OFFICE OF THE REGISTRAR
MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)

Ref. No.: MU/RO/2017/ 554-A **16th May 2017**

OFFICE ORDER

Sub.: Reconstitution of Board of Studies for Department of Physical Education & Sports.

The Board of Studies for the Department of Physical Education & Sports is reconstituted as per Rule 12 of the Statutes of Mewar University, as under:

1. Prof. (Dr.) R.K. Paliwal, Dean Academic - Chairman
2. Prof. (Dr.) Ankit Shukla, Professor, University of D.A.V.V. Indore (M.P.) - External Member
3. Dr. Shantilal Bamta, Sports Officer, Shaheed Narendra Singh College, Jaora (M.P.) - External Member
4. Mr. Rakesh Giri, Assistant Professor - Internal Member
5. Dr. Pooja Gupta, Head & Associated Professor - Convener

The terms of reference for the Board of Studies are as provided in Rule 12 of the Statutes.

The Chairman of the Board of Studies may associate any member in the meeting, as a special invitee if it is considered his association will contribute to the task of the meeting with the approval of the President/Vice-Chancellor.

The Convener of the Meeting is advised to hold the meeting of the BOS seeking the convenience of the Chairman in the fourth week of June 2017. The proceedings of the meeting may be sent to the VC/Registrar as early as possible.

The External Members shall be entitled to TA/DA and sitting fees as per the norms prescribed by Mewar University.

Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:

- PS to Hon'ble Chairperson (for kind information)
- PS to Hon'ble President (for kind information)
- PS to Hon'ble Pro-President (for kind information)
- All concerned Deans/Directors/HODs (for kind information & necessary action)
- Accounts/Examination/Library/Store/Warden/Security/IT Head.
- Coordinator, IQAC Cell.
- Record file.

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)

DEPARTMENT OF PHYSICAL EDUCATION & SPORTS

DATE: 28.06.2017

Minutes of Meeting of Board of Studies

The Board of Studies meeting of the Department of Physical Education and Sports was held on 28th June 2017 in Room No. 135 at 11:00 am onwards to approve the new/changes in curriculum and Syllabus revision for session 2017-18.

The following members were present: **(Annexure 1)**

1. Prof. (Dr.) R.K. Paliwal, Dean Academic - Chairman
2. Prof. (Dr.) Ankit Shukla, Professor, University of D.A.V.V. Indore (M.P.) - External Member
3. Dr. Shantilal Bamta, Sports Officer, Shaheed Narendra Singh College, Jaora (M.P.) -External Member
4. Mr. Rakesh Giri, Assistant Professor - Internal Member
5. Dr. Pooja Gupta, Head & Associated Professor -Convener

Dr. Pooja Gupta, (Head Department of Physical Education & Sports) warmly welcomed all the board members. The Head also appreciated the presence of outside experts who took the pain and keen interest to attend this meeting.

Agenda 1: To approve minutes of the previous BOS held on 12-06-2016

Resolution: Minutes of the previous BOS of the Physical Education & Sports department held on 12-06-2016 were discussed and approved.

Agenda 2: Brief presentation of academic activities of the department before the BOS Committee by the convener.

Resolution: Dr. Pooja Gupta, (Head, Physical Education & Sports) presented a departmental activity report mentioning all the activities conducted related to curricular development, research development, faculty development and Industrial collaboration.

Agenda 3: Introduction of New Programmes/ Course

Resolution: Based on the suggestion received from the member of the BOS committee, it is decided to start a new program "Master of Physical Education & Sports" for the upcoming session 2017 – 2018.

- Master of Physical Education & Sports (MPES) **(Annexure 2)**

28.06.2017

MEWAR UNIVERSITY Chittorgarh-312901 (Raj.)

Agenda 4: To recommend the approved syllabus to Academic Council.

Resolution: Members of the Board of Studies approved the revised syllabus and recommended the same be forwarded to the Academic Council for their approval.

The meeting was dissolved with thanks to the Chair and all the Board of Studies Members.

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)

DEPARTMENT OF PHYSICAL EDUCATION & SPORTS

DATE: 28.06.20

Annexure 1: Attendance Sheet

S.NO.	Name & Designation	Designation in BOS	Signature
1	Prof. (Dr.) R.K. Paliwal, Dean Academic	Chairman	
2	Prof. (Dr.) Ankit Shukla, Professor, University of D.A.V.V. Indore (M.P.)	External Member	28/6/2017
3	Dr. Shantilal Bamta, Sports Officer, Shaheed Narendra Singh College, Jaora (M.P.)	External Member	28/06/2017
4	Mr. Rakesh Giri, Assistant Professor	Internal Member	28/6/2017
5	Dr. Pooja Gupta, Head & Associated Professor	Convener	28.06.2017

28.06.2017

MEWAR UNIVERSITY (Raj.) Chittorgarh-312901

ACADEMIC PROGRAMME
(With no. of lectures and Credits per week)

M.P.E.S. SEMESTER – I

Part – A (Theory Papers)		No. of classes per week			No. of Credits	Faculty Name
		Lectures	Tutorials	Practical / Project Work		
T-01	Research Methods	03	01	-	04	
T-02	Statistics	03	01	-	04	
T-03	Scientific Principles of Sports Training	03	01	-	04	
T-04	Officiating and Coaching	03	-	03	04	
Part – B (Practical)						
P-01	Conditioning & Match Practice	05	05	-	10	
Part – C (Viva-voce)						
C-01	Comprehensive Viva-voce	-	-	-	04	
				Total Credits	**30**	

M.P.E.S. SEMESTER – II

Part – A (Theory Papers)		No. of classes per week			No. of Credits	Faculty Name
		Lectures	Tutorials	Practical / Project Work		
T-05	Officiating & Coaching	03	-	03	04	
T-06	Measurement and Evaluation	03	01	-	04	
T-07	Professional Preparation & Curriculum Design	03	01	-	04	
T-08	Basic Computer Application	03	-	01	04	
Part – B (Practical)						
P-02	Conditioning & Match Practice	05	05	-	10	
Part – C (Viva-voce)						
C-02	Comprehensive Viva-voce	-	-	-	04	
				Total Credits	**30**	

M.P.E.S. SEMESTER – III

Part – A (Theory Papers)		No. of classes per week			No. of Credits	Faculty Name
		Lectures	Tutorials	Practical / Project Work		
T-09	Sports Psychology	03	01	-	04	
T-10	Exercise Physiology	03	01	-	04	
T-11	Sports Medicine	03	01	-	04	
T-12	Sports Specialization	03	01	-	04	
Part – B (Practical)						
P-03	Conditioning & Match Practice		05	-	05	
P-04	Sports Specialization (Practical Skill)	05	-	-	05	
Part – C (Viva-voce)						
C-03	Comprehensive Viva-voce	-	-	-	04	
				Total Credits	**30**	

M.P.E.S. SEMESTER – IV

Part – A (Theory Papers)		No. of classes per week			No. of Credits	Faculty Name
		Lectures	Tutorials	Practical / Project Work		
T-13	Biomechanics	03	01	-	04	
T-14	Management of Physical Education OR Dissertation	03	01	-	04	
T-15	Sports Specialization	03	01		04	
T-16	Theory Teaching Lessons	04		-	04	
Part – B (Practical)						
P-05	Conditioning & Match Practice	-	05	-	05	
P-06	Sports Specialization (Coaching Lessons)	05	-	-	05	
Part – C (Viva-voce)						
C-04	Comprehensive Viva-voce	-	-	-	04	
				Total Credits	**30**	

OFFICE OF THE REGISTRAR
MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)

Ref. No.: MU/RO/2017/642-A **07th June, 2017**

OFFICE ORDER

Sub.: Reconstitution of Board of Studies for Department of Pharmacy

The Board of Studies for the Department of Pharmacy is reconstituted as per Rule12 of the Statutes of Mewar University, as under:

1) Dr. Gopal Garg, Professor & Dean	Chairman
2) Dr. Rajesh Verma, Professor, Apex University, Jaipur	External Member 1
3) Dr. Vinesh Chaudhary, Professor, LBS College of Pharmacy, Jaipur	External Member 2
4) Mr. Zubair Bashir, Pharmacist	Alumni
5) Mr. Amit Khandelwal, MD, Elocon Pharmaceutical Pvt Ltd, Jaipur	Member from Industry
6) Ms. Neelam Somani, Assistant Professor	Internal Member 1
7) Mr. Aziz Ahmed, Assistant Professor	Internal Member 2
8) Ms. Shashi Daksh, Assistant Professor	Internal Member 3
9) Mr. Gaurav Kumar Sharma, Assistant Professor & HOD	Convener

The terms of reference for the Board of Studies are as provided in Rule 12 or the Statutes.

The Chairman of the Board of Studies may associate any member in the meeting, as special invitee if it is considered his association will contribute in the task of the meeting with the approval of the President/Vice Chancellor.

The Convener of the Meeting is advised to hold the meeting of the BOS seeking convenience of the Chairman in the second week of June 2017. The proceedings of the meeting may be sent to the VC/Registrar as early as possible.

The External Members shall be entitled for TA/DA and sitting fees as per the norms prescribed by the Mewar University.

Registrar

Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:

- PS to Hon'ble Chairperson (for kind information)
- PS to Hon'ble President (for kind information)
- PS to Hon'ble Pro-President (for kind information)
- All concerned Deans/Directors/HoD's (for kind information & necessary action)
- Accounts/Examination/Library/Store/Warden/Security/IT Head.
- Coordinator, IQAC Cell.
- Record file.

