



## **MONAD UNIVERSITY**

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N.H.24, Delhi Hapur Road, Village & Post – Kastla, Kasmabad,  
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### **Course Plan**

**Program:** Master of Pharmacy

**Semester:** II Semester

**Advance Pharmacology-II**

**Course Code:** MPL-201T

**Session: 2021-2022**

<b>Sno.</b>	<b>Day</b>	<b>Subject</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Total</b>
1.	D+1	Endocrine pharmacology	1	0	1
2.	D+2	Molecular and cellular mechanism of action of hormones such growth hormone	1	0	1
3.	D+3	Prolactin,	1	0	1
4.	D+4	Thyroid	1	0	1
5.	D+5	Insulin	1	0	1
6.	D+6	Sex hormone	1	0	1
7.	D+7	Anti-thyroid drugs	1	0	1
8.	D+8	Anti-thyroid drugs	1	0	1
9.	D+9	Oral hypoglycemic agents	1	0	1
10.	D+10	Oral hypoglycemic agents,	1	0	1

11.	D+11	Oralcontraceptives	1	0	1
12.	D+12	Drugs affecting calcium regulation	1	0	1
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>12</b>
13.	D+13	Chemotherapy	1	0	1
14.	D+14	Cellular and molecular mechanism of actions and	1	0	1
15.	D+15	resistance of antimicrobial agents	1	0	1
16.	D+16	such as B-lactamsdrugs.	1	0	1
17.	D+17	aminoglycosides,	1	0	1
		quinolones,			
18.	D+18	Macrolide	1	0	1
19.	D+19	biotics	1	0	1
20.	D+20	antibiotics	1	0	1
21.	D+21	Antifungal	1	0	1
22.	D+22	viral	1	0	1
23.	D+23	antiviral,	1	0	1
24.	D+24	TB	1	0	1
25.	D+25	anti-TB	1	0	1
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>12</b>
26.	D+26	Protozoal Infections	1	0	1
27.	D+27	Drugs used in Protozoal Infections	1	0	1
28.	D+28	Drugs used in the treatment of Helminthiasis.	1	0	1
29.	D+29	Chemotherapy of cancerImmunopharmacology	0	1	1
30.	D+30	Cellular and biochemical mediators ofinflammation	0	1	1
31.	D+31	inflammation	1	0	1

32.	D+32	immune response	1	0	1
33.	D+33	Allergic	1	0	1
34.	D+34	hypersensitivity reactions	1	0	1
35.	D+35	Pharmacotherapy of asthma	1	0	1
36.	D+36	COPD	1	0	1
37.	D+37	Immunosuppressants	1	0	1
38.	D+38	Immunostimulants	1	0	1
		<b>Total</b>	<b>11</b>	<b>2</b>	<b>13</b>
39.	D+39	Git pharmacology	1	0	1
40.	D+40	Antiulcer drugs,	1	0	1
41.	D+41	Prokinetics	1	0	1
42.	D+42	Antiemetics	0	1	1
43.	D+43	Anti-diarrheals	1	0	1
44.	D+44	Drugs for constipation	1	0	1
45.	D+45	Irritable bowel syndrome	1	0	1
46.	D+46	Chronopharmacology	1	0	1
47.	D+47	Biological and circadian rhythms	1	0	1
48.	D+48	Applications of chronotherapy in various diseases like. Cardiovascular disease, diabetes,	1	0	1
49.	D+49	Asthma	1	0	1
50.	D+50	Peptic ulcer	1	0	1
		<b>Total</b>	<b>11</b>	<b>1</b>	<b>12</b>
51.	D+51	Free radicals Pharmacology	1	0	1
52.	D+52	Generation of free radicals,	1	0	1
53.	D+53	role of free radicals in etiopathology of various diseases	1	0	1
54.	D+54	such as diabetes	1	0	1

55.	D+55	neurodegenerative diseases	1	0	1
56.	D+56	cancer.	1	0	1
57.	D+57	Protective activity of certain important antioxidant	1	0	1
58.	D+58	Recent Advances in Treatment: Alzheimer's disease	0	1	1
59.	D+59	Parkinson's disease, Cancer,	1	0	1
60.	D+60	Diabetes mellitus	1	0	1
		<b>Total</b>	<b>11</b>	<b>1</b>	<b>12</b>



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### **Course Plan**

**Program-** M. Pharm

**Semester-II**<sup>nd</sup>

**Course-**Advance Pharmacology-II

**Course Code-** MPL-205P

**Session - 2021-22**

<b>S. No.</b>	<b>Day</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
	D+Day					
1	D+1	To study the methodology of experiments on isolated tissue preparations.	0	0	4	4
2	D+2	To find out the strength of the given sample of Ach by interpolation bioassay method using guinea pig ileum.	0	0	4	4
3	D+3	To record the dose response curves of Acetylcholine using chicken ileum.	0	0	4	4
4	D+4	To record the dose response curve (DRC) of acetylcholine and its modification by Atropine using Ex-Pharm software.	0	0	4	4
5	D+5	To obtain graded dose response curve of histamine and determine the concentration of same in a solution (of unknown) concentration using matching bioassay.	0	0	4	4

6	D+6	To record the concentration response curve of histamine and its modification by an anti-histaminic using isolated guinea pig ileum preparation.	0	0	4	4
7	D+7	To estimate the strength of an unknown sample of acetylcholine by three-point method.	0	0	4	4
8	D+8	To estimate the strength of an unknown sample of acetylcholine by four-point bioassay employing isolated chicken ileum.	0	0	4	4
9	D+9	To calculate PA <sub>2</sub> value of Atropine using Ach as agonist by guinea pig ileum.	0	0	4	4
10	D+10	To calculate pA <sub>2</sub> value for Chlorpheniramine using isolated rat ileum preparation.	0	0	4	4
11	D+11	To record the effect of physostigmine on the DRC of Acetylcholine on frog Rectus Abdominal Muscle.	0	0	4	4
12	D+12	To perform the bioassay of oxytocin by four-point bioassay method with the help of Ex-Pharm software.	0	0	4	4
		TOTAL	0	0	48	48

