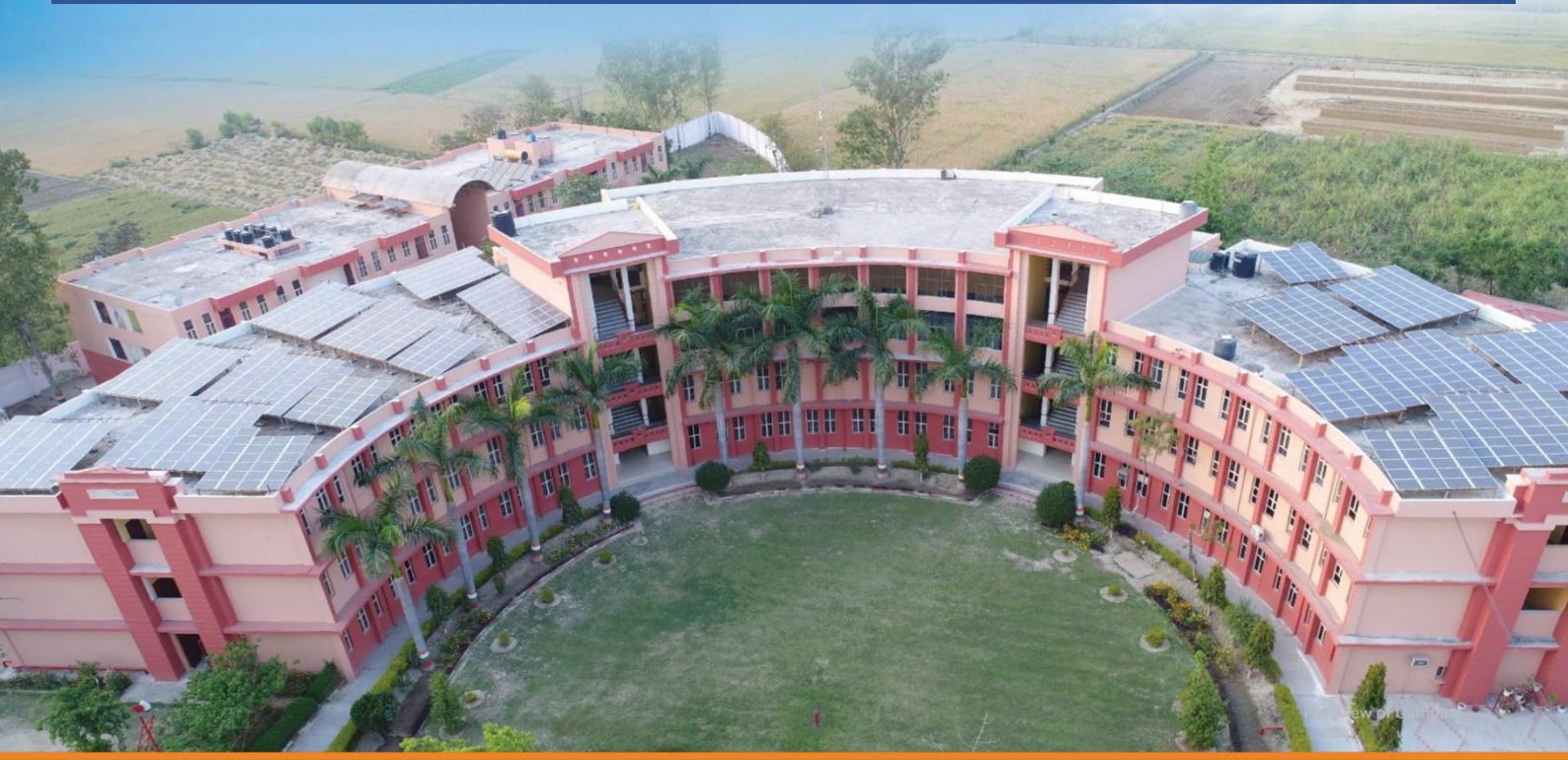
Shobhit University
EDUCATION EMPOWERS

nirf
Top 101-125 Band in Pharmacy

CRITERION 1 – CURRICULAR ASPECTS

1.2.2 PERCENTAGE OF NEW DEGREE PROGRAMMES, FELLOWSHIPS AND DIPLOMAS INTRODUCED BY THE UNIVERSITY ACROSS ALL FACULTIES DURING THE LAST FIVE YEARS (CERTIFICATE PROGRAMMES ARE NOT TO BE INCLUDED)

To reduce enormous use of paper and printing the ensure data, sign and a seal by the Competent Authority for all the papers, we have used the Class-3 Digital Signatures where a Registration Authority i.e. Dr. Mahipal Singh, Registrar of our University authenticate the documents and responses claimed in this pdf file.



Shobhit University
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Minutes of relevant BoS meetings Clearing approving the introduction of new Degree Programmes claimed in the SSR

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School of Pharmacy (AdarshVijendra Institute of Pharmaceutical sciences)

Date: 25.06.2019

Minutes of the Meeting of Board of Studies

13th Meeting of the Board of Studies of School of Pharmacy (Adarsh Vijendra Institute of Pharmaceutical Sciences), Shobhit University Gangoh was organized on 25.06.2019at 02:00 P.M. online on Google Meet. The meeting was attended by:

1. Dr. Ranjit Singh — Chairman, Board of Studies
Professor & Director
School of Pharmacy,
Shobhit University Gangoh

2. Mr.Devkant Sharma ,
Associate Professor,
CH Devi Lal College of Pharmacy
Jagdari, Jamnagar — External Member

3. Mr. Gaurav Saini
Associate Professor
Siddhartha Institute of Pharmacy ,
Dehradun Uttarakhand — External Member

4. Dr.Siraj Anwar Associate Professor,
School of Pharmacy, GD Goenka University, Gurugram — External Member

5. Dr Arif Naseer Professor, School of Pharmacy,
Shobhit University Gangoh — Internal Member

6. Dr. Bhupendra Chauhan Associate Professor School of Pharmacy,
Shobhit University Gangoh — Internal Member

7. Dr. Zulphikar Ali Assistant Professor School of Pharmacy,
Shobhit University Gangoh — Internal Member

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The following discussed and approved:

Welcome address by Chairman

The Chairman extended a warm welcome to all the members of Board of Studies and the following information was shared before the members of the Board of Studies:

Draft Approved by Pharmacy Council of India (Scheme & Syllabi of Batch of 2019-20 for different Program on Choice Based Credit System.

Item BOS 13.1: Approval of the Minutes of the 12th BOS Meeting held on 16 Dec 2018. was circulated among the members and the same were notified after the approval of the Board of Studies. {Annexure- 1}

Item BOS 13.2: Introduction and Implementation of the Scheme and Syllabus of New Programme i.e. M. Pharm (Pharmacology, Pharmaceutics & Pharmaceutical Chemistry approved by Pharmacy Council of India) w. e. f. 2019-20 academic semester.

- **BOS members approved Implementation of the Scheme and Syllabus of New Programme i.e. M.Pharm (Pharmacology, Pharmaceutics & Pharmaceutical Chemistry) (Annexure-2)**

Item BOS 13.3: Approval of Examiners (Theory & Practical) and Paper Setters of the Odd semester courses in B.Pharm and M.Pharm(Pharmacology, Pharmaceutics and Pharmaceutical Chemistry) from **July to Dec. 2019**. The same is being sent to the Controller of Examinations, Shobhit University Gangoh, in a sealed cover. {Annexure-3}

Item BOS 13.4: Discussion on the Value Added courses offered for students and ratification of the same.

- BOS members approved the list of Value added courses offered to students.

The meeting ended with a vote of thanks to the Chairman, Board of Studies.

The suggestions given by the panel of BOS have been discussed with the Vice Chancellor and Dean Academics. The action taken on the suggestions has been approved by competent authorities.

Signed by:

(Chairman, BOS)

(Dean Academics)

(Vice Chancellor)

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Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

School Of Pharmacy

Ordinances, Regulations & Syllabus

For

Master of Pharmacy (M.Pharm) 2 Year Programme
Semester Pattern
(w.e.f. session 2019-2020)

Approved by PCI and adopted in the year 2019 (13th Meeting ,Board of Studies)

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CHAPTER –I:REGULATIONS

1. Short Title and Commencement

These regulations shall be called as "The Revised Regulations for the Master of Pharmacy (M. Pharm.)Degree Program - Credit Based Semester System (CBSS) of the Pharmacy Council of India, New Delhi". They shall come into effect from the Academic Year 2016-17. The regulations framed are subject to modifications from time to time by the authorities of the university.

2. Minimum qualification for admission

A Pass in the following examinations

a) B. Pharm Degree examination of an Indian university established by law in India from an institution approved by Pharmacy Council of India and has scorednot less than 55 % of the maximum marks (aggregate of 4 years of B.Pharm.)

b) Every student, selected for admission to post graduate pharmacy program in any PCI approved institution should have obtained registration with the State Pharmacy Council or should obtain the same within one month from the date of his/her admission, failing which the admission of the candidate shall be cancelled.

Note: It is mandatory to submit a migration certificate obtained from the respective university where the candidate had passed his/her qualifying degree (B.Pharm.)

3. Duration of the program

The program of study for M.Pharm. shall extend over a period of four semesters (two academic years). The curricula and syllabi for the program shall be prescribed from time to time by Phamacy Council of India, New Delhi.

4. Medium of instruction and examinations

Medium of instruction and examination shall be in English.

5. Working days in each semester

Each semestershall consist of not less than 100 working days. The odd semesters shall be conducted from the month of **J**une/**J**uly to November/December and the even semesters shall be conducted from the month of December/**J**anuary to May/**J**une in every calendar year.

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6. Attendance and progress

A candidate is required to put in at least 80% attendance in individual courses considering theory and practical separately. The candidate shall complete the prescribed course satisfactorily to be eligible to appear for the respective examinations.

7. Program/Course credit structure

As per the philosophy of Credit Based Semester System, certain quantum of academic work viz. theory classes, practical classes, seminars, assignments, etc. are measured in terms of credits. On satisfactory completion of the courses, a candidate earns credits. The amount of credit associated with a course is dependent upon the number of hours of instruction per week in that course. Similarly the credit associated with any of the other academic, co/extra- curricular activities is dependent upon the quantum of work expected to be put in for each of these activities per week/per activity.

Credit assignment

Theory and Laboratory courses

Courses are broadly classified as Theory and Practical. Theory courses consist of lecture (L) and Practical (P) courses consist of hours spent in the laboratory. Credits (C) for a course is dependent on the number of hours of instruction per week in that course, and is obtained by using a multiplier of one (1) for lecture and a multiplier of half (1/2) for practical (laboratory) hours.Thus, for example, a theory course having four lectures per week throughout the semester carries a credit of 4. Similarly, a practical having four laboratory hours per week throughout semester carries a credit of 2.

The contact hours of seminars, assignments and research work shall be treated as that of practical courses for the purpose of calculating credits. i.e., the contact hours shall be multiplied by 1/2. Similarly, the contact hours of journal club, research work presentations and discussions with the supervisor shall be considered as theory course and multiplied by 1.

Minimum credit requirements

The minimum credit points required for the award of M. Pharm. degree is 95. However based on the credit points earned by the students under the head of co-curricular activities, a student shall earn a maximum of 100 credit points. These credits are divided into Theory courses, Practical, Seminars, Assignments,Research work, Discussions with the supervisor, Journal club and Co-Curricular activities over the duration of four semesters. The credits

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are distributed semester-wise as shown in Table 14. Courses generally progress in sequence, building competencies and their positioning indicates certain academic maturity on the part of the learners. Learners are expected to follow the semester-wise schedule of courses given in the syllabus.

8. Academic work

A regular record of attendance both in Theory, Practical, Seminar, Assignment, Journal club, Discussion with the supervisor, Research work presentation and Dissertation shall be maintained by the department / teaching staff of respective courses.

9. Course of study

The specializations in M.Pharm program is given in Table 1.

Table – 1: List of M.Pharm. Specializations and their Code

S. No.	Specialization	Code
1.	Pharmaceutics	MPH
2.	Pharmaceutical Chemistry	MPC
3.	Pharmacology	MPL

The course of study for M.Pharm specializations shall include Semester wise Theory & Practical as given in Table – 2 to 11. The number of hours to be devoted to each theory and practical course in any semester shall not be less than that shown in Table – 2 to 11.

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Table – 2: Course of study for M. Pharm. (Pharmaceutics)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
Semester I					
MPH101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MPH102T	Drug Delivery System	4	4	4	100
MPH103T	Modern Pharmaceutics	4	4	4	100
MPH104T	Regulatory Affair	4	4	4	100
MPH105P	Pharmaceutics Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
Total		35	26	35	650
Semester II					
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
MPH204T	Cosmetic and Cosmeceuticals	4	4	4	100
MPH205P	Pharmaceutics Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

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Table – 3: Course of study for M. Pharm. (Pharmaceutical Chemistry)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
Semester I					
MPC101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MPC1012T	Advanced Organic Chemistry -I	4	4	4	100
MPC103T	Advanced Medicinal chemistry	4	4	4	100
MPC104T	Chemistry of Natural Products	4	4	4	100
MPC105P	Pharmaceutical Chemistry Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
Total		35	26	35	650
Semester II					
MPC201T	Advanced Spectral Analysis	4	4	4	100
MPC202T	Advanced Organic Chemistry -II	4	4	4	100
MPC203T	Computer Aided Drug Design	4	4	4	100
MPC204T	Pharmaceutical Process Chemistry	4	4	4	100
MPC205P	Pharmaceutical Chemistry Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

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Table – 4: Course of study for (Pharmacology)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
Semester I					
MPL 101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MPL 102T	Advanced Pharmacology-I	4	4	4	100
MPL 103T	Pharmacological and Toxicological Screening Methods-I	4	4	4	100
MPL 104T	Cellular and Molecular Pharmacology	4	4	4	100
MPL 105P	Pharmacology Practical I	12	6	12	150
-	Seminar/Assignment	7	4	7	100
Total		35	26	35	650
Semester II					
MPL 201T	Advanced Pharmacology II	4	4	4	100
MPL 202T	Pharmacological and Toxicological Screening Methods-II	4	4	4	100
MPL 203T	Principles of Drug Discovery	4	4	4	100
MPL 204T	Experimental Pharmacology practical- II	4	4	4	100
MPL 205P	Pharmacology Practical II	12	6	12	150
-	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

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Table – 5: Course of study for M. Pharm. III Semester
(Common for All Specializations)

Course Code	Course	Credit Hours	Credit Points
MRM 301T	Research Methodology and Biostatistics*	4	4
-	Journal club	1	1
-	Discussion / Presentation (Proposal Presentation)	2	2
-	Research Work	28	14
Total		35	21

* Non University Exam

Table – 6: Course of study for M. Pharm. IV Semester
(Common for All Specializations)

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

Table – 7: Semester wise credits distribution

Semester	Credit Points
I	26
II	26
III	21
IV	20
Co-curricular Activities (Attending Conference, Scientific Presentations and Other Scholarly Activities)	Minimum=02 Maximum=07*
Total Credit Points	Minimum=95 Maximum=100*

*Credit Points for Co-curricular Activities

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Table – 8: Guidelines for Awarding Credit Points for Co-curricular Activities

Name of the Activity	Maximum Credit Points Eligible / Activity
Participation in National Level Seminar/Conference/Workshop/Symposium/ Training Programs (related to the specialization of the student)	01
Participation in international Level Seminar/Conference/Workshop/Symposium/ Training Programs (related to the specialization of the student)	02
Academic Award/Research Award from State Level/National Agencies	01
Academic Award/Research Award from International Agencies	02
Research / Review Publication in National Journals (Indexed in Scopus / Web of Science)	01
Research / Review Publication in International Journals	

Note: International Conference: Held Outside India International **J**ournal:

The Editorial Board Outside India

*The credit points assigned for extracurricular and or co-curricular activities shall be given by the Principals of the colleges and the same shall be submitted to the University. The criteria to acquire this credit point shall be defined by the colleges from time to time.

10. Program Committee

1. The M. Pharm. programme shall have a Programme Committee constituted by the Head of the institution in consultation with all the Heads of the departments.

2. The composition of the Programme Committee shall be as follows:
A teacher at the cadre of Professor shall be the Chairperson; One Teacher from eachM.Pharm specialization and four student representatives (two from each academic year), nominated by the Head of the institution.

3. Duties of the Programme Committee:
   i. Periodically reviewing the progress of the classes.
   ii. Discussing the problems concerning curriculum, syllabus and the conduct of classes.
   iii. Discussing with the course teachers on the nature and scope of assessment for the course and the same shall be announced to the students at the beginning of respective semesters.

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iv. Communicating its recommendation to the Head of the institution on academic matters.

v. The Programme Committee shall meet at least twice in a semester preferably at the end of each sessionalexam and before the end semester exam.

11. Examinations/Assessments

The schemes for internal assessment and end semester examinations are givenin Table – 9.

End semester examinations

The End Semester Examinations for each theory and practical coursethrough semesters I to IVshall beconducted by the respective university except for the subject with asterix symbol (*) in table I and II for which examinations shall be conducted by the subject experts at college level and the marks/grades shall be submitted to the university.

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Tables – 9 : Schemes for internal assessments and end semester
(Pharmaceutics- MPH)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER I								
MPH 101T	Modern Pharmaceutical Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MPH 102T	Drug Delivery System	10	15	1 Hr	25	75	3 Hrs	100
MPH 103T	Modern Pharmaceutics	10	15	1 Hr	25	75	3 Hrs	100
MPH 104T	Regulatory Affair	10	15	1 Hr	25	75	3 Hrs	100
MPH 105P	Pharmaceutics Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MPH 201T	Molecular Pharmaceutics(Nano Tech and Targeted DDS)	10	15	1 Hr	25	75	3 Hrs	100
MPH 202T	Advanced Biopharmaceutics & Pharmacokinetics	10	15	1 Hr	25	75	3 Hrs	100
MPH 203T	Computer Aided Drug Delivery System	10	15	1 Hr	25	75	3 Hrs	100
MPH	Cosmetic	10	15	1 Hr	25	75	3 Hrs	100

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204T	and Cosmeceuticals							
MPH 205P	Pharmaceutics Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

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table: 10 (Pharmaceutical Chemistry-MPC)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER I								
MPC101T	Modern Pharmaceutical Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MPC102T	Advanced Organic Chemistry -I	10	15	1 Hr	25	75	3 Hrs	100
MPC103T	Advanced Medicinal chemistry	10	15	1 Hr	25	75	3 Hrs	100
MPC104T	Chemistry of Natural Products	10	15	1 Hr	25	75	3 Hrs	100
MPC105P	Pharmaceutical Chemistry Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MPC201T	Advanced Spectral Analysis	10	15	1 Hr	25	75	3 Hrs	100
MPC202T	Advanced Organic Chemistry -II	10	15	1 Hr	25	75	3 Hrs	100
MPC203T	Computer Aided Drug Design	10	15	1 Hr	25	75	3 Hrs	100
MPC204T	Pharmaceutical Process Chemistry	10	15	1 Hr	25	75	3 Hrs	100
MPC205P	Pharmaceutic	20	30	6 Hrs	50	100	6	150

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	al Chemistry Practical II						Hrs	
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

	Assurance							
MPA204T	Herbal and Cosmetic analysis	10	15	1 Hr	25	75	3 Hrs	100
MPA205P	Pharmaceutical Analysis-II	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

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Tables – 11: Schemes for internal assessments and end semester examinations(Pharmacology-MPL)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER I								
MPL101T	Modern Pharmaceutical Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MPL102T	Advanced Pharmacology-I	10	15	1 Hr	25	75	3 Hrs	100
MPL103T	Pharmacological and Toxicological Screening Methods-I	10	15	1 Hr	25	75	3 Hrs	100
MPL104T	Cellular and Molecular Pharmacology	10	15	1 Hr	25	75	3 Hrs	100
MPL105P	Experimental Pharmacology - I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MPL201T	Advanced Pharmacology II	10	15	1 Hr	25	75	3 Hrs	100
MPL102T	Pharmacological and Toxicological Screening Methods-II	10	15	1 Hr	25	75	3 Hrs	100
MPL203T	Principles of Drug Discovery	10	15	1 Hr	25	75	3 Hrs	100
MPL204T	Clinical research and pharmacovigilance	10	15	1 Hr	25	75	3 Hrs	100
MPL205P	Experimental Pharmacology - II	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

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Tables – 12: Schemes for internal assessments and end semester examinations(Semester III& IV)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER III								
MRM301T	Research Methodology and Biostatistics*	10	15	1 Hr	25	75	3 Hrs	100
-	Journal club	-	-	-	25	-	-	25
-	Discussion / Presentation (Proposal Presentation)	-	-	-	50	-	-	50
-	Research work*	-	-	-	-	350	1 Hr	350
Total								525
SEMESTER IV								
-	Journal club	-	-	-	25	-	-	25
-	Discussion / Presentation (Proposal Presentation)	-	-	-	75	-	-	75
-	Research work and Colloquium	-	-	-	-	400	1 Hr	400
Total								500

*Non University Examination

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Internal assessment: Continuous mode

The marks allocated for Continuous mode of Internal Assessment shall be awarded as per the scheme given below.

Table – 13: Scheme for awarding internal assessment: Continuous mode

Theory	
Criteria	Maximum Marks
Attendance (Refer Table – 28)	8
Student – Teacher interaction	2
Total	10
Practical	
Attendance (Refer Table – 28	10
Based on Practical Records, Regular viva voce, etc.	10
Total	20

Table – 14: Guidelines for the allotment of marks for attendance

Percentage of Attendance	Theory	Practical
95 – 100	8	10
90 – 94	6	7.5
85 – 89	4	5
80 – 84	2	2.5
Less than 80	0	0

11.2.1. Sessional Exams

Two sessional exams shall be conducted for each theory / practical course as per the schedule fixed by the college(s). The scheme of question paper for theory and practical sessional examinations is given in the table. The average marks of two sessional exams shall be computed for internal assessment as per the requirements given in tables.

12. Promotion and award of grades

A student shall be declared PASS and eligible for getting grade in a course of M.Pharm.programme if he/she secures at least 50% marks in that particular courseincluding internal assessment.

13. Carry forward of marks

In case a student fails to secure the minimum 50% in any Theory or Practical course as specified in 12, then he/she shall reappear for the end semester examination of that course. However his/her marks of the Internal Assessment shall be carried over and he/she shall be entitled for grade obtained by him/her on passing.

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14. Improvement of internal assessment

A student shall have the opportunity to improve his/her performance only once in the sessional exam component of the internal assessment. The re-conduct of the sessional exam shall be completed before the commencement of next end semester theory examinations.

15. Reexamination of end semester examinations

Reexamination of end semester examination shall be conducted as per the schedule given in table 15. The exact dates of examinations shall be notified from time to time.

Table – 15: Tentative schedule of end semester examinations

Semester	For Regular Candidates	For Failed Candidates
I and III	November / December	May / June
II and IV	May / June	November / December

16. Allowed to keep terms (ATKT):

No student shall be admitted to any examination unless he/she fulfills the norms given in 6. ATKT rules are applicable as follows:

A student shall be eligible to carry forward all the courses of I and IIsemesters till the III semester examinations. However, he/she shall not be eligible to attend the courses of IV semester until all the courses of I, II and III semesters are successfully completed.

A student shall be eligible to get his/her CGPA upon successful completion of the courses of I to IV semesters within the stipulated time period as per the norms.

Note: Grade AB should be considered as failed and treated as one head for deciding ATKT. Such rules are also applicable for those students who fail to register for examination(s) of any course in any semester.

17. Grading of performances

Letter grades and grade points allocations:

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course.The letter grades and their corresponding grade points are given in Table – 16.

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Table – 16: Letter grades and grade points equivalent to Percentage of marks and performances

Percentage of Marks Obtained	Letter Grade	Grade Point	Performance
90.00 – 100	O	10	Outstanding
80.00 – 89.99	A	9	Excellent
70.00 – 79.99	B	8	Good
60.00 – 69.99	C	7	Fair
50.00 – 59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

A learner who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

18. The Semester grade point average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtainedin all the courses by the student during the semester. For example, if a student takes five courses (Theory/Practical) in a semester with credits C1, C2, C3 and C4 and the student's grade points in these courses

are G1, G2, G3 and G4, respectively, and then students' SGPA is equal to:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4}{C_1 + C_2 + C_3 + C_4}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a learner has a F or ABS grade in course 4, theSGPA shall then be computed as:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4 * \text{ZERO}}{C_1 + C_2 + C_3 + C_4}$$

19. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the IV semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all IV semesters and their courses. The CGPA shall reflect the failed statusin case of F grade(s), till the course(s) is/are passed. When the course(s) is/are passedby obtaining a pass grade on subsequent examination(s) theCGPA

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shall only reflect the new grade and not the fail grades earned earlier.The CGPAis calculated as:

$$CGPA = \frac{C_1S_1 + C_2S_2 + C_3S_3 + C_4S_4}{C_1 + C_2 + C_3 + C_4}$$

where C_1, C_2, C_3,.... is the total number of credits for semester I,II,III,…. and S_1,S_2, S_3,....is the SGPA of semester I,II,III,…. .