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)

DEPARTMENT OF PHARMACY

DATE: 10-06-2017

Minutes of Meeting of Board of Studies

Minutes of the BOS of the Department of Pharmacy meeting held on 10-06-2017 at 11.30 AM in Conference Hall. The following members were present: **(Annexure 1)**

1) Dr. Gopal Garg, Professor & Dean	Chairman
2) Dr. Rajesh Verma, Professor, Apex University, Jaipur	External Member 1
3) Dr. Vinesh Chaudhary, Professor, LBS College of Pharmacy, Jaipur	External Member 2
4) Mr. Zubair Bashir, Pharmacist	Alumni
5) Mr. Amit Khandelwal, MD, Elocon Pharmaceutical Pvt Ltd, Jaipur	Member from Industry
6) Ms. Neelam Somani, Assistant Professor	Internal Member 1
7) Mr. Aziz Ahmed, Assistant Professor	Internal Member 2
8) Ms. Shashi Daksh, Assistant Professor	Internal Member 3
9) Mr. Gaurav Kumar Sharma, Assistant Professor & HOD	Convener

Agenda 1: Grant of leave of absence member, if any
Resolution: No one was absent

Agenda 2: Welcoming the New Members
Resolution: Mr. Gaurav Kumar Sharma, Head of the Department of Pharmacy, warmly welcomed all the board members. The Head also appreciated the presence of outside experts who took the pain and keen interest to attend this meeting.

Agenda 3: Minutes of the previous Meeting of the Board of Studies of the Department of Pharmacy Mewar University
Resolution: Minutes of the previous BOS of the Pharmacy Department held on 13-06-2016 were discussed and approved.

Agenda 4: Revision in any program/course

Resolution: No changes were made to PCI approved scheme and syllabus of the course B. Pharma and D Pharma. The Committee decided to continue them as mentioned by PCI rules and regulations.

Agenda 5: Propose to review the course structure and syllabus for B. Pharma and D. Pharma
Resolution: The Committee reviewed and approved the scheme and syllabus of course B. Pharma and D Pharma for the upcoming session from 2017-18. **(Annexure 2)**

PRINCIPAL
Departmnt of Pharmacy
Mewar University
Gangrar, Chittorgarh

Agenda 6: Any suggestion by BOS members

Resolution: The Chairperson Prof. (Dr.) Gopal Garg, Department of Pharmacy informed that the department has applied to increase the student seats from 60 to 100 numbers to the pharmacy council of India (PCI).

• Committee has analyzed the results of the previous semesters of the B. Pharma and D. Pharma and discussed the proper implementations of the Practical sessions so the laboratory-based knowledge of the students can be improved.

Agenda 7: To recommend the approved syllabus to Academic Council.

Resolution: Members of the Board of Studies approved the revised syllabus and recommended the same be forwarded to the Academic Council for their approval.

The meeting was concluded with a gentle thanks by the Chairperson Prof. (Dr.) Gopal Garg, Department of Pharmacy.

PRINCIPAL
Departmnt of Pharmacy
Mewar University
Gangrar, Chittorgarh

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)

DEPARTMENT OF PHARMACY

DATE: 10-06-2017

Annexure 1: Attendance Sheet

S.NO.	Name & Designation	Designation in BOS	Signature
1	Dr. Gopal Garg, Professor & Dean	Chairman	
2	Dr. Rajesh Verma, Professor, Apex University, Jaipur	External Member 1	
3	Dr. Vinesh Chaudhary, Professor, LBS College of Pharmacy, Jaipur	External Member 2	
4	Mr. Zubair Bashir, Pharmacist	Alumni	
5	Mr. Amit Khandelwal, MD, Elocon Pharmaceutical Pvt Ltd, Jaipur	Member from Industry	
6	Ms. Neelam Somani, Assistant Professor	Internal Member 1	
7	Mr. Aziz Ahmed, Assistant Professor	Internal Member 2	
8	Ms. Shashi Daksh, Assistant Professor	Internal Member 3	
9	Mr. Gaurav Kumar Sharma, Assistant Professor & HOD	Convener	

PRINCIPAL
Department of Pharmacy
Mewar University
Gangrar, Chittorgarh

रजिस्ट्री सं० डी० एल०-33004/99

REGD. NO. D. L.-33004/99

भारत का राजपत्र
The Gazette of India

असाधारण
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PART III—Section 4
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PUBLISHED BY AUTHORITY

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No. 3621] NEW DELHI, THURSDAY, DECEMBER 11, 2014/AGRAHAYANA 20, 1936

PHARMACY COUNCIL OF INDIA
NOTIFICATION

New Delhi, the 10th December, 2014

The Master of Pharmacy (M.Pharm) Course Regulations, 2014

No. 14-1346/2014-PCI.—In exercise of the powers conferred by Sections 10 and 18 of the Pharmacy Act, 1948 (8 of 1948), the Pharmacy Council of India, with the approval of the Central Government hereby makes the following regulations, namely–

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.

7.1. Credit assignment

7.1.1. 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.

7.2. 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

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

Table – 4: 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

Table – 6: Course of study for M. Pharm. (Pharmaceutical Quality Assurance)

Course Code	Course	Credit Hours	Credit Points	Hrs./wk	Marks
	Semester I				
MQA101T	Modern Pharmaceutical Analytical Techniques	4	4	4	100
MQA102T	Quality Management System	4	4	4	100
MQA103T	Quality Control and Quality Assurance	4	4	4	100
MQA104T	Product Development and Technology Transfer	4	4	4	100
MQA105P	Pharmaceutical Quality Assurance Practical I	12	6	12	150
	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650
	Semester II				
MQA201T	Hazards and Safety Management	4	4	4	100
MQA202T	Pharmaceutical Validation	4	4	4	100
MQA203T	Audits and Regulatory Compliance	4	4	4	100
MQA204T	Pharmaceutical Manufacturing Technology	4	4	4	100
MQA205P	Pharmaceutical Quality Assurance Practical II	12	6	12	150
	Seminar/Assignment	7	4	7	100
	Total	35	26	35	650

Table - 12: 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 - 13: 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 - 14: 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

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 given in Table - 16.

11.1. 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.

204T	and Cosmeceutic als							
MPH 205P	Pharmaceuti cs Practical I	20	30	6 Hrs	50	100	6 Hrs	150
	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

MIP205P	Industrial Pharmacy Practical II	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

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

Tables – 19: Schemes for internal assessments and end semester examinations (Pharmaceutical Analysis-MPA)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER I								
MPA101T	Modern Pharmaceutical Analysis	10	15	1 Hr	25	75	3 Hrs	100
MPA102T	Advanced Pharmaceutical Analysis	10	15	1 Hr	25	75	3 Hrs	100
MPA103T	Pharmaceutical Validation	10	15	1 Hr	25	75	3 Hrs	100
MPA104T	Food Analysis	10	15	1 Hr	25	75	3 Hrs	100
MPA105P	Pharmaceutical Analysis-I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MPA201T	Advanced Instrumental Analysis	10	15	1 Hr	25	75	3 Hrs	100
MPA202T	Modern Bio-Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MPA203T	Quality Control and Quality	10	15	1 Hr	25	75	3 Hrs	100

Tables – 20: Schemes for internal assessments and end semester examinations (Pharmaceutical Quality Assurance-MQA)

Course Code	Course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
SEMESTER I								
MQA101T	Modern Pharmaceutical Analytical Techniques	10	15	1 Hr	25	75	3 Hrs	100
MQA102T	Quality Management System	10	15	1 Hr	25	75	3 Hrs	100
MQA103T	Quality Control and Quality Assurance	10	15	1 Hr	25	75	3 Hrs	100
MQA104T	Product Development and Technology Transfer	10	15	1 Hr	25	75	3 Hrs	100
MQA105P	Pharmaceutical Quality Assurance Practical I	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650
SEMESTER II								
MQA201T	Hazards and Safety Management	10	15	1 Hr	25	75	3 Hrs	100
MQA202T	Pharmaceutical Validation	10	15	1 Hr	25	75	3 Hrs	100
MQA203T	Audits and Regulatory Compliance	10	15	1 Hr	25	75	3 Hrs	100
MQA204T	Pharmaceutical Manufacturing Technology	10	15	1 Hr	25	75	3 Hrs	100
MQA205P	Pharmaceutical Quality Assurance Practical II	20	30	6 Hrs	50	100	6 Hrs	150
-	Seminar /Assignment	-	-	-	-	-	-	100
Total								650

11.2. Internal assessment: Continuous mode

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

Table – 27: 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 – 28: 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.

MEWAR UNIVERSITY
CHITTORGARH (RAJASTHAN)
BECHLOR OF PHARMACY (PRACTICE) REGULATION,2014

PHARMACY COUNCIL OF INDIA

NOTIFICATION

New Delhi, the 18th December,2014

Bachelor of pharmacy (practice),Regulations,2014

No.14-117/2014-PCI- In exercise of the powers conferred by section 10 and 18 of the Pharmacy Act, 1948(8 of 1948), the Pharmacy Council of India, with the approval of the Central Government hereby makes the following regulations; namely-

CHAPTER-I

1. Short title and commencement. –

(1) These regulations may be called the Bachelor of Pharmacy (Practice) Regulations, 2014

(2) They shall come into force from the date of their publication in the official Gazette.

