>31</b>	<b>5</b>	<b>28</b>

## Semester V

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP501T	Medicinal Chemistry II – Theory	3	1	4
BP502T	Industrial Pharmacy I – Theory	3	1	4



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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	4	-	2
BP507P	Pharmacology II – Practical	4	-	2
BP508P	Pharmacognosy and Phytochemistry II – Practical	4	-	2
<b>Total</b>		<b>27</b>	<b>5</b>	<b>26</b>

## semester VI

Course code	Name of the course	No. of hours	Tutorial	Credit points
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	4	-	2
BP608P	Pharmacology III – Practical	4	-	2
BP609P	Herbal Drug Technology – Practical	4	-	2
<b>Total</b>		<b>30</b>	<b>6</b>	<b>30</b>

## Semester VII

Course code	Name of the course	No. of hours	Tutorial	Credit points
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	-	2



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BP706PS	Practice School*	12	-	6
<b>Total</b>		<b>28</b>	<b>5</b>	<b>24</b>

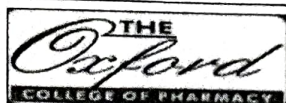
## Semester VIII

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP801T	Biostatistics and Research Methodology	3	1	4
BP802T	Social and Preventive Pharmacy	3	1	4
BP803ET	Pharma Marketing Management	3 + 3 = 6	1 + 1 = 2	4 + 4 = 8
BP804ET	Pharmaceutical Regulatory Science			
BP805ET	Pharmacovigilance			
BP806ET	Quality Control and Standardization of Herbals			
BP807ET	Computer Aided Drug Design			
BP808ET	Cell and Molecular Biology			
BP809ET	Cosmetic Science			
BP810ET	Experimental Pharmacology			
BP811ET	Advanced Instrumentation Techniques			
BP812ET	Dietary Supplements and Nutraceuticals			
BP813PW	Project Work	12	-	6
<b>Total</b>		<b>24</b>	<b>4</b>	<b>22</b>

## PHARM D

### FIRST YEAR

S. No	Name of Subject	No. of hours of Theory	No. of hours of Practical	No. of hours of Tutorial
(1)	(2)	(3)	(4)	(5)
1.1	Human Anatomy and Physiology	3	3	1
1.2	Pharmaceutics	2	3	1
1.3	Medicinal Biochemistry	3	3	1
1.4	Pharmaceutical Organic Chemistry	3	3	1
1.5	Pharmaceutical Inorganic Chemistry	2	3	1



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1.6	Remedial Mathematics/ Biology**	3	3*	1
	<b>Total Hours</b>	<b>16</b>	<b>18</b>	<b>6 = (40)</b>

### SECOND YEAR

S. No	Name of Subject	No. of hours of Theory	No. of hours of Practical	No. of hours of Tutorial
(1)	(2)	(3)	(4)	(5)
2.1	Pathophysiology	3	-	1
2.2	Pharmaceutical Microbiology	3	3	1
2.3	Pharmacognosy & Phytopharmaceuticals	3	3	1
2.4	Pharmacology-I	3	3	1
2.5	Community Pharmacy	2	-	1
2.6	Pharmacotherapeutics-I	3	3	1
	<b>Total Hours</b>	<b>17</b>	<b>12</b>	<b>6 = (32)</b>

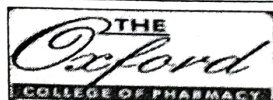
### THIRD YEAR

S. No	Name of Subject	No. of hours of Theory	No. of hours of Practical	No. of hours of Tutorial
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(1)	(2)	(3)	(4)	(5)
3.1	Pharmacology-II	3	3	1
3.2	Pharmaceutical Analysis	3	3	1
3.3	Pharmacotherapeutics-II	3	3	1
3.4	Pharmaceutical Jurisprudence	2	-	-
3.5	Medicinal Chemistry	3	3	1
3.6	Pharmaceutical Formulations	2	3	1
	<b>Total Hours</b>	<b>16</b>	<b>15</b>	<b>6 = (36)</b>