20. Declaration of class

The class shall be awarded on the basis of CGPA as follows: First Class with Distinction = CGPA of. 7.50 and above

First Class = CGPA of 6.00 to 7.49

Second Class = CGPA of 5.00 to 5.99

21. Project work

All the students shall undertake a project under the supervision of a teacher in Semester III to IV and submit a report. 4 copies of the project report shall be submitted (typed & bound copy not less than 75 pages).

The internal and external examiner appointed by the University shall evaluate the project at the time of the Practical examinations of other semester(s). The projects shall be evaluated as per the criteria given below.

Evaluation of Dissertation Book:

Objective(s) of the work done	50 Marks
Methodology adopted	150 Marks
Results and Discussions	250 Marks
Conclusions and Outcomes	50 Marks
Total	500 Marks

Evaluation of Presentation:

Presentation of work	100 Marks
Communication skills	50 Marks
Question and answer skills	100 Marks
Total	250 Marks

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22. Award of Ranks

Ranks and Medals shall be awarded on the basis of final CGPA. However, candidates who fail in one or more courses during the M.Pharm program shall not be eligible for award of ranks. Moreover, the candidates should have completed the M. Pharm program in minimum prescribed number of years, (two years) for the award of Ranks.

23. Award of degree

Candidates who fulfill the requirements mentioned above shall be eligible for award of degree during the ensuing convocation.

24. Duration for completion of the program of study

The duration for the completion of the program shall be fixed as double the actual duration of the program and the students have to pass within the said period, otherwise they have to get fresh Registration.

25. Revaluation I Retotaling of answer papers

There is no provision for revaluation of the answer papers in any examination. However, the candidates can apply for retotaling by paying prescribed fee.

26. Re-admission after break of study

Candidate who seeks re-admission to the program after break of study has to get the approval from the university by paying a condonation fee

Course Programme-
Pharmaceutics

Program Educational Objectives (PEOs)

Program Educational Objectives (PEOs) for a Master of Pharmacy (M.Pharm) with a focus on Pharmaceutics program typically outline the broad goals that graduates are expected to achieve in their professional careers and further education.

PEO1 Comprehensive Understanding of Pharmaceutics: Graduates will possess a thorough understanding of the principles and practices of pharmaceutical formulation, design, and delivery systems, including their biochemical and biopharmaceutical aspects.

PEO2 Research and Development Expertise: Graduates will engage in innovative research and development, contributing to the advancement of novel drug formulations and technologies that enhance therapeutic efficacy and safety.

PEO3 Application of Advanced Analytical Techniques: Graduates will demonstrate proficiency in employing advanced analytical techniques for the characterization and quality assessment of pharmaceutical products.

PEO4 Regulatory Knowledge and Compliance: Graduates will understand regulatory frameworks and guidelines related to pharmaceutical development, ensuring compliance throughout the drug development process.

PEO5 Critical Thinking and Problem-Solving Skills: Graduates will apply critical thinking and problem-solving skills to address complex challenges in drug formulation and delivery, optimizing therapeutic outcomes.

PEO6 Collaborative Skills in Interdisciplinary Teams: Graduates will effectively collaborate with healthcare professionals and researchers from diverse disciplines to enhance drug development and patient care.

PEO7 Ethical and Professional Standards: Graduates will uphold high ethical standards and professional integrity in their research and practice, prioritizing patient safety and the responsible conduct of research.

PEO8 Effective Communication Skills: Graduates will be able to communicate complex pharmaceutical concepts and research findings clearly and effectively to various stakeholders, including peers, regulatory agencies, and the public.

PEO9 Global Health Awareness: Graduates will understand global health issues and contribute to developing pharmaceutical solutions that improve access to essential medicines and enhance public health outcomes.

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Programme Specific Objectives (PSO's)

PSO1 Advanced Pharmaceutical Knowledge: Graduates will demonstrate a deep understanding of drug development processes, including formulation, synthesis, and quality control of pharmaceutical products.

PSO2 Clinical Pharmacy Skills: Graduates will apply clinical knowledge to assess patient medication regimens, provide pharmaceutical care, and contribute to interdisciplinary healthcare teams.

PSO3 Research Methodology: Graduates will be proficient in research methodologies, enabling them to design, conduct, and analyze pharmaceutical research effectively, including clinical trials and drug studies.

PSO4 Pharmacokinetics and Pharmacodynamics: Graduates will understand the principles of pharmacokinetics and pharmacodynamics, applying this knowledge to optimize drug therapy for diverse patient populations.

PSO5 Regulatory Affairs Expertise: Graduates will navigate regulatory frameworks and guidelines, ensuring compliance in the development and marketing of pharmaceutical products.

PSO6 Formulation Development: Graduates will be skilled in the development and evaluation of various dosage forms, utilizing modern techniques and technologies for innovative drug delivery systems.

PSO7 Quality Assurance and Control: Graduates will implement quality assurance and control measures in pharmaceutical manufacturing and laboratory settings, ensuring the safety and efficacy of products.

PSO8 Patient Counseling and Education: Graduates will effectively communicate medication-related information to patients, enhancing adherence and promoting safe medication use.

PSO9 Ethical and Professional Responsibility: Graduates will adhere to ethical guidelines and professional standards, promoting integrity and accountability in their pharmacy practice.

PSO10 Interprofessional Collaboration: Graduates will work collaboratively with healthcare professionals, understanding the roles of various team members in providing comprehensive patient care.

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(Programme Outcome Objectives (POO's)

POO1 Pharmaceutical Knowledge Application: Graduates will apply advanced knowledge of pharmaceutics to develop, formulate, and evaluate pharmaceutical products effectively.

POO2 Research Competence: Graduates will demonstrate the ability to design and conduct independent research in pharmaceutics, utilizing appropriate methodologies and analytical techniques.

POO3 Formulation Development Skills: Graduates will be skilled in developing various drug delivery systems, optimizing formulations for different routes of administration.

POO4 Analytical Proficiency: Graduates will utilize advanced analytical techniques to assess the quality and stability of pharmaceutical formulations, ensuring compliance with regulatory standards.

POO5 Clinical Application: Graduates will apply their knowledge of pharmacokinetics and pharmacodynamics to optimize drug therapy and improve patient outcomes.

POO6 Regulatory Compliance: Graduates will understand and navigate regulatory requirements and guidelines affecting pharmaceutical development and commercialization.

POO7 Ethical Standards: Graduates will uphold ethical principles in research and practice, ensuring patient safety and adherence to professional standards.

POO8 Communication Skills: Graduates will effectively communicate complex pharmaceutical concepts and research findings to a variety of audiences, including healthcare professionals and regulatory agencies.

POO9Collaborative Teamwork: Graduates will work effectively in interdisciplinary teams, contributing to collaborative problem-solving and enhancing healthcare delivery.

POO10 Commitment to Lifelong Learning: Graduates will demonstrate a commitment to lifelong learning, actively engaging in professional development and staying updated on advancements in pharmaceutics.

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PHARMACEUTICS(MPH)

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES
(MPH 101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know,

- Chemicals and Excipients
- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY 60 HOURS

1. a. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV- Visible spectroscopy. — 11 Hrs

   b. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy

   c. Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.

   d. Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.

2 NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy. — 11 Hrs

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3 Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy — 11 Hrs

4 Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution and applications of the following:
a) Paper chromatography b) Thin Layer chromatography
c) Ion exchange chromatography d) Column chromatography
e) Gas chromatography f) High Performance Liquid chromatography
g) Affinity chromatography — 11 Hrs

5 a. Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following:
a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing
b. X ray Crystallography: Production of X rays, Different X ray diffraction methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X- ray diffraction. — 11 Hrs

6 Immunological assays : RIA (Radio immuno assay), ELISA, Bioluminescence assays. — 5 Hrs

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein,Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler,Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4thedition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rdEdition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume11, Marcel Dekker Series

MA
L S

DRUG DELIVERY SYSTEMS
(MPH 102T)

SCOPE

This course is designed to impart knowledge on the area of advances in noveldrug delivery systems.

OBJECTIVES

Upon completion of the course, student shall be able to understand

- The various approaches for development of novel drug deliverysystems.
- The criteria for selection of drugs and polymers for the development ofdelivering system
- The formulation and evaluation of Novel drug delivery systems..

THEORY 60 Hrs

1.	Sustained Release(SR) and Controlled Release (CR) formulations: Introduction & basic concepts, advantages/ disadvantages, factors influencing, Physicochemical & biological approaches for SR/CR formulation, Mechanism of Drug Delivery from SR/CR formulation. Polymers: introduction, definition, classification, properties and application Dosage Forms for Personalized Medicine: Introduction, Definition, Pharmacogenetics, Categories of Patients for Personalized Medicines: Customized drug delivery systems, Bioelectronic Medicines, 3D printing of pharmaceuticals, Telepharmacy.	10 Hrs
2	Rate Controlled Drug Delivery Systems: Principles & Fundamentals, Types, Activation; Modulated Drug Delivery Systems;Mechanically activated, pH activated, Enzyme activated, and Osmotic activated Drug Delivery Systems Feedback regulated Drug Delivery Systems; Principles & Fundamentals.	10 Hrs
3	Gastro-Retentive Drug Delivery Systems: Principle, concepts advantages and disadvantages, Modulation of GI transit time approaches to extend GI transit. Buccal Drug Delivery Systems: Principle of muco adhesion, advantages and disadvantages, Mechanism of drug permeation, Methods of formulation and its evaluations.	10 Hrs
4	Occular Drug Delivery Systems: Barriers of drug permeation, Methods to overcome barriers.	06 Hrs

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5	Transdermal Drug Delivery Systems: Structure of skin and barriers, Penetration enhancers, Transdermal Drug Delivery Systems, Formulation and evaluation.	10 Hrs
6	Protein and Peptide Delivery: Barriers for protein delivery. Formulation and Evaluation of delivery systems of proteins and other macromolecules.	08 Hrs
7	Vaccine delivery systems: Vaccines, uptake of antigens, single shot vaccines, mucosal and transdermal delivery of vaccines.	06 Hrs

REFERENCES

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.
2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker,Inc., New York, 1992.
3. Encyclopedia of controlled delivery, Editor- Edith Mathiowitz, Published by WileyInterscience Publication, John Wiley and Sons, Inc, New York! Chichester/Weinheim
4. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
5. S.P.Vyas and R.K.Khar, Controlled Drug Delivery - concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002

JOURNALS

1. Indian Journal of Pharmaceutical Sciences (IPA)
2. Indian drugs (IDMA)
3. Journal of controlled release (Elsevier Sciences) desirable
4. Drug Development and Industrial Pharmacy (Marcel & Decker) desirable

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MODERN PHARMACEUTICS
(MPH 103T)

Scope

Course designed to impart advanced knowledge and skills required to learnvarious aspects and concepts at pharmaceutical industries

Objectives

Upon completion of the course, student shall be able to understand

- The elements of preformulation studies.
- The Active Pharmaceutical Ingredients and Generic drug Product development
- Industrial Management and GMP Considerations.
- Optimization Techniques & Pilot Plant Scale Up Techniques
- Stability Testing, sterilization process & packaging of dosage forms.

THEORY 60 HRS

1.	a. Preformation Concepts – Drug Excipient interactions - different methods, kinetics of stability, Stability testing. Theories of dispersion and pharmaceutical Dispersion (Emulsion and Suspension, SMEDDS) preparation and stability Large and small volume parental – physiological and formulation consideration, Manufacturing and evaluation.	10 Hrs
	b. Optimization techniques in Pharmaceutical Formulation: Concept and parameters of optimization, Optimization techniques in pharmaceutical formulation and processing. Statistical design, Response surface method, Contour designs, Factorial designs and application in formulation	10 Hrs
2	Validation : Introduction to Pharmaceutical Validation, Scope & merits of Validation, Validation and calibration of Master plan, ICH & WHO guidelines for calibration and validation of equipments, Validation of specific dosage form, Types of validation. Government regulation, Manufacturing Process Model, URS, DQ, IQ, OQ & P.Q. of facilities.	10 Hrs
3	cGMP & Industrial Management: Objectives and policies of current good manufacturing practices, layout of buildings, services, equipments and their maintenance Production management: Production organization, , materials management, handling and transportation, inventory management and control, production and planning control, Sales forecasting, budget and cost control, industrial and personal relationship. Concept of Total Quality Management.	10 Hrs

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4	Compression and compaction: Physics of tablet compression, compression, consolidation, effect of friction, distribution of forces, compaction profiles. Solubility.	10 Hrs
5	Study of consolidation parameters; Diffusion parameters, Dissolution parameters and Pharmacokinetic parameters, Heckel plots, Similarity factors – f2 and f1, Higuchi and Peppas plot, Linearity Concept of significance, Standard deviation , Chi square test, students T-test , ANOVA test.	10 Hrs

REFERENCES

1. Theory and Practice of Industrial Pharmacy By Lachmann and Libermann
2. Pharmaceutical dosage forms: Tablets Vol. 1-3 by Leon Lachmann.
3. Pharmaceutical Dosage forms: Disperse systems, Vol, 1-2; By LeonLachmann.
4. Pharmaceutical Dosage forms: Parenteral medications Vol. 1-2; By LeonLachmann.
5. Modern Pharmaceutics; By Gillbert and S. Banker.
6. Remington's Pharmaceutical Sciences.
7. Advances in Pharmaceutical Sciences Vol. 1-5; By H.S. Bean & A.H.Beckett.
8. Physical Pharmacy; By Alfred martin
9. Bentley's Textbook of Pharmaceutics – by Rawlins.
10. Good manufacturing practices for Pharmaceuticals: A plan for total quality control, Second edition; By Sidney H. Willig.
11. Quality Assurance Guide; By Organization of Pharmaceutical producers ofIndia.
12. Drug formulation manual; By D.P.S. Kohli and D.H.Shah. Easternpublishers, New Delhi.
13. How to practice GMPs; By P.P.Sharma. Vandhana Publications, Agra.
14. Pharmaceutical Process Validation; By Fra. R. Berry and Robert A. Nash.
15. Pharmaceutical Preformulations; By J.J. Wells.
16. Applied production and operations management; By Evans, Anderson,Sweeney and Williams.
17. Encyclopaedia of Pharmaceutical technology, Vol I – III.

MA
L S

REGULATORY AFFAIRS
(MPH 104T)

Scope

Course designed to impart advanced knowledge and skills required to learn the concept of generic drug and their development, various regulatory filings in different countries, different phases of clinical trials and submitting regulatory documents : filing process of IND, NDA and ANDA

- To know the approval process of
- To know the chemistry, manufacturing controls and their regulatoryimportance
- To learn the documentation requirements for
- To learn the importance and

Objectives:

Upon completion of the course, it is expected that the students will be able to understand

- The Concepts of innovator and generic drugs, drug developmentprocess
- The Regulatory guidance's and guidelines for filing and approvalprocess
- Preparation of Dossiers and their submission to regulatory agencies indifferent countries
- Post approval regulatory requirements for actives and drug products
- Submission of global documents in CTD/ eCTD formats
- Clinical trials requirements for approvals for conducting clinical trials
- Pharmacovigilence and process of monitoring in clinical trials.

THEORY 60 Hrs

1. a. Documentation in Pharmaceutical industry: Master formula record, DMF (Drug Master File), distribution records. Generic drugs product development Introduction , Hatch- Waxman act and amendments, CFR (CODE OF FEDERAL REGULATION) ,drug product performance, in-vitro, ANDA regulatory approval process, NDA approval process, BE and drug product assessment, in –vivo, scale up process approval changes, post marketing surveillance, outsourcing BA and BE to CRO. 12 Hrs

   b. Regulatory requirement for product approval: API, biologics, novel, therapies obtaining NDA, ANDA for genericdrugs ways and means of US registration for foreign drugs

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2	CMC, post approval regulatory affairs. Regulation for combination products and medical devices.CTD and ECTD format, industry and FDA liaison. ICH - Guidelines of ICH-Q, S E, M. Regulatory requirements of EU, MHRA, TGA and ROW countries.	12 Hrs
3	Non clinical drug development: Global submission of IND, NDA, ANDA. Investigation of medicinal products dossier, dossier (IMPD) and investigator brochure (IB).	12 Hrs
4	Clinical trials: Developing clinical trial protocols. Institutional review board/ independent ethics committee Formulation and working procedures informed Consent process and procedures. HIPAA· new, requirement to clinical study process, pharmacovigilance safety monitoring in clinical trials.	12 Hrs

REFERENCES

1. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargeland IsaderKaufer,Marcel Dekker series, Vol.143
2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P.Martin, Drugs and the Pharmaceutical Sciences,Vol.185,Informa Health care Publishers.
3. New Drug Approval Process: Accelerating Global Registrations By Richard AGuarino, MD,5th edition, Drugs and the Pharmaceutical Sciences,Vol.190.
4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley& Sons.Inc.
5. FDA regulatory affairs: a guide for prescription drugs, medical devices, and biologics/edited By Douglas J. Pisano, David Mantus.
6. Clinical Trials and Human Research: A Practical Guide to RegulatoryCompliance By Fay A.Rozovsky and Rodney K. Adams
7. www.ich.org/
8. www.fda.gov/
9. europa.eu/index_en.htm
10. https://www.tga.gov.au/tga-basics

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PHARMACEUTICS PRACTICALS - I
(MPH 105P)

1. Analysis of pharmacopoeial compounds and their formulations by UV Vis spectrophotometer
2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry
3. Experiments based on HPLC
4. Experiments based on Gas Chromatography
5. Estimation of riboflavin/quinine sulphate by fluorimetry
6. Estimation of sodium/potassium by flame photometry
7. To perform In-vitro dissolution profile of CR/ SR marketed formulation
8. Formulation and evaluation of sustained release matrix tablets
9. Formulation and evaluation osmotically controlled DDS
10. Preparation and evaluation of Floating DDS- hydro dynamically balanced DDS
11. Formulation and evaluation of Muco adhesive tablets.
12. Formulation and evaluation of trans dermal patches.
13. To carry out preformulation studies of tablets.
14. To study the effect of compressional force on tablets disintegration time.
15. To study Micromeritic properties of powders and granulation.
16. To study the effect of particle size on dissolution of a tablet.
17. To study the effect of binders on dissolution of a tablet.
18. To plot Heckal plot, Higuchi and peppas plot and determine similarityfactors.

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MOLECULAR PHARMACEUTICS (NANO TECHNOLOGY & TARGETED DDS) (NTDS)
(MPH 201T)

Scope

This course is designed to impart knowledge on the area of advances in noveldrug delivery systems.

Objectives

Upon completion of the course student shall be able to understand

- The various approaches for development of novel drug deliverysystems.
- The criteria for selection of drugs and polymers for the development ofNTDS
- The formulation and evaluation of novel drug delivery systems.

THEORY 60 Hrs

1.	Targeted Drug Delivery Systems: Concepts, Events and biological process involved in drug targeting. Tumor targeting and Brain specific delivery.	12 Hrs
2	Targeting Methods: introduction preparation and evaluation. Nano Particles & Liposomes: Types, preparation and evaluation.	12 Hrs
3	Micro Capsules / Micro Spheres: Types, preparation and evaluation , Monoclonal Antibodies ; preparation and application, preparation and application of Niosomes, Aquasomes, Phytosomes, Electrosomes.	12 Hrs
4	Pulmonary Drug Delivery Systems : Aerosols, propellents, ContainersTypes, preparation and evaluation, Intra Nasal Route Delivery systems; Types, preparation and evaluation.	12 Hrs
5	Nucleic acid based therapeutic delivery system : Gene therapy, introduction (ex-vivo & in-vivo gene therapy). Potential target diseases for gene therapy (inherited disorder and cancer). Gene expression systems (viral and nonviral gene transfer). Liposomal gene delivery systems. Biodistribution and Pharmacokinetics. knowledge of therapeutic antisense molecules and aptamers as drugs of future.	12 Hrs

REFERENCES

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded,Marcel Dekker, Inc., New York, 1992.
2. S.P.Vyas and R.K.Khar, Controlled Drug Delivery - concepts andadvances, VallabhPrakashan, New Delhi, First edition 2002.
3. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, NewDelhi, First edition 1997 (reprint in 2001).

MA
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ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS
(MPH 202T)

Scope

This course is designed to impart knowledge and skills necessary for dose calculations, dose adjustments and to apply biopharmaceutics theories in practical problem solving. Basic theoretical discussions of the principles of biopharmaceutics and pharmacokinetics are provided to help the students' to clarify the concepts.

Objectives

Upon completion of this course it is expected that students will be able understand,

- The basic concepts in biopharmaceutics and pharmacokinetics.
- The use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination.
- The critical evaluation of biopharmaceutic studies involving drug product equivalency.
- The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.
- The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic

THEORY 60 Hrs

1. Drug Absorption from the Gastrointestinal Tract: Gastrointestinal tract, Mechanism of drug absorption, Factors affecting drug absorption, pH–partition theory of drug absorption. Formuulation and physicochemical factors: Dissolution rate, Dissolution process, Noyes–Whitney equation and drug dissolution, Factors affecting the dissolution rate. Gastrointestinal absorption: role of the dosage form: Solution (elixir, syrup and solution) as a dosage form ,Suspension as a dosage form, Capsule as a dosage form, Tablet as a dosage form ,Dissolution methods ,Formulation and processing factors, Correlation of in vivo data with in vitro dissolution data.Transport model: Permeability-Solubility-Charge State and the pH Partition Hypothesis, Properties of the Gastrointestinal Tract (GIT), pH Microclimate Intracellular pH Environment, Tight-Junction Complex. 12 Hrs

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2	Biopharmaceutic considerations in drug product design and In Vitro Drug Product Performance: Introduction, biopharmaceutic factors affecting drug bioavailability, rate-limiting steps in drug absorption, physicochemical nature of the drug formulation factors affecting drug product performance, in vitro: dissolution and drug release testing, compendial methods of dissolution, alternative methods of dissolution testing,meeting dissolution requirements,problems of variable control in dissolution testingperformance of drug products. In vitro–in vivo correlation, dissolution profile comparisons, drug product stability,considerations in the design of a drug product.	12 Hrs
3	Pharmacokinetics: Basic considerations, pharmacokinetic models, compartment modeling: one compartment model- IV bolus, IV infusion, extra-vascular. Multi compartment model:two compartment - model in brief, non-linear pharmacokinetics: cause of non-linearity, Michaelis – Menten equation, estimation of k_{max} and v_{max}. Drug interactions: introduction, the effect of protein-binding interactions,the effect of tissue-binding interactions,cytochrome p450-based drug interactions,drug interactions linked to transporters.	12 Hrs
4	Drug Product Performance, In Vivo: Bioavailability and Bioequivalence: drug product performance, purpose of bioavailability studies, relative and absolute availability. methods for assessing bioavailability, bioequivalence studies, design and evaluation of bioequivalence studies, study designs, crossover study designs, evaluation of the data, bioequivalence example, study submission and drug review process. biopharmaceutics classification system, methods. Permeability: In-vitro, in-situ and In-vivo methods.generic biologics (biosimilar drug products),clinical significance of bioequivalence studies, special concerns in bioavailability and bioequivalence studies, generic substitution.	12 Hrs
5	Application of Pharmacokinetics: Modified-Release Drug Products, Targeted Drug Delivery Systems and Biotechnological Products. Introduction to Pharmacokinetics and pharmacodynamic, drug interactions. Pharmacokinetics and pharmacodynamics of biotechnology drugs. Introduction, Proteins and peptides, Monoclonal antibodies, Oligonucleotides, Vaccines (immunotherapy), Gene therapies.	12 Hrs

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REFERENCES

1. Biopharmaceutics and Clinical Pharmacokinetics by Milo Gibaldi, 4th edition,Philadelphia, Lea and Febiger, 1991
2. Biopharmaceutics and Pharmacokinetics, A. Treatise, D .M. Brahmankar and Sunil B. Jaiswal., VallabPrakashan, Pitampura, Delhi
3. Applied Biopharmaceutics and Pharmacokinetics by Shargel. Land YuABC, 2nd edition, Connecticut Appleton Century Crofts, 1985
4. Textbook of Biopharmaceutics and Pharmacokinetics, Dr. Shobha Rani R. Hiremath,Prism Book
5. Pharmacokinetics by Milo Gibaldi and D. Perrier, 2nd edition, Marcel Dekker Inc.,New York, 1982
6. Current Concepts in Pharmaceutical Sciences: Biopharmaceutics, Swarbrick. J, Leaand Febiger, Philadelphia, 1970
7. Clinical Pharmacokinetics, Concepts and Applications 3rd edition by MalcolmRowland and Thom~ N. Tozer, Lea and Febiger, Philadelphia, 1995
8. Dissolution, Bioavailability and Bioequivalence, Abdou. H.M, Mack PublishingCompany, Pennsylvania 1989
9. Biopharmaceutics and Clinical Pharmacokinetics, An Introduction, 4th edition,revised and expande by Robert. E. Notari, Marcel Dekker Inc, New York and Basel,1987.
10. Biopharmaceutics and Relevant Pharmacokinetics by John. G Wagner and M.Pemarowski, 1st edition, Drug Intelligence Publications, Hamilton, Illinois, 1971.
11. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James. G.Boylan, Marcel Dekker Inc, New York, 1996.
12. Basic Pharmacokinetics,1 st edition,Sunil S JambhekarandPhilip J Breen,pharmaceutical press, RPS Publishing,2009.
13. Absorption and Drug Development- Solubility, Permeability, and Charge State, Alex Avdeef, John Wiley & Sons, Inc,2003.