2. Bachelor of Pharmacy (Practice) [B.Pharm. (Practice)] shall consist of a degree certificate of having completed the course of study and passed examination as prescribed in these regulations for the purpose of additional qualification to be entered in the register of pharmacists.

CHAPTER-II

3. Duration of the course. –

The duration of the course shall be of two academic years with each year spread over a period of not less than 180 working days

4. Minimum qualification for admission to the course –

i. A pass in Diploma course in Pharmacy from an institution approved by the Pharmacy Council of India under section 12 of the Pharmacy Act, 1948.
ii. A registered pharmacist.
iii. A minimum of four years of pharmacy practice experience in a community or hospital pharmacy –
   a. A certificate from competent authority stating that the candidate is endorsed as registered pharmacist in the drug license of a pharmacy as proof of practice experience in case of community pharmacist
   b. A certificate from the Principal/Medical Superintendent/competent person of the Hospital/Health Unit stating that the candidate is working as a pharmacist will be accepted as proof of practice experience in case of hospital pharmacist

iv. A 'No Objection Certificate' from the employer in prescribed format (Annexure -A)

Provided that there shall be reservation of seats for the students belonging to the scheduled castes, scheduled tribes and other backward classes in accordance with the instructions issued by the Central Government/State Government/Union Territory Administration, as the case may be, from time to time.

5. The number of admissions in the programme shall be as prescribed by the Pharmacy Council of India from time to time and presently be restricted to 40 students in an academic year

6. Approval of the authority conducting the course of study –

a. No pharmacy institution shall start Bachelor of Pharmacy (Practice) programme or increase the number of admission without obtaining the prior approval of the Pharmacy Council of India.
b. Any pharmacy college for the purpose of obtaining permission under sub-section (1) of section 12 of the Pharmacy Act shall submit a scheme as prescribed in Appendix-I by the Pharmacy Council of India.
c. The scheme referred to in sub-regulation (b) above, shall be in such form and contain such particulars and be preferred in such manner and be accompanied with such fee as may be prescribed.
d. The institutions approved by the Pharmacy Council of India for running Bachelor of Pharmacy course under section 12 of the Pharmacy Act, 1948 alone shall be eligible for starting Bachelor of Pharmacy (Practice) degree course.

Provided that the Pharmacy Council of India shall not approve any institution under these regulations unless it provides adequate arrangements for teaching in regard to building, accommodation, laboratories, equipments, teaching staff, non-teaching staff, etc., as specified in Appendix-II to these regulations.

7. **Course of study.** –The course of study shall consist of the subjects as given in the Tables below. The course shall consist of class room teaching and assignment works. The assignment works shall be done at the place of work under the supervision and guidance of teaching staff of the academic institution. The number of contact hours in a week devoted to each subject for class room teaching shall not be less than that noted against it in columns (3) below.

TABLE - I

First Year :

S.No.	Name of Subject	Minimum No. of total contact hours	No. of contact hours /week
(1)	(2)	(3)	(4)
1.1	Pathophysiology and Pharmacotherapeutics I	40	1
1.2	Pathophysiology and Pharmacotherapeutics II	40	1
1.3	Pharmacy Practice I	40	1
1.4	Pharmacy Practice II	40	1
1.5	Applied Pharmaceutics	40	1
1.6	Social Pharmacy I	40	1
1.7	Case presentation, Seminar, Assignments	160	4
	Total	400	10

Second Year :

S.No.	Name of Subject	Minimum No. of total contact hours	No. of contact hours /week
(1)	(2)	(3)	(4)
2.1	Pathophysiology and Pharmacotherapeutics III	40	1
2.2	Pathophysiology and Pharmacotherapeutics IV	40	1
2.3	Pharmacy Practice III	40	1
2.4	Pharmacy Practice IV	40	1
2.5	Social Pharmacy II	40	1
2.6	Pharmaceutical Jurisprudence	40	1
2.7	Case presentation, Seminar, Assignments	160	4
	Total	400	10

8. **Syllabus.** – The detailed syllabus for each subject of study in the said Tables shall be as specified in the guidelines given in Appendix-III. The guidelines may, with the approval of Central Council of the Pharmacy Council of India, be amended and notified from time to time.

9. **Examination.** –

1. There shall be an examination at the end of calendar year. The first examination shall be the annual examination and the second examination shall be supplementary examination.
2. The examinations shall be of written nature for theory and for the practicals: The students shall submit the assignments done by them in the form of a report which will be followed by viva-voce carrying maximum marks for each part of a subject as indicated in Tables below :

1st Year examination :

TABLE-II

S.No.	Name of Subject	Maximum marks for Theory			Maximum marks for Assignments (including Viva voce 25%)
		University Examination	Sessional marks	Total	
1.1	Pathophysiology and Pharmacotherapeutics I	60	40	100	100
1.2	Pathophysiology and Pharmacotherapeutics II	60	40	100	100
1.3	Pharmacy Practice I	60	40	100	100
1.4	Pharmacy Practice II	60	40	100	100
1.5	Applied Pharmaceutics	60	40	100	100
1.6	Social Pharmacy I	60	40	100	100
	Total			600	600

2nd Year examination :

S.No.	Name of Subject	Maximum marks for Theory			Maximum marks for Assignments (including Viva Voce-25%)
		University Examination	Sessional marks	Total	
1.1	Pathophysiology and Pharmacotherapeutics III	60	40	100	100
1.2	Pathophysiology and Pharmacotherapeutics IV	60	40	100	100
1.3	Pharmacy Practice III	60	40	100	100
1.4	Pharmacy Practice IV	60	40	100	100
1.5	Social Pharmacy - II	60	40	100	100
1.6	Pharmaceutical Jurisprudence	60	40	100	100
	Total			600	600

10. Eligibility for appearing at the examination.— A student who produces a certificate from the Head of the Institution in which he has undergone the course in proof of his having regularly and satisfactorily undergone the course of study by attending not less than 80% of the classes held in theory and has submitted the assignments/ project report duly approved by the supervising teacher shall be eligible for appearing at the examination.

11. Mode of examinations.—

(1) Theory examination shall be of three hours duration.

(2) A student who fails in theory examination of a subject shall be permitted to re-appear in that subject

(3) Assignment work shall consist of evaluation of report by both internal & external examiners with a seminar and viva –voce (Oral) examination.

12. Award of sessional marks and maintenance of records.—

(1) A regular record of theory examinations conducted in an institution imparting the Bachelor of Pharmacy (Practice) Course, shall be maintained for each student in the institution and 40 marks for each subject shall be allotted as internal assessment.

(2) There shall be at least three periodic sessional examinations during each year and the highest aggregate of any two performances shall form the basis of calculating sessional marks.

13. Minimum marks for passing examination.— A student shall not be declared to have passed examination unless he secures at least 50% marks in each of the subjects separately in the theory examinations, including sessional marks and at least 50% marks in assignment work. The students securing 60% marks or above in aggregate in all subjects in a single attempt at the examination shall be declared to have passed in first class. A student securing 75% marks or above in any subject or subjects shall be declared to have passed with distinction in the subject or those subjects provided he passes in all the subjects in a single attempt.

14. Eligibility for promotion to next Class.—

1. All students who have appeared for all the subjects and passed the examination are eligible for promotion to the next year.
2. The student failing in subjects of 1st year B.Pharm. (Practice) examination shall be permitted to proceed to the 2nd year of B.Pharm. (Practice). However, such students shall have to pass all the subjects of the 1st and 2nd year of B.Pharm. (Practice) course and shall complete the course within 4 academic years from the session in which he was admitted in the course, for the consideration of B.Pharm. (Practice) degree.

15. Approval of examinations.— Examinations mentioned in regulations 9 to12 and 14 shall be held by the examining authority approved by the Pharmacy Council of India under sub-section (2) of Section 12 of the Pharmacy Act, 1948.

16. Certificate of passing examination.— every student who has passed the examinations for the Bachelor of Pharmacy (Practice) shall be granted a degree certificate by the examining authority.

CHAPTER-III

17. Assignment work.—

1. To allow the student to understand and develop data collection and reporting skills in the area of community, hospital and clinical pharmacy in particular and principles of pharmacy practice in general, the assignment work shall be carried out under the supervision of a teacher of the Academic Institution on the topic approved by the Head of the Academic Institution. The same shall be announced to students within one month of commencement of the classes in each of the subjects for the session. Assignment shall be presented in a written report and as a seminar before the final examination. External and the internal examiners appointed by the examining authority for the said purpose shall do the assessment of the work done.
2. Assignment work shall comprise of objectives of the work, methodology, results, discussions and conclusions.

18. Objectives of Assignment work.— The main objectives of the work is to—

(i) show the evidence of having made accurate description of work and of having recorded the findings in an impartial manner; and

(ii) develop the students skills in data collection, analysis and reporting and interpretation skills.

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19. Methodology.— To complete the work following methodology shall be adopted, namely:—

(i) Not more than ten students shall work under an authorized teacher;

(ii) The topic shall be approved by the Head of the Department or Head of the Institution;

(iii) The work chosen shall be related to the subjects taught in a particular session and due consideration has to be given regarding the suitability for carrying out the work in his workplace.

20. Reporting .— (1) Student working on the assignment shall submit the report after completion of work to the Head of the Department or Head of the Institution. The report should include a certificate issued by the authorized teacher.

(2) Submission of the report shall be done at least one month prior to the commencement of annual examination.