Date-  
and Signature

Name



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### **Course Plan**

**Program-** M. Pharm

**Semester-II**

**Course-** Pharmacological and Toxicological Screening Methods-II

**Course Code-** MPL-202 (T)

#### **Session - 2021-22**

S. No.	Day	Subject	L	T	P	Total
1.	D Day					
2.	D+1	Basic definition and types of toxicolog	1	0	0	1
3.	D+2	general, mechanistic, regulatory and descriptive	1	0	0	1
4.	D+3	Regulatory guidelines for conducting toxicity studies OECD	1	0	0	1
5.	D+4	Regulatory guidelines for conducting toxicity studies OECD	1	0	0	1
6.	D+5	Tutorial (Problem solving session/ class test)	0	1	0	1
7.	D+6	ICH	1	0	0	1
8.	D+7	EPA	1	0	0	1
9.	D+8	Schedule Y	1	0	0	1
10.	D+9	OECD principles of Good laboratory practice (GLP)	1	0	0	1
11.	D+10	OECD principles of Good laboratory practice (GLP)	1	0	0	1
12.	D+11	History, concept and its importance in drug development	1	0	0	1

<b>TOTAL</b>			<b>10</b>	<b>1</b>	<b>0</b>	<b>11</b>
13.	D+12	Acute, sub-acute	1	0	0	1
14.	D+13	Acute eye irritat ion,	1	0	0	1
15.	D+14	Dermal and inhalational studies as per OECD guidelines.	1	0	0	1
16.	D+15	Acute eye irritat ion,	1	0	0	1
17.	D+16	skin sensitization	0	1	0	1
18.	D+17	dermal irritation & dermal toxicity studies	1	0	0	1
19.	D+18	Test item characterization- importance	1	0	0	1
20.	D+19	Test item characterization- importance,	1	0	0	1
21.	D+20	methods in regulatory toxicology studies	1	0	0	1
22.	D+21	methods in regulatory toxicology studies	1	0	0	1
23.	D+22	<b>Tutorial (Problem solving session/ class test)</b>	0	1	0	1
<b>TOTAL</b>			<b>9</b>	<b>2</b>	<b>0</b>	<b>11</b>
24.	D+23	Reproductive toxicology studies	1	0	0	1
25.	D+24	Male reproductive toxicity studies	1	0	0	1
26.	D+25	Male reproductive toxicity studies	1	0	0	1
27.	D+26	Female reproductive studies (segment I and segment III)	1	0	0	1
28.	D+27	Tutorial (Problem solving session/ class test)	0	1	0	1
29.	D+28	Female reproductive studies (segment I and segment III)	1	0	0	1
30.	D+29	teratogenecity studies (segment II	1	0	0	1
31.	D+30	Genotoxicity studies (Ames Test,	1	0	0	1
32.	D+31	in vitro and in vivo Micronucleus and Chromosomal aberrations studies)	1	0	0	1
33.	D+32	in vitro and in vivo Micronucleus and Chromosomal aberrations studies)	1	0	0	1
34.	D+33	In vivo carcinogenicity studies	1	0	0	1
35.	D+34	In vivo carcinogenicity studies	1	0	0	1



36.	D+35	<b>Tutorial (Problem solving session/ class test)</b>	0	1	0	1
<b>TOTAL</b>			<b>11</b>	<b>2</b>	<b>0</b>	<b>13</b>
37.	D+36	IND enabling studies (IND studies)	1	0	0	1
38.	D+37	Definition of IND, importance of IND	1	0	0	1
39.	D+38	industry perspective, list of studies needed for IND Submission.	1	0	0	1
40.	D+39	industry perspective, list of studies needed for IND Submission.	1	0	0	1
41.	D+40	Safety pharmacology studies- origin, concepts and importance of safety pharmacology.	1	0	0	1
42.	D+41	Safety pharmacology studies- origin, concepts and importance of safety pharmacology.	1	0	0	1
43.	D+42	Tier1- CVS, CNS and respiratory safety pharmacology	1	0	0	1
44.	D+43	HERG assay. Tier2- GI, renal and other studies	1	0	0	1
45.	D+44	HERG assay. Tier2- GI, renal and other studies	1	0	0	1
46.	D+45	Tutorial (Problem solving session/ class test)	0	1	0	1
<b>TOTAL</b>			<b>9</b>	<b>1</b>	<b>0</b>	<b>10</b>
47.	D+46	Toxicokinetics- Toxicokinetic evaluation in preclinical studies	1	0	0	1
48.	D+47	Toxicokinetics- Toxicokinetic evaluation in preclinical studies	1	0	0	1
49.	D+48	Toxicokinetics- Toxicokinetic evaluation in preclinical studies	1	0	0	1
50.	D+49	saturation kinetics Importance and applications of toxicokinetic studies.	1	0	0	1
51.	D+50	saturation kinetics Importance and applications of toxicokinetic studies	1	0	0	1
52.	D+51	saturation kinetics Importance and applications of toxicokinetic studies	1	0	0	1
53.	D+52	saturation kinetics Importance and applications of toxicokinetic studies	1	0	0	1
54.	D+53	Alternative methods to animal toxicity testing	1	0	0	1
55.	D+54	Alternative methods to animal toxicity testing	1	0	0	1

<b>56.</b>	D+55	Alternative methods to animal toxicity testing	1	0	0	1
<b>57.</b>	D+58	Tutorial (Problem solving session/ class test)	0	1	0	1
<b>TOTAL</b>			<b>10</b>	<b>1</b>	<b>0</b>	<b>11</b>