### FOURTH YEAR

S. No	Name of Subject	No. of hours of Theory	No. of hours of Practical	No. of hours of Tutorial
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(1)	(2)	(3)	(4)	(5)
4.1	Pharmacotherapeutics-III	3	3	1
4.2	Hospital Pharmacy	2	3	1
4.3	Clinical Pharmacy	3	3	1
4.4	Biostatistics & Research Methodology	2	-	1
4.5	Biopharmaceutics & Pharmacokinetics	3	3	1
4.6	Clinical Toxicology	2	-	1
	<b>Total Hours</b>	<b>15</b>	<b>12</b>	<b>6 = (33)</b>

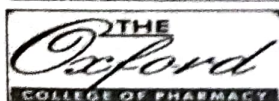
## FIFTH YEAR

S. No	Name of Subject	No. of hours of Theory	No. of hours of Practical	No. of hours of Tutorial
(1)	(2)	(3)	(4)	(5)
5.1	Clinical Research	3	-	1
5.2	Pharmacoepidemiology and Pharmacoconomics	3	-	1
5.3	Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring	2	-	1
5.4	Clerkship *	-	-	1

## FIRST PB

S. No	Name of Subject	No. of hours of Theory	No. of hours of Practical	No. of hours of Tutorial
(1)	(2)	(3)	(4)	(5)
1.1	Pharmacotherapeutics- I & II	3	3	1
1.2	Hospital & Community Pharmacy	3	3	1
1.3	Clinical Pharmacy	3	3	1
1.4	Biostatistics & Research Methodology	2	-	1
1.5	Clinical Toxicology	2	-	1
1.6	Pharmacotherapeutics-III	3	3	1
1.7	Biopharmaceutics & Pharmacokinetics	3	3	1
	<b>Total Hours</b>	<b>19</b>	<b>15</b>	<b>7 = (41)</b>

## SECOND PB



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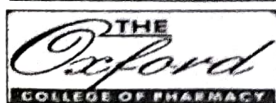
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(1)	(2)	(3)	(4)	(5)
2.1	Clinical Research	3	-	1
2.2	Pharmacoepidemiology and Pharmacoeconomics	3	-	1
2.3	Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring	2	-	1
2.4	Clerkship *	-	-	1
2.5	Project Work (Six Months)	-	20	-
	<b>Total Hours</b>	<b>8</b>	<b>20</b>	<b>4 = (32)</b>

## M.PHARM PHARMACEUTICS

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
<b>Semester I</b>					
MPA101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MPH101T	Modified Release Drug Delivery System	4	4	4	100
MPH102T	Modern Pharmaceutics	4	4	4	100
MPH103T	Pharmaceutical Regulatory Affair	4	4	4	100
MPH104P	Pharmaceutics Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	<b>Total</b>	<b>35</b>	<b>26</b>	<b>35</b>	<b>650</b>
<b>Semester II</b>					
MPH201T	Molecular Pharmaceutics(Nano Tech and Targeted DDS)	4	4	4	100
MPH202T	Advanced Biopharmaceutics & Pharmacokinetics	4	4	4	100
MPH203T	Computer Aided Drug Delivery System	4	4	4	100



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MPH204T	Cosmetic and Cosmeceuticals	4	4	4	100
MPH205P	Pharmaceutics Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
<b>Total</b>		<b>35</b>	<b>26</b>	<b>35</b>	<b>650</b>

## M.PHARM PHARMACOGNOSY

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
<b>Semester I</b>					
MPA101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MPG101T	Advanced Pharmacognosy-1	4	4	4	100
MPG102T	Phytochemistry	4	4	4	100
MPG103T	Industrial Herbal drug technology	4	4	4	100
MPG104P	Pharmacognosy Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
<b>Total</b>		<b>35</b>	<b>26</b>	<b>35</b>	<b>650</b>
<b>Semester II</b>					
MPG201T	Medicinal Plant biotechnology	4	4	4	100
MPG102T	Advanced Pharmacognosy-II	4	4	4	100
MPG203T	Indian system of medicine	4	4	4	100
MPG204T	Herbal cosmetics	4	4	4	100
MPG205P	Pharmacognosy Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
<b>Total</b>		<b>35</b>	<b>26</b>	<b>35</b>	<b>650</b>

## M.PHARM PHARMACOLOGY

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
<b>Semester I</b>					
MPA101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MPL101T	Advanced Pharmacology-I	4	4	4	100
MPL102T	Pharmacological and Toxicological Screening Methods-I	4	4	4	100
MPL103T	Cellular and Molecular Pharmacology	4	4	4	100
MPL104P	Pharmacology Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
<b>Total</b>		<b>35</b>	<b>26</b>	<b>35</b>	<b>650</b>
<b>Semester II</b>					
MPL201T	Advanced Pharmacology II	4	4	4	100



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Children's Education Society (Regd.)