21. Evaluation.— The following methodology shall be adopted for evaluating assignment work—

Evaluation shall be done on the following items:	Marks
a) Write up of the assignment	(40)
b) Presentation of work	(15)
c) Seminar	(20)
d) Question and answer skills (viva voce)	(25)
Total	(100 marks)

CHAPTER-IV

22. The fees for the course shall be prescribed by Pharmacy Council of India from time to time for guidance to the State Government/Course Conducting Authorities.

Annexure-A

{See regulation 4(iv)}

Format for 'No Objection Certificate' from the Employer

This to certify that ---------- son/daughter of---------- is working in this Institution/Pharmacy- as------- since ---------- and the undersigned has no objection if he gets himself admitted in the Bachelor in Pharmacy (Practice) Course for the session----------. He will be allowed to attend the course and facilities will be provided for carrying out the assignments as part of course in this Institution/Organization.

Signature and seal of the authorized person.

Guidelines for conducting Bachelor of Pharmacy (Practice) course

APPENDIX-I
[See Regulation 6(b)]

SCHEME FOR OBTAINING PRIOR PERMISSION OF PHRMACY COUNCIL OF INDIA FOR CONDUCTING THE BACHELOR OF PHARMACY (PRACTICE) COURSE.

1. Name of the Course Conducting Authority:

2. Complete Postal Address of the Course Conducting Authority:

3. Year of establishment of the Institute:

4. Approval status of the Institute for conducting Bachelor of Pharmacy (B.Pharm) Course:
(Copy of the latest approval to be enclosed)

5. No objection/consent of affiliation from Examining Authority (i.e. University) for starting the course:
(Copy of the letter to be enclosed)

6. Deficiencies as pointed out in the latest Inspection Report:
(Use separate sheet)

7. Proposed date of commencement of the course:

8. Proposed intake capacity:

9. Proposed Time schedule for conducting the course:

10. Details of teaching staff in the specified subject in the following format:

Name of the Department	Sl. No.	Name of the Teachers	Working experience in the Institution	Qualification	Experience	Existing Teaching Load	Any Experience in Hospital/Community/Clinical Research/Practice
1	2	3	4	5	6	7	8
Pharmaceutics							
Pharmacology							
Pharmacy Practice							

11. Declaration of the teachers for teaching the additional Course:
(Declarations from teachers to be enclosed)

12. Whether visiting/part-time teachers to be appointed:
(If yes, furnish the details in the following proforma)

Sl.No.	Name of the Teacher	Qualification	Practice Experience	Present attachment

13. Enclose the acceptance from the visiting teachers as identified:

14. Whether the Institute/Trust is running a Model Community Pharmacy :

15. If not, is there any planning to start the same in near future:

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Signature of the Principal with date

APPENDIX-II
{See proviso to regulation 6(d) }

MINIMUM REQUIREMENT FOR OBTAINING
THE APPROVAL OF PHRMACY COUNCIL OF INDIA
FOR CONDUCTING THE BACHELOR OF PHARMACY (PRACTICE) COURSE

PART I - PRINCIPAL

		Qualification	Teaching Experience Required
Qualification/ Experience		M. Pharm	15 years, out of which 5 years as Prof. / HOD
		Ph.D	10 years, out of which at least 05 years as Asst. Prof

PART II PHYSICAL INFRASTRUCTURE

1. Availability of Land (details)

a. Building : Own/rented

b. Total built up area of the college building in Sq.mts : Built up Area

c. Amenities and Circulation Area

2. Class rooms:

Total number of class rooms provided for D. Pharm and B. Pharm/Bachelor of Pharmacy (Practice) course

Class	Required	Available numbers	Required Area * for each Class Room
D. Pharm	02		90 Sq. mts each
B. Pharm	04		90 Sq. mts each (Desirable) 75 Sq. mts each (Essential)
Bachelor of Pharmacy (Practice)	01		40 Sq. mts each

(* To accommodate 60 students)

3. Laboratory requirement for both D. Pharm and B. Pharm and Bachelor of Pharmacy (Practice) course.

Sl. No.	Infrastructure for	Requirement as per Norms	Available No. & Area in Sq. mts.	Remarks/ Deficiency
1	Laboratory Area for B. Pharm Course (10 Labs) Laboratory area for D. Pharm Course (03 Labs)	90 Sq .mts x n (n=10) - Including Preparation room - Desirable 75 Sq. mts - Essential		
2	Pharmaceutics Pharmaceutical Chemistry Pharmaceutical Analysis Pharmacology Pharmacognosy	03 Laboratories 03 Laboratories 01 Laboratory 03 Laboratories 02 Laboratories		

	Pharmaceutical Biotechnology (Including Aseptic Room) Total No. Laboratories for B.Pharm and D.Pharm Course	01 Laboratory 13 Laboratories *		
3	Preparation Room for each lab (One room can be shared by two labs, if it is in between two labs)	10 sq mts (Minimum)		
4	Area of the Machine Room	80-100 Sq.mts		
5	Central Instrument Room	80 Sq.mts with A/ C		
6	Store Room – I	1 (Area 100 Sq mts)		
7	Store Room – II (For Inflammable chemicals)	1 (Area 20 Sq mts)		

*For D. Pharm and B. Pharm both.

1. All the Laboratories should be well lit & ventilated.
2. All Laboratories should be provided with basic amenities and services like exhaust fans and fuming chamber to reduce the pollution wherever necessary.
3. The workbenches should be smooth and easily cleanable preferably made of non-absorbent material.
4. The water taps should be non-leaking and directly installed on sinks. Drainage should be efficient.
5. Balance room should be attached to the concerned laboratories.

4. Administration Area:

Sl.No.	Name of infrastructure	Requirement as per Norms in number	Requirement as per Norms, in area
1	Principal's Chamber	01	30 Sq .mts
2	Office – I – Establishment	01	60 Sq. mts
3	Office – II – Academics		
4	Confidential Room		

5. Staff Facilities:

Sl. No.	Name of infrastructure	Requirement as per Norms in number	Requirement as per Norms in area
1	HODs rooms for B.Pharm Course	Minimum 4	20 Sq mts x 4
2	Faculty Rooms for D.Pharm & B.Pharm course		10 Sq mts × n (n=No. of teachers)
3	Faculty Rooms for Bachelor of Pharmacy (Practice) course		10 Sq mts × n (n=No. of teachers)

6. Museum, Library, Animal House and other Facilities:

Sl No.	Name of infrastructure	Requirement as per Norms in number	Requirement as per Norms in area
1	Animal experimentation learning modules	01	-
2	Library	01	150 Sq. mts

3	Museum	01	50 Sq. mts (May be attached to the Pharmacognosy lab)
4	**Model Pharmacy** **Essential:** **Running Model Community Pharmacy** **Desirable** Drug Model Store	**01**	**80 Sq.mts** **(including 10 Sq.mt for Drug Information Centre & 10 Sq.mt. for Patient Counselling)**
5	Auditorium / Multi Purpose Hall (Desirable)	01	250 – 300 seating capacity
6	Herbal Garden (Desirable)	01	Adequate number of medicinal plants

7. Student Facilities:

Sl. No.	Name of infrastructure	Requirement as per Norms in number	Requirement as per Norms in area
1	Girl's Common Room (Essential)	01	60 Sqmts
2	Boy's Common Room (Essential)	01	60 Sq.mts
3	Toilet Blocks for Boys	01	24 Sq.mts
4	Toilet Blocks for Girls	01	24 Sq.mts
5	Drinking Water facility – Water cooler (Essential)	01	-
6	Boy's Hostel (Desirable)	01	9 Sq mts/ Room Single occupancy
7	Girl's Hostel (Desirable)	01	9 Sq mts / Room (single occupancy) 20 Sq mts / Room (triple occupancy)
8	Power Backup Provision (Desirable)	01	

8. Computer and other Facilities:

Name	Required
Computer Room for B.Pharm Course	01 system for every 2 students (with internet and Printer facilities) (Area 75 Sq mts)
Computer For Model Pharmacy	As required for teaching and practice purposes and for drug information services
Computer (Latest configuration)	1 system for every 10 students (UG & PG)
Printers	1 printer for every 10 computers
Multi Media Projector	01
Generator (5KVA)	01

9. Library books and periodicals

The minimum norms for the initial stock of books, yearly addition of the books and the number of journals to be subscribed are as given below:

Item	Titles (No)	Minimum Volumes (No)
Number of books	150	1500 adequate coverage of a large number of standard text books and titles in all disciplines of pharmacy
Annual addition of books		150 books per year
Periodicals		10 National
Hard copies / online		05 International periodicals
CDS		Adequate Nos
Internet Browsing Facility		Yes/No (Minimum ten Computers)
Reprographic Facilities:		
Photo Copier		01
Fax		01
Scanner		01

10. A. Subject wise Classification:

Sl. No	Subject	Titles	Numbers
1	Pharmaceutics		
2	Pharmaceutical Chemistry		
3	Pharmacognosy		
4	Biochemistry and Clinical Pathology		
5	Human Anatomy and Physiology		
6	Health Education and Community Pharmacy		
7	Pharmacy Practice		
8	Pharmacology and Toxicology		
9	Pharmaceutical Jurisprudence		
10	Drug Store and Business Management		
11	Hospital and Clinical Pharmacy		
12	Social Pharmacy		

10. B. Library Staff:

	Staff	Qualification	Required
1	Librarian	M. Lib	1
2	Assistant Librarian	D. Lib	1
3	Library Attenders	10 +2 / PUC	2

PART III ACADEMIC REQUIREMENTS

A. Faculty requirements:

1. Student Staff Ratio:

(Required ratio --- Theory → 40:1 and Assignment → 10:1.