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### **Course Plan**

**Program-** M. Pharm

**Semester-** II

**Course-**PRINCIPLES OF DRUG DISCOVERY

**Course Code-**(MPL 203T)

**Session** –2021-2022

S. No.	Day	Subject	L	T	P	Total
	D Day					
1.	D+1	An overview of modern drug discovery process: Target identification, target validation.	1	0	0	1
2.	D+2	Lead identification and lead Optimization.	1	0	0	1
3.	D+3	Economics of drug discovery.	1	0	0	1
4.	D+4	Target Discovery and validation-Role of Genomics.	1	0	0	1
5.	D+5	Tutorial (Problem solving session/ class test)	0	1	0	1
6.	D+6	Proteomics and Bioinformatics.	1	0	0	1
7.	D+7	Role of Nucleic acid microarrays, Protein microarrays	1	0	0	1
8.	D+8	Antisense technologies, siRNAs.	1	0	0	1
9.	D+9	Antisense oligonucleotides	1	0	0	1

10.	D+10	Tutorial (Problem solving session/ class test)	0	1	0	1
11.	D+11	Zinc finger proteins.	1	0	0	1
12.	D+12	Role of transgenic animals in target validation.	1	0	0	1
<b>TOTAL</b>			<b>10</b>	<b>2</b>	<b>0</b>	<b>12</b>
13.	D+13	Lead Identification- combinatorial chemistry.	1	0	0	1
14.	D+14	High throughput screening, in silico lead discovery techniques.	1	0	0	1
15.	D+15	Assay development for hit identification.	1	0	0	1
16.	D+16	Protein structure Levels of protein structure, Domain.	1	0	0	1
17.	D+17	Tutorial (Problem solving session/ class test)	0	1	0	1
18.	D+18	Motifs, and folds in protein structure.	1	0	0	1
19.	D+19	Computational prediction of protein structure.	1	0	0	1
20.	D+20	Threading modeling methods.	1	0	0	1
21.	D+21	Homology modeling methods.	1	0	0	1
22.	D+22	Application of NMR.	1	0	0	1
23.	D+23	X-ray crystallography in protein structure prediction	1	0	0	1
24.	D+24	Tutorial (Problem solving session/ class test)	0	1	0	1
<b>TOTAL</b>			<b>10</b>	<b>2</b>	<b>0</b>	<b>12</b>
25.	D+25	Rational Drug Design: Introduction.	1	0	0	1
26.	D+26	Traditional vs rational drug design.	1	0	0	1
27.	D+27	Methods followed in traditional drug design.	1	0	0	1
28.	D+28	High throughput screening, Concepts of Rational Drug Design.	1	0	0	1
29.	D+29	Tutorial (Problem solving session/ class test)	0	1	0	1
30.	D+30	Rational Drug Design Methods: Structure.	1	0	0	1

31.	D+31	Pharmacophore based approaches.				
32.	D+32	Virtual Screening techniques.				
33.	D+33	Drug likeness screening.				
34.	D+34	Concept of pharmacophore mapping.				
35.	D+35	Pharmacophore based Screening.				
36.	D+36	Tutorial (Problem solving session/ class test)	1	0	0	1
<b>TOTAL</b>			<b>10</b>	<b>2</b>	<b>0</b>	<b>12</b>
37.	D+37	Molecular docking.	1	0	0	1
38.	D+38	Rigid docking and flexible docking.	1	0	0	1
39.	D+39	Manual docking.	1	0	0	1
40.	D+40	Docking based screening.	1	0	0	1
41.	D+41	Tutorial (Problem solving session/ class test)	0	1	0	1
42.	D+42	De novo drug design.	1	0	0	1
43.	D+43	Quantitative analysis of Structure Activity Relationship	1	0	0	1
44.	D+44	History and development of QSAR.	1	0	0	1
45.	D+45	SAR versus QSAR.	1	0	0	1
46.	D+46	Physicochemical parameters.	1	0	0	1
47.	D+47	Hansch analysis, Fee Wilson analysis and relationship between them.	1	0	0	1
48.	D+48	Tutorial (Problem solving session/ class test)	0	1	0	1
<b>TOTAL</b>			<b>10</b>	<b>2</b>	<b>0</b>	<b>12</b>
49.	D+49	QSAR Statistical methods.	1	0	0	1
50.	D+50	Regression analysis, partial least square analysis (PLS)	1	0	0	1
51.	D+51	Miscellaneous multivariate statistical methods.	1	0	0	1
52.	D+52	Tutorial (Problem solving session/ class test)	0	1	0	1

<b>53.</b>	D+53	3D-QSAR approaches like COMFA and COMSIA.	1	0	0	1
<b>54.</b>	D+54	Prodrug design-Basic concept.	1	0	0	1
<b>55.</b>	D+55	Prodrugs to improve patient acceptability.	1	0	0	1
<b>56.</b>	D+56	Drug solubility, Drug absorption and distribution.	1	0	0	1
<b>57.</b>	D+57	Site specific drug delivery.	1	0	0	1
<b>58.</b>	D+58	Sustained drug action.	1	0	0	1
<b>59.</b>	D+59	Rationale of prodrug design and practical consideration of prodrug design.	1	0	0	1
<b>60.</b>	D+60	Tutorial (Problem solving session/ class test)	0	1	0	1
<b>TOTAL</b>			<b>10</b>	<b>2</b>	<b>0</b>	<b>12</b>



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### **Course Plan**

**Program-** M. Pharm

**Semester-** II

**Course-**Clinical Research

and Pharmacovigilance

**Course Code-** MPL-204 (T)

#### **Session - 2021-22**

<b>S. No.</b>	<b>Day</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
1.	D Day					
2.	D+1	Regulatory Perspectives of Clinical Trials: Origin and Principles of International Conference on Harmonization	1	0	0	1
3.	D+2	Good Clinical Practice (ICH-GCP) guidelines	1	0	0	1
4.	D+3	Ethical Committee: Institutional Review Board	1	0	0	1
5.	D+4	Ethical Guidelines for Biomedical Research	1	0	0	1
6.	D+5	Tutorial (Problem solving session/ class test)	0	1	0	1
7.	D+6	Human Participant Schedule Y.	1	0	0	1
8.	D+7	ICMR	1	0	0	1
9.	D+8	Informed Consent Process: Structure and content of an Informed Consent Process	1	0	0	1
10.	D+9	Ethical principles governing informed consent process	1	0	0	1
11.	D+10	consent process	1	0	0	1