MA
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COMPUTER AIDED DRUG DEVELOPMENT
(MPH 203T)

Scope

This course is designed to impart knowledge and skills necessary for computer Applications in pharmaceutical research and development who want to understand the application of computers across the entire drug research and development process. Basic theoretical discussions of the principles of more integrated and coherent use of computerized information (informatics) in the drug development process are provided to help the students to clarify the concepts.

Objectives

Upon completion of this course it is expected that students will be able tounderstand,

- History of Computers in Pharmaceutical Research and Development
- Computational Modeling of Drug Disposition
- Computers in Preclinical Development
- Optimization Techniques in Pharmaceutical Formulation
- Computers in Market Analysis
- Computers in Clinical Development
- Artificial Intelligence (AI) and Robotics
- Computational fluid dynamics(CFD)

THEORY		60 Hrs
1.	a. Computers in Pharmaceutical Research and Development: A General Overview: History of Computers in Pharmaceutical Research and Development. Statistical modeling in Pharmaceutical research and development: Descriptive versus Mechanistic Modeling, Statistical Parameters, Estimation, Confidence Regions, Nonlinearity at the Optimum, Sensitivity Analysis, Optimal Design, Population Modeling b. Quality-by-Design In Pharmaceutical Development: Introduction, ICH Q8 guideline, Regulatory and industry views on QbD, Scientifically based QbD - examples of application.	12 Hrs
2	Computational Modeling Of Drug Disposition: Introduction ,Modeling Techniques: Drug Absorption, Solubility, Intestinal Permeation, Drug Distribution ,Drug Excretion, Active Transport; P-gp, BCRP, Nucleoside Transporters, hPEPT1, ASBT, OCT, OATP, BBB-Choline Transporter.	12 Hrs

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3	Computer-aided formulation development:: Concept of optimization, Optimization parameters, Factorial design, Optimization technology & Screening design. Computers in Pharmaceutical Formulation: Development of pharmaceuticalemulsions, microemulsion drug carriers Legal Protection of Innovative Uses of Computers in R&D, The Ethics of Computing in Pharmaceutical Research, Computers in Market analysis	12 Hrs
4	a. Computer-aided biopharmaceutical characterization: Gastrointestinal absorption simulation. Introduction, Theoretical background, Model construction, Parameter sensitivity analysis, Virtual trial, Fed vs. fasted state, In vitro dissolution and in vitro- in vivo correlation, Biowaiver considerations b. Computer Simulations in Pharmacokinetics and Pharmacodynamics: Introduction, Computer Simulation: Whole Organism, Isolated Tissues, Organs, Cell, Proteins and Genes. c. Computers in Clinical Development: Clinical Data Collection and Management, Regulation of Computer Systems	12 Hrs
5	Artificial Intelligence (AI), Robotics and Computational fluid dynamics: General overview, Pharmaceutical Automation, Pharmaceutical applications, Advantages and Disadvantages. Current Challenges and Future Directions.	12 Hrs

REFERENCES

1. Computer Applications in Pharmaceutical Research and Development,Sean Ekins, 2006, John Wiley & Sons.
2. Computer-Aided Applications in Pharmaceutical Technology, 1st Edition, **J**elena Djuris, Woodhead **P**ublishing
3. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick,James. G.Boylan, Marcel Dekker Inc, New York, 1996.

MA
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COSMETICS AND COSMECEUTICALS
(MPH 204T)

Scope

This course is designed to impart knowledge and skills necessary forthefundamental need for cosmetic and cosmeceutical products.

Objectives

Upon completion of the course, the students shall be able to understand

- Key ingredients used in cosmetics and cosmeceuticals.
- Key building blocks for various formulations.
- Current technologies in the market
- Various key ingredients and basic science to develop cosmetics andcosmeceuticals
- Scientific knowledge to develop cosmetics and cosmeceuticals withdesired Safety, stability, and efficacy.

THEORY 60 Hrs

1. Cosmetics – Regulatory : Definition of cosmetic products as per Indian regulation. Indian regulatory requirements for labeling of cosmetics Regulatory provisions relating to import of cosmetics., Misbranded and spurious cosmetics. Regulatory provisions relating to manufacture of cosmetics – Conditions for obtaining license, prohibition of manufacture and sale of certain cosmetics, loan license, offences and penalties. 12 Hrs

2 Cosmetics - Biological aspects : Structure of skin relating toproblems like dry skin, acne, pigmentation, prickly heat, wrinkles and body odor. Structure of hair and hair growth cycle. Commonproblems associated with oral cavity. Cleansing and care needsfor face, eye lids, lips, hands, feet, nail, scalp, neck, body andunder-arm. 12 Hrs

3 Formulation Building blocks: Building blocks for different product formulations of cosmetics/cosmeceuticals. Surfactants – Classification and application. Emollients, rheological additives: classification and application. Antimicrobial used as preservatives, their merits and demerits. Factors affecting microbial preservative efficacy. Building blocks for formulation of a moisturizing cream, vanishing cream, cold cream, shampoo and toothpaste. Soaps and syndetbars. 12 Hrs

Perfumes; Classification of perfumes. Perfume ingredients listed as allergens in EU regulation.

Controversial ingredients: Parabens, formaldehyde liberators, dioxane.

4	Design of cosmeceutical products: Sun protection, sunscreens classification and regulatory aspects. Addressing dry skin, acne, sun-protection, pigmentation, prickly heat, wrinkles, body odor., dandruff, dental cavities, bleeding gums, mouth odor and sensitive teeth through cosmeceutical formulations.	12 Hrs
5	Herbal Cosmetics : Herbal ingredients used in Hair care, skincare and oral care. Review of guidelines for herbal cosmetics byprivate bodies like cosmos with respect to preservatives,emollients, foaming agents, emulsifiers and rheology modifiers. Challenges in formulating herbal cosmetics.	12 Hrs

REFERENCES

1. Harry's Cosmeticology. 8th edition.
2. Poucher'sperfumecosmeticsandSoaps,10th edition.
3. Cosmetics - Formulation, Manufacture and quality control, PP.Sharma,4thedition
4. Handbook of cosmetic science and Technology A.O.Barel, M.Paye and H.I. Maibach. 3rd edition
5. Cosmetic and Toiletries recent suppliers catalogue.
6. CTFA directory.

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PHARMACEUTICS PRACTICALS - II
(MPH 205P)

1. To study the effect of temperature change , non solvent addition,incompatible polymer addition in microcapsules preparation
2. Preparation and evaluation of Alginate beads
3. Formulation and evaluation of gelatin /albumin microspheres
4. Formulation and evaluation of liposomes/niosomes
5. Formulation and evaluation of spherules
6. Improvement of dissolution characteristics of slightly soluble drug by Soliddispersion technique.
7. Comparison of dissolution of two different marketed products /brands
8. Protein binding studies of a highly protein bound drug & poorly proteinbound drug
9. Bioavailability studies of Paracetamol in animals.
10. Pharmacokinetic and IVIVC data analysis by Winnoline^{R} software
11. In vitro cell studies for permeability and metabolism
12. DoE Using Design Expert® Software
13. Formulation data analysis Using Design Expert® Software
14. Quality-by-Design in Pharmaceutical Development
15. Computer Simulations in Pharmacokinetics and Pharmacodynamics
16. Computational Modeling Of Drug Disposition
17. To develop Clinical Data Collection manual
18. To carry out Sensitivity Analysis, and Population Modeling.
19. Development and evaluation of Creams
20. Development and evaluation of Shampoo and Toothpaste base
21. To incorporate herbal and chemical actives to develop products
22. To address Dry skin, acne, blemish, Wrinkles,dandruff

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Course Programme-
Pharmaceutical chemistry

Program Educational Objectives (PEOs)

Program Educational Objectives (PEOs) for a Master of Pharmacy (M.Pharm) program typically outline the broad goals that graduates are expected to achieve in their professional careers and further education. Here are some common PEOs for an M.Pharm program:

PEO1 Professional Competence: Graduates will demonstrate advanced knowledge and skills in pharmaceutical sciences, enabling them to contribute effectively in various sectors such as industry, academia, and healthcare.

PEO2 Research and Innovation: Graduates will engage in research activities, promoting innovation and development of new drug formulations, therapeutic approaches, and pharmaceutical technologies.

PEO3 Leadership and Teamwork: Graduates will exhibit leadership qualities and the ability to work collaboratively in multidisciplinary teams, enhancing their effectiveness in professional settings.

PEO4 Ethical Practice: Graduates will uphold ethical standards and practices in pharmacy, ensuring patient safety, regulatory compliance, and responsible conduct in research and practice.

PEO5 Ethical Lifelong Learning: Graduates will demonstrate a commitment to lifelong learning and professional development, staying updated with the latest advancements in the pharmaceutical field.

PEO6 Ethical Community Engagement: Graduates will engage with the community, promoting public health initiatives and contributing to the education of patients and healthcare professionals about medication use and safety.

PEO7 Critical Thinking and Problem-Solving: Graduates will apply critical thinking and analytical skills to address complex pharmaceutical problems, making informed decisions based on scientific evidence.

PEO8 Regulatory Knowledge: Graduates will possess a thorough understanding of regulatory frameworks governing pharmaceutical development, approval processes, and marketing, ensuring compliance in their practices.

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PEO9 Interdisciplinary Collaboration: Graduates will effectively collaborate with healthcare professionals, researchers, and industry partners to enhance patient care and drive pharmaceutical innovation.

PEO10 Communication Skills: Graduates will demonstrate strong oral and written communication skills, effectively conveying complex pharmaceutical concepts to diverse audiences, including patients, colleagues, and regulatory bodies.

PEO11 Pharmacovigilance and Safety: Graduates will be equipped to monitor, evaluate, and manage drug safety, actively participating in pharmacovigilance activities to ensure the well-being of patients.

PEO12 Global Perspective: Graduates will develop a global perspective on healthcare and pharmaceutical practices, understanding the impact of cultural, economic, and policy factors on medication management.

Programme Specific Objectives (PSO's)

PSO1 Advanced Chemical Knowledge: Graduates will demonstrate a thorough understanding of organic, inorganic, and medicinal chemistry principles as they apply to drug design and development.

PSO2 Synthesis and Characterization: Graduates will be skilled in the synthesis, purification, and characterization of pharmaceutical compounds using modern analytical techniques.

PSO3 Drug Design and Development: Graduates will apply knowledge of structure-activity relationships (SAR) and molecular modeling to design and develop new pharmaceutical agents.

PSO4 Analytical Method Development: Graduates will be proficient in developing and validating analytical methods for the quantitative and qualitative analysis of pharmaceutical substances.

PSO5 Quality Assurance and Control: Graduates will understand and implement quality assurance and control measures in pharmaceutical manufacturing processes to ensure product safety and efficacy.

PSO6 Regulatory Affairs Knowledge: Graduates will possess a comprehensive understanding of the regulatory frameworks governing the pharmaceutical industry, including drug approval processes and compliance requirements.

PSO7 Interdisciplinary Collaboration: Graduates will effectively collaborate with professionals in related fields, including pharmacology and pharmacognosy, to enhance drug development and therapeutic outcomes.

PSO8 Research and Innovation: Graduates will engage in innovative research projects, contributing to the field of pharmaceutical chemistry through publications and presentations.

PSO9 Ethical Practice: Graduates will adhere to ethical guidelines in research and pharmaceutical practice, ensuring integrity in all scientific endeavors.

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Programme Outcome Objectives (POO's)

POO1 Knowledge Application: Graduates will apply advanced knowledge of pharmaceutical sciences to solve complex problems in drug development, formulation, and patient care.

POO2 Research Proficiency: Graduates will demonstrate the ability to conduct independent research, critically analyze data, and contribute to scientific literature in the field of pharmacy.

POO3 Clinical Judgment: Graduates will make informed clinical decisions based on evidence-based practices, optimizing therapeutic outcomes for patients.

POO4 Communication Skills: Graduates will effectively communicate pharmaceutical information, both orally and in writing, to diverse audiences, including patients, healthcare professionals, and regulatory bodies.

POO5 Ethical Standards: Graduates will adhere to ethical principles in all aspects of pharmaceutical practice, ensuring patient safety and promoting public health.

POO6 Team Collaboration: Graduates will work effectively in interdisciplinary teams, contributing to comprehensive patient care and fostering collaboration among healthcare providers.

POO7 Lifelong Learning: Graduates will exhibit a commitment to lifelong learning, seeking out continuing education opportunities to stay updated with advancements in the pharmaceutical field.

POO8 Regulatory Knowledge: Graduates will understand and navigate the regulatory landscape governing pharmaceutical products, ensuring compliance with laws and guidelines.

POO9 Patient-Centered Care: Graduates will provide patient-centered pharmaceutical care, considering individual patient needs, preferences, and values in their practice.

POO10 Innovation and Entrepreneurship: Graduates will demonstrate the ability to innovate and explore entrepreneurial opportunities in the pharmaceutical industry, contributing to the development of new products and services.

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PHARMACEUTICALCHEMISTRY(MPC)

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (MPC 101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know about chemicals andexcipients

- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

	THEORY	60 Hrs
1.	a. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy, Difference/ Derivative spectroscopy. b. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy, Data Interpretation. c. Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence (Characterestics of drugs that can be analysed by flourimetry), Quenchers, Instrumentation and Applications of fluorescence spectrophotometer. d. Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.	10 Hrs
2	NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy.	10 Hrs

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3	Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy.	10 Hrs
4	Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution, isolation of drug from excipients, data interpretation and applications of the following: a) Thin Layer chromatography b) High Performance Thin Layer Chromatography c) Ion exchange chromatography d) Column chromatography e) Gas chromatography f) High Performance Liquid chromatography g) Ultra High Performance Liquid chromatography h) Affinity chromatography i) Gel Chromatography	10 Hrs
5	a.Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing b) X ray Crystallography: Production of X rays, Different X ray methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X-ray diffraction.	10 Hrs
6	a. Potentiometry: Principle, working, Ion selective Electrodes and Application of potentiometry. b. Thermal Techniques: Principle, thermal transitions and Instrumentation (Heat flux and power-compensation and designs), Modulated DSC, Hyper DSC, experimental parameters (sample preparation, experimental conditions, calibration, heating and cooling rates, resolution, source of errors) and their influence, advantage and disadvantages, pharmaceutical applications. Differential Thermal Analysis (DTA): Principle, instrumentation	10 Hrs

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and advantage and disadvantages, pharmaceutical applications, derivative differential thermal analysis (DDTA). TGA: Principle, instrumentation, factors affecting results, advantage and disadvantages, pharmaceutical applications.

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein,Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler,Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4thedition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi,3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis - Modern Methods – Part B - J W Munson, Vol11, Marcel. Dekker Series
8. Spectroscopy of Organic Compounds, 2nd edn., P.S/Kalsi, Wiley estern Ltd., Delhi.
9. Textbook of Pharmaceutical Analysis, KA.Connors, 3rd Edition, John Wiley& Sons, 1982.

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ADVANCED ORGANIC CHEMISTRY - I
(MPC 102T)

Scope

The subject is designed to provide in-depth knowledge about advances in organic chemistry, different techniques of organic synthesis and their applications to process chemistry as well as drug discovery.

Objectives

Upon completion of course, the student shall be to understand

- The principles and applications of reterosynthesis
- The mechanism & applications of various named reactions
- The concept of disconnection to develop synthetic routes for smalltarget molecule.
- The various catalysts used in organic reactions
- The chemistry of heterocyclic compounds

THEORY 60 Hrs

1. Basic Aspects of Organic Chemistry: 12 Hrs
   1. Organic intermediates: Carbocations, carbanions, free radicals, carbenes and nitrenes. Their method of formation, stability and synthetic applications.
   2. Types of reaction mechanisms and methods of determining them,
   3. Detailed knowledge regarding the reactions, mechanisms and their relative reactivity and orientations.

   Addition reactions

   a) Nucleophilic uni- and bimolecular reactions (SN1 and SN2)
   b) Elimination reactions (E1 & E2; Hoffman & Saytzeff's rule)
   c) Rearrangement reaction

2 Study of mechanism and synthetic applications of following named Reactions: 12 Hrs

Ugi reaction, Brook rearrangement, Ullmann coupling reactions, Dieckmann Reaction, Doebner-Miller Reaction, Sandmeyer Reaction, Mitsunobu reaction, Mannich reaction, Vilsmeyer-Haack Reaction, Sharpless asymmetric epoxidation, Baeyer-Villiger oxidation, Shapiro & Suzuki reaction, Ozonolysis and Michael addition reaction

3 Synthetic Reagents & Applications: 12 Hrs

Aluminiumisopropoxide, N-bromosuccinamide, diazomethane, dicyclohexylcarbodimide, Wilkinson reagent, Witting reagent. Osmium tetroxide, titanium chloride, diazopropane, diethyl azodicarboxylate, Triphenylphosphine, Benzotriazol-1-yloxy) tris (dimethylamino) phosphonium hexafluoro-phosphate (BOP).

Protecting groups

a. Role of protection in organic synthesis
b. Protection for the hydroxyl group, including 1,2-and1,3-diols:ethers, esters, carbonates, cyclic acetals & ketals
c. Protection for the Carbonyl Group: Acetals and Ketals
d. Protection for the Carboxyl Group: amides and hydrazides,esters
e. Protection for the Amino Group and Amino acids: carbamatesand amides

4 Heterocyclic Chemistry: 12 Hrs

Organic Name reactions with their respective mechanism and application involved in synthesis of drugs containing five, six membered and fused hetrocyclics such as Debus-Radziszewski imidazole synthesis, Knorr Pyrazole Synthesis Pinner Pyrimidine Synthesis, Combes Quinoline Synthesis, Bernthsen Acridine Synthesis, Smiles rearrangement and Traube purine synthesis.

Synthesis of few representative drugs containing these hetrocyclic nucleus such as Ketoconazole, Metronidazole, Miconazole, celecoxib, antipyrin, Metamizole sodium, Terconazole, Alprazolam, Triamterene, Sulfamerazine, Trimethoprim, Hydroxychloroquine, Quinine, Chloroquine, Quinacrine, Amsacrine, Prochlorpherazine, Promazine, Chlorpromazine,Theophylline , Mercaptopurine and Thioguanine.

5 Synthon approach and retrosynthesis applications

i. Basic principles, terminologies and advantages of retrosynthesis; guidelines for dissection of molecules. Functional group interconvertion and addition (FGI and FGA) 12 Hrs
ii. C-X disconnections; C-C disconnections – alcohols and carbonyl compounds; 1,2-, 1,3-,1,4-, 1,5-, 1,6-difunctionalized compounds
iii. Strategies for synthesis of three, four, five and six-membered ring.

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REFERENCES

1. "Advanced Organic chemistry, Reaction, Mechanisms and Structure", JMarch, John Wiley and Sons, New York.
2. "Mechanism and Structure in Organic Chemistry", ES Gould, Hold Rinchartand Winston, New York.
3. "Organic Chemistry" Clayden, Greeves, Warren and Woihers., OxfordUniversity Press 2001.
4. "Organic Chemistry" Vol I and II. I.L. Finar. ELBS, Pearson Education Lts, Dorling Kindersley 9India) Pvt. Ltd.,.
5. A guide to mechanisms in Organic Chemistry, Peter Skyes (OrientLongman, New Delhi).
6. Reactive Intermediates in Organic Chemistry, Tandom and Gowel, Oxford& IBH Publishers.
7. Combinational Chemistry – Synthesis and applications – Stephen RWilson & Anthony W Czarnik, Wiley – Blackwell.
8. Carey, Organic Chemistry, 5th Edition (Viva Books Pvt. Ltd.)
9. Organic Synthesis - The Disconnection Approach, S. Warren, Wily India
10. Principles of Organic Synthesis, ROC Norman and JM Coxan, NelsonThorns.
11. Organic Synthesis - Special Techniques. VK Ahluwalia and R Agarwal,Narosa Publishers.
12. Organic Reaction Mechanisms IVth Edtn, VK Ahluwalia and RK Parashar,Narosa Publishers.

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ADVANCED MEDICINAL CHEMISTRY
(MPC 103T)

Scope

The subject is designed to impart knowledge about recent advances in the field of medicinal chemistry at the molecular level including different techniques for the rational drug design.

Objectives

At completion of this course it is expected that students will be able tounderstand

- Different stages of drug discovery
- Role of medicinal chemistry in drug research
- Different techniques for drug discovery
- Various strategies to design and develop new drug like molecules forbiological targets
- Peptidomimetics

THEORY 60 Hrs

1. Drug discovery: Stages of drug discovery, lead discovery; identification, validation and diversity of drug targets. 12 Hrs

   Biological drug targets: Receptors, types, binding and activation, theories of drug receptor interaction, drug receptor interactions, agonists vs antagonists, artificial enzymes.

2 Prodrug Design and Analog design: 12 Hrs

   a) Prodrug design: Basic concept, Carrier linked prodrugs/ Bioprecursors, Prodrugs of functional group, Prodrugs to improve patient acceptability, Drug solubility, Drug absorption and distribution, site specific drug delivery and sustained drug action. Rationale of prodrug design and practical consideration of prodrug design.

   b) Combating drug resistance: Causes for drug resistance, strategies to combat drug resistance in antibiotics and anticancer therapy, Genetic principles of drug resistance.

   c) Analog Design: Introduction, Classical & Non classical, Bioisosteric replacement strategies, rigid analogs,

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alteration of chain branching, changes in ring size, ring position isomers, design of stereo isomers and geometric isomers, fragments of a lead molecule, variation in inter atomic distance.

3 a) Medicinal chemistry aspects of the following class of drugs — 12 Hrs

Systematic study, SAR, Mechanism of action and synthesis of new generation molecules of following class of drugs:

a) Anti-hypertensive drugs, Psychoactive drugs, Anticonvulsantdrugs, H1 & H2 receptor antagonist, COX1 & COX2 inhibitors, Adrenergic & Cholinergic agents, Antineoplastic and Antiviral agents.

b) Stereochemistry and Drug action: Realization that stereo selectivity is a pre-requisite for evolution. Role of chirality in selective and specific therapeutic agents. Case studies, Enantio selectivity in drug adsorption, metabolism, distribution and elimination.

4 Rational Design of Enzyme Inhibitors

Enzyme kinetics & Principles of Enzyme inhibitors, Enzyme inhibitors in medicine, Enzyme inhibitors in basic research, rational design of non-covalently and covalently binding enzyme inhibitors. — 12 Hrs

5 Peptidomimetics

Therapeutic values of Peptidomimetics, design of peptidomimetics by manipulation of the amino acids, modification of the peptide backbone, incorporating conformational constraints locally or globally. Chemistry of prostaglandins, leukotrienes and thromboxones. — 12 Hrs

REFERENCES

1. Medicinal Chemistry by Burger, Vol I –VI.
2. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry, 12th Edition, Lppincott Williams & Wilkins, Woltess Kluwer (India) Pvt.Ltd, New Delhi.
3. Comprehensive Medicinal Chemistry – Corwin and Hansch.
4. Computational and structural approaches to drug design edited by Robert M Stroud and Janet. F Moore

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5. Introduction to Quantitative Drug Design by Y.C. Martin.
6. Principles of Medicinal Chemistry by William Foye, 7th Edition, IppincottWilliams & Wilkins, Woltess Kluwer (India) Pvt.Ltd, New Delhi.
7. Drug Design Volumes by Arienes, Academic Press, Elsevier Publishers,Noida, Uttar Pradesh..
8. Principles of Drug Design by Smith.
9. The Organic Chemistry of the Drug Design and Drug action by RichardB.Silverman, II Edition, Elsevier Publishers, New Delhi.
10. An Introduction to Medicinal Chemistry, Graham L.Patrick, III Edition,Oxford University Press, USA.
11. Biopharmaceutics and pharmacokinetics, DM.Brahmankar, Sunil B.**J**aiswal II **E**dition, 2014, Vallabh **P**rakashan, New Delhi.
12. Peptidomimetics in Organic and Medicinal Chemistry by Antonio Guarnaand Andrea Trabocchi, First edition, Wiley publishers.

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CHEMISTRY OF NATURAL PRODUCTS
(MPC 104T)

Scope

The subject is designed to provide detail knowledge about chemistry of medicinal compounds from natural origin and general methods of structural elucidation of such compounds. It also emphasizes on isolation, purification and characterization of medicinal compounds from natural origin.