# The Oxford College of Pharmacy

(Recognised by the Govt. of Karnataka, Affiliated to Rajiv Gandhi University of Health Sciences, Karnataka;

Approved by Pharmacy Council of India, New Delhi)

MPL102T	Pharmacological and Toxicological Screening Methods-II	4	4	4	100
MPL203T	Principles of Drug Discovery	4	4	4	100
MPL204T	Experimental Pharmacology practical- II	4	4	4	100
MPL205P	Pharmacology Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	<b>Total</b>	<b>35</b>	<b>26</b>	<b>35</b>	<b>650</b>

## M.PHARM III SEM (PHARMACEUTICS, PHARMACOGNOSY, PHARMACOLOGY)

Course Code	Course	Credit Hours	Credit Points
MRM101T	Research Methodology and Biostatistics*	4	4
-	Journal club	1	1
-	Discussion / Presentation (Proposal Presentation)	2	2
-	Research Work	28	14
	<b>Total</b>	<b>35</b>	<b>21</b>

## M.PHARM IV SEM (PHARMACEUTICS, PHARMACOGNOSY, PHARMACOLOGY)

Course Code	Course	Credit Hours	Credit Points
-	Journal Club	1	1
-	Research Work	31	16
-	Discussion/Final Presentation	3	3
	<b>Total</b>	<b>35</b>	<b>20</b>

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			COURSE OUTCOMES							
CLASS	COURSE	SLNO	COURSE OUTCOMES							
I SEM B.PHARM	Human Anatomy and Physiology -I	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.							
	Pharmaceutical Analysis-I	1	Understand the principles of volumetric and electro chemical analysis.							
		2	Carryout various volumetric and electrochemical titrations.							
		3	Develop analytical skills							
	Pharmaceutics-I	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 forms.							
	Pharmaceutical Inorganic Chemistry	1	Know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals							
		2	Understand the medicinal and pharmaceutical importance of inorganic compounds							
	Communication Skills	1	Understand the behavioural needs for a Pharmacist to function effectively in the areas of pharmaceutical operation							1
		2	Communicate effectively (Verbal and Non-Verbal)	1	1	1				
		3	Effectively manage the team as a team player			1				
		4	Develop interview skills	1						
		5	Develop Leadership qualities and essentials							
	Remedial Biology	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.								
Remedial Mathematics	1	Know the theory and their application in Pharmacy								
	2	Solve the different types of problems by applying theory								
	3	Appreciate the important application of mathematics in Pharmacy								

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II SEM B.PHARM	Human Anatomy and Physiology -II	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. Perform the haematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.						
		4							
		5	Appreciate coordinated working pattern of different organs of each system						
Pharmaceutical Organic Chemistry -I		6	Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body						
		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,						
Biochemistry		4	Identify/confirm the identification of organic compound.						
		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.						
Pathophysiology		3	Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.						
		1	Describe the etiology and pathogenesis of the selected disease states;						
		2	Name the signs and symptoms of the diseases;						
Computer Applications in Pharmacy		3	Mention the complications of the diseases						
		1	Know the various types of application of computers in pharmacy						
		2	Know the various types of databases						
Environmental Sciences		3	Know the various applications of databases in pharmacy						
		1	Create the awareness about environmental problems among learners.						
		2	Impart basic knowledge about the environment and its allied problems.					1	
		3	Develop an attitude of concern for the environment.					1	
		4	Motivate learner to participate in environment protection and environment improvement					1	