2. Minimum No. of working days for B. PHARM PRACICE: 180

3. Staff Pattern for B. Pharm & B.Phram (Practice) courses department wise:

Professor : Asst. Professor : Lecturer

Department / Division	Name of the post	For strength of 60 students of B.Pharm & 40 students of B.Pharm (Practice)
Department of Pharmaceutics	Professor	1
	Asst. Professor	1
	Lecturer	4
Department of Pharmaceutical Chemistry (including Pharmaceutical Analysis)	Professor	1
	Asst. Professor	1
	Lecturer	4
Department of Pharmacology	Professor	1
	Asst. Professor	1
	Lecturer	5
Department of Pharmacognosy	Professor	1
	Asst. Professor	1
	Lecturer	2
Department of Pharmacy Practice	Professor	1
	Asst.professor	2
	lecturer	2

4. Teaching Staff required year wise exclusively for B. Pharm (Practice) for intake of 40 Students.

	Staff required for I B. Pharm Practice	Staff required for II B. Pharm Practice
Principal	1	1
Pharmacology	1	1
Pharmaceutics	1	1
Pharmacy Practice	2	2
Part time teaching Staff For pathophysiology and pharmacotherapeutics	As required	As required

At least 2 teachers shall possess M.Pharm (Pharmacy Practice) or Pharm D. Qualification.

5. Number of non-teaching staff available for D. Pharm and B. Pharm course for intake of 60 students:

Sl. No.	Designation	Required Number	Required Qualification	Available		Remarks of the Inspection team
				Number	Qualification	
1	Laboratory Technician	1 for each Dept	D. Pharm			
2	Labortory Assistants/ Attenders	1 for each Lab (minimum)	SSLC			
3	Office Superintendent	1	Degree			
4	Accountant	1	Degree			
5	Store keeper	1	D. Pharm/ Degree			

6	Computer Data Operator	1	BCA / Graduate with Computer Course			
7	First Division Assistant	1	Degree			
8	Second Division Assistant	2	Degree			
9	Peon	2	SSLC			
10	Cleaning personnel	Adequate	---			
11	Gardener	Adequate	---			

B. DOCUMENTATION

Records to be maintained: Essential

Sl. No	Records
1	Admissions Registers
2.	Individual Service Register
3.	Staff Attendance Registers
4.	Sessional Marks Register
5.	Final Marks Register
6.	Student Attendance Registers
7.	Minutes of meetings- Teaching Staff
8.	Fee paid Registers
9.	Acquittance Registers
10.	Accession Register for books and Journals in Library
11.	Log book for chemicals and Equipment costing more than Rupees one lakh
12.	Job Cards for laboratories
13.	Standard Operating Procedures (SOP's) for Equipment
14.	Laboratory Manuals
15.	Stock Register for Equipment
16.	Animal House Records as per CPCSEA
17.	Record of submission of Assignments by students
18.	Record of Case presentation/Seminars conducted

PART IV – EQUIPMENT AND APPARATUS

The institution shall comply fully by having all equipments as prescribed in SIF for approval of B. Pharm course u/s 12 of the Pharmacy Act.

APPENDIX-III

(See regulation 8)

Course curriculum

1.1. Pathophysiology and Pharmacotherapeutics I

Scope:

Practicing pharmacists will have opportunity to review the case notes or prescriptions in their practice setting and able to identify and resolve the drug related problems. This will ensure the improved patient care and decreases the unnecessary health care expenditure.

Objectives:

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

(a) Understand the anatomy and physiology of the respective system

(b) Understand the disease process
(c) Know the signs and symptoms of the disease.
(d) Appreciate the various therapeutic regimens with their advantages and disadvantages.

Course duration:

Learning

40 hours of learning by blended mode of teaching. Blended teaching includes didactic and onsite learning.

Case Presentations

During the course each student should present 5 cases covering the diseases prescribed in the syllabus.

Assignments
Each student should complete two assignments covering therapeutics and pharmacy practice concepts and will be evaluated at the time Final Examination.

Detailed Syllabus and Lecture Schedules

1. **Introduction to pathophysiology and therapeutics – scope and objectives - 1 hr**

2. **Prescribing guidelines (Drug and dosage selection and dose calculation) for - 4 hrs**
   a) Pediatrics
   b) Geriatrics
   c) Pregnant and breast feeding women
   d) Renally and hepatically challenged patients

3. **Elements of anatomy, etiopathogenesis, diagnostic techniques, clinical manifestations and pharmacotherapeutics of diseases associated with Cardiovascular System - 15 hrs**
   (a) Hypertension
   (b) Ischemic Heart diseases (Angina and Myocardial Infarction)
   (c) Hyperlipidemia
   (d) Congestive Heart Failure
   (e) Arrhythmias

4. **Elements of anatomy, Etiopathogenesis, diagnostic techniques, clinical manifestations and pharmacotherapeutics of diseases associated with Respiratory- System - 12 hrs**
   (a) Asthma
   (b) COPD
   (c) Drug induced pulmonary diseases

5. **Elements of anatomy Etiopathogenesis, diagnostic techniques, clinical manifestations and pharmacotherapeutics of diseases associated with Endocrine System - 8 hrs**
   (a) Diabetes.
   (b) Thyroid diseases

Books/References:
Suggested Assignments:

vii) Home Medication Review

b) **Patient Data analysis**

Patient case history, drug therapy evaluation, identification and resolving of drug related problems. - 02 hours

4. **Practice Management :** - 08 hrs

a. Professional practice standards - Good Pharmacy Practice – in detail including Good storage practice, good dispensing practices, etc. (national and international scenario) (for both community and hospital pharmacy)
b. Pharmacy Practice Regulations (PCI), Code of Ethics for Pharmacists
c. SOPs, writing SOPs, Documentation, writing various record formats for community and hospital pharmacy, validation of various processes in Hospital & Community Pharmacy.
d. Concept of Accreditation of Pharmacies
e. Validation concepts & instruments for community pharmacy and hospital pharmacy
f. Concept of Audits in community and hospital pharmacy

5. **Hospital and Hospital Pharmacy Organisation** - 6 Hrs

a) Definition of Hospital, Hospital Pharmacy, Organizational Structure of Hospital, Hospital Pharmacy, professional roles and responsibilities of hospital pharmacist.

b) Advantages, need and disadvantages/risks of Hospitalization. Nosocomial infections/HAI – worldwide scenario, statistics/prevalence, dangers, precautions to take, Problems related to hospitals, high risk environment.

c) International scenario vs Indian Scenario of Hospital Pharmacy Practice.

d) Hospital Pharmacy Practice - Requirements for functioning of hospital pharmacy, Qualification and experience requirements for pharmacists, work load statistics.

e) Standards of Pharmacies in hospitals

6. **Drug Committees** - 4 Hrs

Pharmacy and Therapeutics Committee, Hospital Formulary, Infection Control committee, Institutional Review Board.

7. **Community Pharmacy** - 8 hrs

a) Definition, scope and professional responsibilities of community pharmacist.

b) International scenario vs Indian Scenario of Community Pharmacy Practice

c) Pharmacy Assistant/Technician/Salesperson – roles and responsibilities.

d) Community pharmacist's services to other health care professionals, and to nursing homes

8. **Community Pharmacy Management** - 4 hrs

Selection of site, legal requirements, procurement, storage, and inventory control, product display, finance management.

Books and references
Suggested assignment topics

Suggested topics for assignment

1.3. Pharmacy Practice I

Scope

Practicing pharmacists have opportunity to provide various patient care services to improve the patient's health in community settings through counselling, health screening services, and other education programs. In hospital settings, pharmacists can ensure appropriate dispensing, education to patient, and provide all hospital pharmacy services including clinical pharmacy services such as drug information and ADR reporting.

Objectives:

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

(a) Understand the professional roles of pharmacists in community, hospital and clinical pharmacy areas.
(b) Understand the professional responsibilities of the pharmacists.
(c) Provide the intended services.

Course duration:

Learning

40 hours of learning by blending method. Blending method includes didactic and onsite learning.

Assignments

Each student should complete two assignments covering therapeutics and pharmacy practice concepts and will be evaluated at the time Final Examination.

Detailed Syllabus and Lecture Schedules

1. Introduction to Pharmacy Practice – Definition, patient focused approach, scope/areas of practice - **1 hour**

2. Introduction to Clinical Pharmacy - **3Hrs**

a) Definition, Scope, Objectives of Clinical Pharmacy Practice
b) International v/s National scenario
c) Professional responsibilities of Clinical Pharmacists.

3. Clinical Pharmacy daily activities - **6 hrs**

a) Definition, objectives and procedures of
   i) Ward round participation
   ii) Treatment chart review
   iii) Drug information
   iv) Patient counseling
   v) ADR monitoring and reporting
   vi) Therapeutic drug monitoring.

1.2. Pathophysiology and Pharmacotherapeutics II

Scope:

Practicing pharmacists will have the opportunity to review the case notes or prescriptions in their practice setting and able to identify and resolve the drug related problems. This will ensure the improved patient care and decreases the unnecessary health care expenditure.

Objectives:

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

(a) Understand the anatomy and physiology of respective system
(b) Understand the disease process
(c) Know the signs and symptoms of the disease.
(d) Appreciate the various therapeutic regimens with their advantages and disadvantages.