12.	D+11	Tutorial (Problem solving session/ class test)	0	1	0	1
<b>TOTAL</b>			<b>9</b>	<b>2</b>	<b>0</b>	<b>11</b>
13.	D+12	Clinical Trials	1	0	0	1
14.	D+13	Clinical Trials Types and Design	1	0	0	1
15.	D+14	Experimental Study- RCT	1	0	0	1
16.	D+15	Non RCT	1	0	0	1
17.	D+16	Observation Study: Cohort	0	1	0	1
18.	D+17	Case Control, Cross sectional	1	0	0	1
19.	D+18	Clinical Trial Study Team	1	0	0	1
20.	D+19	Roles and responsibilities of Clinical Trial Personnel: Investigator,	1	0	0	1
21.	D+20	Study Coordinator, Sponsor	1	0	0	1
22.	D+21	Contract Research Organization and its management	1	0	0	1
23.	D+22	<b>Tutorial (Problem solving session/ class test)</b>	0	1	0	1
<b>TOTAL</b>			<b>9</b>	<b>2</b>	<b>0</b>	<b>11</b>
24.	D+23	Clinical Trial Documentation- Guidelines to the preparation of documents	1	0	0	1
25.	D+24	Preparation of protocol	1	0	0	1
26.	D+25	Investigator Brochure, Case Report Forms	1	0	0	1
27.	D+26	Clinical Study Report Clinical Trial Monitoring	1	0	0	1
28.	D+27	Tutorial (Problem solving session/ class test)	0	1	0	1
29.	D+28	Safety Monitoring in CT	1	0	0	1
30.	D+29	Adverse Drug Reactions: Definition and types..	1	0	0	1
31.	D+30	Detection and reporting methods.	1	0	0	1
32.	D+31	Severity and seriousness assessment	1	0	0	1
33.	D+32	Predictability and preventability assessment	1	0	0	1
34.	D+33	Management of adverse drug reactions;	1	0	0	1
35.	D+34	Terminologies of ADR.	1	0	0	1
36.	D+35	<b>Tutorial (Problem solving session/ class test)</b>	0	1	0	1



		<b>TOTAL</b>	<b>11</b>	<b>2</b>	<b>0</b>	<b>13</b>
<b>37.</b>	D+36	Basic aspects, terminologies and establishment of pharmacovigilance.	1	0	0	1
<b>38.</b>	D+37	History and progress of pharmacovigilance	1	0	0	1
<b>39.</b>	D+38	Significance of safety monitoring,	1	0	0	1
<b>40.</b>	D+39	Pharmacovigilance in India and international aspects.	1	0	0	1
<b>41.</b>	D+40	WHO and Regulatory terminologies of ADR,	1	0	0	1
<b>42.</b>	D+41	evaluation of medication safety,	1	0	0	1
<b>43.</b>	D+42	Establishing pharmacovigilance centres in Hospitals,	1	0	0	1
<b>44.</b>	D+43	Industry and National programmes related to pharmacovigilance.	1	0	0	1
<b>45.</b>	D+44	Roles and responsibilities in Pharmacovigilance	1	0	0	1
<b>46.</b>	D+45	Tutorial (Problem solving session/ class test)	0	1	0	1
<b>TOTAL</b>			<b>9</b>	<b>1</b>	<b>0</b>	<b>10</b>
<b>47.</b>	D+46	Methods, ADR reporting	1	0	0	1
<b>48.</b>	D+47	tools used in Pharmacovigilance	1	0	0	1
<b>49.</b>	D+48	International classification of diseases,	1	0	0	1
<b>50.</b>	D+49	International Non- proprietary names for drugs	1	0	0	1
<b>51.</b>	D+50	Passive and Active surveillance	1	0	0	1
<b>52.</b>	D+51	Comparative observational studies	1	0	0	1
<b>53.</b>	D+52	Targeted clinical investigations and Vaccine safety surveillance.	1	0	0	1
<b>54.</b>	D+53	Spontaneous reporting system	1	0	0	1
<b>55.</b>	D+54	Reporting to regulatory authorities	1	0	0	1
<b>56.</b>	D+55	Guidelines for ADRs reporting	1	0	0	1
<b>57.</b>	D+56	Argus, Aris G Pharmacovigilance	1	0	0	1
<b>58.</b>	D+57	VigiFlow, Statistical methods for evaluating medication safety data	1	0	0	1
<b>59.</b>	D+58	Tutorial (Problem solving session/ class test)	0	1	0	1

<b>TOTAL</b>			<b>12</b>	<b>1</b>	<b>0</b>	<b>13</b>
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<b>60.</b>	D+59	Pharmacoepidemiology	1	0	0	1
<b>61.</b>	D+60	Pharmacoepidemiology	1	0	0	1
<b>62.</b>	D+61	Pharmacoepidemiology	1	0	0	1
<b>63.</b>	D+62	pharmacoeconomics	1	0	0	1
<b>64.</b>	D+63	pharmacoeconomics	1	0	0	1
<b>65.</b>	D+64	pharmacoeconomics	1	0	0	1
<b>66.</b>	D+65	Safety pharmacology	1	0	0	1
<b>67.</b>	D+66	Safety pharmacology	1	0	0	1
<b>68.</b>	D+67	Safety pharmacology	1	0	0	1
<b>69.</b>	D+68	ADR	1	0	0	1
<b>70.</b>	D+69	Tutorial (Problem solving session/ class test)	0	1	0	1
<b>TOTAL</b>			<b>10</b>	<b>1</b>	<b>0</b>	<b>11</b>