## III SEM B.PHARM/Pharmaceutical Organic Chemistry-II

- 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
- Physical Pharmaceutics -I
- 1 Understand various physicochemical properties of drug molecules in the designing the dosage form
  - 2 Know the principles of chemical kinetics & to use them in assigning expiry date for formulation
  - 3 Demonstrate use of physicochemical properties in evaluation of dosage forms.
  - 4 Appreciate physicochemical properties of drug molecules in formulation research and development
- Pharmaceutical Microbiology
- 1 Understand methods of identification, cultivation and preservation of various microorganisms
  - 2 Importance of sterilization in microbiology and pharmaceutical industry
  - 3 Learn sterility testing of pharmaceutical products.
  - 4 Microbiological standardization of Pharmaceuticals.
  - 5 Understand the cell culture technology and its applications in pharmaceutical industries.
- Pharmaceutical Engineering
- 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

## IV SEM B.PHARM/Pharmaceutical Organic Chemistry -III

- 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
- Medicinal Chemistry-I
- 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
- Physical Pharmaceutics -II
- 1 Understand various physicochemical properties of drug molecules in the designing the dosage form
  - 2 Know the principles of chemical kinetics & to use them in assigning expiry date for Formulation
  - 3 Demonstrate use of physicochemical properties in evaluation of dosage forms.
  - 4 Appreciate physicochemical properties of drug molecules in formulation research and Development
- Pharmacology-I
- 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
- Pharmacognosy and Phytochemistry -I
- 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
- Pharmaceutical Jurisprudence
- 1 The Pharmaceutical legislations and their implications in the development and marketing 2. Various Indian pharmaceutical Acts and Laws
  - 2 The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
  - 3 The code of ethics during the pharmaceutical practice

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V SEM B.PHARM	Medicinal Chemistry-III	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.							
		Pharmacology-III	1	Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases.						
			2	Comprehend the principles of toxicology and treatment of various poisonings and						
			3	Appreciate correlation of pharmacology with related medical sciences.						
		Herbal Drug Technology	1	Understand raw material as source of herbal drugs from cultivation to herbal drug product. 2. know the WHO and ICH guidelines for evaluation of herbal drugs.						
			2	Know the herbal cosmetics, natural sweeteners, nutraceuticals						
			3	Appreciate patenting of herbal drugs, GMP						
		Biopharmaceutics and Pharmacokinetic	1	Understand the basic concepts in biopharmaceutics and pharmacokinetics.						
			2	Use plasma data and derive the pharmacokinetic parameters to describe the process of drug absorption, distribution, metabolism and elimination.						
			3	Critically evaluate biopharmaceutic studies involving drug product equivalency						
			4	Design and evaluate dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.						
		Pharmaceutical Biotechnology	5	Detect potential clinical pharmacokinetic problems and apply basic pharmacokinetic principles to solve them						
			1	Understanding 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							
	Pharmaceutical Quality Assurance	4	Appreciate the use of microorganisms in fermentation technology							
		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 industries							
		4	Understand the responsibilities of QA & QC departments							
B.PHARM VII SEM	Instrumental Methods Of Analysis	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						1	
		Industrial Pharmacy	1	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 in India and US					1	
			4	Understand the approval process and regulatory requirements for drug products					1	
		Pharmacy Practice	1	Know various drug distribution methods in a hospital						
			2	Appreciate the pharmacy stores management and inventory control						
			3	Monitor drug therapy of patient through medication chart review and clinical review					1	
		4	Obtain medication history interview and counsel the patients							
		5	Identify drug related problems							
		6	Detect and assess adverse drug reactions						1	
		7	Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states							
		8	Know pharmaceutical care services							
		9	Do patient counselling in community pharmacy;							
		10	Appreciate the concept of Rational drug therapy							