Objectives

At completion of this course it is expected that students will be able tounderstand-

- Different types of natural compounds and their chemistry andmedicinal importance
- The importance of natural compounds as lead molecules for new drugdiscovery
- The concept of rDNA technology tool for new drug discovery
- General methods of structural elucidation of compounds of naturalorigin
- Isolation, purification and characterization of simple chemicalconstituents from natural source

THEORY 60 Hrs

1. Study of Natural products as leads for new pharmaceuticals for the following class of drugs — 12 Hrs

   a) Drugs Affecting the Central Nervous System: MorphineAlkaloids
   b) Anticancer Drugs: Paclitaxel and Docetaxel, Etoposide, andTeniposide
   c) Cardiovascular Drugs: Lovastatin, Teprotide and Dicoumarol
   d) Neuromuscular Blocking Drugs: Curare alkaloids
   e) Anti-malarial drugs and Analogues
   f) Chemistry of macrolid antibiotics (Erythromycin, Azithromycin, Roxithromycin, and Clarithromycin) and β - Lactam antibiotics (Cephalosporins and Carbapenem)

2 a) Alkaloids

General introduction, classification, isolation, purification, molecular modification and biological activity of alkaloids, general methods of structural determination of alkaloids, structural elucidation and stereochemistry of ephedrine, morphine, ergot, emetine and reserpine. — 12 Hrs

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b) Flavonoids

Introduction, isolation and purification of flavonoids, General methods of structural determination of flavonoids; Structural elucidation of quercetin.

c) Steroids

General introduction, chemistry of sterols, sapogenin and cardiac glycosides. Stereochemistry and nomenclature of steroids, chemistry of contraceptive agents male & female sex hormones (Testosterone, Estradiol, Progesterone), adrenocorticoids (Cortisone), contraceptive agents and steroids (Vit – D).

3 a) Terpenoids — 12 Hrs

Classification, isolation, isoprene rule and general methods of structural elucidation of Terpenoids; Structural elucidation of drugs belonging to mono (citral, menthol, camphor), di(retinol, Phytol, taxol) and tri terpenoids (Squalene,Ginsenoside) carotinoids (β carotene).

b) Vitamins

Chemistry and Physiological significance of Vitamin A, B1, B2, B12, C, E, Folic acid and Niacin.

4 a). Recombinant DNA technology and drug discovery — 12 Hrs

rDNA technology, hybridoma technology, New pharmaceuticals derived from biotechnology; Oligonucleotide therapy. Gene therapy: Introduction, Clinical application and recent advances in gene therapy, principles of RNA & DNA estimation

b). Active constituent of certain crude drugs used in Indigenous system Diabetic therapy – Gymnema sylvestre, Salacia reticulate, Pterocarpus marsupiam, Swertia chirata, Trigonella foenum graccum; Liver dysfunction – Phyllanthus niruri; Antitumor – Curcuma longa Linn.

5 Structural Characterization of natural compounds — 12 Hrs

Structural characterization of natural compounds using IR, 1HNMR, 13CNMR and MS Spectroscopy of specific drugs e.g., Penicillin, Morphine, Camphor, Vit-D, Quercetin and Digitalis glycosides.

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REFERENCES

1. Modern Methods of Plant Analysis, Peech and M.V.Tracey, Springer –Verlag, Berlin, Heidelberg.
2. Phytochemistry Vol. I and II by Miller, Jan Nostrant Rein Hld.
3. Recent advances in Phytochemistry Vol. I to IV – Scikel Runeckles,Springer Science & Business Media.
4. Chemistry of natural products Vol I onwards IWPAC.
5. Natural Product Chemistry Nakanishi Gggolo, University Science Books,California.
6. Natural Product Chemistry "A laboratory guide" – Rapheal Khan.
7. The Alkaloid Chemistry and Physiology by RHF Manske, Academic Press.
8. Introduction to molecular Phytochemistry – CHJ Wells, Chapmannstall.
9. Organic Chemistry of Natural Products Vol I and II by Gurdeep andChatwall, Himalaya Publishing House.
10. Organic Chemistry of Natural Products Vol I and II by O.P. Agarwal,Krishan Prakashan.
11. Organic Chemistry Vol I and II by I.L. Finar, Pearson education.
12. Elements of Biotechnology by P.K. Gupta, Rastogi Publishers.
13. Pharmaceutical Biotechnology by S.P.Vyas and V.K.Dixit, CBS Publishers.
14. Biotechnology by Purohit and Mathur, Agro-Bios, 13th edition.
15. Phytochemical methods of Harborne, Springer, Netherlands.
16. Burger's Medicinal Chemistry.

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PHARMACEUTICAL CHEMISTRY PRACTICAL - I
(MPC 105P)

1. Analysis of Pharmacopoeial compounds and their formulations by UV Vis spectrophotometer, RNA & DNA estimation
2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry
3. Experiments based on Column chromatography
4. Experiments based on HPLC
5. Experiments based on Gas Chromatography
6. Estimation of riboflavin/quinine sulphate by fluorimetry
7. Estimation of sodium/potassium by flame photometry

To perform the following reactions of synthetic importance

1. Purification of organic solvents, column chromatography
2. Claisen-schimidt reaction.
3. Benzyllic acid rearrangement.
4. Beckmann rearrangement.
5. Hoffmann rearrangement
6. Mannich reaction
7. Synthesis of medicinally important compounds involving more than one step along with purification and Characterization using TLC, melting point and IR spectroscopy (4 experiments)
8. Estimation of elements and functional groups in organic natural compounds
9. Isolation, characterization like melting point, mixed melting point, molecular weight determination, functional group analysis, co-chromatographic technique for identification of isolated compounds and interpretation of UV and IR data.
10. Some typical degradation reactions to be carried on selected plant constituents

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ADVANCED SPECTRAL ANALYSIS
(MPC 201T)

Scope

This subject deals with various hyphenated analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are LC-MS, GC-MS, ATR-IR, DSC etc.

Objectives

At completion of this course it is expected that students will be able tounderstand-

- Interpretation of the NMR, Mass and IR spectra of various organiccompounds
- Theoretical and practical skills of the hyphenated instruments
- Identification of organic compounds

THEORY 60Hrs

1. UV and IR spectroscopy: 12 Hrs

Wood ward – Fieser rule for 1,3- butadienes, cyclic dienes and α, β-carbonyl compounds and interpretation compounds of enones. ATR-IR, IR Interpretation of organic compounds.

2 NMR spectroscopy: 12 Hrs

1-D and 2-D NMR, NOESY and COSY, HECTOR, INADEQUATE techniques, Interpretation of organic compounds.

3 Mass Spectroscopy 12 Hrs

Mass fragmentation and its rules, Fragmentation of important functional groups like alcohols, amines, carbonyl groups and alkanes, Meta stable ions, Mc Lafferty rearrangement, Ring rule, Isotopic peaks, Interpretation of organic compounds.

4 Chromatography: 12 Hrs

Principle, Instrumentation and Applications of the following :

a) GC-MS b) GC-AAS c) LC-MS d) LC-FTIR e) LC-NMR f) CE-MS g) High Performance Thin Layer chromatography h) Super critical fluid chromatography i) Ion Chromatography j) I-EC (Ion- Exclusion Chromatography) k) Flash chromatography

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5 a). Thermal methods of analysis — 12 Hrs

Introduction, principle, instrumentation and application of DSC,DTA and TGA.

b). Raman Spectroscopy

Introduction, Principle, Instrumentation and Applications.

c). Radio immuno assay

Biological standardization , bioassay, ELISA, Radioimmunoassay of digitalis and insulin.

REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein,Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler,Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
5. Quantitative analysis of Pharmaceutical formulations by HPTLC - P DSethi, CBS Publishers, New Delhi.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi,3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series

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ADVANCED ORGANIC CHEMISTRY - II
(MPC 202T)

Scope

The subject is designed to provide in-depth knowledge about advances in organic chemistry, different techniques of organic synthesis and their applications to process chemistry as well as drug discovery.

Objectives

Upon completion of course, the student shall able to understand

- The principles and applications of Green chemistry
- The concept of peptide chemistry.
- The various catalysts used in organic reactions
- The concept of stereochemistry and asymmetric synthesis.

THEORY 60 Hrs

1. Green Chemistry: 12 Hrs
   a. Introduction, principles of green chemistry
   b. Microwave assisted reactions: Merit and demerits of its use, increased reaction rates, mechanism, superheating effects of microwave, effects of solvents in microwave assisted synthesis, microwave technology in process optimization, its applications in various organic reactions and heterocycles synthesis
   c. Ultrasound assisted reactions: Types of sonochemical reactions, homogenous, heterogeneous liquid-liquid and liquid-solid reactions, synthetic applications
   d. Continuous flow reactors: Working principle, advantages and synthetic applications.
2. Chemistry of peptides 12 Hrs
   a. Coupling reactions in peptide synthesis
   b. Principles of solid phase peptide synthesis, t-BOC and FMOC protocols, various solid supports and linkers: Activation procedures, peptide bond formation, deprotection and cleavage from resin, low and high HF cleavage protocols, formation of free peptides and peptide amides, purification and case studies, site-specific chemical modifications of peptides
   c. Segment and sequential strategies for solution phase peptide synthesis with any two case studies
   d. Side reactions in peptide synthesis: Deletion peptides, side

reactions initiated by proton abstraction, protonation, over- activation and side reactions of individual amino acids.

3 Photochemical Reactions — 12 Hrs

Basic principles of photochemical reactions. Photo-oxidation, photo-addition and photo-fragmentation.

Pericyclic reactions

Mechanism, Types of pericyclic reactions such as cyclo addition, electrocyclic reaction and sigmatrophic rearrangement reactions with examples

4 Catalysis: — 12 Hrs

a. Types of catalysis, heterogeneous and homogenous catalysis, advantages and disadvantages
b. Heterogeneous catalysis – preparation, characterization, kinetics, supported catalysts, catalyst deactivation and regeneration, some examples of heterogeneous catalysis used in synthesis of drugs.
c. Homogenous catalysis, hydrogenation, hydroformylation, hydrocyanation, Wilkinson catalysts, chiral ligands and chiral induction, Ziegler-Natta catalysts, some examples of homogenous catalysis used in synthesis of drugs
d. Transition-metal and Organo-catalysis in organic synthesis:
   Metal-catalyzed reactions
e. Biocatalysis: Use of enzymes in organic synthesis, immobilized enzymes/cells in organic reaction.
f. Phase transfer catalysis - theory and applications

5 Stereochemistry & Asymmetric Synthesis — 12 Hrs

a. Basic concepts in stereochemistry – optical activity, specific rotation, racemates and resolution of racemates, the Cahn, Ingold, Prelog (CIP) sequence rule, meso compounds, pseudo asymmetric centres, axes of symmetry, Fischers D and L notation, cis-trans isomerism, E and Z notation.
b. Methods of asymmetric synthesis using chiral pool, chiral auxiliaries and catalytic asymmetric synthesis, enantiopure separation and Stereo selective synthesis with examples.

REFERENCES

1. "Advanced Organic chemistry, Reaction, mechanisms and structure", JMarch, John Wiley and sons, New York.
2. "Mechanism and structure in organic chemistry", ES Gould, Hold Rinchartand Winston,NewYork.
3. "Organic Chemistry" Clayden, Greeves, Warren and Woihers., Oxford University Press 2001.
4. "Organic Chemistry" Vol I and II. I.L. Finar. ELBS, Sixth ed., 1995.
5. Carey, Organic chemistry, 5th edition (Viva Books Pvt. Ltd.)
6. Organic synthesis-the disconnection approach, S. Warren, Wily India
7. Principles of organic synthesis, ROCNorman and JMCoxan, Nelson thorns
8. Organic synthesis- Special techniques VK Ahluwalia and R Aggarwal,Narosa Publishers.
9. Organic reaction mechanisms IV edtn, VK Ahluwalia and RK Parashar,Narosa Publishers.

MA
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COMPUTER AIDED DRUG DESIGN
(MPC 203T)

Scope

The subject is designed to impart knowledge on the current state of the arttechniques involved in computer assisted drug design.

Objectives

At completion of this course it is expected that students will be able tounderstand

- Role of CADD in drug discovery
- Different CADD techniques and their applications
- Various strategies to design and develop new drug like molecules.
- Working with molecular modeling softwares to design new drugmolecules
- The in silico virtual screening protocols

Theory	60 Hrs
1. Introduction to Computer Aided Drug Design (CADD) History, different techniques and applications. Quantitative Structure Activity Relationships: Basics History and development of QSAR: Physicochemical parameters and methods to calculate physicochemical parameters: Hammett equation and electronic parameters (sigma), lipophilicity effects and parameters (log P, pi-substituent constant), steric effects (Taft steric and MR parameters) Experimental and theoretical approaches for the determination of these physicochemical parameters.	12 Hrs
2 Quantitative Structure Activity Relationships: Applications Hansch analysis, Free Wilson analysis and relationship betweenthem, Advantages and disadvantages; Deriving 2D-QSAR equations. 3D-QSAR approaches and contour map analysis. Statistical methods used in QSAR analysis and importance ofstatistical parameters.	12 Hrs
3 Molecular Modeling and Docking a) Molecular and Quantum Mechanics in drug design. b) Energy Minimization Methods: comparison between global	12 Hrs

minimum conformation and bioactive conformation

c) Molecular docking and drug receptor interactions: Rigid docking, flexible docking and extra-precision docking. Agents acting on enzymes such as DHFR, HMG-CoA reductase and HIV protease, choline esterase (AchE & BchE)

4 Molecular Properties and Drug Design — 12 Hrs

a) Prediction and analysis of ADMET properties of new molecules and its importance in drug design.

b) De novo drug design: Receptor/enzyme-interaction and its analysis, Receptor/enzyme cavity size prediction, predicting the functional components of cavities, Fragment based drug design.

c) Homology modeling and generation of 3D-structure of protein.

5 Pharmacophore Mapping and Virtual Screening — 12 Hrs

Concept of pharmacophore, pharmacophore mapping, identification of Pharmacophore features and Pharmacophore modeling; Conformational search used in pharmacophore mapping.

In Silico Drug Design and Virtual Screening Techniques

Similarity based methods and Pharmacophore based screening, structure based In-silico virtual screening protocols.

REFERENCES

1. Computational and structural approaches to drug discovery, Robert MStroud and Janet. F Moore, RCS Publishers.
2. Introduction to Quantitative Drug Design by Y.C. Martin, CRC Press,Taylor & Francis group..
3. Drug Design by Ariens Volume 1 to 10, Academic Press, 1975, ElsevierPublishers.
4. Principles of Drug Design by Smith and Williams, CRC Press, Taylor &Francis.
5. The Organic Chemistry of the Drug Design and Drug action by Richard B.Silverman, Elsevier Publishers.
6. Medicinal Chemistry by Burger, Wiley Publishing Co.

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7. An Introduction to Medicinal Chemistry –Graham L. Patrick, OxfordUniversity Press.
8. Wilson and Gisvold's Text book of Organic Medicinal and PharmaceuticalChemistry, Ippincott Williams & Wilkins.
9. Comprehensive Medicinal Chemistry – Corwin and Hansch, PergamonPublishers.
10. Computational and structural approaches to drug design edited by Robert M Stroud and Janet. F Moore

MA
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PHARMACEUTICAL PROCESS CHEMISTRY
(MPC 204T)

Scope

Process chemistry is often described as scale up reactions, taking them from small quantities created in the research lab to the larger quantities that are needed for further testing and then to even larger quantities required for commercial production. The goal of a process chemist is to develop synthetic routes that are safe, cost-effective, environmentally friendly, and efficient. The subject is designed to impart knowledge on the development and optimization of a synthetic route/s and the pilot plant procedure for the manufacture of Active Pharmaceutical Ingredients (APIs) and new chemical entities (NCEs) for the drug development phase.

Objectives

At completion of this course it is expected that students will be able tounderstand

- The strategies of scale up process of apis and intermediates
- The various unit operations and various reactions in process chemistry

THEORY — 60 Hrs

1. Process chemistry — 12 Hrs

Introduction, Synthetic strategy

Stages of scale up process: Bench, pilot and large scale process.In-process control and validation of large scale process.

Case studies of some scale up process of APIs.

Impurities in API, types and their sources including genotoxicimpurities

2 Unit operations — 12 Hrs

a) Extraction: Liquid equilibria, extraction with reflux, extraction with agitation, counter current extraction.
b) Filtration: Theory of filtration, pressure and vacuum filtration, centrifugal filtration,
c) Distillation: azeotropic and steam distillation
d) Evaporation: Types of evaporators, factors affecting evaporation.
e) Crystallization: Crystallization from aqueous, non- aqueous solutions factors affecting crystallization, nucleation. Principle and general methods of Preparation of polymorphs, hydrates, solvates and amorphous APIs.

3	Unit Processes - I a) Nitration: Nitrating agents, Aromatic nitration, kinetics and mechanism of aromatic nitration, process equipment for technical nitration, mixed acid for nitration, b) Halogenation: Kinetics of halogenations, types of halogenations, catalytic halogenations. Case study on industrial halogenation process. c) Oxidation: Introduction, types of oxidative reactions, Liquid phase oxidation with oxidizing agents. Nonmetallic Oxidizing agents such as H_2O_2, sodium hypochlorite, Oxygen gas, ozonolysis.	12 Hrs
4	Unit Processes - II a) Reduction: Catalytic hydrogenation, Heterogeneousand homogeneous catalyst; Hydrogen transfer reactions, Metal hydrides. Case study on industrial reductionprocess. b) Fermentation: Aerobic and anaerobic fermentation. Production of i. Antibiotics; Penicillin and Streptomycin, ii. Vitamins: B2 and B12 iii. Statins: Lovastatin, Simvastatin c) Reaction progress kinetic analysis i. Streamlining reaction steps, route selection, ii. Characteristics of expedient routes, characteristics of cost-effective routes, reagent selection, families of reagents useful for scale-up.	12 Hrs
5	Industrial Safety a) MSDS (Material Safety Data Sheet), hazard labels of chemicals and Personal Protection Equipment (PPE) b) Fire hazards, types of fire & fire extinguishers c) Occupational Health & Safety Assessment Series 1800 (OHSAS-1800) and ISO-14001(Environmental Management System), Effluents and its management	12 Hrs

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REFERENCES

1. Process Chemistry in the Pharmaceutical Industry: Challenges in an Ever-Changing Climate-An Overview; K. Gadamasetti, CRC Press.
2. Pharmaceutical Manufacturing Encyclopedia, 3rd edition, Volume 2.
3. Medicinal Chemistry by Burger, 6th edition, Volume 1-8.
4. W.L. McCabe, J.C Smith, Peter Harriott. Unit operations of chemicalengineering, 7th edition, McGraw Hill
5. Polymorphism in Pharmaceutical Solids .Dekker Series Volume 95 Ed: HG Brittain (1999)
6. Regina M. Murphy: Introduction to Chemical Processes: Principles,Analysis, Synthesis
7. Peter J. Harrington: Pharmaceutical Process Chemistry for Synthesis:Rethinking the Routes to Scale-Up
8. P.H.Groggins: Unit processes in organic synthesis (MGH)
9. F.A.Henglein: Chemical Technology (Pergamon)
10. M.Gopal: Dryden's Outlines of Chemical Technology, WEP East-West Press
11. Clausen,Mattson: Principle of Industrial Chemistry, Wiley Publishing Co.,
12. Lowenheim & M.K. Moran: Industrial Chemicals
13. S.D. Shukla & G.N. Pandey: A text book of Chemical Technology Vol. II,Vikas Publishing House
14. J.K. Stille: Industrial Organic Chemistry (PH)
15. Shreve: Chemical Process, Mc Grawhill.
16. B.K.Sharma: Industrial Chemistry, Goel Publishing House
17. ICH Guidelines
18. United States Food and Drug Administration official website www.fda.gov

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PHARMACEUTICAL CHEMISTRY PRACTICALS – II
(MPC 205P)

1. Synthesis of organic compounds by adapting different approachesinvolving (3 experiments)
   a) Oxidation
   b) Reduction/hydrogenation
   c) Nitration
2. Comparative study of synthesis of APIs/intermediates by different synthetic routes (2 experiments)
3. Assignments on regulatory requirements in API (2 experiments)
4. Comparison of absorption spectra by UV and Wood ward – Fieser rule
5. Interpretation of organic compounds by FT-IR
6. Interpretation of organic compounds by NMR
7. Interpretation of organic compounds by MS
8. Determination of purity by DSC in pharmaceuticals
9. Identification of organic compounds using FT-IR, NMR, CNMR and Massspectra
10. To carry out the preparation of following organic compounds
11. Preparation of 4-chlorobenzhydrylpiperazine. (an intermediate for cetirizine HCl).
12. Preparation of 4-iodotolene from p-toluidine.
13. $NaBH_4$ reduction of vanillin to vanillyl alcohol
14. Preparation of umbelliferone by Pechhman reaction
15. Preparation of triphenyl imidazole
16. To perform the Microwave irradiated reactions of synthetic importance(Any two)
17. Determination of log P, MR, hydrogen bond donors and acceptors ofselected drugs using softwares
18. Calculation of ADMET properties of drug molecules and its analysis usingsoftwares Pharmacophore modeling
19. 2D-QSAR based experiments
20. 3D-QSAR based experiments
21. Docking study based experiment
22. Virtual screening based experiment

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Course Programme-
Pharmacology

Program Educational Objectives (PEOs)

Program Educational Objectives (PEOs) for a Master of Pharmacy (M.Pharm) program typically outline the broad goals that graduates are expected to achieve in their professional careers and further education. Here are some common PEOs for an M.Pharm program:

PEO1 Professional Competence: Graduates will demonstrate advanced knowledge and skills in pharmaceutical sciences, enabling them to contribute effectively in various sectors such as industry, academia, and healthcare.

PEO2 Research and Innovation: Graduates will engage in research activities, promoting innovation and development of new drug formulations, therapeutic approaches, and pharmaceutical technologies.

PEO3 Leadership and Teamwork: Graduates will exhibit leadership qualities and the ability to work collaboratively in multidisciplinary teams, enhancing their effectiveness in professional settings.

PEO4 Ethical Practice: Graduates will uphold ethical standards and practices in pharmacy, ensuring patient safety, regulatory compliance, and responsible conduct in research and practice.

PEO5 Ethical Lifelong Learning: Graduates will demonstrate a commitment to lifelong learning and professional development, staying updated with the latest advancements in the pharmaceutical field.

PEO6 Ethical Community Engagement: Graduates will engage with the community, promoting public health initiatives and contributing to the education of patients and healthcare professionals about medication use and safety.

PEO7 Critical Thinking and Problem-Solving: Graduates will apply critical thinking and analytical skills to address complex pharmaceutical problems, making informed decisions based on scientific evidence.

PEO8 Regulatory Knowledge: Graduates will possess a thorough understanding of regulatory frameworks governing pharmaceutical development, approval processes, and marketing, ensuring compliance in their practices.

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PEO9 Interdisciplinary Collaboration: Graduates will effectively collaborate with healthcare professionals, researchers, and industry partners to enhance patient care and drive pharmaceutical innovation.

PEO10 Communication Skills: Graduates will demonstrate strong oral and written communication skills, effectively conveying complex pharmaceutical concepts to diverse audiences, including patients, colleagues, and regulatory bodies.

PEO11 Pharmacovigilance and Safety: Graduates will be equipped to monitor, evaluate, and manage drug safety, actively participating in pharmacovigilance activities to ensure the well-being of patients.

PEO12 Global Perspective: Graduates will develop a global perspective on healthcare and pharmaceutical practices, understanding the impact of cultural, economic, and policy factors on medication management.

Programme Specific Objectives (PSO's)

PSO1 Advanced Pharmaceutical Knowledge: Graduates will demonstrate a deep understanding of drug development processes, including formulation, synthesis, and quality control of pharmaceutical products.

PSO2 Clinical Pharmacy Skills: Graduates will apply clinical knowledge to assess patient medication regimens, provide pharmaceutical care, and contribute to interdisciplinary healthcare teams.

PSO3 Research Methodology: Graduates will be proficient in research methodologies, enabling them to design, conduct, and analyze pharmaceutical research effectively, including clinical trials and drug studies.

PSO4 Pharmacokinetics and Pharmacodynamics: Graduates will understand the principles of pharmacokinetics and pharmacodynamics, applying this knowledge to optimize drug therapy for diverse patient populations.

PSO5 Regulatory Affairs Expertise: Graduates will navigate regulatory frameworks and guidelines, ensuring compliance in the development and marketing of pharmaceutical products.

PSO6 Formulation Development: Graduates will be skilled in the development and evaluation of various dosage forms, utilizing modern techniques and technologies for innovative drug delivery systems.

PSO7 Quality Assurance and Control: Graduates will implement quality assurance and control measures in pharmaceutical manufacturing and laboratory settings, ensuring the safety and efficacy of products.

PSO8 Patient Counseling and Education: Graduates will effectively communicate medication-related information to patients, enhancing adherence and promoting safe medication use.

PSO9 Ethical and Professional Responsibility: Graduates will adhere to ethical guidelines and professional standards, promoting integrity and accountability in their pharmacy practice.

PSO10 Interprofessional Collaboration: Graduates will work collaboratively with healthcare professionals, understanding the roles of various team members in providing comprehensive patient care.

(Programme Outcome Objectives (POO's)

POO1 Knowledge of Drug Mechanisms: Understand the pharmacokinetics and pharmacodynamics of various drug classes and how they interact with biological systems.

POO2 Clinical Application: Apply pharmacological principles in clinical settings to optimize drug therapy and improve patient outcomes.