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### **Course Plan**

**Program-** B. Pharm

**Semester-** VI

**Course-**Herbal Drug Technology

**Course Code-** BP-609(P)

**Session - 2020-21**

S. No.	Day	Subject	L	T	P	Total
1	D Day					
2	D+1	To perform preliminary phytochemical screening of crude drugs	0	0	3	3
3	D+2	To determine the alcohol content of Asava and arista.	0	0	3	3
4	D+3	To evaluate the given excipients from natural origin.	0	0	3	3
5	D+4	To prepare and evaluate 10gm of Turmeric Herbal cream.	0	0	3	3
6	D+5	Preparation and standardization of herbal lotion.	0	0	3	3
7	D+6	To prepare and standardize Methi-Shikakai shampoo.	0	0	3	3
8	D+7	To prepare and evaluate 50gm of Churna mixture.	0	0	3	3
9	D+8	To determine the total alkaloid content of cinchona extract.	0	0	3	3
10	D+9	To prepare and evaluate 20ml of Orange Syrup B.P.C	0	0	3	3

<b>11</b>	D+10	To prepare and evaluate the 400mg tablet.	0	0	3	3
<b>12</b>	D+11	Monograph Analysis of Castor Oil.	0	0	3	3
<b>13</b>	D+12	To prepare and submit 100 ml of Sodium chloride solution BPC 1968.	0	0	3	3
<b>14</b>	D+13	To prepare and submit 50 ml Chloroxylenol Solution BPC 1968.	0	0	3	3
<b>TOTAL</b>			<b>0</b>	<b>0</b>	<b>39</b>	<b>39</b>



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### **Course Plan**

**Program:** Master of Pharmacy

**Semester:** II Semester

**Course:** ADVANCED SPECTRAL ANALYSIS

**Course:** M. Pharm

**Code:** MPC-201T

**Session: 2021-2022**

<b>Sno.</b>	<b>Day</b>	<b>Subject</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Total</b>
1.	D+1	UV spectroscopy	1	0	1
2.	D+2	Application of UV Spectroscopy	1	0	1
3.	D+3	IR spectroscopy	1	0	1
4.	D+4	Application of IR Spectroscopy	1	0	1
5.	D+5	Wood ward – Fieser rule	1	0	1
6.	D+6	Wood ward – Fieser rule for 1,3- butadienes	1	0	1
7.	D+7	Wood ward – Fieser rule for cyclic dienes	1	0	1
8.	D+8	Wood ward – Fieser rule for $\alpha$ -carbonyl compounds	1	0	1

9.	D+9	Wood ward – Fieser rule for $\beta$ -carbonyl compounds	1	0	1
10.	D+10	Interpretation compounds of enones.	1	0	1
11.	D+11	ATR-IR,	1	0	1
12.	D+12	IR Interpretation of organic compounds.	1	0	1
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>12</b>
13.	D+13	NMR spectroscopy	1	0	1
14.	D+14	1-D NMR	1	0	1
15.	D+15	2-D NMR,	1	0	1
16.	D+16	NOESY	1	0	1
17.	D+17	COSY,	1	0	1
18.	D+18	HECTOR,	1	0	1
19.	D+19	INADEQUATE techniques,	1	0	1
20.	D+20	1-DNMR and Interpretation of organic compounds	1	0	1
21.	D+21	2-D NMR and Interpretation of organic compounds	1	0	1
22.	D+22	NOESY and Interpretation of organic compounds	1	0	1
23.	D+23	COSY and Interpretation of organic compounds	1	0	1
24.	D+24	HECTOR, and Interpretation of organic compounds	1	0	1
25.	D+25	INADEQUATE and Interpretation of organic compounds	1	0	1
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>12</b>
26.	D+26	Mass Spectroscopy	1	0	1
27.	D+27	Mass fragmentation and its rules,	1	0	1

28.	D+28	Fragmentation of important functional groups like alcohols,	1	0	1
29.	D+29	Fragmentation of important functional groups like amines	0	1	1
30.	D+30	Fragmentation of important functional groups like carbonyl groups	0	1	1
31.	D+31	Fragmentation of important functional groups like alkanes,	1	0	1
32.	D+32	Fragmentation of important functional groups like Meta stable ions,	1	0	1
33.	D+33	Fragmentation of important functional groups like Mc Lafferty rearrangement,	1	0	1
34.	D+34	Fragmentation of important functional groups like Ring rule,	1	0	1
35.	D+35	Fragmentation of important functional groups like Isotopic peaks	1	0	1
36.	D+36	Amines Interpretation of organic compounds	1	0	1
37.	D+37	Carbonyl groups Interpretation of organic compounds	1	0	1
38.	D+38	Isotopic peaks Interpretation of organic compounds	1	0	1
		<b>Total</b>	<b>11</b>	<b>2</b>	<b>13</b>
39.	D+39	Chromatography	1	0	1
40.	D+40	Principle, Instrumentation	1	0	1
41.	D+41	Applications of the following: a) GC-MS	1	0	1
42.	D+42	Applications of the following: c) LC-MS	0	1	1
43..	D+43	Applications of the following: d) LC-FTIR	1	0	1
44.	D+44	Applications of the following: e) LC-NMR	1	0	1
45.	D+45	F) CE- MS	1	0	1
46.	D+46	G) High Performance Thin Layer chromatography	1	0	1
47.	D+47	H) Super critical fluid chromatography	1	0	1
48.	D+48	I) Ion Chromatography	1	0	1
49.	D+49	J) I-EC (Ion Exclusion Chromatography)	1	0	1
50.	D+50	K) Flash chromatography	1	0	1
		<b>Total</b>	<b>11</b>	<b>1</b>	<b>12</b>
51.	D+51	A). Thermal methods of analysis Introduction	1	0	1