B.PHARM VIII SE	Biostatistics and Research Methodology	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							
Social and Preventive Pharmacy		1	Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.						1	
		2	Have a critical way of thinking based on current healthcare development.						1	
		3	Evaluate alternative ways of solving problems related to health and pharmaceutical issues							1
Pharmaceutical Marketing		1	to provide an understanding of marketing concepts and techniques and the application of the same in the pharmaceutical industry							
		2	Know about the process of drug discovery and development							
Pharmaceutical Regulatory Science		1	Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals							
		2	Know the regulatory approval process and their registration in Indian and international markets							
		3	The importance of drug safety monitoring							
Pharmacovigilance		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							
		6	International standards for classification of diseases and drugs							
		7	Adverse drug reaction reporting systems and communication in pharmacovigilance							
		8	Methods to generate safety data during pre-clinical, clinical and post approval phases of drugs' life cycle							
		9	Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation							
		10	Pharmacovigilance Program of India (PvPI)							
		11	ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning							
		12	CIOMS requirements for ADR reporting							
		13	Writing case narratives of adverse events and their quality.							
		Quality Control and Standardisation of		1	WHO guidelines for quality control of herbal drugs					
2	Quality assurance in herbal drug industry									
3	The regulatory approval process and their registration in Indian and international markets									
4	Appreciate EU and ICH guidelines for quality control of herbal drugs									
Computer Aided Drug Design		1	Design and discovery of lead molecules							
		2	The role of drug design in drug discovery process							
		3	The concept of QSAR and docking							1
		4	Various strategies to develop new drug like molecules.							1

Cell and Molecular Biology	1	Summarize cell and molecular biology history							
	2	Summarize cellular functioning and composition							
	3	Describe the chemical foundations of cell biology							
	4	Summarize the DNA properties of cell biology							
	5	Describe protein structure and function							
	6	Describe cellular membrane structure and function							
	7	Describe basic molecular genetic mechanisms							
	8	Summarize the Cell Cycle							
Experimental Pharmacology	1	Appreciate the applications of various commonly used laboratory animals							1
	2	Appreciate and demonstrate the various screening methods used in preclinical research							1
	3	Appreciate and demonstrate the importance of biostatistics and research methodology							1
	4	Design and execute a research hypothesis independently							
Advanced Instrumentation Techniques	1	Understand the advanced instruments used and its applications in drug analysis							
	2	Understand the chromatographic separation and analysis of drugs							
	3	Understand the calibration of various analytical instruments							
	4	Know analysis of drugs using various analytical instruments							1



		2	Appreciate the important applications of mathematics in pharmacy.						
Pharm D	Pathophysiology	1	Describe the etiology and pathogenesis of the selected disease states;						
		2	Name the signs and symptoms of the diseases; and						
		3	Mention the complications of the diseases.						
Pharmaceutical Microbiology		1	Know the anatomy, identification, growth factors and sterilization of microorganisms;						
		2	Know the mode of transmission of disease causing microorganism, symptoms of disease, and treatment aspect;						
		3	Do estimation of RNA and DNA and thereby identifying the source;						
		4	Do cultivation and identification of the microorganisms in the laboratory;						
		5	Do identification of diseases by performing the diagnostic tests; and						
		6	Appreciate the behavior of motility and behavioral characteristics of microorganisms.						
Pharmacognosy and Phytopharmaceuticals		1	Understand the basic principles of cultivation, collection and storage of crude drugs						
		2	Know the source, active constituents and uses of crude drugs						
		3	Appreciate the applications of primary and secondary metabolites of the plant						
Pharmacology-I		1	Understand the pharmacological aspects of drugs falling under the above mentioned chapters,						
		2	Handle and carry out the animal experiments;						
		3	Appreciate the importance of pharmacology subject as a basis of therapeutics, and						
		4	Correlate and apply the knowledge therapeutically.						
Community Pharmacy		1	Know pharmaceutical care services;						
		2	Know the business and professional practice management skills in community pharmacies;						
		3	Do patient counselling & provide health screening services to public in community pharmacy;						
		4	Respond to minor ailments and provide appropriate medication;						
		5	Show empathy and sympathy to patients; and						
		6	Appreciate the concept of Rational drug therapy.						
Pharmacotherapeutics I		1	The pathophysiology of selected disease states and the rationale for drug therapy;						
		2	The therapeutic approach to management of these diseases;						
		3	The controversies in drug therapy;						
		4	The importance of preparation of individualised therapeutic plans based on diagnosis;						
		5	Needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);						
		6	Describe the pathophysiology of selected disease states and explain the rationale for drug therapy;						
		7	Summarise the therapeutic approach to management of these diseases, including reference to the latest available evidence;						
		8	Discuss the controversies in drug therapy;						
		9	Discuss the preparation of individualised therapeutic plans based on diagnosis; and						
		10	Identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).						