Course duration:

Learning

40 hours of learning by blending method.

Blended mode of education and includes didactic and onsite learning.

Case Presentations

During the course each student should present 5 cases covering the diseases prescribed in the syllabus.

Assignments

Each student should complete two assignments covering therapeutics and pharmacy practice concepts and will be evaluated at the time Final Examination.

Detailed Syllabus and Lecture Schedules

1. Elements of anatomy, Etiopathogenesis, diagnostic techniques, clinical manifestations and pharmacotherapeutics of diseases associated with -CNS 18 hr

(a) Anxiety
(b) Depression
(c) Schizophrenia,
(d) Manic depressive disorders
(e) Epilepsy,
(f) Parkinson's disease,
(g) Headaches

2. Elements of anatomy, Etiopathogenesis, diagnostic techniques, clinical manifestations and pharmacotherapeutics of diseases associated with GI Disorders 10 hrs

(a) Dyspepsia,
(b) Acid Pepsin Disease,
(c) Inflammatory Bowel Disease.
(d) Liver disorders- Hepatitis, Gall stones, Alcoholic Liver Disease.

3. Elements of anatomy, etiopathogenesis, clinical manifestations and pharmacotherapeutics of diseases associated with hematological System 8 hrs

(a) Erythropoietic system – Over view, Iron deficiency anemia, Megaloblastic anemia, Sideroblastic anemia, Hemolytic anemia, Venous Thromboembolism, Arterial Thromboembolism, Drug induced blood disorders.

Books and references

1.4. Pharmacy Practice II

Scope

Practicing pharmacists have opportunity to provide various patient care services to improve the patient's health in community settings through counseling, health screening services, and other education programs. In hospital settings, pharmacists can ensure appropriate dispensing, education to patient, and provide all hospital pharmacy services including clinical pharmacy services such as drug information and ADR reporting

Objectives:

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

a) Understand the professional roles of pharmacists in community, hospital and clinical pharmacy areas.
b) Understand the professional responsibilities of the pharmacists.
c) Provide the intended services.

Course duration:

Learning

40 hours of learning by blending method.
Blended teaching includes didactic and onsite learning.

Assignments

Each student should complete two assignments covering therapeutics and pharmacy practice concepts and will be evaluated at the time of Final Examination.

Detailed syllabus and lecture wise teaching schedules

1. **Hospital Pharmacy Stores Management** - 04 hours
Stores Management, Drug Purchase and Procurement, Inventory Control and GPP. Management of Material and Finance.
2. **Drug Dispensing and Drug Distribution** - 8 hours
Drug distribution – various methods, individual order method, Floor Stock Method, Unit Dose Drug Distribution Method, Drug basket method, Distribution to ICCU/ICU/Emergency wards, Automated drug dispensing systems and devices , Distribution of Narcotic and Psychotropic substances , GPP associated with all these.
3. **Central Sterile Supply Services** - 2 hours
4. **Prescription and prescription handling** - 5 hours

a. Definition, Parts of prescriptions, good prescribing practices, legality of prescriptions, identification of drug related problems in prescriptions.
b. Prescription handling, labeling of dispensed medications (Main label, Ancillary label, pictograms), Medication usage instructions.
c. Good dispensing practices
d. Drug Interactions (Drug-Drug, Drug-Food, Drug-Lab investigations) – types, interpretation and detection, prevention, Practice on market prescriptions, Use of drug interaction software's.
e. PPIs – (Patient Package Insert) - Basic concept, Importance and beneficial use of PPIs. Scenario in India and other countries.

5. **Pharmaceutical Care** - 02 hours
Definition, principles and procedures of pharmaceutical care
6. **Patient Counseling** 04 hours

Definition, various stages of patient counseling, barriers in counseling and strategies to overcome barriers in patient counseling. Patient information leaflets- definition, layout and design of PILs.

7. **Health Screening Services** - 04 hours

Definition, scope, and uses of health screening services, procedures involved in screening blood pressure, capillary blood glucose, body mass index

8. **Interpretation of laboratory data** - 10 hours

a) Haematological, Liver function, Renal function, thyroid function tests
b) Tests associated with cardiac disorders
c) Fluid and electrolyte balance
d) Microbiological culture sensitivity tests
e) Pulmonary Function Tests

books and references

suggested topics for assignments

1.5. Applied Pharmaceutics

Scope

This course is designed to impart a fundamental knowledge on different dosage forms and pharmacokinetic changes in the body. It helps the student to understand the basic concepts regarding, absorption, distribution, metabolism and excretion.

Objectives

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

a) Understand the formulation principles of various dosage forms
b) Understand the basic principles of stability, storage and administration of various dosage forms
c) Learn above novel drug delivery systems
d) Understand various pharmacokinetic pathways and optimize the drug therapy.
e) Understand Pro Drugs concept.

Course duration:

Learning

40 hours of learning by blended teaching. Blending teaching includes didactic and onsite learning.

Assignments

Each student should complete two assignments covering Pharmaceutical Dosage forms and Pharmacokinetic concepts

Text Books

a. Cooper and Gunns Dispensing for pharmacy students.
b. A text book Professional Pharmacy by N. K. Jain and S. N. Sharma.
c. D.M. Brahmankar and Sunil B Jaiswal. Text Book of Biopharmaceutics and Pharmacokinetics – A treatise. Vallabh Prakashan, Delhi.

Reference Books

a) Introduction to Pharmaceutical dosage forms by Howard C. Ansel.
b) Remington's Pharmaceutical Sciences

Lecture wise program and detailed syllabus

1. Introduction to Pharmaceutical Dosage Forms - 1 hr
2. Basics of GMP, GLP, QA, QC - 1 hr

3. Study the following about all dosage forms : - 15 hrs
   a. Need, advantage, disadvantages
   b. Brief of various ingredients used and need for these, basic properties of inactives. Basic overview of manufacturing without going into details.
   c. Storage, packaging requirements
   d. Possible stability and defects issues
   e. Proper use, special precautions while using, instructions to patients
   f. Bioavailability/biopharmaceutics aspects
4. Introduction to Novel drug delivery systems, instructions to be given to patients – Transdermal, infusion pumps, genetically engineered medicines, etc. - 6 hrs
5. Introduction to Bio-Pharmaceutics - 1 hr
6. Absorption of drugs - 3 hrs
   a) Introduction to absorption, structure and physiology of cell membrane
   b) Factors affecting drug absorption, Absorption of drugs from extra vascular routes.
7. Distribution of Drugs - 2 hrs
   a) Tissue permeability of drugs, Physiological barriers to drug distribution.
   b) Factors affecting drug distribution.
   c) Volume of drug distribution, Drug protein, drug tissue binding.
8. Biotransformation of drugs - 3 hrs
   a) Drug metabolizing organs and Enzymes
   b) Phase I reactions, Phase II reactions
   c) Factors affecting biotransformation of the drugs
9. Excretion of drugs - 1 hour
   Renal excretion of drugs, Factors affecting the renal filtration,
   Non renal routes of drug excretion
10. Prodrugs - 1 hour
    a) Definition and applications of prodrugs
11. Bioavailability and Bioequivalence - 4 hours
    a) Definition of bioavailability and bioequivalence
    b) Factors affecting bioavailability.
    c) Importance of BA, BE, BA Classification system, NTI drugs, care to be taken in prescribing and dispensing of such drugs

Assignments

Each student should complete two assignments covering therapeutics and pharmacy practice concepts and will be evaluated at the time Final Examination

1.6 Social Pharmacy – I

Scope:

Practicing pharmacists have opportunity to provide various patient care services to improve the patient's health in the society. By monitoring the health of the individuals, providing them education about health, precautions, and pharmacists can improve their professional image.

Objectives:

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

a) Understand the social responsibility of the pharmacists in the society
b) Understand the health policies
c) Provide health care services to patients.

Course duration:

Learning

40 hours of learning by blending method. Blending method includes didactic and onsite learning.

Assignments

Each student should complete **two assignments** covering therapeutics and pharmacy practice concepts

Detailed syllabus and topics

1.Introduction to Social Pharmacy –

a) Definition and Scope - Introduction to Social Pharmacy as a discipline and its various concepts. Sociological Understanding of Health and Illness, Role of Pharmacist in Public Health

b) WHO Definition of health – various dimensions of health - **1hr**

c) Introduction and broad overview of health systems, infrastructure, and functioning in India and other countries – both in Public and private sector. National health programmes in India – brief study of these and the role of pharmacist in each of these. - **1 hr**

- **5 hrs**

2. Drugs, Industry & Policies - **7 hrs**

a. Drugs and developed countries, developing countries, GATT, patents, Patents Act.

b. Pharmaceutical Industry and its activities, Classification systems of drugs, Social marketing – brief study of organizations and functioning like Medicines Sans Frontiers

c. Concept of RUM, WHO Essential Medicines, Irrational medicine use and its associated problems, etc., Evidence based medicine, STGs (Standard Treatment Guidelines)

d. National Drug Policy, National Health Policy, Pharmacy & Drug Ethics –

3. Pharmacoeconomics – Definition, types of pharmacoeconomic models, consumption of drugs, pharmaceutical pricing and reimbursement, Health Insurance - **3 hrs**

4. Pharmacoepidemiology – Definition, scope, advantages and disadvantages. - **3 hrs**

5.Health Promotion and Health education - **20 hrs**

a) Epidemiology of Communicable Diseases : Causative agents and Clinical presentations and Role of Pharmacist in prevention of communicable diseases :

(i) Respiratory infections – chickenpox, measles, rubella, mumps, influenza (including Avian-Flu, H1N1), diphtheria, whooping cough, meningococcal meningitis, acute respiratory infections, tuberculosis

(ii) Intestinal infections – poliomyelitis, viral hepatitis, cholera, acute diarrhoeal diseases, typhoid, food poisoning, amebiasis, worm infestations

(iii) Arthropod-borne infections - dengue, malaria, filariasis and, chikungunya

(iv) Zoonoses – rabies, yellow fever, Japanese encephalitis, plague, human salmonellosis, ricketsial diseases, taeniasis, hydatid disease, leishmaniasis

(v) Surface infections – trachoma, tetanus, leprosy, STDs, HIV/AIDS

(vi) Emerging and reemerging infectious diseases.