52.	D+52	Principle, instrumentation and application of DSC	1	0	1
53.	D+53	Principle, instrumentation and application of DTA	1	0	1
54.	D+54	Principle, instrumentation of TGA	1	0	1
55.	D+55	Application of TGA.	1	0	1
56.	D+56	B). Raman Spectroscopy Introduction, Principle	1	0	1
57.	D+57	Instrumentation and Applications of Raman spectroscopy	1	0	1
58.	D+58	Biological standardization	0	1	1
59.	D+59	Bioassay, ELISA,	1	0	1
60.	D+60	Radio-immuno assay of digitalis and insulin.	1	0	1
		<b>Total</b>	<b>11</b>	<b>1</b>	<b>12</b>





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### Course Plan

**Program:** Master of Pharmacy

**Semester:** II Semester

**Course:** ADVANCED ORGANIC CHEMISTRY – II

**Course:** M.Pharm

**Code:** MPC-202T

**Session:** 2021-2022

Sno.	Day	Subject	Lecture	Tutorial	Total
1.	D+1	Green Chemistry: Introduction, principles of green chemistry.	1	0	1
2.	D+2	Microwave assisted reactions: Merit and demerits of its use.	1	0	1
3.	D+3	Increased reaction rates, mechanism, superheating effects of microwave	1	0	1
4.	D+4	Effects of solvents in microwave assisted synthesis	1	0	1
5.	D+5	Microwave technology in process optimization, its applications in various organic reactions and heterocyclic synthesis.	1	0	1
6.	D+6	Ultrasound assisted reactions: Types of sonochemical reactions.	1	0	1
7.	D+7	Ultrasound assisted reactions: homogenous liquid-liquid synthetic applications.	1	0	1

8.	D+8	Ultrasound assisted reactions: homogenous liquid-solid reactions, synthetic applications.	1	0	1
9.	D+9	Ultrasound assisted reactions: heterogeneous liquid-liquid reactions, synthetic applications.	1	0	1
10.	D+10	Ultrasound assisted reactions: heterogeneous liquid-solid reactions, synthetic applications.	1	0	1
11.	D+11	Continuous flow reactors: Working principle.	1	0	1
12.	D+12	Continuous flow reactors: Advantages and synthetic applications.	1	0	1
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>12</b>
13.	D+13	Chemistry of peptides: Introduction	1	0	1
14.	D+14	Coupling reactions in peptide synthesis	1	0	1
15.	D+15	Principles of solid phase peptide synthesis	1	0	1
16.	D+16	T-BOC and Fmoc protocols.	1	0	1
17.	D+17	various solid supports and linkers: Activation procedures, peptide bond formation, deprotection and cleavage from resin,	1	0	1
18.	D+18	Low and high HF cleavage protocols.	1	0	1
19.	D+19	Formation of free peptides and peptide amides, purification and case studies, site-specific chemical modifications of peptides	1	0	1
20.	D+20	Segment and sequential strategies for solution phase peptide synthesis with any two case studies	1	0	1
21.	D+21	Side reactions in peptide synthesis: Deletion peptides, side reactions initiated by proton.	1	0	1
22.	D+22	Abstraction, protonation, overactivation and side reactions of individual amino acids.	1	0	1
23.	D+23	Photochemical Reactions Basic principles of photochemical reactions. Photo-oxidation, photo-addition and photo-fragmentation.	1	0	1
24.	D+24	Pericyclic reactions Mechanism, Types of pericyclic reactions such as cyclo addition,	1	0	1

25.	D+25	Electrocyclic reaction and sigmatropic rearrangement reactions with examples	1	0	1
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>12</b>
26.	D+26	Basic principles of photochemical reactions.	1	0	1
27.	D+27	Photo-oxidation	1	0	1
28.	D+28	Photo-addition and photo-fragmentation.	1	0	1
29.	D+29	Pericyclic reactions	0	1	1
30.	D+30	Mechanism, Types of pericyclic reactions such as cyclo addition.	0	0	1
31.	D+31	Electrocyclic reaction	1	0	1
32.	D+32	Sigmatropic rearrangement reactions.	1	0	1
33.	D+33	Examples of Pericyclic reactions	1	1	1
34.	D+34	Examples of Electrocyclic reactions	1	1	1
		<b>Total</b>	<b>11</b>	<b>3</b>	<b>12</b>
39.	D+39	Introduction of Catalysis, types of catalyst.	1	0	1
40.	D+40	Heterogeneous and homogenous catalysis, advantages and disadvantages	1	0	1
41.	D+41	Heterogeneous catalysis – preparation, characterization.	1	0	1
42.	D+42	Kinetics, supported catalysts.	0	1	1
43..	D+43	Catalyst deactivation and regeneration.	1	0	1
44.	D+44	Examples of heterogeneous catalysis used in synthesis of drugs.	1	0	1
45.	D+45	Homogenous catalysis, hydrogenation, hydroformylation and hydrocyanation.	1	0	1
46.	D+46	Wilkinson catalysts, chiral ligands and chiral induction.	1	0	1
47.	D+47	Ziegler-Natta catalysts, some examples of homogenous catalysis used in synthesis of drugs.	1	0	1
48.	D+48	Transition-metal and Organo-catalysis in organic synthesis: Metal-catalyzed reactions.	1	0	1
49.	D+49	Biocatalysis: Use of enzymes in organic synthesis, immobilized enzymes/cells in organic reaction. And	1	0	1
50.	D+50	Phase transfer catalysis □ theory and	1	0	1

		applications.			
		<b>Total</b>	<b>11</b>	<b>1</b>	<b>12</b>
51.	D+51	Stereochemistry & Asymmetric Synthesis Basic concepts in stereochemistry - optical activity, specific rotation.	1	0	1
52.	D+52	Racemates and resolution of racemates, the Cahn, Ingold, Prelog (CIP) sequence rule.	1	0	1
53.	D+53	Meso compounds, pseudoasymmetric centres, axes of symmetry.	1	0	1
54.	D+54	Fischer's D and L notation.	1	0	1
55.	D+55	Cis-trans isomerism, E and Z notation.	1	0	1
56.	D+56	Methods of asymmetric synthesis using chiral pool.	1	0	1
57.	D+57	Chiral auxiliaries synthesis.	1	0	1
58.	D+58	Catalytic asymmetric synthesis.	0	1	1
59.	D+59	Enantiopure separation with examples.	1	0	1
60.	D+60	Stereo selective synthesis with examples.	1	0	1
		<b>Total</b>	<b>11</b>	<b>1</b>	<b>12</b>