I.P.D	Pharmacology II	1	Understand the pharmacological aspects of drugs falling under the above mentioned chapters,						
		2	Carry out the animal experiments confidently,						
		3	Appreciate the importance of pharmacology subject as a basis of therapeutics, and						
		4	Correlate and apply the knowledge therapeutically						
Pharmaceutical Analysis	1	Understand the principles of volumetric and electrochemical analysis							
	2	Carry out various volumetric and electrochemical titrations							
	3	Develop analytical skills							
	4	Understand the chromatographic separation and analysis of drugs.							
	5	Perform quantitative & qualitative analysis of drugs using various analytical instruments.							
Pharmacotherapeutics II	1	Know the pathophysiology of selected disease states and the rationale for drug therapy							
	2	Know the therapeutic approach to management of these diseases;							
	3	Know the controversies in drug therapy;							
	4	Know the importance of preparation of individualised therapeutic plans based on diagnosis; and							
	5	Appreciate the needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).							
Pharmaceutical Jurisprudence	1	Practice the Professional ethics					1		
	2	Understand the various concepts of the pharmaceutical legislation in India;					1		
	3	Know the various parameters in the Drug and Cosmetic Act and rules;					1		
	4	Know the Drug policy, DPCO, Patent and design act;					1		
	5	Understand the labeling requirements and packaging guidelines for drugs and cosmetics;					1		
	6	Be able to understand the concepts of the Dangerous Drugs Act, Pharmacy Act and Excise duties Act; and					1		
	7	Other laws as prescribed by the Pharmacy Council of India from time to time including International Laws.					1		
Medicinal Chemistry	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.							
Pharmaceutical Formulations	1	Understand the principle involved in formulations of various pharmaceutical dosage forms;							
	2	Prepare various pharmaceutical formulations;							
	3	Perform evaluation of pharmaceutical dosage forms; and							
	4	Understand and appreciate the concept of bioavailability and bioequivalence, their role in clinical situations.							
I.P.D	Pharmaceutical Jurisprudence	6	Understand the various concepts of the pharmaceutical legislation in India;						

IV PD	Pharmacotherapeutics III	1	The pathophysiology of selected disease states and the rationale for drug therapy;					
		2	The therapeutic approach to management of these diseases;					
		3	The controversies in drug therapy;					
		4	The importance of preparation of individualised therapeutic plans based on diagnosis;					
		5	Needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);					
		6	Describe the pathophysiology of selected disease states and explain the rationale for drug therapy;					
		7	To summarize the therapeutic approach to management of these diseases including reference to the latest available evidence;					
		8	To discuss the controversies in drug therapy;					
		9	To discuss the preparation of individualised therapeutic plans based on diagnosis; and					
		10	Identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).					
Hospital Pharmacy		1	Know various drug distribution methods;					
		2	Know the professional practice management skills in hospital pharmacies;					
		3	Provide unbiased drug information to the doctors;					
		4	Know the manufacturing practices of various formulations in hospital set up;					
		5	Appreciate the practice based research methods; and					
		6	Appreciate the stores management and inventory control.					
Clinical Pharmacy		1	Monitor drug therapy of patient through medication chart review and clinical review;					
		2	Obtain medication history interview and counsel the patients;					
		3	Identify and resolve drug related problems;					1
		4	Detect, assess and monitor adverse drug reaction;					1
		5	Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states; and					1
		6	Retrieve, analyse, interpret and formulate drug or medicine information.					