Text books (Theory)

1. *Social Pharmacy – Innovation and development edt, Geoff Harding, Sarah Nettleton and Kevin taylor. The Pharmaceutical Press.*
2. **Text Book of Community Pharmacy Practice. RPSGB Publication**

2nd Year

2.1 Pathophysiology and Pharmacotherapeutics III

Scope:

Practicing pharmacists will have opportunity to review the case notes or prescriptions in their practice setting and able to identify and resolve the drug related problems. This will ensure the improved patient care and decreases the unnecessary health care expenditure.

Objectives:

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

(a) Understand the anatomy and physiology of the respective system
(b) Understand the disease process
(c) Know the signs and symptoms of the disease.
(d) Appreciate the various therapeutic regimens with their advantages and disadvantages

Course duration:

Learning

40 hours of learning by blended teaching. Blended teaching includes didactic and onsite learning.

Case Presentations

During the course each student should present 5 cases covering the diseases prescribed in the syllabus.

Assignments

Each student should complete two assignments covering therapeutics and pharmacy practice concepts and will be evaluated at the time Final Examination.

Detailed syllabus and Lecture wise schedules

1. Infectious diseases: - **25 Hours**

(a) Guidelines for the rational use of antibiotics and surgical Prophylaxis.

(b) Pathophysiology and Pharmacotherapeutics of Tuberculosis, Meningitis, Respiratory tract infections, Gastroenteritis, Endocarditis, Septicemia, Urinary tract infections, Protozoal infection-Malaria, HIV & Opportunistic infections, Fungal infections, Viral infections, Gonarrhoea and Syphillis

2. Musculoskeletal disorders - **08 Hrs**

(a) Basics of Anatomy and physiology of musculoskeletal system.

(b) Pathophysiology and Pharmacotherapeutics of Rheumatoid arthritis, Osteoarthritis, Gout, Spondylitis, Systemic Lupus Erythematosus

3 Renal system - **07 Hrs**

a) Basics of anatomy and physiology of Renal system

b) Pathophysiology and pharmacotherapeutics of Acute Renal Failure, Chronic Renal Failure, Renal Dialysis, Drug induced renal disorders

Books and references

Suggested topics for assignment.

2.2. Pathophysiology and Pharmacotherapeutics IV :

Scope:

Practicing pharmacists will have opportunity to review the case notes or prescriptions in their practice setting and able to identify and resolve the drug related problems. This will ensure the improved patient care and decreases the unnecessary health care expenditure.

Objectives:

Upon completion of the course, the student will be able to :

a) Understand the anatomy and physiology of the respective system
b) Understand the disease process
c) Know the signs and symptoms of the disease.
d) Appreciate the various therapeutic regimens with their advantages and disadvantages

Course duration:

Learning

40 hours of learning by blended teaching . Blended teaching includes didactic and onsite learning.

Case Presentations

During the course each student should present 5 cases covering the diseases prescribed in the syllabus.

Assignments

Each student should complete two assignments covering therapeutics and pharmacy practice concepts and will be evaluated at the time Final Examination.

Detailed Syllabus and Lecture Wise Program

1. Oncology: - **15 Hrs**

Basic principles of Cancer therapy,
General introduction to cancer chemotherapeutic agents,
Chemotherapy of breast cancer, leukemia.
Management of chemotherapy induced nausea and emesis

2. Dermatology: - **7 Hrs**

(a) Pathophysiology and Pharmacotherapeutics of Psoriasis, Scabies, Eczema, Impetigo

3. Women's Health - **10 Hrs**

(a) Physiology of Menstrual Cycle
(b) Contraception – Physical Methods, Chemical Methods, IUDs, and Permanent methods.
(c) Disorders related to Menstrual Cycle – Polycystic ovary Syndrome, Dysmenorrhea, Premenstrual Syndrome.
(d) Obstetric Drug Therapy – Trimesters of Pregnancy, Common complaints of Pregnancy and their management – nausea, vomiting, reflex esophagitis, Diabetes mellitus, Hypertension and Preeclampsia, FDA Categorisation of drugs in Pregnancy
(e) Menopause – signs and symptoms and Management

4. Elements of anatomy and Physiology of Vision Etiopathogenesis, diagnostic techniques, clinical manifestations and pharmacotherapeutics of diseases associated with Eye such as

(a) Glaucoma
(b) Infectious ophthalmic diseases

Books and references - 3hrs
Suggested topics for assignment

2.3. Pharmacy Practice III

Scope:

Practicing pharmacists have opportunity to provide various patient care services to improve the patient's health in community settings through counseling, health screening services, and other education programs. In hospital settings, pharmacists can ensure appropriate dispensing, education to patient, and providing all hospital pharmacy services including clinical pharmacy services such as drug information and Pharmacovigilance.

Objectives:

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

a. Understand the professional roles of pharmacists in community, hospital and clinical pharmacy areas.
b. Understand the professional responsibilities of the pharmacists.
c. Provide the intended services.

Course duration:

Learning

40 hours of learning by blending teaching. Blending teaching includes didactic and onsite learning.

Assignments

Each student should complete two assignments covering therapeutics and pharmacy practice concepts and will be evaluated at the time Final Examination.

Detailed syllabus and Lecture wise program

1. **Drugs and Poison Information**
   (a) Introduction to drug information resources available - 06 hrs
   (b) Systematic approach in answering DI queries
   (c) Critical evaluation of drug information and literature
   (d) Preparation of written and verbal reports
   (e) Establishing a Drug Information Centre
   f) Poisons information- organization & information resources
   (g) Drug Information Bulletin

2. **Pharmacovigilance**
   (a) Scope, definition and aims of Pharmacovigilance - 05 hrs
   (b) Adverse drug reactions - Classification, mechanism, predisposing factors, causality assessment [different scales used]
   (c) Reporting, evaluation, monitoring, preventing & management of ADRs
   (d) Role of pharmacist in management of ADR.

3. **Medication Errors** - classification, consequences, prevention, and role of Pharmacist. Dispensing errors, and ways to minimize them. 03 hrs

4. Medication adherence - Consequences on non-adherence, role of pharmacist methods to improve adherence, compliance aids - 03 hrs

5. Communication skills – verbal, written, Body language - 03 hrs

6. OTC medications – definition, need, and role of Pharmacist. OTC medications in India, counseling for OTC products. Self medication and role of pharmacist in promoting safe self-medication.

7. Responding to symptoms/minor ailments - 02 hours

Relevant pathophysiology, common non-pharmacological and OTC drug therapy, and referral to doctor – in :Pain, GI disturbances (Nausea, Vomiting, Dyspepsia, diarrhea, constipation), Worm infestations, Pyrexia, Ophthalmic symptoms, URT infections, skin disorders, oral and dental disorders. - 10 hrs

8. Hospital supplies –

a. Surgical items/supplies – catheters, syringes & needles, I.v. sets, Ryle's tubes, Study of Wound management, stoma and incontinence products, Surgical dressing like cotton, gauze, bandages and adhesive tapes, - 7 hrs

b. sutures, ligatures,

c. patient care equipment – nebulizers, thermometers, .

9. Veterinary Pharmacy – introduction and Role of pharmacist in procurement and distribution of veterinary medicines

Books and references - 4 hrs

Suggested topics for assignments

2.4. Pharmacy Practice IV

Scope:

Practicing pharmacists have opportunity to provide various patient care services to improve the patient's health in community settings through counseling, health screening services, and other education programs. In hospital settings, pharmacists can ensure appropriate dispensing, education to patient, and providing all hospital pharmacy services including clinical pharmacy services such as drug information and Pharmacovigilance.

Objectives:

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

a) Understand the professional roles of pharmacists in community, hospital and clinical pharmacy areas.
b) Understand the professional responsibilities of the pharmacists.
c) Provide the intended services.

Course duration:

Learning

40 hours of learning by blending method. Blending method includes didactic and onsite learning.

Assignments

Each student should complete two assignments covering therapeutics and pharmacy practice concepts and will be evaluated at the time Final Examination.

Detailed syllabus and lecture wise program

1. Health Accessories - 05 Hrs

Study and handling of various common health accessories handled in hospital and community pharmacy. Student should have working knowledge, uses and cautions in using these. (Wheel Chairs, Canes, Crutches, and other orthopedic aids, Bed Pans, Vaporizers, Syringes and Needles, Hot water Bottles, Clinical Thermometers, Trusses, First Aid Supplies, Family Medicine Cabinet, etc.