POO3 Safety and Efficacy: Evaluate the safety, efficacy, and potential side effects of medications, including understanding drug interactions and contraindications.

POO4 Research Skills: Conduct and interpret pharmacological research, including the ability to critically analyze scientific literature and apply findings to practice.

POO5 Ethical Considerations: Understand ethical issues related to pharmacotherapy, including informed consent, drug regulation, and the implications of new therapies.

POO6 Patient-Centered Care: Develop communication skills to educate patients about their medications, including dosage, administration, and potential side effects.

POO7 Interprofessional Collaboration: Work effectively as part of a healthcare team to ensure comprehensive patient care and medication management.

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PHARMACOLOGY (MPL)

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (MPL 101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know about,

- Chemicals and Excipients
- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

THEORY 60 Hrs

1. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy, Difference/ Derivative spectroscopy. 10 Hrs

   IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy, Data Interpretation.

   Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence (Characterestics of drugs that can be analysed by flourimetry), Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.

   Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.

2 NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy. 10 Hrs

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3	Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy.	10 Hrs
4	Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution, isolation of drug from excipients, data interpretation and applications of the following: j) Thin Layer chromatography k) High Performance Thin Layer Chromatography l) Ion exchange chromatography m) Column chromatography n) Gas chromatography o) High Performance Liquid chromatography p) Ultra High Performance Liquid chromatography q) Affinity chromatography r) Gel Chromatography	10 Hrs
5	Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing X ray Crystallography: Production of X rays, Different X ray methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X-ray diffraction.	10 Hrs
6	Potentiometry: Principle, working, Ion selective Electrodes and Application of potentiometry. Thermal Techniques: Principle, thermal transitions and Instrumentation (Heat flux and power-compensation and designs), Modulated DSC, Hyper DSC, experimental parameters (sample preparation, experimental conditions, calibration, heating and cooling rates, resolution, source of errors) and their influence, advantage and disadvantages, pharmaceutical applications. Differential Thermal Analysis (DTA): Principle, instrumentation and advantage and disadvantages, pharmaceutical applications, derivative differential thermal analysis (DDTA). TGA: Principle, instrumentation, factors affecting results, advantage and disadvantages, pharmaceutical applications.	10 Hrs

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REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein,Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler,Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4thedition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi,3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis - Modern Methods – Part B - J W Munson, Vol11, Marcel. Dekker Series
8. Spectroscopy of Organic Compounds, 2nd edn., P.S/Kalsi, Wiley estern Ltd., Delhi.
9. Textbook of Pharmaceutical Analysis, KA.Connors, 3rd Edition, John Wiley& Sons, 1982.

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ADVANCED PHARMACOLOGY - I
(MPL 102T)

Scope

The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, this subject helps the students to understand the concepts of drug action and mechanisms involved

Objectives

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

- Discuss the pathophysiology and pharmacotherapy of certain diseases
- Explain the mechanism of drug actions at cellular and molecular level
- Understand the adverse effects, contraindications and clinical uses ofdrugs used in treatment of diseases

THEORY 60 Hrs

1. General Pharmacology 12 Hrs

a. Pharmacokinetics: The dynamics of drug absorption, distribution, biotransformation and elimination. Concepts of linear and non-linear compartment models. Significance of Protein binding.

b. Pharmacodynamics: Mechanism of drug action and the relationship between drug concentration and effect. Receptors, structural and functional families of receptors, quantitation of drug receptors interaction and elicited effects.

2 Neurotransmission 12 Hrs

a. General aspects and steps involved in neurotransmission.

b. Neurohumoral transmission in autonomic nervous system (Detailed study about neurotransmitters- Adrenaline and Acetyl choline).

c. Neurohumoral transmission in central nervous system (Detailed study about neurotransmitters- histamine, serotonin, dopamine, GABA, glutamate and glycine].

d. Non adrenergic non cholinergic transmission (NANC). Co-transmission

Systemic Pharmacology

A detailed study on pathophysiology of diseases, mechanism of action, pharmacology and toxicology of existing as well as novel drugs used in the following systems

Autonomic Pharmacology

Parasympathomimetics and lytics, sympathomimetics and lytics, agents affecting

neuromuscular junction

3	Central nervous system Pharmacology General and local anesthetics Sedatives and hypnotics, drugs used to treat anxiety. Depression, psychosis, mania, epilepsy, neurodegenerativediseases. Narcotic and non-narcotic analgesics.	12 Hrs
4	Cardiovascular Pharmacology Diuretics, antihypertensives, antiischemics, anti- arrhythmics,drugs for heart failure and hyperlipidemia. Hematinics, coagulants , anticoagulants, fibrinolytics and anti-platelet drugs	12 Hrs
5	Autocoid Pharmacology The physiological and pathological role of Histamine, Serotonin,Kinins Prostaglandins Opioid autocoids. Pharmacology of antihistamines, 5HT antagonists.	12 Hrs

REFEERENCES

1. The Pharmacological Basis of Therapeutics, Goodman and Gillman's
2. Principles of Pharmacology. The Pathophysiologic basis of drug Therapy by David E Golan, Armen H, Tashjian Jr, Ehrin J,Armstrong, April W, Armstrong, Wolters, Kluwer-Lippincott Williams & Wilkins Publishers.
3. Basic and Clinical Pharmacology by B.G Katzung
4. Hand book of Clinical Pharmacokinetics by Gibaldi and Prescott.
5. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel and Andrew B.C.Yu.
6. Graham Smith. Oxford textbook of Clinical Pharmacology.
7. Avery Drug Treatment
8. Dipiro Pharmacology, Pathophysiological approach.
9. Green Pathophysiology for Pharmacists.

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10. Robbins & Cortan Pathologic Basis of Disease, 9th Ed. (RobbinsPathology)
11. A Complete Textbook of Medical Pharmacology by Dr. S.K Srivastavapublished by APC Avichal Publishing Company
12. KD.Tripathi. Essentials of Medical Pharmacology.
13. Modern Pharmacology with Clinical Applications, Craig Charles R. & Stitzel Robert E., Lippincott Publishers.
14. Clinical Pharmacokinetics & Pharmacodynamics : Concepts and Applications – Malcolm Rowland and Thomas N.Tozer, Wolters Kluwer, Lippincott Williams & Wilkins Publishers.
15. Applied biopharmaceutics and Pharmacokinetics, Pharmacodynamics and Drug metabolism for industrial scientists.
16. Modern Pharmacology, Craig CR. & Stitzel RE, Little Brown & Company.

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PHARMACOLOGICAL AND TOXICOLOGICAL SCREENING METHODS - I
(MPL 103T)

Scope

This subject is designed to impart the knowledge on preclinical evaluation of drugs and recent experimental techniques in the drug discovery and development. The subject content helps the student to understand the maintenance of laboratory animals as per the guidelines, basic knowledge of various in-vitro and in-vivo preclinical evaluation processes

Objectives

Upon completion of the course the student shall be able to,

- Appraise the regulations and ethical requirement for the usage of experimental animals.
- Describe the various animals used in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals
- Describe the various newer screening methods involved in the drug discovery process
- Appreciate and correlate the preclinical data to humans

THEORY 60 Hrs

1. Laboratory Animals — 12 Hrs

Common laboratory animals: Description, handling and applications of different species and strains of animals.

Transgenic animals: Production, maintenance and applications Anaesthesia and euthanasia of experimental animals.
Maintenance and breeding of laboratory animals. CPCSEA guidelines to conduct experiments on animals

Good laboratory practice.

Bioassay-Principle, scope and limitations and methods

2 Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. — 12 Hrs

General principles of preclinical screening. CNS Pharmacology:behavioral and muscle co ordination, CNS stimulants and

depressants, anxiolytics, anti-psychotics, anti epileptics andnootropics. Drugs for neurodegenerative diseases like Parkinsonism, Alzheimers and multiple sclerosis. Drugs acting on Autonomic Nervous System.

3	Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Respiratory Pharmacology: anti-asthmatics, drugs for COPD and anti allergics. Reproductive Pharmacology: Aphrodisiacs and antifertility agents Analgesics, antiinflammatory and antipyretic agents. Gastrointestinal drugs: anti ulcer, anti - emetic, anti- diarrheal and laxatives.	12 Hrs
4	Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Cardiovascular Pharmacology: antihypertensives, antiarrythmics, antianginal, antiatherosclerotic agents and diuretics. Drugs for metabolic disorders like anti-diabetic, antidyslipidemic agents. Anti cancer agents. Hepatoprotective screening methods.	12 Hrs
5	Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Iimmunomodulators, Immunosuppressants and immunostimulants General principles of immunoassay: theoretical basis and optimization of immunoassay, heterogeneous and homogenous immunoassay systems. Immunoassay methods evaluation; protocol outline, objectives and preparation. Immunoassay for digoxin and insulin Limitations of animal experimentation and alternate animal experiments. Extrapolation of in vitro data to preclinical and preclinical tohumans	12 Hrs

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REFERENCES

1. Biological standardization by J.H. Burn D.J. Finney and I.G. Goodwin
2. Screening methods in Pharmacology by Robert Turner. A
3. Evaluation of drugs activities by Laurence and Bachrach
4. Methods in Pharmacology by Arnold Schwartz.
5. Fundamentals of experimental Pharmacology by M.N.Ghosh
6. Pharmacological experiment on intact preparations by Churchill Livingstone
7. Drug discovery and Evaluation by Vogel H.G.
8. Experimental Pharmacology by R.K.Goyal.
9. Preclinical evaluation of new drugs by S.K. Guta
10. Handbook of Experimental Pharmacology, SK.Kulkarni
11. Practical Pharmacology and Clinical Pharmacy, SK.Kulkarni, 3rd Edition.
12. David R.Gross. Animal Models in Cardiovascular Research, 2nd Edition,Kluwer Academic Publishers, London, UK.
13. Screening Methods in Pharmacology, Robert A.Turner.
14. Rodents for Pharmacological Experiments, Dr.Tapan Kumar chatterjee.
15. Practical Manual of Experimental and Clinical Pharmacology by BikashMedhi (Author), Ajay Prakash (Author)

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CELLULAR AND MOLECULAR PHARMACOLOGY
(MPL 104T)

Scope:

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. This information will further help the student to apply the knowledge in drug discovery process.

Objectives:

Upon completion of the course, the student shall be able to,

- Explain the receptor signal transduction processes.
- Explain the molecular pathways affected by drugs.
- Appreciate the applicability of molecular pharmacology andbiomarkers in drug discovery process.
- Demonstrate molecular biology techniques as applicable for pharmacology

THEORY 60 Hrs

1. Cell biology 12 Hrs

Structure and functions of cell and its organelles

Genome organization. Gene expression and its regulation, importance of siRNA and micro RNA, gene mapping and gene sequencing

Cell cycles and its regulation.

Cell death– events, regulators, intrinsic and extrinsic pathways of apoptosis.

Necrosis and autophagy.

2 Cell signaling 12 Hrs

Intercellular and intracellular signaling pathways.

Classification of receptor family and molecular structure ligand gated ion channels; G-protein coupled receptors, tyrosine kinase receptors and nuclear receptors.

Secondary messengers: cyclic AMP, cyclic GMP, calcium ion, inositol 1,4,5-trisphosphate, (IP3), NO, and diacylglycerol.

Detailed study of following intracellular signaling pathways: cyclic AMP signaling pathway, mitogen-activated protein kinase (MAPK) signaling, **J**anus kinase (**J**AK)/signal transducer and activator of transcription (STAT) signaling pathway.

3	Principles and applications of genomic and proteomic tools DNA electrophoresis, PCR (reverse transcription and real time), Gene sequencing, micro array technique, SDS page, ELISA and western blotting, Recombinant DNA technology and gene therapy Basic principles of recombinant DNA technology-Restriction enzymes, various types of vectors. Applications of recombinant DNA technology. Gene therapy- Various types of gene transfer techniques, clinical applications and recent advances in gene therapy.	12 Hrs
4	Pharmacogenomics Gene mapping and cloning of disease gene. Genetic variation and its role in health/ pharmacology Polymorphisms affecting drug metabolism Genetic variation in drug transporters Genetic variation in G protein coupled receptors Applications of proteomics science: Genomics, proteomics,metabolomics, functionomics, nutrigenomics Immunotherapeutics Types of immunotherapeutics, humanisation antibody therapy, Immunotherapeutics in clinical practice	12 Hrs
5	a. Cell culture techniques Basic equipments used in cell culture lab. Cell culture media, various types of cell culture, general procedure for cell cultures; isolation of cells, subculture, cryopreservation, characterization ofcells and their application. Principles and applications of cell viability assays, glucose uptake assay, Calcium influx assays Principles and applications of flow cytometry b. Biosimilars	12 Hrs

REFERENCES:

1. The Cell, A Molecular Approach. Geoffrey M Cooper.
2. Pharmacogenomics: The Search for Individualized Therapies. Edited by J. Licinio and M -L. Wong
3. Handbook of Cell Signaling (Second Edition) Edited by Ralph A. et.al
4. Molecular Pharmacology: From DNA to Drug Discovery. John Dickensonet.al
5. Basic Cell Culture protocols by Cheril D.Helgason and Cindy L.Miller
6. Basic Cell Culture (Practical Approach) by J. M. Davis (Editor)
7. Animal Cell Culture: A Practical Approach by John R. Masters (Editor)
8. Current porotocols in molecular biology vol I to VI edited by FrederickM.Ausuvel et la.

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PHARMACOLOGICAL PRACTICAL - I
(MPL 105P)

1. Analysis of pharmacopoeial compounds and their formulations by UV Vis spectrophotometer
2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry
3. Experiments based on HPLC
4. Experiments based on Gas Chromatography
5. Estimation of riboflavin/quinine sulphate by fluorimetry
6. Estimation of sodium/potassium by flame photometry

Handling of laboratory animals.

1. Various routes of drug administration.
2. Techniques of blood sampling, anesthesia and euthanasia of experimentalanimals.
3. Functional observation battery tests (modified Irwin test)
4. Evaluation of CNS stimulant, depressant, anxiogenics and anxiolytic, anticonvulsant activity.
5. Evaluation of analgesic, anti-inflammatory, local anesthetic, mydriatic andmiotic activity.
6. Evaluation of diuretic activity.
7. Evaluation of antiulcer activity by pylorus ligation method.
8. Oral glucose tolerance test.
9. Isolation and identification of DNA from various sources (Bacteria,Cauliflower, onion, Goat liver).
10. Isolation of RNA from yeast
11. Estimation of proteins by Braford/Lowry's in biological samples.
12. Estimation of RNA/DNA by UV Spectroscopy
13. Gene amplification by PCR.
14. Protein quantification Western Blotting.
15. Enzyme based in-vitro assays (MPO, AChEs, α amylase, α glucosidase).
16. Cell viability assays (MTT/Trypan blue/SRB).
17. DNA fragmentation assay by agarose gel electrophoresis.
18. DNA damage study by Comet assay.
19. Apoptosis determination by fluorescent imaging studies.
20. Pharmacokinetic studies and data analysis of drugs given by differentroutes of administration using softwares
21. Enzyme inhibition and induction activity
22. Extraction of drug from various biological samples and estimation of drugsin biological fluids using different analytical techniques (UV)
23. Extraction of drug from various biological samples and estimation of drugsin biological fluids using different analytical techniques (HPLC)

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REFERENCES

1. CPCSEA, OECD, ICH, USFDA, Schedule Y, EPA guidelines,
2. Fundamentals of experimental Pharmacology by M.N.Ghosh
3. Handbook of Experimental Pharmacology by S.K. Kulkarni.
4. Drug discovery and Evaluation by Vogel H.G.
5. Spectrometric Identification of Organic compounds - Robert M Silverstein,
6. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler,Timothy A. Nieman,
7. Vogel's Text book of quantitative chemical analysis - Jeffery, Basset, Mendham, Denney,
8. Basic Cell Culture protocols by Cheril D. Helgason and Cindy L.Mille
9. Basic Cell Culture (Practical Approach) by J. M. Davis (Editor)
10. Animal Cell Culture: A Practical Approach by John R. Masters (Editor)
11. Practical Manual of Experimental and Clinical Pharmacology by Bikash Medhi(Author), Ajay Prakash (Author) Jaypee brothers' medical publishers Pvt. Ltd

MA
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ADVANCED PHARMACOLOGY - II
(MPL 201T)

Scope

The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, the subject helps the student to understand the concepts of drug action and mechanism involved

Objectives

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

- Explain the mechanism of drug actions at cellular and molecular level
- Discuss the Pathophysiology and pharmacotherapy of certain diseases
- Understand the adverse effects, contraindications and clinical uses ofdrugs used in treatment of diseases

THEORY 60 Hrs

1. Endocrine Pharmacology — 12 Hrs

Molecular and cellular mechanism of action of hormones such asgrowth hormone,

prolactin, thyroid, insulin and sex hormones

Anti-thyroid drugs, Oral hypoglycemic agents, Oral contraceptives, Corticosteroids.

Drugs affecting calcium regulation

2 Chemotherapy — 12 Hrs

Cellular and molecular mechanism of actions and resistance ofantimicrobial agents

such as ß-lactams, aminoglycosides, quinolones, Macrolideantibiotics.

Antifungal, antiviral, and anti-TB drugs.

3 Chemotherapy — 12 Hrs

Drugs used in Protozoal Infections

Drugs used in the treatment of Helminthiasis

Chemotherapy of cancer Immunopharmacology

Cellular and biochemical mediators of inflammation and immuneresponse.

Allergic or

hypersensitivity reactions. Pharmacotherapy of asthma and

COPD.

Immunosuppressants and Immunostimulants

4	GIT Pharmacology Antiulcer drugs, Prokinetics, antiemetics, anti-diarrheals anddrugs for constipation and irritable bowel syndrome. Chronopharmacology Biological and circadian rhythms, applications of chronotherapy invarious diseases like cardiovascular disease, diabetes, asthma and peptic ulcer	12 Hrs
5	Free radicals Pharmacology Generation of free radicals, role of free radicals in etiopathology ofvarious diseases such as diabetes, neurodegenerative diseases and cancer.Protective activity of certain important antioxidant Recent Advances in Treatment: Alzheimer's disease, Parkinson's disease, Cancer, Diabetesmellitus	12 Hrs

REFERENCES

1. The Pharmacological basis of therapeutics- Goodman and Gill man's
2. Principles of Pharmacology. The Pathophysiologic basis of drug therapy byDavid E Golan et al.
3. Basic and Clinical Pharmacology by B.G -Katzung
4. Pharmacology by H.P. Rang and M.M. Dale.
5. Hand book of Clinical Pharmacokinetics by Gibaldi and Prescott.
6. Text book of Therapeutics, drug and disease management by E T.Herfindal and Gourley.
7. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel andAndrew B.C.Yu.
8. Handbook of Essential Pharmacokinetics, Pharmacodynamics and DrugMetabolism for Industrial Scientists
9. Robbins & Cortan Pathologic Basis of Disease, 9th Ed. (RobbinsPathology)
10. A Complete Textbook of Medical Pharmacology by Dr. S.K Srivastavapublished by APC Avichal Publishing Company.
11. KD.Tripathi. Essentials of Medical Pharmacology
12. Principles of Pharmacology. The Pathophysiologic basis of drug Therapy by David E Golan, Armen H, Tashjian **J**r, Ehrin **J**,Armstrong, April W, Armstrong, Wolters, Kluwer-Lippincott Williams & Wilkins Publishers

MA
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PHARMACOLOGICAL AND TOXICOLOGICAL SCREENING METHODS-II
(MPL 202T)

Scope:

This subject imparts knowledge on the preclinical safety and toxicological evaluation of drug & new chemical entity. This knowledge will make the student competent in regulatory toxicological evaluation.

Objectives:

Upon completion of the course, the student shall be able to,

- Explain the various types of toxicity studies.
- Appreciate the importance of ethical and regulatory requirements fortoxicity studies.
- Demonstrate the practical skills required to conduct the preclinicaltoxicity studies.

	THEORY	60 Hrs
1.	Basic definition and types of toxicology (general, mechanistic, regulatory and descriptive) Regulatory guidelines for conducting toxicity studies OECD, ICH,EPA and Schedule Y OECD principles of Good laboratory practice (GLP) History, concept and its importance in drug development	12 Hrs
2	Acute, sub-acute and chronic- oral, dermal and inhalational studies as per OECD guidelines. Acute eye irritation, skin sensitization, dermal irritation & dermal toxicity studies. Test item characterization- importance and methods in regulatory toxicology studies	12 Hrs
3	Reproductive toxicology studies, Male reproductive toxicity studies, female reproductive studies (segment I and segment III), teratogenecity studies (segment II) Genotoxicity studies (Ames Test, in vitro and in vivo Micronucleus and Chromosomal aberrations studies) In vivo carcinogenicity studies	12 Hrs
4	IND enabling studies (IND studies)- Definition of IND, importance of IND, industry perspective, list of studies needed for IND submission.	12 Hrs

	Safety pharmacology studies- origin, concepts and importance of safety pharmacology. Tier1- CVS, CNS and respiratory safety pharmacology, HERG assay. Tier2- GI, renal and other studies	
5	Toxicokinetics- Toxicokinetic evaluation in preclinical studies, saturation kinetics Importance and applications of toxicokinetic studies. Alternative methods to animal toxicity testing.	12 Hrs

REFERENCES

1. Hand book on GLP, Quality practices for regulated non-clinical research and development (http://www.who.int/tdr/publications/documents/glp- handbook.pdf).
2. Schedule Y Guideline: drugs and cosmetics (second amendment) rules, 2005, ministry of health and family welfare (department of health) New Delhi
3. Drugs from discovery to approval by Rick NG.
4. Animal Models in Toxicology, 3rd Edition, Lower and Bryan
5. OECD test guidelines.
6. Principles of toxicology by Karen E. Stine, Thomas M. Brown.
7. Guidance for Industry M3(R2) Nonclinical Safety Studies for the Conduct of Human Clinical Trials and Marketing Authorization for Pharmaceuticals (http://www.fda.gov/downloads/drugs/guidancecomplianceregulatoryinformation/guidances/ucm073246.pdf)

MA
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PRINCIPLES OF DRUG DISCOVERY
(MPL 203T)

Scope:

The subject imparts basic knowledge of drug discovery process. Thisinformation will make the student competent in drug discovery process

Objectives:

Upon completion of the course, the student shall be able to,

- Explain the various stages of drug discovery.
- Appreciate the importance of the role of genomics, proteomics andbioinformatics in drug discovery
- Explain various targets for drug discovery.
- Explain various lead seeking method and lead optimization
- Appreciate the importance of the role of computer aided drug design indrug discovery

THEORY 60 Hrs

1. An overview of modern drug discovery process: Target identification, target validation, lead identification and lead Optimization. Economics of drug discovery. 12 Hrs
   Target Discovery and validation-Role of Genomics, Proteomics and Bioinformatics. Role of Nucleic acid microarrays, Protein microarrays, Antisense technologies, siRNAs, antisense oligonucleotides, Zinc finger proteins. Role of transgenic animals in target validation.
2. Lead Identification- combinatorial chemistry & high throughput screening, in silico lead discovery techniques, Assay development for hit identification.
   Protein structure 12 Hrs
   Levels of protein structure, Domains, motifs, and folds in protein structure. Computational prediction of protein structure: Threading and homology modeling methods. Application of NMR and X-ray crystallography in protein structure prediction
3. Rational Drug Design
   Traditional vs rational drug design, Methods followed in traditional drug design, High throughput screening, Concepts of Rational Drug Design, Rational Drug Design Methods: Structure and Pharmacophore based approaches 12 Hrs

	Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening,	
4	Molecular docking: Rigid docking, flexible docking, manualdocking; Docking based screening. De novo drug design. Quantitative analysis of Structure Activity Relationship History and development of QSAR, SAR versus QSAR, Physicochemical parameters, Hansch analysis, Fee Wilson analysis and relationship between them.	12 Hrs
5	QSAR Statistical methods – regression analysis, partial least square analysis (PLS) and other multivariate statistical methods. 3D-QSAR approaches like COMFA and COMSIA Prodrug design-Basic concept, Prodrugs to improve patient acceptability, Drug solubility, Drug absorption and distribution, site specific drug delivery and sustained drug action. Rationale of prodrug design and practical consideration of prodrug design	12 Hrs

REFERENCES

1. MouldySioud. Target Discovery and Validation Reviews and Protocols: Volume 2 Emerging Molecular Targetsand Treatment Options. 2007Humana Press Inc.
2. Darryl León. Scott MarkelIn. Silico Technologies in Drug Target Identification and Validation. 2006 by Taylor and Francis Group, LLC.
3. Johanna K. DiStefano. Disease Gene Identification. Methods andProtocols. Springer New York Dordrecht Heidelberg London.
4. Hugo Kubiny. QSAR: Hansch Analysis and Related Approaches. Methodsand Principles in Medicinal Chemistry. Publisher Wiley-VCH
5. Klaus Gubernator, Hans-Joachim Böhm. Structure-Based Ligand Design. Methods and Principles in Medicinal Chemistry. Publisher Wiley-VCH
6. Abby L . Parrill. M . Rami Reddy. Rational Drug Design. Novel Methodology and Practical Applications. ACS Symposium Series; American Chemical Society: Washington, DC, 1999.
7. J. Rick Turner. New drug development design, methodology and, analysis. John Wiley & Sons, Inc., New Jersey.