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### **Course Plan**

**Program:** Master of Pharmacy

**Semester:** II Semester

**Course:** COMPUTER AIDED DRUG DESIGN

**Course:** M. Pharm

**Code:** MPC-203T

**Session:2021-2022**

<b>Sno.</b>	<b>Day</b>	<b>Subject</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Total</b>
1.	D+1	Introduction to Computer Aided Drug Design (CADD).	1	0	1
2.	D+2	History, different techniques and applications.	1	0	1
3.	D+3	Quantitative Structure Activity Relationships	1	0	1
4.	D+4	BasicsHistory and development of QSAR	1	0	1
5.	D+5	Physicochemical parameters	1	0	1
6.	D+6	Methods to calculate physicochemical parameters.	1	0	1
7.	D+7	Hammettequation	1	0	1

8.	D+8	Electronic parameters (sigma).	1	0	1
9.	D+9	Lipophilicity effects.	1	0	1
10.	D+10	Parameters (log P, pi-substituent constant).	1	0	1
11.	D+11	Steric effects (Taft steric and MR parameters).	1	0	1
12.	D+12	Experimental and theoretical approaches for the determination of these physicochemical parameters.	1	0	1
		<b>Total</b>	<b>12</b>	<b>0</b>	<b>12</b>
13.	D+13	Application of Quantitative Structure Activity Relationships.	1	0	1
14.	D+14	Hansch analysis	1	1	2
15.	D+15	Free Wilson analysis and relationship between Hansch Analysis.	1	1	2
16.	D+16	Advantages and disadvantages of Hansch and Free Wilson analysis.	1	0	1
17.	D+17	Deriving 2D-QSAR equations.	1	0	1
18.	D+18	3D-QSAR approaches and contour map analysis.	1	1	2
19.	D+19	Statistical methods used in QSAR analysis.	1	1	2
20.	D+20	Importance of statistical parameters	1	0	1
		<b>Total</b>	<b>8</b>	<b>4</b>	<b>12</b>
26.	D+26	Introduction of Molecular modeling.	1	0	1
27.	D+27	Application of Molecular modeling.	1	0	1
28.	D+28	Introduction molecular Docking, Application of Molecular Docking.	1	0	1
29.	D+29	Introduction of Molecular mechanics in Drug Design.	1	0	1
30.	D+30	Application of Molecular mechanics in Drug Design.	1	0	1
31.	D+31	Introduction of Quantum mechanics in Drug Design.	1	0	1

32.	D+32	Application of Quantum mechanics in Drug Design.	1	0	1
33.	D+33	Introduction of Energy Minimization Methods.	1	0	1
34.	D+34	Application of Energy Minimization Methods.	1	0	1
35.	D+35	Comparison between global minimum conformation and bioactive conformation.	1	0	1
36.	D+36	Molecular docking and drug receptor interactions: Rigid docking, flexible docking and extra-precision docking.	1	0	1
37.	D+37	Agents acting on enzymes such as DHFR, HMG-CoA reductase and HIV protease, choline esterase (AChE & BchE).	1	0	1
38.	D+38	Tutorial	1	1	1
		<b>Total</b>	<b>11</b>	<b>0</b>	<b>13</b>
39.	D+39	Molecular Properties and Drug Design	1	0	1
40.	D+40	Prediction and analysis of ADMET properties of new Molecules.	1	0	1
41.	D+41	Importance in drug design.	1	0	1
42.	D+42	De novo drug design.	0	1	1
43.	D+43	Application of De novo drug design.	1	0	1
44.	D+44	Receptor/enzyme-interaction and its analysis	1	0	1
45.	D+45	Application of Receptor/enzyme-interaction and its analysis	1	0	1
46.	D+46	Receptor/enzyme cavity size prediction.	1	0	1
47.	D+47	Application of Receptor/enzyme cavity size prediction.	1	0	1
48.	D+48	Predicting the functional components of cavities	1	0	1
49.	D+49	Fragment based drug design.	1	0	1
50.	D+50	Homology modeling and generation of 3D-structure of protein.	1	0	1
		<b>Total</b>	<b>11</b>	<b>1</b>	<b>12</b>
51.	D+51	Pharmacophore Mapping and Virtual Screening.	1	0	1
52.	D+52	Concept of pharmacophore.	1	0	1
53.	D+53	Pharmacophore mapping.	1	0	1
54.	D+54	Application of pharmacophore mapping.	1	0	1
55.	D+55	Identification of Pharmacophore features.	1	0	1
56.	D+56	Pharmacophore modeling	1	0	1
57.	D+57	Conformational search used in pharmacophore mapping.	1	0	1
58.	D+58	In Silico Drug Design and Virtual Screening Techniques.	0	1	1

59.	D+59	Similarity based methods and Pharmacophore based screening.	1	0	1
60.	D+60	Structure based In-silico virtual screening protocols.	1	0	1
		<b>Total</b>	<b>11</b>	<b>1</b>	<b>12</b>