CLASS	COURSE	SLNC	COURSE OUTCOMES	Ethics	Human values	Gender equality	Environmental sustainability	Discretion/Field visit/Internship	
M.PHARM I SEM (PHARMACEUTICS)	Modern Pharmaceutical Analytical	1	The analysis of various drugs in single and combination dosage forms						
		2	Theoretical and practical skills of the instrument						
	Drug Delivery System	1	The various approaches for development of novel drug delivery systems.						
		2	The criteria for selection of drugs and polymers for the development of the formulation and evaluation of Novel drug						
	Modern pharmaceuticals	1	To understand the Active Pharmaceutical Ingredients and Generic drug Product development						
		2	To learn Industrial Management and GMP Considerations.						
		3	To understand Optimization Techniques & Pilot Plant Scale Up Techniques						
		4	To study Stability Testing, sterilization process & packaging of dosage forms					1	
	Regulatory Affairs	1	The Concepts of innovator and generic drugs, drug development process						
		2	The Regulatory guidance's and guidelines for filing and approval process	1					
		3	Preparation of Dossiers and their submission to regulatory agencies in different countries						
		4	Post approval regulatory requirements for actives and drug products						
	M.PHARM II SEM (PHARMACEUTICS)	Modern Pharmaceutics (NTDS)	1	The various approaches for development of novel drug delivery systems.					
			2	The criteria for selection of drugs and polymers for the development of NTDS					
			3	The formulation and evaluation of novel drug delivery systems					
		Advanced Biopharmaceutics and	1	The basic concepts in biopharmaceutics and pharmacokinetics.					
2			The use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination.						
3			The critical evaluation of biopharmaceutic studies involving drug product equivalency. The design and evaluate dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.					1	
4			The potential clinical pharmacokinetic problems and apply basic pharmacokinetic						
5			The principles to solve them						
Computer Aided Drug Design		1	History of Computers in Pharmaceutical Research and Development						
		2	Computational Modelling of Drug Disposition						
		3	Computers in Preclinical Development						
		4	Optimization Techniques in Pharmaceutical Formulation						
		5	Computers in Market Analysis						
		6	Computers in Clinical Development						
		7	Artificial Intelligence (AI) and Robotics		1				
		8	Computational fluid dynamics (CFD)						
Cosmetics and Cosmeceuticals	1	The key ingredients used in cosmetics and cosmeceuticals.							
	2	The key building blocks for various formulations.							
	3	The current technologies in the market							
	4	The various key ingredients and basic science to develop cosmetics and cosmeceuticals							



M. PHARM I SEM (PHARMACOGNOSY)	7	Perform the adverse drug reaction reporting systems and communication in Pharmacovigilance					
Modern Pharmaceutical Analytical	1	The analysis of various drugs in single and combination dosage forms					1
	2	Theoretical and practical skills of the instrument					
Advanced Pharmacognosy-I	1	Know the advances in production and cultivation of drugs					
	2	Know the various phyto-pharmaceuticals and their source, medical use and utilisation					
	3	Know the various nutraceuticals/ herbs and their health benefits					
Phytochemistry	1	Know the various phytoconstituents and their properties & general process of natural product drug discovery					1
	2	To know the process of identification, purification and isolation of phytoconstituents					
Industrial Pharmacognostical tec	1	Know the requirements for the setting up of herbal/natural drug industry					
	2	To know and understand the guidelines for quality of herbal medicines					
	3	To know the patenting /IPR of herbals and trade of raw and finished materials					
Medicinal plant biotechnology	1	Know the process like genetic engineering in medicinal plants for higher yield of Phytopharmaceuticals					1
	2	Use the biotechnological techniques for obtaining and improving the quality of natural products/medicinal plants					
M. PHARM I SEM (PHARMACOGNOSY)							
Advanced Pharmacognosy -II	1	Know the validation of herbal remedies					
	2	Know the methods of detection of adulteration and evaluation techniques for the herbal drugs					
	3	To know the methods of screening of herbals for various biological properties					1
Indian systems of Medicine	1	To understand the basic principles of various Indian systems of medicine					
	2	To know the clinical research of traditional medicines, Current Good Manufacturing Practice of Indian systems of medicine and formulation					
Herbal Medicines	1	Understand the basic principles of various herbal/natural cosmetic preparations					
	2	Current Good Manufacturing Practices of herbal/natural cosmetics as per the regulatory authorities				1	
SEMESTER-III AND IV RESEARCH WORK							
M.Pharm III SEM and IV SEM	1	The research methodology.					
	2	The biostatistical methods.					
	3	To write the review and research articles					

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