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CLINICAL RESEARCH AND PHARMACOVIGILANCE
(MPL 204T)

Scope:

This subject will provide a value addition and current requirement for the students in clinical research and pharmacovigilance. It will teach the students on conceptualizing, designing, conducting, managing and reporting of clinical trials. This subject also focuses on global scenario of Pharmacovigilance in different methods that can be used to generate safety data. It will teach the students in developing drug safety data in Pre-clinical, Clinical phases of Drug development and post market surveillance.

Objectives:

Upon completion of the course, the student shall be able to,

- Explain the regulatory requirements for conducting clinical trial
- Demonstrate the types of clinical trial designs
- Explain the responsibilities of key players involved in clinical trials
- Execute safety monitoring, reporting and close-out activities
- Explain the principles of Pharmacovigilance
- Detect new adverse drug reactions and their assessment
- Perform the adverse drug reaction reporting systems and communication in Pharmacovigilance

THEORY 60 Hrs

1. Regulatory Perspectives of Clinical Trials: 12 Hrs

Origin and Principles of International Conference on Harmonization - Good Clinical Practice (ICH-GCP) guidelines Ethical Committee: Institutional Review Board, Ethical Guidelines for Biomedical Research and Human Participant-Schedule Y, ICMR

Informed Consent Process: Structure and content of an Informed Consent Process Ethical principles governing informed consent process

2 Clinical Trials: Types and Design

Experimental Study- RCT and Non RCT, 12 Hrs

Observation Study: Cohort, Case Control, Cross sectional

Clinical Trial Study Team

Roles and responsibilities of Clinical Trial Personnel: Investigator, Study Coordinator, Sponsor, Contract Research Organization and its management

3	Clinical Trial Documentation- Guidelines to the preparation of documents, Preparation of protocol, Investigator Brochure, Case Report Forms, Clinical Study Report Clinical Trial Monitoring- Safety Monitoring in CT Adverse Drug Reactions: Definition and types. Detection and reporting methods. Severity and seriousness assessment.Predictability and preventability assessment, Management of adverse drug reactions; Terminologies of ADR.	12 Hrs
4	Basic aspects, terminologies and establishment of pharmacovigilance History and progress of pharmacovigilance, Significance of safety monitoring, Pharmacovigilance in India and international aspects, WHO international drug monitoring programme, WHO and Regulatory terminologies of ADR, evaluation of medication safety, Establishing pharmacovigilance centres in Hospitals, Industry and National programmes related to pharmacovigilance. Roles and responsibilities in Pharmacovigilance	12 Hrs
5	Methods, ADR reporting and tools used in Pharmacovigilance International classification of diseases, International Non- proprietary names for drugs, Passive and Active surveillance, Comparative observational studies, Targeted clinical investigations and Vaccine safety surveillance. Spontaneous reporting system and Reporting to regulatory authorities, Guidelines for ADRs reporting. Argus, Aris G Pharmacovigilance, VigiFlow, Statistical methods for evaluating medication safety data.	12 Hrs
6	Pharmacoepidemiology, pharmacoeconomics, safety pharmacology	12 Hrs

REFERENCES

1. Central Drugs Standard Control Organization- Good Clinical Practices, Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health;2001.
2. International Conference on Harmonization of Technical requirements for registration of Pharmaceuticals for human use. ICH Harmonized Tripartite Guideline. Guideline for Good Clinical Practice.E6; May 1996.

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3. Ethical Guidelines for Biomedical Research on Human Subjects 2000.Indian Council of Medical Research, New Delhi.
4. Textbook of Clinical Trials edited by David Machin, Simon Day and SylvanGreen, March 2005, John Wiley and Sons.
5. Clinical Data Management edited by R K Rondels, S A Varley, C F Webbs.Second Edition, Jan 2000, Wiley Publications.
6. Handbook of clinical Research. Julia Lloyd and Ann Raven Ed. Churchill Livingstone.
7. Principles of Clinical Research edited by Giovanna di Ignazio, Di Giovannaand Haynes.

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PHARMACOLOGICAL PRACTICAL - II
(MPL 205P)

1. To record the DRC of agonist using suitable isolated tissues preparation.
2. To study the effects of antagonist/potentiating agents on DRC of agonistusing suitable isolated tissue preparation.
3. To determine to the strength of unknown sample by matching bioassay by using suitable tissue preparation.
4. To determine to the strength of unknown sample by interpolation bioassayby using suitable tissue preparation
5. To determine to the strength of unknown sample by bracketing bioassayby using suitable tissue preparation
6. To determine to the strength of unknown sample by multiple pointbioassay by using suitable tissue preparation.
7. Estimation of PA_2 values of various antagonists using suitable isolatedtissue preparations.
8. To study the effects of various drugs on isolated heart preparations
9. Recording of rat BP, heart rate and ECG.
10. Recording of rat ECG
11. Drug absorption studies by averted rat ileum preparation.
12. Acute oral toxicity studies as per OECD guidelines.
13. Acute dermal toxicity studies as per OECD guidelines.
14. Repeated dose toxicity studies- Serum biochemical, haematological, urineanalysis, functional observation tests and histological studies.
15. Drug mutagenicity study using mice bone-marrow chromosomal aberrationtest.
16. Protocol design for clinical trial.(3 Nos.)
17. Design of ADR monitoring protocol.
18. In-silico docking studies. (2 Nos.)
19. In-silico pharmacophore based screening.
20. In-silico QSAR studies.
21. ADR reporting

REFERENCES

1. Fundamentals of experimental Pharmacology-by M.N.Ghosh
2. Hand book of Experimental Pharmacology-S.K.Kulakarni
3. Text book of in-vitro practical Pharmacology by Ian Kitchen
4. Bioassay Techniques for Drug Development by Atta-ur-Rahman, Iqbalchoudhary and William Thomsen
5. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel andAndrew B.C.Yu.
6. Handbook of Essential Pharmacokinetics, Pharmacodynamics and DrugMetabolism for Industrial Scientists.

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Semester III

MRM 301T - Research Methodology & Biostatistics

UNIT – I

General Research Methodology: Research, objective, requirements, practical difficulties, review of literature, study design, types of studies, strategies to eliminate errors/bias, controls, randomization, crossover design, placebo, blinding techniques.

UNIT – II

Biostatistics: Definition, application, sample size, importance of sample size, factors influencing sample size, dropouts, statistical tests of significance, type of significance tests, parametric tests(students "t" test, ANOVA, Correlation coefficient, regression), non-parametric tests (wilcoxan rank tests, analysis of variance, correlation, chi square test), null hypothesis, P values, degree of freedom, interpretation of P values.

UNIT – III

Medical Research: History, values in medical ethics, autonomy, beneficence, non-maleficence, double effect, conflicts between autonomy and beneficence/non-maleficence, euthanasia, informed consent, confidentiality, criticisms of orthodox medical ethics, importance of communication, control resolution, guidelines, ethics committees, cultural concerns, truth telling, online business practices, conflicts of interest, referral, vendor relationships, treatment of family members, sexual relationships, fatality.

UNIT – IV

CPCSEA guidelines for laboratory animal facility: Goals, veterinary care, quarantine, surveillance, diagnosis, treatment and control of disease, personal hygiene, location of animal facilities to laboratories, anesthesia, euthanasia, physical facilities, environment, animal husbandry, record keeping, SOPs, personnel and training, transport of lab animals.

UNIT – V

Declaration of Helsinki: History, introduction, basic principles for all medical research, and additional principles for medical research combined with medical care

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Shobhit University
EDUCATION EMPOWERS

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U.: www.sug.ac.in

School of Ayurveda(KSVAMC&RC)

Date: 3.02.2023

Minutes of the Meeting of Board of Studies

9th Meeting of the Board of Studies of the School Of Ayurveda, Shobhit University Gangoh was organized on 3.02.2023 at 02:00 pm onwards. The meeting was attended by:

1. Dr. S.K Pathak — Chairman, Board of Studies
   Professor & Principal
   School of Ayurveda,
   Shobhit University Gangoh

2. Dr. Satish Jaimini — External Member
   Professor
   MJF Ayurveda College,Chomu

3. Dr.Vinod Kumar Swami — External Member
   Asso. Professor
   Jyotividhyapeeth University

4. Dr.Shailendra Bhardwaj — Member
   Professor
   School of Ayurveda
   Shobhit University Gangoh

6. Dr. Vikas kumar Sharma — Member
   Professor
   School of Ayurveda
   Shobhit University Gangoh

The following discussed and approved:

Welcome address by Chairman

The Chairman extended a warm welcome to all the members of Board of Studies and the following information was tabled before the members of the Board of Studies:

1. Input given by the Subject Experts on the Scheme and syllabi of the ongoing Batches.
2. **Draft Approved by NCISM (Scheme & Syllabi of Batch of 2022-23 for different Program on Elective Course pattern).**

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U.: www.sug.ac.in

Item BOS 9.1: Approval of the Minutes of the 8th BOS Meeting held on 24th Mar. 2022 was circulated among the members and the same were notified after the approval of the Board of Studies. {Annexure- 1}

Item BOS 9.2: Introduction of New Programme and Implementation of scheme and syllabus of MS (Shalya Tantra) & MD (Kaya Chikitsa) already approved by NCISM.

- **BOS approved implementation of the Programme MS (Shalya Tantra) & MD (Kaya Chikitsa) w.e.f. the academic session 2022-23.{Annexure-2)**

Item BOS 9.3: Analysis of Students' feedback & Action taken report:

- BOS Chairman has expressed that the student feedback and action taken report process is done at the end of academic session. The BOS members noted the same.

Item BOS 9.4: Analysis of the feedback on curriculum from stakeholders:

- The BOS chairman presented the analysis report of stakeholders' feedback on curriculum. The BOS members noted the same and advised to incorporate the suggestions as per the feasibility. The Action Taken Report is enclosed herewith. {Annexure-3}

Item BOS 9.5: Approval of Examiners (Theory & Practical) and Paper Setters of the courses in BAMS 1st year to 4th year and MD, MS for session **2022-23** . The same is being sent to the Controller of Examinations, MM University, in a sealed cover. {Annexure-4}

Item BOS 9.6: Discussion on the Value Added courses offered for students and ratification of the same.

- BOS members approved the list of Value added courses offered to students.

The meeting ended with a vote of thanks to the Chairman, Board of Studies.

The suggestions given by the panel of BoS have been discussed with the Vice Chancellor and Dean Academics. The action taken on the suggestions has been approved by competent authorities.

Signed by:
(Chairman, BOS)

(Dean Academies)

(Vice Chancellor)

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Shobhit University
EDUCATION EMPOWERS

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School of Ayurveda (KSVAMC&RC)

Date: 22.12.2023

Minutes of the Meeting of Board of Studies

10th Meeting of the Board of Studies of the School Of Ayurveda, Shobhit University Gangoh was organized on 22.12.2023 at 02:00 pm onwards. The meeting was attended by:

1. Dr. Vikas Kumar Sharma — Chairman, Board of Studies
   Professor & Principal
   School Of Ayurveda,
   Shobhit University Gangoh.

2. Dr. Manoj Sharma — External Member
   Professor
   Kicchi Ayurved College, Rudrapur.

3. Dr. Sangeeta Mishra — External Member
   Asso. Professor
   Tibbia College of Ayurveda, Delhi

4. Dr. Krishnanand. C — Member
   Professor
   School of Ayurveda
   Shobhit University Gangoh.

6. Dr. Preeti Sharma — Member
   Asso. Professor
   School of Ayurveda
   Shobhit University Gangoh.

The following discussed and approved:

Welcome address by Chairman
The Chairman extended a warm welcome to all the members of Board of Studies and the following information was tabled before the members of the Board of Studies:

1. Input given by the Subject Experts on the Scheme and syllabi of the ongoing Batches.
2. **Draft Approved by NCISM (Scheme & Syllabi of Batch of 2023-24 for different Program on Elective Course pattern).**

Item BOS 10.1: Approval of the Minutes of the 9th BOS Meeting held on 03 Feb. 2023 was circulated among the members and the same were notified after the approval of the Board of Studies. {Annexure-1}

Item BOS 10.2: Introduction of New Programme and Implementation of scheme and syllabus of **Doctor of Medicine (Kirya Sharir), Doctor of Medicine (Ayurveda Samhita & Siddhant), Doctor of Medicine (Rachna Sharir) & Master of Surgery (Prasuti Tantra & Stree Rog)** already approved by NCISM.

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- BOS approved incorporation of the New Programme **Doctor of Medicine (Kirya Sharir), Doctor of Medicine (Ayurveda Samhita & Siddhant), Doctor of Medicine (Rachna Sharir) & Master of Surgery (Prasuti Tantra & Stree Rog)**{Annexure-2)

Item BOS 10.3: Analysis of Students' feedback & Action taken report:

- BOS Chairman has expressed that the student feedback and action taken report process is done at the end of academic session. The BOS members noted the same.

Item BOS 10.4: Analysis of the feedback on curriculum from stakeholders:

- The BOS chairman presented the analysis report of stakeholders' feedback on curriculum. The BOS members noted the same and advised to incorporate the suggestions as per the feasibility. The Action Taken Report is enclosed herewith. {Annexure-3}

Item BOS 10.5: Approval of Examiners (Theory & Practical) and Paper Setters of the courses in BAMS 1st year to 4th year and MD, MS for session **2023-4**. The same are being sent to the Controller of Examinations, Shobhit University, in a sealed cover. {Annexure-4}

Item BOS 10.5: Discussion on the Value Added courses offered for students and ratification of the same.

- BOS members approved the list of Value added courses offered to students.

The meeting ended with a vote of thanks to the Chairman, Board of Studies.

The suggestions given by the panel of BOS have been discussed with the Vice Chancellor and Dean Academics. The actions taken on the suggestions have been approved by competent authorities.

Signed by:

(Chairman, BOS)

(Dean Academies)

(Vice Chancellor)

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Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

SCHOOL OF AYURVEDA

Ordinances, Regulations & Syllabus

For

M.D in Kayachikitsa Three year Programme

(W.e.f. session 2022-2023)

Approved and adopted in the year 2022 (Board of Studies; 9th Meeting)

Programme Educational Objectives (PEOs)

1. **Mastery in Kayachikitsa**:
   - Develop expertise in Ayurvedic principles and practices of internal medicine, with a focus on understanding the pathophysiology, diagnosis, and treatment of systemic disorders.
2. **Holistic Health Care Providers**:
   - Equip graduates to offer holistic treatment integrating Ayurveda's preventive, promotive, and curative aspects in managing chronic and lifestyle-related diseases.
3. **Research and Innovation**:
   - Foster skills for conducting advanced research to validate Ayurvedic therapies and develop evidence-based treatment protocols.
4. **Leadership in Healthcare**:
   - Prepare graduates to take leadership roles in promoting Ayurvedic medicine in healthcare systems locally and globally.
5. **Ethics and Compassion**:
   - Instill a strong sense of ethical practice, cultural sensitivity, and patient-centered care.

Programme Specific Objectives (PSOs)

1. **Clinical Excellence in Ayurveda**:
   - Achieve proficiency in diagnosing and managing diseases using Ayurvedic approaches such as Panchakarma, Rasayana, and dietary and lifestyle modifications.
2. **Integration with Modern Medicine**:
   - Understand and collaborate with modern medical systems to provide integrative healthcare solutions, recognizing the indications and limitations of both.
3. **Focus on Preventive Medicine**:
   - Implement preventive strategies through the Ayurvedic principles of Dinacharya, Ritucharya, and Sadvritta in public health.
4. **Specialized Knowledge of Kayachikitsa**:
   - Gain expertise in managing chronic ailments like diabetes, arthritis, gastrointestinal disorders, and neurological conditions using Ayurvedic treatments.

Programme Outcome Objectives (POOs)

1. **Comprehensive Ayurvedic Knowledge**:
   - Demonstrate advanced knowledge of classical Ayurvedic texts, including Charaka Samhita, and their application to contemporary health challenges.
2. **Patient-Centered Practice**:
   - Independently diagnose and manage a wide range of internal medical conditions using Ayurvedic tools and personalized treatment plans.
3. **Research Competence**:
   - Design and conduct research to evaluate the efficacy of Ayurvedic treatments, contributing to scientific literature and policy-making.
4. **Collaboration and Communication**:
   - Effectively communicate with patients, caregivers, and multidisciplinary teams to optimize patient outcomes.

5. **Public Health Contribution**:
    - Apply Ayurvedic principles to improve community health through awareness, preventive care, and treatment strategies for non-communicable diseases.
6. **Ethical and Professional Responsibility**:
    - Practice Ayurveda with a commitment to ethical principles, patient safety, and sustainable healthcare practices.

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M.D.-AYURVEDA PRELIMINARY
10 .KAYACHIKITSA (General Medicine)

PAPER-II Theory- 100 marks

PART A 50 marks

1. Understanding of fundamental concepts of Kayachikitsa like Vriddhi and Kshaya of Dosha, Dushya, Mala with Amshaamsha Kalpana. Srotodushti, Khavaigunya, Agni, Ama (Saama and Nirama Dosha, Dhatu & Mala). Aavarana, Rogamarga, Ashayapakarsha, Dosha Gati, Kriyakala. Aushadha Sevana Kala, Anupana, Pathya-Apathya and their scientific relevance during health and disease.
2. Detailed knowledge of Rogi Roga Pariksha including detailed history taking and systemic examination of patient. Clinical implementation of Dwividha Pariksha, Trividha Pariksha, Chaturvidha Pariksha, Panchavidha Pariksha, Shadvidha Pariksha, Ashtavidha Pariksha, Dashvidha Parikshya Bhavas and Prakrityadi Dashvidha Pariksha.
3. Principles of Kayachikitsa in disease management including Shodhana, Shamana and Naimittika Rasayana.
4. Introduction of the basic principles of Modern medicine, Homeopathy, Unani, Siddha, Tibetan Medicine, Yoga and Naturopathy and their relevance in light of the basic principles of Ayurvedic medicine.

PART B 50 marks

1. Chikitsa Siddhanta of Pranavaha, Annavaha, Udakavaha, Rasadi Dhatuvaha, Malavaha & Manovaha Srotovikara.
2. Emergency medicine: Acute Severe Asthma, pulmonary oedema, myocardial infarction, cerebrovascular accidents, water and electrolyte imbalance, haemorrhage, syncope, seizure, coma, hyperpyrexia, hypertensive encephalopathy.
3. Knowledge of conducting various medical procedures like infusions, tapping, lumbar puncture, Ryle's tube insertion, catheterization, tractions, water seal drainage, Cardio Pulmonary Ressucitation.
4. Basic knowledge of underlying principles of ECG, TMT, echo cardiography, vascular doppler studies, EEG, EMG, X-Ray, USG, CT scan, MRI, PET and their interpretation.
5. Knowledge of common Ayurvedic formulations and preparations used in treatment:

Churna- Triphala, Sitopaladi, Lavanbhaskara, Hingvashtaka, Avipattikara, Gangadhara, Shaddharana, Sudarshana, Panchasakara, Ajmodadi.
Kashaya- Dashamula, Rasnasaptaka, Asanadi, Pathyadi, Phalatrikadi, Punarnavashtaka, Gojivhadi, Mahamanjishthadi, Drakshadi Kashaya.
Asavas-Arista- Amritarishta, Kanakasava, Chitrakasava, Saraswatarishta, Ashwagandharishta , Chandanasava.

Vati- Sanjivani, Chandraprabha, Agnitundi, Chitrakadi, Khadiradi, Vyoshadi, Shankha Vati, Shiva Gutika.

Guggula-Kalpana-Triphalaguggula, Kaishoraguggula, Trayodashangaguggula, Simhanadaguggula, Yogarajaguggula, Gokshuradi guggula, Kanchanaraguggula.
Rasaushadhi- Tribhuvanakirti Rasa, Arogyavardhini Rasa, Shwasakuthara Rasa, Rasamanikya Rasa, Smritisagara Rasa, Lakshmivilasa Rasa, Sutshekhara Rasa, Pravala Panchamrita Parpati, Hemagarbhapottali Rasa.
Taila- Mahanarayana Taila, Pindataila, Prasarinyadi Taila, Ksheerabala Taila, Brihat Saindhavadi Taila, Panchaguna Taila, Amritadi Taila, Marichyadi Taila, Mahamasha Taila.
Ghrita- Mahatriphaladi Ghrita, Brahmi Ghrita, Panchtikta Guggulu Ghrita, Sukumara Ghrita, Dadimadya Ghrita, Kantakari Ghrita, Kalyanaka Ghrita.
Lehya- Chyavanaprasha Avaleha, Kushmanda Avaleha, Ashwagandha Avaleha, Agastya Hareetaki Rasayana, Drakshavaleha, Vasavaleha, Amrita-Bhallataka Rasayana.

PRACTI CAL 100 marks

Content:-

Daily hospital duties in OPD, IPD and casualty

Bed-side case taking – 25 patients

Distribution of marks (practical):

1. Case records of 25 Patients in detail 20 marks
2. Bedside clinical case taking-
   Long case 20 marks
   Short case 10 marks
3. Medical procedures/laboratory work 15 marks
4. Instruments and spotting 15 marks
5. Viva voce 20 marks

REFERENCE BOOKS-

Charak Samhita -
Cakrapanidutta commentry Sushrut Samhita -with all available commentaries. Ashtang Samgraha –Indu commentary
Ashtang Hridaya –Arundutta and Hemadri commentry
Cikitsadarsha - Pandit Rajesvardutta Shastri
Kayachikitsa - Ramaraksha Pathak
Rog Pariksha Vidhi - Priyavrat Sharma
Panchakarma Vigyan - Haridas
Sridhar Kasture Ayurved Nidan Chikitsa Siddhanta - Prof. R.H.Singh.
Kayachikitsa Vol. I-IV. - Prof. Ajay Kumar Davidson’s Principles and Practice of Medicine.
API Text Book of Medicine.
Harrison’s Text Bok of Medicine.
Cecil Text Book of Medicine.
Relevant texts of concerned subjects.

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Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

SCHOOL OF AYURVEDA

Ordinances, Regulations & Syllabus

For

M.D in Shalyatantra Three year Programme

(W.e.f. session 2022-2023)

Approved and adopted in the year 2022 (Board of Studies; 9th Meeting)

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Programme Educational Objectives (PEOs)

1. **Mastery of Shalyatantra**: Graduates will gain a deep understanding of Ayurvedic surgical principles, procedures, and their integration with contemporary surgical practices.
2. **Research and Development**: Graduates will be equipped to undertake innovative research in Shalyatantra to advance the discipline and improve patient outcomes.
3. **Holistic Healthcare Leadership**: Graduates will develop leadership qualities to promote the holistic approach of Ayurveda in addressing surgical and para-surgical challenges.
4. **Professionalism and Ethics**: Emphasis on ethical practices, compassionate care, and adherence to classical Ayurvedic principles in professional life.
5. **Lifelong Learning**: Graduates will pursue continual learning to adapt to advancements in surgical techniques and healthcare technologies.

Programme Specific Objectives (PSOs)

1. **Core Competence in Shalyatantra**:
   - Gain expertise in Ayurvedic surgical techniques like Ksharasutra, Agnikarma, and Raktamokshana.
   - Understand and perform modern surgical interventions with an Ayurvedic perspective.
2. **Integration with Modern Medicine**:
   - Ability to identify situations where modern surgical procedures are required and work collaboratively with contemporary medical professionals.
3. **Patient-Centered Approach**:
   - Develop skills to provide individualized care using Shalyatantra principles while addressing patient needs effectively.
4. **Community and Preventive Health**:
   - Apply Ayurvedic surgical principles in community healthcare, focusing on prevention and minimally invasive approaches.

Programme Outcome Objectives (POOs)

1. **Comprehensive Knowledge**:
   - Demonstrate detailed knowledge of Shalyatantra texts (e.g., Sushruta Samhita) and their clinical applications.
2. **Clinical Proficiency**:
   - Independently diagnose and treat surgical conditions using Ayurvedic and contemporary methods.
3. **Research Acumen**:
   - Conduct and contribute to scholarly research in Ayurveda, focusing on evidence-based validation of Shalyatantra techniques.
4. **Communication and Collaboration**:
   - Effectively communicate with peers, patients, and multidisciplinary teams to improve healthcare delivery.
5. **Cultural Competency**:
   - Promote and practice Ayurvedic principles in a culturally sensitive manner, addressing diverse patient populations.