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### **Course Plan**

**Program-MASTER OF PHARMACY**

**Semester- II**

**Course-PHARMCEUTICAL PROCESS CHEMISTRY**

**Course Code-MPC204T**

**Session- 2021-2022**

S. No.	Day	Subject	L	T	P	Total
1	D Day					
2	D+1	Introduction to process chemistry	1	0	0	1
3	D+2	Stages of scale up process: Bench, pilot and large scale process.	1	0	0	1
4	D+3	In-process control	1	0	0	1
5	D+4	Validation of large scale process	1	0	0	1
6	D+5	Problem Solving Session/ class test	0	1	0	1
7	D+6	Case studies of some scale up process of APIs	1	0	0	1
8	D+7	Impurities in API	1	0	0	1
9	D+8	Impurities in API	1	0	0	1
10	D+9	Types and sources of impurities including genotoxic impurities	1	0	0	1
11	D+10	Problem Solving Session/ class test	0	1	0	1
		TOTAL	08	2	0	10
12	D+11	Extraction: Liquid equilibria, extraction with reflux	1	0	0	1
13	D+12	Counter current extraction	1	0	0	1
14	D+13	Filtration: Theory of filtration, pressure and vacuum Filtration, centrifugal filtration	1	0	0	1

15	D+14	Distillation: azeotropic and steam distillation	1	0	0	1
16	D+15	Problem Solving Session/ class test	0	1	0	1
17	D+16	Evaporation: Types of evaporators, factors affecting evaporation	1	0	0	1
18	D+17	Crystallization: Crystallization from aqueous, non aqueous solutions	1	0	0	1
19	D+18	Factors affecting crystallization, nucleation	1	0	0	1
20	D+19	Principle and general methods of Preparation of polymorphs, hydrates, solvates and amorphous APIs	1	0	0	1
21	D+20	Problem Solving Session/ class test	0	1	0	1
		TOTAL	08	2	0	10
22	D+21	Nitration: Nitrating agents, Aromatic nitration, kinetics and mechanism of aromatic nitration	1	0	0	1
23	D+22	process equipment for technical nitration, mixed acid for nitration <sup>2</sup>	1	0	0	1
24	D+23	Halogenation: Kinetics of halogenations, types of halogenations,	1	0	0	1
25	D+24	catalytic halogenations. Case study on industrial halogenation process.	1	0	0	1
26	D+25	Problem Solving Session/ class test	0	1	0	1
27	D+26	Oxidation: Introduction, types of oxidative reactions, Liquid phase oxidation with oxidizing agents	1	0	0	1
28	D+27	Nonmetallic Oxidizing agents such as H <sub>2</sub> O <sub>2</sub>	1	0	0	1
29	D+28	Sodium hypochlorite	1	0	0	1
30	D+29	Oxygen gas, Ozonolysis	1	0	0	1
31	D+30	Problem Solving Session/ class test	0	1	0	1
		TOTAL	08	2	0	10
32	D+31	Reduction: Catalytic hydrogenation, Heterogeneous and homogeneous catalyst	1	0	0	1
33	D+32	Hydrogen transfer reactions, Metal hydrides. Case study on industrial reduction process	1	0	0	1
34	D+33	Fermentation: Aerobic and anaerobic fermentation. Production of i. Antibiotics; Penicillin and Streptomycin	1	0	0	1
35	D+34	Problem sloving session/ class test	0	1	0	1
36	D+35	Fermentation: Aerobic and anaerobic fermentation. Production of ii. Vitamins: B <sub>2</sub> and B <sub>12</sub> iii. Statins: Lovastatin, Simvastatin	1	0	0	1
37	D+36	Reaction progress kinetic analysis i. Streamlining reaction steps, route selection,	1	0	0	1
	D+37	Characteristics of expedient routes, characteristics of cost-effective routes, reagent selection, families of	1	0	0	1

		reagents useful for scale-up				
<b>38</b>	D+38	Problem sloving session/ class test	0	1	0	1
<b>39</b>		TOTAL	06	02	0	08
<b>40</b>	D+39	Industrial Safety MSDS (Material Safety Data Sheet), hazard labels of chemicals	1	0	0	1
<b>41</b>	D+40	Personal Protection Equipment (PPE)	1	0	0	1
<b>42</b>	D+41	Fire hazards, types of fire & fire extinguishers	1	0	0	1
<b>43</b>	D+42	Problem Solving Session/ class test	0	1	0	1
<b>44</b>	D+43	Occupational Health & Safety Assessment Series 1800 (OHSAS-1800)	1	0	0	1
<b>45</b>	D+44	ISO-14001(Environmental Management System), Effluents and its management	1	0	0	1
<b>46</b>	D+45	Problem Solving session / class test	0	1	0	1
		TOTAL	05	2	0	7

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### **Course Plan**

**Program-** M. Pharm

**Semester-II**<sup>nd</sup>

**Course-**PHARMACEUTICAL CHEMISTRY PRACTICALS – II

**Course Code-** MPC-205P

**Session - 2021-22**

S. No.	Day	Subject	L	T	P	Total
	D+Day					
1	D+1	To carry out the preparation of 4 - chlorobenzhydrylpiperazine.	0	0	4	4
2	D+2	To Preparation and Submit of 4-iodotolene from p-toluid	0	0	4	4
3	D+3	To Preparation and Submit Preparation of umbelliferone by Pechhman reaction	0	0	4	4
4	D+4	To Preparation of triphenyl imidazole	0	0	4	4
5	D+5	To determine Interpretation of organic compounds by FT-IR	0	0	4	4
6	D+6	To determine the Interpretation of organic compounds by NMR	0	0	4	4
7	D+7	To determine the Interpretation of organic compounds by MS	0	0	4	4
8	D+8	To carry out the Determination of purity by DSC in pharmaceuticals.	0	0	4	4

9	D+9	To Identify of organic compounds using FT-IR	0	0	4	4
10	D+10	To Identify of organic compounds using NMR	0	0	4	4
11	D+11	To Identify of organic compounds using CNMR	0	0	4	4
12	D+12	To Identify of organic compounds using Mass spectra	0	0	4	4
		TOTAL	0	0	48	48

Date-  
and Signature

Name