POST GRADUATE PRELIMINARY
13. M.S. (AYU) SHALYA TANTRA – GENERAL SURGERY

FUNDAMENTAL PRINCIPLES AND APPLIED ASPECTS OF SHALYA TANTRA

PAPER-II

THEORY- 100 MARKS
TEACHING HOURS – 100 HRS

PART A **50 MARKS**

1. Etymology, Definition, Scope and Importance of Shalya Tantra.
2. Study of Sushruta Samhita Sutra Sthana from 1st to 29th chapter.
3. Study of modern surgical clinical methodology.
4. Applied anatomy, physiology and surgical pathology of common surgical conditions including relevant Ayurvedic aspects.
5. Applied aspect of Shat Kriyakala in the pathogenesis of surgical diseases.
6. Applied aspect of Prakriti in understanding the causes and role of treatment in surgical diseases.
7. Applied aspect of basic principles of Ayurveda in Rogi Pariksha (Trividha, Shadvidha, Ashtavidha and Dashavidha Pariksha).
8. Concept and applied aspect of Sadhya-Asadhya (Prognosis) - Arishtha lakshana.
9. Marma Sharira – Etymological derivation, definition, basic concept of Marma, origin, classification, Pramana. Consequences of Marmaghata and their management.
10. Concept of Shock - Its varieties, etiopathogenesis and management – Cardiopulmonary resuscitation (CPR), Endo-tracheal intubation and Tracheostomy. Drug reactions and Anaphylaxis – Management.
11. Basics of Fluid, Electrolyte, Acid Base Balance and Nutrition
12. Antibiotics, Analgesics, Anti-inflammatory and Emergency drugs in surgical practice.
13. Surgical Emergency conditions and its management.
14. Sushruta's concept of Rakta. Raktasrava – Haemorrhage – Types, Patho-physiology, clinical features and management. Concept of Raktastambhana – Haemostasis. Bloodtransfusion – Indications, blood groups, components, compatibility and complications with management.
15. Medico-legal aspects in Surgery. Knowledge of documentation and record keeping.

PART B **50 marks**

16. Knowledge of ancient and recent Yantra and Shastra – Surgical instruments and their application in surgical practice.
17. Asepsis and Antisepsis. Sterilisation (Nirjivanukaran) - methods and types.
18. Surgical infections – Sepsis, Cellulitis, Erysepelas, Tetanus, Gas gangrene. Handling and care of HIV and Hepatitis positive patients. Knowledge of conditions like Bacteraemia, Septicaemia, Toxaemia and Pyaemia
19. Sangyaharan / Anesthesiology - Types, methods, indications, contraindications, complications and its management.
20. Trividha Karma – Purva, Pradhan and Pashchat Karma. Modern principles of preoperative and post-operative care.
21. Ashtavidha Shastra Karmas.
22. Bandhana Karma – Recent advances.
23. Kshara Karma – Introduction, types, method of various preparations like Kshara, Kshara Varti, Kshara Pichu and applications.
24. Kshara Sutra – Method of preparation, standardization and applications.
25. Agnikarma – Introduction, types and applications.
26. Raktamokshana – Introduction, types and applications.
27. Application of Panchakarma therapy in surgical practice.
28. Scope of Pathya-Apathya in the management of surgical diseases.

PRACTICAL

100 MARKS

Content:

1. Hospital duties in OPD, IPD, OT and Casualty.
2. Case record – 50 cases.
3. Surgical cases – Observing/Assisting/Performing- 50 cases.
4. Knowledge of instruments required in surgical practices.
5. Ayurvedic and Modern diagnostic and therapeutic procedures.
6. Fluid therapy and blood transfusion.
7. Contraception and sterilizations.
8. Pre-operative, operative and post operative procedures.
9. Practical training of local Anaesthesia.
10. Interpretation of Imaging techniques.
11. Practical knowledge of Yogya vidhi – Experimental surgery and Simulators.

Distribution of marks (practical):

1. Presentation of related Research work like Synopsis and Case record - 20 marks
2. Bedside clinical case taking-
   - Long case - 20 marks
   - Short case - 10 marks
3. Identification of instruments, X-ray etc - 10 marks
4. Demonstration of Surgical and Parasurgical Procedure - 10 marks
5. Viva voce - 30 marks

REFERENCE BOOKS:

1. Sushruta Samhita
2. Ashtanga Sangraha
3. Ashtanga Hridaya
4. Charaka Samhita
5. The Surgical instruments of the Hindus - Girindranath Mukhopadhyaya
6. Shalya Tantra Samuchchaya - Pandit Ramadesh Sharma
7. Shalya Vigyan (Part 1-2) - Dr. Surendra Kumar Sharma
8. Shalya Samanvaya (Part 1-2) - Vd. Anantaram Sharma
9. Shalya Pradeepika - Dr. Mukund Swaroop Verma
10. Soushruti - Dr. Ram Nath Dwivedi
11. Clinical Shalya Vigyan - Dr. Akhilanand Sharma
12. Bhagna Chikitsa - Dr. Prabhakar Janardhan Deshpande
13. Kshara sutra management in anorectal ailments - Dr. S.K. Sharma, Dr. K.R.Sharma and Dr. Kulwant Singh.
14. A manual on Fistula-in-ano and Ksharasutra Therapy – Dr. Manoranjan Sahu
15. Recent trends in the management of Arshas / Haemorrhoids - Dr. P. Hemantha Kumar
16. Anorectal diseases in Ayurveda - Dr. Sizoria and Dr. Praveen Kumar Chowdary.
17. Adhunika Shalya Chikitsa Siddanta - Dr. Katil Narshingham Udupa
18. Agnikarma Technology Innovation - Dr. P.D. Gupta
19. Shalya Tantra Ke Siddhant - Dr. K.K.Takral
20. Arsha Evum Bhagander Mein sutra Avacharan - Vd. Kanak Prasad Vyas
21. Recent advances in Kshara Sutra - Dr. M. Bhaskar Rao
22. Leech application in Ayurveda - Dr. M. Bhaskar Rao
23. Kshara Sutra - Dr. S.N.Pathak
24. Text book of Shalya Tantra (Ayurvedic Surgery) - Dr. P. Hemantha Kumar
25. Shalya Shalakya Tantra - Vd. S.G. Joshi
26. Surgical ethics of Ayurveda - Dr. D.N. Pande
27. Anushastra Karma - Dr. D.N. Pande
28. Concept of Vrana is Ayurveda - Dr. Lakshman Singh
29. Significance for Poorva Karma in Surgical Patient - Dr. Lakshman Singh
30. Sangyaharan Prakash - Dr. D.N. Pande
31. Marma Science and Principles of Marma Therapy – Dr. Sunil Kumar Joshi
32. Recent trends in the management of Bhagandara / Fistula-in-ano - Dr. P. Hemantha Kumar
33. Principles and Practice of Agnikarma - Dr. Anand Kumar and Dr. Kanchan Shekokar
34. Shalya Vigyan (Sachitra) - Anantram Sharma
35. Text book of Surgery - Sabiston
36. Operative Surgery – Rob and smith

37. Bailey and Love's Short Practice of Surgery - Norman.S. Williams, Charles.V. Mann and R.C.G. Russell
38. Text books of Operative Surgery - Farquharson's
39. Principles of Surgery - Schwartz
40. Emergency Surgery - Hamilton Bailey's
41. Manipal Manual of Surgery - Dr. Rajgopal Shenoy
42. SRB's Manual of Surgery - Sriram Bhat M
43. Surgery of the Anus, Rectum and Colon - John Goligher
44. Surgical pathology - Willing Worth
45. Clinical methods in surgery - S. Das
46. Textbook of Operative Surgery - S. Das
47. A concise Text Book of Surgery - S. Das
48. A manual on Clinical Surgery - S. Das
49. A System of Surgical Diagnosis - T.N. Patel
50. Clinical Anatomy/ Surgical Anatomy - John E.Skandalakis
51. A Practical Guide to Operative Surgery - S. Das
52. Manual of Surgical Instruments - M.M. Kapur
53. Ward Procedures - Patel Mansukh. B
54. Drugs and Equipment for Anaesthesia - Arun kumar
55. Primary Anaesthesia - Maurice King
56. Synopsis of Anaesthesia - Lee
57. Outline of Orthopedics - John Crawford Adams and David Hamblen. L
58. Fractures and Joint Injuries - Watson-Jones
59. Outline of Fracture - John Crawford Adams

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Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

SCHOOL OF AYURVEDA

Ordinances, Regulations & Syllabus

For

M.D in Research Methodology Three year Programme

(W.e.f. session 2023-224)

Approved and adopted in the year 2023 (Board of Studies; 10th Meeting)

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Shobhit University
EDUCATION EMPOWERS

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U.: www.sug.ac.in

Course Objectives:

1. **Foster Research Literacy:**
   - Introduce students to the principles and framework of scientific research and evidence-based practices.
2. **Research Design and Methodology:**
   - Teach students to select appropriate study designs and methodologies for clinical and academic research.
3. **Data Management and Statistical Analysis:**
   - Provide knowledge and hands-on training in collecting, organizing, and analyzing data using statistical tools.
4. **Critical Thinking and Literature Review:**
   - Develop the ability to critically evaluate research articles, systematic reviews, and meta-analyses.
5. **Ethical Conduct in Research:**
   - Instill a comprehensive understanding of research ethics, including consent processes, patient safety, and publication integrity.
6. **Scientific Communication:**
   - Enhance skills in writing research proposals, manuscripts, and effective presentation of research findings.
7. **Problem-Solving in Research:**
   - Train students to identify gaps in medical knowledge and formulate research questions that address these gaps.

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{ANNEXURE-2}

M.D./M.S.-AYURVEDA PRELIMINARY PAPER-I RESEARCH METHODOLOGY AND MEDICAL STATISTICS

PART-A RESEARCH METHODOLOGY

1 Introduction to Research
- A. Definition of the term research
- B. Definition of the term anusandhan
- C. Need of research in the field of Ayurveda

2 General guidelines and steps in the research process
- A. Selection of the research problem
- B. Literature review: different methods (including computer database) with their advantages and limitations
- C. Defining research problem and formulation of hypothesis
- D. Defining general and specific objectives
- E. Research design: observational and interventional, descriptive and analytical, preclinical and clinical, qualitative and quantitative
- F. Sample design G. Collection of the data
- H. Analysis of data.
- I. Generalization and interpretation, evaluation and assessment of hypothesis.
- J. Ethical aspects related to human and animal experimentation.
- K. Information about Institutional Ethics Committee (IEC) and Animal Ethics Committee (AEC) and their functions. Procedure to obtain clearance from respective committees, including filling up of the consent forms and information sheets and publication ethics.

3 Preparation of research proposals in different disciplines for submission to funding agencies taking EMR-AYUSH scheme as a model.

4. Scientific writing and publication skills.
- a. Familiarization with publication guidelines- Journal specific and CONSORT guidelines.
- b. Different types of referencing and bibliography.
- c. Thesis/Dissertation: contents and structure
- d. Research articles structuring: Introduction, Methods, Results and Discussions (IMRAD)

5 Classical Methods of Research.
Concept of Pratyakshadi Pramana Pariksha, their types and application for Research in Ayurveda.

Dravya-, Guna-, Karma-Parikshana Paddhati

Aushadhi-yog Parikshana Paddhati

Swastha, Atura Pariksha Paddhati

DashvidhaParikshya Bhava

Tadvidyasambhasha, vadmarga and tantrayukti

6 Comparison between methods of research in Ayurveda (Pratigya, Hetu, daharana, Upanaya, Nigaman) and contemporary methods in health sciences.

7. Different fields of Research in Ayurveda
   Fundamental research on concepts of Ayurveda
   a. Panchamahabhuta and tridosha.
   b. Concepts of rasa, guna, virya, vipak, prabhav and karma
   c. Concept of prakriti-saradi bhava, ojas, srotas, agni, aam and koshtha.

8. Literary Research-
Introduction to manuscriptology: Definition and scope. Collection, conservation, ataloguing.

Data mining techniques, searching methods for new literature; search of new concepts in the available literature. Methods for searching internal and external evidences about authors, concepts and development of particular body of knowledge.

9. Drug Research (Laboratory-based)- Basic knowledge of the following: Drug sources: plant, animal and mineral. Methods of drug identification. Quality control and standardization aspects: Basic knowledge of Pharmacopoeial standards and parameters as set by Ayurvedic Pharmacopoeia of India.
Information on WHO guidelines for standardization of herbal preparations. Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP).

10. Safety aspects: Protocols for assessing acute, sub-acute and chronic toxicity studies. Familiarization with AYUSH guidelines (Rule 170), CDCSO and OECD guidelines.

11. Introduction to latest Trends in Drug Discovery and Drug Development -Brief information on the traditional drug discovery process -Brief information on the latest trends in the Drug Discovery process through employment of rational approach techniques; anti-sense approach, use of micro and macro-arrays, cell culture based assays, use of concepts of systems biology and network physiology -Brief introduction to the process of Drug development

12. Clinical research:
Introduction to Clinical Research Methodology identifying the priority areas of Ayurveda

Basic knowledge of the following:-

Observational and Interventional studies

Descriptive & Analytical studies

Longitudinal & Cross sectional studies

Prospective & Retrospectives studies

Cohort studies

Randomized Controlled Trials (RCT) &their types Single-case design, case control studies, ethnographic studies, black box design, cross-over design, factorial design. Errors and bias in research. New concepts in clinical trial- Adaptive clinical trials/ Good clinical practices (GCP) Phases of Clinical studies: 0,1,2,3, and 4. Survey studies - Methodology, types, utility and analysis of Qualitative Research methods. Concepts of in-depth interview and Focus Group Discussion.

13. Pharmacovigilance for ASU drugs. Need, scope and aims & objectives. National Pharmacovigilance Programme for ASU drugs.

14. Introduction to bioinformatics, scope of bioinformatics, role of computers in biology. Introduction to Data base- Pub med, Medlar and Scopus. Accession of databases.

15. Intellectual Property Rights- Different aspect and steps in patenting. Information on Traditional Knowledge Digital Library (TKDL).

PART–B **40 marks**

MEDICAL STATISTICS **Teaching hours: 80**

1 Definition of Statistics : Concepts, relevance and general applications of Biostatistics in Ayurveda

2 Collection, classification, presentation, analysis and interpretation of data (Definition, utility and methods)

3 Scales of Measurements - nominal, ordinal, interval and ratio scales. Types of variables – Continuous, discrete, dependent and independent variables. Type of series – Simple, Continuous and Discrete

4 Measures of Central tendency – Mean, Median and Mode.

5 Variability: Types and measures of variability – Range, Quartile deviation, Percentile, Mean deviation and Standard deviation

6 Probability: Definitions, types and laws of probability,

7 Normal distribution: Concept and Properties, Sampling distribution, Standard Error, Confidence Interval and its application in interpretation of results and normal probability curve.

8 Fundamentals of testing of hypotheses:
Null and alternate hypotheses, type I and type 2 errors.

Tests of significance: Parametric and Non-Parametric tests, level of significance and power of the test, 'P' value and its interpretation, statistical significance and clinical significance

9 Univariate analysis of categorical data:
Confidence interval of incidence and prevalence, Odds ratio, relative risk and Risk difference, and their confidence intervals

10 Parametric tests: 'Z' test, Student's 't' test: paired and unpaired, 'F' test, Analysis of variance (ANOVA) test, repeated measures analysis of variance

11 Non parametric methods: Chi-square test, Fisher's exact test, McNemar's test, Wilcoxon test, Mann-Whitney U test, Kruskall – Wallis with relevant post hoc tests (Dunn)

12 Correlation and regression analysis:
Concept, properties, computation and applications of correlation, Simple linear correlation, Karl Pearson's correlation co-efficient, Spearman's rank correlation. Regression- simple and multiple.

13 Sampling and Sample size computation for Ayurvedic research: Population and sample. Advantages of sampling, Random (Probability) and non random (Nonprobability) sampling. Merits of random sampling. Random sampling methods- simple random, stratified, systematic, cluster and multiphase sampling. Concept, logic and requirement of sample size computation, computation of sample size for comparing two means, two proportions, estimating mean and proportions.

14 Vital statistics and Demography: computation and applications - Rate, Ratio, Proportion, Mortality and fertility rates, Attack rate and hospital-related statistics

15 Familiarization with the use of Statistical software like SPSS/GraphPad

PRACTICAL **100 marks**

I. RESEARCH METHODOLOGY **Teaching hours 120**

PRACTICAL NAME

1 Pharmaceutical Chemistry
Familiarization and demonstration of common lab instruments for carrying out analysis as per API

2 Awareness of Chromatographic Techniques Demonstration or Video clips of following:

- Thin-layer chromatography (TLC).
- Column chromatography (CC).
- Flash chromatography (FC)
- High-performance thin-layer chromatography (HPTLC)
- High Performance (Pressure) Liquid Chromatography (HPLC)
- Gas Chromatography (GC, GLC)

4 Pharmacognosy Familiarization and Demonstration of different techniques related to:- Drug administration techniques- oral and parenteral.Blood collection by orbital plexuses puncturing. Techniques of anesthesia and euthanasia. Information about different types of laboratory animals used in experimental research Drug identification as per API including organoleptic evaluation

5 Pharmacology and toxicology
Familiarization and demonstration of techniques related to pharmacology and toxicology

6 Biochemistry (Clinical)
Familiarization and demonstration of techniques related to basic instruments used in a clinical biochemistry laboratory – semi and fully automated clinical analyzers, electrolyte analyzer, ELISA- techniques, nephelometry.

Demonstration of blood sugar estimation, lipid profiles, kidney function test, liver function test.

HbA1, cystatin and microalbumin estimation by nephelometry or other suitable techniques. Interpretation of the results obtained in the light of the data on normal values.

7 Clinical Pathology
Familiarization and demonstration of techniques related to basic and advanced instruments used in a basic clinical pathology lab. Auto cell counter, urine analyzer, ESR, microscopic examination of urine.

8 Imaging Sciences
Familiarization and demonstration of techniques related to the imaging techniques. Video film demonstration of CT-Scan, MRI-scan and PET-scan.

9 Clinical protocol development

II. MEDICAL STATISTICS

Practical hours:20

Statistical exercise of examples from Topic number 4, 5, 8-12, 14, 15. Records to be prepared.

Distribution of marks (practical):

1. Instrumentalspotting test	– 20 marks
2. Clinical protocol writing exercise on a given problem	– 20 marks
3. Records:	
4.Research methodology	-10 Mark
5.Medical statistics	-10 marks
6. Viva- Voce	-40 Marks

REFERENCE BOOKS:

Pharmacognosy:

1. AushotoshKar "Pharmacognosy&Pharmacobiotechnology" New Age International Publisher. Latest Edition. New Delhi.
2. Drug Survey by MayaramUniyal
3. Fahn A (1981). Plant Anatomy 3rd Edition Pergamon Press, Oxford
4. Kokate, CK., Purohit, AP, Gokhale, SB (2010). Pharmacognosy. NiraliPrakashan. Pune.
5. Kokate, CK., Khandelwal and Gokhale, SB (1996). Practical Pharmacognosy. NiraliPrakashan. Pune.
6. Trease G E and Evans W C, Pharinacognosy, Bailliere Tindall, Eastbourne, U K.
7. Tyler V C., Brady, L R., and Robers J E., Pharmacognosy, Lea and Febiger, Philadelphia.
8. Tyler VE Jr and Schwarting AE., Experimental Pharmacognosy, Burgess Pub. Co, Minneaplis, Minnesota.
9. Wallis- TE (2011)- reprint. Practical Pharmacgonosy (Fourth Edition) Pharma Med Press, Hyderabad.
10. Wallis T E, Analytical Microscopy, J & A Churchill limited, London.
11. Wallis T E., Text Book of Pharmacognosy, J & A Churchill Limited, London.
12. WHO guidelines on good agricultural and collection practices- (GACP) for medicinal plants (2003).World Health Organization- Geneva.
13. WHO monographs on selected medicinal plants (1999)—Vol. 1. 1.Plants, Medicinal 2.Herbs 3.Traditional medicine. ISBN 92 4 154517 8. WHO Geneva.

Pharmaceutical chemistry, quality control and drug standardization:

1. Ayurvedic Pharmacopoeia of India. Part I- volume 1 to 8 and Part II- volume 1 to 3. Ministry of Health and Family Welfare. Controller of Publication. Govt of India. New Delhi.
2. Brain, KR and Turner, TD. (1975). The Practical Evaluation Phytopharmaceuticals. Wright Scienctechnica, Bristol.

3. Galen Wood Ewing (1985). Instrumental Methods of Chemical Analysis. McGraw-Hill College ; Fifth edition

4. Harborne, JB (1973). Phytochemistry Methods. Chapman and Hall, International Edition, London.

5. HPTLC- Fingerprint atlas of Ayurvedic Single Plant Drugs mentioned in Ayurvedic Pharmacopoeia Vol- III and IV. CENTRAL COUNCIL FOR RESEARCH IN AYURVEDA AND SIDDHA. New Delhi.

6. Kapoor, RC (2010). Some observations on the metal based preparations in Indian System of Medicine. Indian Journal of Traditional Knwoledge. 9(3): 562-575

7. Khopkar, S. M. Analytical Chemistry, New Age International Publishers , 3 rd edition

8. Laboratory Guide for- The Analysis of Ayurved and Siddha Formulations – CCRAS, New Delhi.

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Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

SCHOOL OF AYURVEDA

Ordinances, Regulations & Syllabus

For

M.D in Ayurveda Samhita And Siddhanta Three year Programme

(W.e.f. session 2023-24)

Approved and adopted in the year 2023 (Board of Studies; 10th Meeting)

MAHIPAL SINGH

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Programme Objectives:

1. **Understanding Ayurvedic Foundations:**
   - Provide a deep understanding of the classical texts (Samhitas) and their core principles (Siddhanta) as the foundation of Ayurvedic knowledge.
2. **Holistic Learning Approach:**
   - Emphasize the integration of theory and practice, linking traditional wisdom with contemporary healthcare needs.
3. **Skill Development in Textual Analysis:**
   - Train students in reading, interpreting, and applying the teachings of classical Ayurvedic texts.
4. **Promotion of Research:**
   - Develop research aptitude in Samhita and Siddhanta to validate and innovate within the Ayurvedic framework.
5. **Ethics and Professionalism:**
   - Inculcate the ethical principles of Ayurveda and foster the professional development of scholars.

Specific Programme Objectives:

1. **Mastery of Samhita Literature:**
   - Achieve proficiency in major Ayurvedic texts such as Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya.
2. **Application of Siddhanta:**
   - Equip students to apply Ayurvedic principles like Tridosha, Panchamahabhuta, and Prakriti in clinical and non-clinical contexts.
3. **Preservation of Ayurvedic Wisdom:**
   - Encourage the preservation, documentation, and propagation of traditional Ayurvedic knowledge.
4. **Critical Analysis and Commentary:**
   - Train students in comparative studies of different commentaries and interpretations of the Samhitas.
5. **Adaptation to Modern Needs:**
   - Integrate classical Ayurvedic knowledge with modern scientific methodologies to address contemporary health challenges.

Programme Outcomes:

1. **Deep Understanding of Ayurvedic Texts:**

Develop expertise in interpreting and contextualizing classical Ayurvedic literature.

2. **Practical Application of Theoretical Knowledge:**
    - Use the principles of Samhita and Siddhanta in clinical diagnosis, treatment, and health promotion.
3. **Competence in Research:**
    - Conduct scholarly research to validate Ayurvedic concepts and develop innovative applications.
4. **Critical Thinking and Analysis:**
    - Analyze traditional Ayurvedic theories in light of modern scientific advancements.
5. **Ethical and Holistic Practice:**
    - Practice Ayurveda in a manner that reflects ethical, sustainable, and holistic healthcare principles.
6. **Promotion and Propagation:**
    - Serve as ambassadors of Ayurveda by contributing to the global dissemination and acceptance of its principles.
7. **Capacity for Lifelong Learning:**
    - Engage in continuous learning to stay updated with evolving knowledge and practices in Ayurveda and healthcare.
8. **Leadership in Ayurveda:**
    - Demonstrate leadership in academic, clinical, and research domains related to Samhita and Siddhanta.

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M.D.-AYURVEDA PRELIMINARY1. AYURVED SAMHITA & SIDDHANTA

(Ayurvedic Compendia & Basic Principles)

PAPER-II THEORY- 100 marks

PART–A Practical- Viva-Voce-100
50 marks

1. Learning and Teaching methodology available in Samhita- Tantrayukti, Tantraguna, Tantradosha, Tachchilya, Vadamarga, Kalpana, Arthashraya, TrividhaGyanopaya, teaching of Pada, Paada, Shloka, Vakya, Vakyartha, meaning and scope of different Sthana and Chatushka of Brihatrayee.
2. Manuscriptology - Collection, conservation, cataloguing, Critical editing through collation, receion (A critical revision of a text incorporating the most plausible elements found in varying sources), emendation (changes for improvement) and textual criticism (critical analysis) of manuscripts. Publication of edited manuscripts.
3. Concept of Bijachatustaya (Purush, Vyadhi, Kriyakaal, Aushadha according to Sushrut Samhita).
4. Introduction and Application of Nyaya (Maxims) - Like Shilaputrak Nyaya, Kapinjaladhikaran
Nyaya, Ghunakshara Nyaya, Gobalivarda Nyaya, NaprishtahGuravoVadanti Nyaya,

Shringagrahika Nyaya, ChhatrinoGacchhanti Nyaya, Shatapatrabhedana Nyaya, Suchikatah Nyaya.

5. Importance and utility of Samhita in present era.
6. Importance of ethics and principles of ideal living as mentioned in Samhita in the present era in relation to life style disorders.
7. Interpretation and co-relation of basic principles with contemporary sciences.

PART-B 50 marks

1. Definition of Siddhanta, types and applied examples in Ayurveda.
2. Ayu and its components as described in Samhita.
3. Principles of Karana-Karyavada, its utility in advancement of research in Ayurveda.
4. Theory of Evolution of Universe (SrishtiUtpatti), its process according to Ayurveda and Darshana.
5. Importance and utility of Triskandha (Hetu, Linga, Aushadh) and their need in teaching, research and clinical practice.
6. Applied aspects of various fundamental principles: Tridosha, Triguna, Purusha and Atmanirupana, Shatpadartha, Ahara-Vihara. Scope and importance of Pariksha (Pramana).
7. Importance of knowledge of SharirPrakriti and ManasPrakriti.
8. Comparative study of Principles of Ayurveda and Shad Darshanas.

REFERENCE BOOKS:-

1 Charak Samhita Chakrapani commentary

2	Sushrut Samhita	Dalhana Commentary
3	AshtangaSamgraha	Indu commentary
4	AshtangaHridaya	Arundutta and Hemadri commentary
5	VaisheshikaDarshan	PrashastapadaBhasya
6	Nyaya Darshan	VatsyayanBhasyaPatanjala
7	Yoga Darshan	Vyas Bhasya
8	Vedantsara	
9	SarvadarshanSamgraha	
10	BhartiyaDarshan	BaldevUpadhayaya
11	Ayurved Darshanam	Acharya Rajkumar Jain

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Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

SCHOOL OF AYURVEDA

Ordinances, Regulations & Syllabus

For

M.D in Rachna Sharir Three year Programme

(W.e.f. session 2023-224)

Approved and adopted in the year 2023 (Board of Studies; 10th Meeting)

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Programme Educational Objectives (PEOs)

PEO 1 In-Depth Anatomical Knowledge: Graduates will acquire a comprehensive understanding of human anatomy, including structural and functional aspects relevant to both Ayurvedic and modern medical practices.

PEO 2 Application of Anatomical Principles: Graduates will be able to apply anatomical knowledge to clinical situations, enhancing diagnostic accuracy and treatment efficacy in Ayurvedic practice.

PEO 3 Research and Innovation: Graduates will engage in research related to anatomical studies, contributing to the body of knowledge in Rachna Sharira and promoting evidence-based practices in Ayurveda.

PEO 4 Holistic Perspective: Graduates will develop a holistic view of anatomy, integrating physical structures with functional and energetic concepts in Ayurveda, thereby enhancing patient care.

PEO 5 Interdisciplinary Collaboration: Graduates will be prepared to collaborate with professionals from various healthcare disciplines, facilitating a comprehensive approach to patient health that respects both Ayurvedic and conventional perspectives.

Programme Specific Objectives (PSO's)

PSO 1 Anatomical Proficiency: Graduates will demonstrate mastery of human anatomy through detailed knowledge of anatomical structures, relationships, and functions relevant to Ayurvedic medicine.

PSO 2 Dissection and Examination Skills: Graduates will acquire practical skills in dissection and examination techniques, enabling them to accurately identify anatomical structures in both cadaveric and clinical settings.

PSO 3 Integration of Ayurvedic Concepts: Graduates will integrate Ayurvedic anatomical concepts, such as the Srotas (channels) and Dhatus (tissues), with modern anatomical knowledge to enhance their understanding of health and disease.

PSO 4 Research Methodology: Graduates will be equipped to conduct research in anatomical studies, exploring the relationship between anatomical structures and Ayurvedic practices to contribute to evidence-based Ayurveda.

PSO 5 Application to Clinical Practice: Graduates will apply their anatomical knowledge in clinical scenarios, improving diagnosis, treatment planning, and patient management in Ayurvedic settings.

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PSO 6 Educational Skills: Graduates will be prepared to educate students and healthcare professionals about the importance of anatomical knowledge in Ayurveda, fostering a deeper understanding of the subject.

Programme Outcome Objectives (POO's)

POO 1 Comprehensive Anatomical Knowledge: Graduates will demonstrate a thorough understanding of human anatomy, including detailed knowledge of anatomical structures and their functional relationships within the context of Ayurveda.

POO 2 Practical Dissection Skills: Graduates will exhibit proficiency in dissection techniques and anatomical examinations, enabling accurate identification and assessment of anatomical structures.

POO 3 Integration of Ayurvedic and Modern Anatomy: Graduates will effectively integrate Ayurvedic concepts of anatomy, such as the understanding of Dhatus and Srotas, with modern anatomical knowledge to enhance clinical practice.

POO 4 Research and Critical Thinking: Graduates will engage in research activities that advance the field of Rachna Sharira, applying critical thinking to evaluate and contribute to anatomical studies and their implications in Ayurveda.

POO 5 Clinical Application: Graduates will apply their anatomical knowledge to clinical practice, improving diagnostic accuracy and treatment outcomes for patients in Ayurvedic settings.

POO 6 Interdisciplinary Collaboration: Graduates will demonstrate the ability to work collaboratively with other healthcare professionals, contributing to a holistic approach to patient care that values both Ayurvedic and modern medical perspectives.

POO 7 Ethical Practice and Professionalism: Graduates will uphold high standards of ethics and professionalism in their practice, ensuring patient safety, confidentiality, and respectful interaction with colleagues and patients.

Course Structure

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M.D.-AYURVEDA PRELIMINARY RACHANA SHARIR (Anatomy)

PAPER-II **Theory 100 marks**

PART-A **50 marks**

1. Basic principles of Sharira, Purushavichaya, RashiPurusha, Karma Purusha (Shad DhatujPurusha), ChaturvimshatiPurusha, EkDhatuPurusha. Relevant principles described in the Sharirasthan of Sushrut Samhita, Charak Samhita, AshtangSangrah and Ashtang Hridaya.

2. Basic principles of GarbhaSharira in Ayurveda: Definitions of Garbha, ShukraShonitaSiddhanta, Dauhrida, MatrijadiGarbhotpattikar bhava.

3. Types of tissues, histological study of liver, spleen, uterus, kidney, endocrine glands, mammary gland, skin, tongue, lungs, bronchi, bones, muscles, cartilages and nervous tissue.

PART-B **50 marks**

1. ParibhashaSharira (Anatomical terminology)
2. PramanaSharira – Anguli and Anjali Pramana, SamapramanaSharira, Ayama – Vistara and their prognostic values.
3. Fundamental aspects of Asthi, Sandhi, PeshiSharir.
4. Fundamental aspects of Sira, Dhamani, Srotas – Definitions, Siravedha, AvedhyaSira. Fundamental aspect of SrotomoolaSthana. 5. Fundamental aspects of Koshtha and Koshthang: Hridaya, Yakrit, Vrikka, phuphphusa, Aantra, Pleeha, Adhivrikkagranthi, Basti, Paurushagranthi, Amashaya, Agnyashaya and Vrishana.
6. Fundamental aspects of UttamangiyaSharir – Introduction to Nervous system - development, divisions, neuron–structure, types, functional anatomy.
7. Mritashodhan (as per Sushruta) and MritaSamrakshana (preservation method of human cadaver).

PRACTICAL 100 marks

Contents:

1. Practical study of bones
2. Practical study of organs
3. Practical study of surface and radiological anatomy.
4. ShavaVichhedana – detailed dissection of the whole body.
5. Practical study of location of Marma
6. Demonstration of histology slides (10 slides)

Distribution of marks (Practical)

1. Spotting - 20 Marks
2. Surface Anatomy - 20 Marks
3. Dissection - 30 Marks

4. Imaging Anatomy – Basic Principles and Application - 10 Marks
5. Viva-Voce - 20 Marks

REFERENCE BOOKS:

6. Relevant matters of Brihatrayee and Laghutrayee
7. PratyakshaShariram - GananathSen
8. AbhinavaShariram - Damodar Sharma Gaur
9. ParishadyamSabdarthaShariram - Damodara Sharma Gaur
10. BrihatShariram - P S Varier
11. Shiva Samhita
12. Gray's Anatomy - Latest Edition
13. Human Anatomy - B D Chaurasia
14. Cunnigham's Companion to Manual of Practical Anatomy.Vol I, II & III
15. Developing Human - Keith L Moore &Persaud
16. Clinically oriented Anatomy - Keith L Moore
17. Clinically oriented Neuro Anatomy - Richard Snell
18. Surface and Radiological Anatomy - Halim
19. Grant's Methods of Anatomy -Grant
20. Grant's dissector -Grant
21. Human Embryology -I. B. Singh
22. Ayuervediya Human Anatomy - G. M. Kanthi

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SCHOOL OF AYURVEDA

Ordinances, Regulations & Syllabus

For

M.D in Kriya Sharir Three year Programme (W.e.f. session 2023-224)

Approved and adopted in the year 2023 (Board of Studies; 10th Meeting)

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Programme Educational Objectives (PEOs)

PED 1 Holistic Understanding: Graduates will develop a comprehensive understanding of the principles of Kriya, including its philosophical, physiological, and psychological aspects, enabling them to integrate these concepts into therapeutic practices.

PED 2 Clinical Application: Graduates will be equipped to apply Kriya techniques in clinical settings, effectively addressing a range of health issues and promoting overall well-being for diverse patient populations.

PED 3 Research and Evidence-Based Practice: Graduates will engage in research that contributes to the scientific validation of Kriya practices, fostering a culture of evidence-based treatment within the field.

PED 4 Professional Ethics and Leadership: Graduates will demonstrate ethical practice and leadership in healthcare, advocating for holistic health approaches and contributing to the advancement of Kriya therapy.

PED 5 Lifelong Learning and Adaptability: Graduates will commit to lifelong learning, staying updated with advancements in yoga therapy and related fields, and adapting their practices to meet evolving health challenges.

Programme Specific Objectives (PSO's)

PSO 1 Kriya Techniques Proficiency: Graduates will master a range of Kriya techniques, including breath control, meditation, and body postures, applying them effectively to promote physical and mental health.

PSO 2 Therapeutic Application: Graduates will be equipped to design and implement personalized Kriya therapy plans for patients, addressing specific health concerns and enhancing overall well-being.

PSO 3 Assessment Skills: Graduates will develop strong assessment skills to evaluate the physical and psychological health of individuals, integrating Kriya principles in their diagnostic approaches.

PSO 4 Research and Evidence-Based Practice: Graduates will engage in research related to Kriya practices, contributing to the body of evidence supporting their effectiveness in various therapeutic contexts.

PSO 5 Patient Education and Communication: Graduates will be skilled in educating patients about Kriya practices, fostering understanding and adherence to therapeutic regimens through effective communication strategies.

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PSO 6 Interdisciplinary Collaboration: Graduates will be prepared to work collaboratively with other healthcare professionals, integrating Kriya with conventional medical practices to provide holistic care.

Programme Outcome Objectives (POO's)

POO 1 Expertise in Kriya Practices: Graduates will demonstrate comprehensive knowledge and practical skills in Kriya techniques, applying them effectively for therapeutic and wellness purposes.

POO 2 Holistic Patient Care: Graduates will provide holistic care by integrating Kriya principles with conventional medical practices, addressing both physical and mental health needs of patients.

POO 3 Clinical Assessment and Diagnosis: Graduates will be skilled in conducting thorough assessments, accurately diagnosing conditions, and developing personalized Kriya-based treatment plans.

POO 4 Research and Application: Graduates will engage in research activities that advance the understanding and efficacy of Kriya therapies, applying evidence-based practices in clinical settings.

POO 5 Patient Communication and Education: Graduates will effectively communicate with patients and families, promoting understanding of Kriya practices and encouraging adherence to therapeutic interventions.

POO 6 Professionalism and Ethics: Graduates will uphold high standards of professionalism and ethics in their practice, ensuring patient safety and confidentiality while advocating for holistic health approaches.

POO 7 Lifelong Learning and Adaptation: Graduates will commit to lifelong learning, remaining current with advancements in Kriya and integrative health practices to adapt to evolving healthcare needs.

Course Structure

Ordinance and Regulations

M.D.-AYURVEDA PRELIMINARY
3.KRIYA SHARIR

PAPER-II Theory 100 Marks

PART-A 50 marks

1. Theory of Loka-PurushaSamya
2. Theory of Panchamahabhuta
3. Physiological aspects of Samanya – Visheshasiddhanta
4. Concepts of Tridosha and Triguna
5. Concept of Dhatu
6. Concept of Mala
7. Description of Ojas
8. Process of AharaParinama including Aharaparinamakara Bhava and AstaAharaVidhiVisesayatana
9. Physiological importance of Agni, its classification and functions
10. Dhatuposana theories
11. Concepts of Atma, Manas and Indriya.
12. Concepts of Prakriti and Ashtavidha Sara.
13. Concept of Srotas

PART-B **50 marks**

Description of essential and relevant understandings related to contemporary physiology, both general physiology and systemic physiology.

1. Essentials of cell physiology – organization of cell.
2. Membrane physiology- transport across cell membrane, action potentials and resting membrane potentials.
3. Homeostasis- negative and positive feedback mechanisms.
4. Genetic code, its expression and regulation of gene expression.
5. Essentials of cardiovascular physiology- cardiac cycle, regulation of heart rate and blood pressure.
6. Essentials of respiratory physiology- regulation of respiration-chemical and neural, gaseous exchange, transportation of gases.
7. Gastrointestinal physiology- various digestive juices and their actions, gastrointestinal hormones, enteric nervous system.
8. Nervous system physiology- ANS, somatic nervous system, reflexes, general and special sensations, higher mental functions, functions of brain, brainstem and spinal cord.

9. Blood: Blood cells-RBCs, WBCs, platelets, plasma proteins and immunity.
10. Muscle physiology: properties and mechanisms of contraction of skeletal, cardiac and smooth muscles.
11. Physiology of excretion- mechanism of urine formation, micturition.
12. Endocrine physiology: Classification of hormones, hormones secreted by pituitary, thyroid, parathyroid, adrenal glands, pineal, pancreas and their functions.

Study of male and female reproductive system: functions of reproductive hormones.

PRACTICAL 100 marks

Contents:
Ayurvedic practicals
Assessment of Prakriti

Assessment of Sara

PramanaPariksha

Hematology
Hemoglobin estimation

Total RBC count

Total WBC count

Differential leukocyte count

Packed cell volume (PCV)

ESR

Bleeding time

Clotting time

Blood grouping and Rh typing

Urine examination -
Physical examination- Specific gravity and reaction of urine

Chemical examination

Albumin test

Sugar test

Ketone bodies

Bile salts and pigments

Distribution of marks (Practical)

1.	Laboratory Practical	- 20
2.	Human Experiment	- 15
3.	Spotting	- 15
4.	PrakritiSaradipariksha	- 20
5.	Practical Record	- 10
6.	Viva-voce	- 20

REFERENCE BOOKS:

1.	AyurvediyaKriyasharir	- Ranjit Rai Desai
2.	Kayachikitsa Parichaya	- C. Dwarkanath
3.	Prakrit Agni Vigyan	- C. Dwarkanath
4.	SharirKriyaVigyan	- Shiv Charan Dhyani
5.	AbhinavaSharirKriyaVigyana	- Acharya Priyavrata Sharma
6.	DoshaDhatu Mala Vigyana	- Shankar Gangadhar Vaidya
7.	PrakritaDoshaVigyana	- Acharya Niranjana Dev
8.	TridoshaVigyana	- Shri Upendranath Das
9.	ShariraTatvaDarshana	- HirlekarShastri
10.	Prakrita Agni Vigyana	- Niranjana Dev
11.	DehaDhatvagniVigyana	- Vd. Pt. HaridattShastri
12.	SharirKriyaVigyana (Part 1-2)	- Acharya Purnchandra Jain
13.	SharirKriyaVigyana	- Shri Moreshwar Dutta Vd.
14.	ShariraKriyaVijnana (Part 1-2)	- NandiniDhargalkar
15.	DoshaDhatu Mala Vigyana	- Basant Kumar Shrimal
16.	AbhinavaSharirKriyaVigyana	- Dr. Shiv Kumar Gaur
17.	PragyogikKriyaSharir	- Acharya P.C. Jain
18.	Kaya ChikitsaParichaya	- Dr. C. Dwarkanath
19.	Concept of Agni	- Vd. Bhagwan Das
20.	PurushVichaya	- Acharya V.J. Thakar
21.	KriyaSharir	- Prof. Yogesh Chandra Mishra
22.	SharirKriyaVigyana	- Prof. Jayaram Yadav & Dr. Sunil Verma
23.	Basic Principles of Kriya-Sharir (A treatise on Ayurvedic Physiology) by	-Dr. Srikant Kumar Panda
24.	SharirKriya – Part I & II	- Dr. Ranade, Dr. Deshpande & Dr. Chobhe
25.	Human Physiology in Ayurveda	- DrKishorPatwardhan
26.	SharirkriyaVignyan Practical Hand Book	- Dr.Ranade, Dr.Chobhe, Dr. Deshpande

27. SharirKriya Part 1&2 - Dr.R.R.Deshapande, Dr.Wavhal
28. Textbook of Physiology - Gyton& Hall
29. Review of medical physiology - William Ganong
30. Essentials Of Medical Physiology - Sembulingam, K.
31. Concise Medical Physiology - Chaudhari, Sujit. K.
32. Fundamental of Anatomy & Physiology - Martini
33. Principals of Anatomy & Physiology - Tortora& Grabowski
34. Human Physiology - Richards, Pocock
35. Samson Wrights Applied Physiology, Keele, Neil, joels
36. Brainstem Control of Wakefulness And Sleep - Steriade, Mirce
37. An Introduction to Human Physiology - Green, J.h.
38. Ancient Indian Medicine - Kutumbiah P.
39. Biographical History of Indian Medicine - Srikanthamurthy KR
40. Ayurveda KriyaSharira - Yogesh Chandra Mishra
41. Textbook of Medical Physiology - InduKhurana
42. Tridosha Theory - SubrahmanyaShastri 43. Statistics in Medicine - K. Syamalan

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Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

SCHOOL OF AYURVEDA

Ordinances, Regulations & Syllabus

For

M.D in Prasuti Tantra Evam Stree Roga And Three year Programme

(W.e.f. session 2023-224)

Approved and adopted in the year 2023 (Board of Studies; 10th Meeting)

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Programme Educational Objectives (PEOs)

PEO 1 Comprehensive Knowledge: Graduates will acquire in-depth knowledge of Ayurvedic principles and practices related to obstetrics and gynecology, enabling them to manage maternal and child health effectively.

PEO 2 Clinical Proficiency: Graduates will develop advanced surgical skills and clinical competencies necessary for performing obstetric and gynecological procedures, ensuring safe and effective patient care.

PEO 3 Research and Evidence-Based Practice: Graduates will engage in research activities that contribute to the body of knowledge in Prasuti Tantra, promoting evidence-based practices in Ayurvedic obstetrics and gynecology.

PEO 4 Holistic Patient Management: Graduates will demonstrate the ability to provide holistic care to women throughout their reproductive life, addressing physical, mental, and emotional health needs.

PEO 5 Interdisciplinary Collaboration: Graduates will be prepared to collaborate with healthcare professionals from various disciplines, integrating Ayurvedic approaches with conventional practices to enhance maternal and child health outcomes.

Programme Specific Objectives (PSO's)

PSO 1 Surgical Skills Mastery: Graduates will develop advanced surgical skills in performing obstetric and gynecological procedures, including cesarean sections, laparoscopic surgeries, and other relevant interventions.

PSO 2 Comprehensive Patient Assessment: Graduates will acquire the ability to conduct thorough assessments of pregnant women and gynecological patients, utilizing Ayurvedic diagnostic techniques alongside modern medical evaluations.

PSO 3 Management of Complications: Graduates will be equipped to manage obstetric and gynecological emergencies and complications, ensuring prompt and effective care to improve patient outcomes.

PSO 4 Integrative Treatment Plans: Graduates will formulate and implement individualized treatment plans that combine Ayurvedic therapies and practices with conventional medical approaches for comprehensive care.

PSO 5 Research and Critical Analysis: Graduates will engage in research projects focused on Prasuti Tantra, contributing to the advancement of knowledge and practices in Ayurvedic obstetrics and gynecology.

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PSO 6 Patient Education and Counseling: Graduates will effectively educate and counsel patients regarding reproductive health, prenatal care, and postnatal wellness, promoting informed decision-making and self-care.

Programme Outcome Objectives (POO's)

POO 1 Clinical Competence: Graduates will demonstrate advanced clinical skills in obstetrics and gynecology, effectively diagnosing and managing a wide range of conditions related to maternal and child health.

POO 2 Surgical Proficiency: Graduates will exhibit proficiency in performing complex surgical procedures specific to obstetrics and gynecology, ensuring high standards of patient care and safety.

POO 3 Holistic Patient Care: Graduates will provide holistic care that integrates Ayurvedic principles with modern medical practices, addressing the physical, emotional, and psychological needs of patients.

POO 4 Research Contribution: Graduates will engage in and contribute to research in Prasuti Tantra, critically evaluating and applying findings to enhance clinical practice and patient outcomes.

POO 5 Interdisciplinary Collaboration: Graduates will effectively collaborate with healthcare professionals across various disciplines, fostering a team approach to comprehensive maternal and child health care.

POO 6 Patient Communication and Education: Graduates will demonstrate effective communication skills, educating patients and families about reproductive health, treatment options, and preventive care.

POO 7 Ethics and Professionalism: Graduates will uphold ethical standards and professionalism in all aspects of practice, ensuring patient safety, confidentiality, and respect for diverse cultural backgrounds.

Course Structure

M.S.AYURVEDA PRELIMINARY 14. PRASUTI AVUM STRI ROGA (Gynecology & obstetrics)

PAPER-II Theory- 100 marks

PART A 50 marks

1. Concept of Tridosha, Dhatu, Upadhatu, Agni, PanchaMahabhuta in relation to Prasuti and StriRoga.
2. Concept of Artava and Shukra.
3. Concept of Rasa, Guna, Veerya, Vipak and Karma of Dravya used in Prasuti and StriRoga.
4. Action and adverse drug reaction related to commonly used plants and Rasa Aushadhi in Prasuti and StriRoga.
5. Concept of Pathya- Apathya in relation to Prasuti and StriRoga.
6. Concept of Garbhadhan and Garbha.
7. Concept of Vrana and Vranadushti.
8. Concept of special therapies of Ayurved used in Prasuti and StriRoga.
9. Concept of Ashtavidha Shastra Karma,Yantra&shastra used in Prasuti and StriRoga

PRACTI CAL 100 marks

1. Applied anatomy and physiology of genito-urinary system, abdomen, pelvis, pelvic floor, anterior abdominal wall, inguinal ligament, inguinal canal, vulva, rectum and anal canal. 2. Abnormal development, structure and function of female and male urogenital systems
2. Development, structure and function of placenta, umbilical cord and amniotic fluid.
3. Physiological and neuro-endocrinal changes during puberty, adolescence and menstruation.
4. Introduction of hormones related with gynaecology and obstetrics. Ovulation, fertilization, climacteric and menopause. Biophysical and biochemical changes in uterus and cervix during pregnancy and labour.
5. Pre-natal, Natal and Post natal counseling and examination.
6. Pharmacological study of drugs used in gynaecology and obstetrics.
7. Knowledge of diagnostic techniques used in gynaecology and obstetrics.
8. Basic Knowledge of pathological and biochemical investigation used in gynaecology and obstetrics.
9. Ethics, law and Acts Related to gynaecology and obstetrics – laws of abortion and adoption.
10. Knowledge of contraception and sterilization procedures.
11. Pre-operative and post operative care in gynaecology and obstetrics.

PRACTI CAL 100 marks

Contents:

i. Hospital duties in OPD, IPD, labor room, OT and casualty 2. History taking and counseling - 25 cases.
ii. Labor cases - observation/performing - 10 cases

2. Knowledge of instruments required in gynaecology and obstetric practices.
3. Ayurvedic diagnostic and therapeutic procedures.
4. Fluid therapy and blood transfusion.
5. Contraception and sterilizations.
6. Pre-operative, operative and post operative procedures.
   i. Distribution of marks (Practical)
7. Case records of Patients in Detail (25 Cases) - 20 Marks
8. Bedside clinical case taking
   i. Long case - 20 Marks
   ii. Short case - 10 Marks
9. Procedures - 15 Marks
10. Identification of instruments, X-ray etc& Spotting - 15 Marks
11. Viva - voce - 20 Marks

REFERENCE BOOKS:

1. Related matter from all thasamhitas and their commentaries. 2. Prasutitantraevumstreeroga by profTewari P V
2. Concepts of gynecology Dr Nirmala G Joshi.
3. Prasuti Tantra Prof. M. Dwivedi
4. Streerogavigyan - Dr VNK Usha 6. NavyaprasutiVigyanDr Pooja Bharadwaja
5. Text book of gynaecology-Berek and Novak.
6. Text book of obstetrics- Williums
7. Text book of obstetrics- D C Dutta
8. Text book of gynaecology - D C Dutta 11. Gabbe's normal and problem pregnancies.
9. Human embryology by Saddler.
12. Jeffcoat's principles of gynaecology 14. Telinde'sgynaecological surgery.