2. Medical gases – different gases and their use, coding and care of cylinders, delivery of gases to various parts of hospital, domiciliary oxygen services, and role of pharmacist

3. I.V admixure services and role of Pharmacist - 3 hrs

4. Total Parenteral Nutrition – Definition, composition and clinical use of TPN 2 hrs - 3 hrs

5. Clinical Reseach - 12 hrs

Introduction to Clinical trials
Various phases of clinical trial.
Methods of post marketing surveillance
Abbreviated New Drug Application submission
Good Clinical Practice – ICH, GCP,
- Central drug standard control organisation (CDSCO) guidelines, Schedule Y
-Composition, responsibilities, procedures of IRB / IEC
Role and responsibilities of clinical trial personnel as per ICH GC

a. Sponsor
b. Investigators
c. Clinical research associate
d. Auditors
e. Contract research coordinators
f. Regulatory authority

Designing of clinical study documents (protocol, CRF, ICF, PIC with assignment)
Informed consent Process

6. Introduction to Biostatistics

7. Research in pharmacy practice areas. - 3hrs

8. Continuing education for pharmacists - 1 hr

9. Compunding of Pharmaceuticals in the hospital/community pharmacy. Weights and measures, calculations involving percentage solutions, allegation, proof spirit, Isotonic solutions. Bulk compounding in hospitals, pre-packaging. - 3Hr

10. Manufacturing of Pharmaceutical Formulations in hospital – various aspects, current status - 03 hrs

11. Radiopharmaceuticals – Handling and Packaging, clinical usage, and role of pharmacist - 02 hrs

12. Applications of IT and computers in pharmacy practice - 2 hrs

13. Provision of cytotoxic chemotherapy, and various considerations/handling. Handling of cytotoxic waste and disposal.
Pharmaceutical (Medicines and allied products) waste management in hospitals, community pharmacy, and the community and the role of the pharmacist.

14. Medical Devices & I.V. pumps - 3Hr

15. Individualised medicines, Gene therapy, Genomics & proteomics, Biochips, biosensors and MEMS micro electro mechanical systems - 2 Hr

2.5. Pharmaceutical Jurisprudence

Scope:

A profession becomes successful when it is guided with suitable laws. This course describes about the Pharmacy Act, Drugs and Cosmetics Act, Dangerous drugs act, Medicinal and Toilet preparation act, DPCO and Professional ethics.

Course Objectives:

Upon completion of the course the student shall be able to

1. Understand various concepts of the pharmaceutical legislation in India
2. Know various rules drafted in Drug and Cosmetic Act, Pharmacy Act, NDPS Acts, relevant to pharmacy practice.
3. Know the Consumer Protection Act, PFA Act, DPCO,.
4. Understand the labeling requirements and packaging guidelines for drugs and cosmetics

Course duration:

Learning

40 hours of learning by blended teaching. Blended teaching method includes didactic and onsite learning.

Assignments

Each student should complete two assignments covering therapeutics and pharmacy practice concepts and will be evaluated at the time Final Examination.

Detailed syllabus and Lecture wise Program

1. A brief review of Pharmaceutical legislations. **01 hr**

A Study of various pharmaceutical and related legislations with more emphasis on aspects relevant to community & hospital pharmacy practice in India. Study the aspects only from practical angle, with examples, case studies, etc.:

2. Drugs and Cosmetics Act-1940 and Rules 1945 **15 hrs**

- Duties & Responsibilities of Drug Inspectors, other officers, and obligations of the pharmacy to them
- Brief about DTAB, DCC, Drug testing laboratories
- Various drug licences for retail pharmacy, requirements to start a pharmacy/medical store, application forms, issue of licence, display of licences, duration of licences, laws related to stocking, handling and sale of drugs and devices
- Various schedules under the Act & Rule – study in brief –those relevant to pharmacy practice
- Labelling requirements of drugs – various aspects
- Spurious, misbranded, adulterated, counterfeit drugs – various aspects related to this, how to recognize, role of the pharmacist
- Import of drugs for personal use
- Various documents to be maintained under the Act & Rules by a pharmacy
- Storage requirements, handling expired goods
- Various punishments under the Act
- Practical study of Prescription and non-prescription drugs, market samples, examine for labeling, etc.

- Laws relating to various traditional systems/ medicines approved in India
- Banning of drugs

3. **Pharmacy Act – 1948**
4. **Medicinal and Toilet Preparation Act-1955** - 03 hrs
5. **Narcotic Drugs and Psychotropic Substances Act – 1985** - 04 hrs
6. **Drugs and Magic Remedies (Objectionable Advertisements) Act and Rules, 1954** - 04 hrs
7. **Essential Commodities Act** - 02 hrs
8. **Drugs Prices Control Order** - 02 hrs
9. **Prevention of Cruelty to Animals Act, 1960** - 02hrs.
10. Consumer Protection Act , 1986 - 02 hrs
11. Prevention of Food Adulteration Act & Rules, laws relating to Dietary Supplements, Food supplements, etc - 02 hrs
12. The Infant Milk Substitutes, Feeding Bottles and Infant Foods (Regulation of Production, Supply and Distribution) Amendment Act, 2003 - 02 Hrs

Books and references

2.6. Social Pharmacy II

Scope:

Practicing pharmacists have opportunity to provide various patient care services to improve the patient's health in the society. By monitoring the health of the individuals, providing them education about health, precautions, and pharmacists can improve their professional image.

Objectives:

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

a. Understand the social responsibility of the pharmacists in the society
b. Provide professional services to the patients.

Course duration:

Learning

40 hours of learning by blending method. Blending method includes didactic and onsite learning.

Assignments

Each student should complete two assignments covering therapeutics and pharmacy practice concepts and will be evaluated at the time Final Examination.

Syllabus and lecture wise programme

A. **Preventive care:**

1. Vaccines, and immunizations – and Role of Pharmacist - 2 hours
2. Role of Pharmacist in Demography & Family Planning - 2 hours
3. Mother and child health, importance of breastfeeding, ill effects of formula foods and bottle feeding, and role of Pharmacist - 4 hours
4. Geriatrics and role of Pharmacist - 1 hour
5. Effect of Environment on Health & Role of Pharmacist – Water pollution, safe supply of water, - 1 hour

6. Occupational diseases/illnesses and Role of Pharmacist - 1 hours
7. Mental Health and role of Pharmacist - 1 hours
8. Psychosocial Pharmacy : Drugs of misuse and abuse – psychotropic and narcotics, and other pharmaceuticals and chemicals, tobacco and tobacco products, alcohol. Social & psychosocial impact of these, role of pharmacist in reducing, preventing the menace.

   Tobacco cessation and role of pharmacist - 3 Hr
9. Palliative/terminal care and role of pharmacist in handling psychosocial issues - 3Hr
10. Care for disabled and role of pharmacist in handling psychosocial issues - 2 Hr
11. Early intervention in hereditary diaseses, screening tests - 1 hour

B. Nutrition and health : - 20 Hr

1. Basics of nutrition – Macronutrients and Micronutrients, fibre – importance, sources (Plant and animal origin),
2. Calorific and nutritive values of various foods
3. Daily/recommended dietary allowance and functions of each. Balanced diets – for various individual groups. Nutrition deficiency diseases
4. Food as a medicine. Brief study of various concepts of Naturopathy.
5. Nutrition as per Ayurveda – Ayurvedic outlook to diets – as per prakruti, seasons, seasonal availability of foods, etc. Prakruti study in brief.
6. Wrong/improper foods and food habits, causes of various disease conditions, ill effects of wrong foods/fast foods, timed foods, etc – Western foods as well as Indian foods – reasons for wrong effects on body.
7. Basics of genetically modified foods – advantages, disadvantages
8. Effects of environment on foods, artificial ripening, hybridization, use of pesticides, adulteration, etc.
9. Nutrition/dietary recommendation for different disease conditions – e.g. diabetes, blood pressure, Hyperlipidemia, arthritis, renal disease, liver disease, allergies, etc.
10. Artificial sweeteners, zero calorie concept, glycemic index of foods
11. Dietary supplements, neutraceuticals, food supplements – legal standing, indications, rational use, benefits, ADRs, Drug Interactions, pharmacoeconomics.

C. First Aid Services in Community Pharmacy - 10 hours

RECOMMENDED BOOKS

1. Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone Publication
2. Pharmacotherapy: A Pathophysiologic Approach - Joseph T. Dipiro et al. Appleton & Lange
3. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
4. Applied Therapeutics: The Clinical Use of Drugs. Lloyd Young and Koda-Kimble MAJ
5. Text Book of Hospital Pharmacy by Quadry and Merchant.
6. Text Book of Clinical Pharmacy Practice. Edt. G. Parthasarathi, Karin Nyfort Hansen and Milap. C.Nahata. Orient Longman Publications.
7. Text Book of Community Pharmacy Practice. RPSGB Publication.
8. Community Pharmacy Handbook- Jonathan Waterfield
9. Community Pharmacy: Symptoms, Diagnosis and Treatement: Paul Rutter

10. Minor Illness in Major Diseases-the Clinical Manifestation in the Community: Paul Stillman

11. Sociology for Pharmacist: Tayler, Nettleton, Harding

12. Pharmacy Practice: Tayler, Harding

13. Social Pharmacy: Tayler, Geoffery

14. Stockley's Drugs Interaction: Karen Baxter

15. Cooper and Gunn : Dispensing for Pharmacy Students.

16. A text book Professional Pharmacy by N. K. Jain and S. N. Sharma.

17. Introduction to Pharmaceutical dosage forms by Howard C. Ansel.

18. Remington's Pharmaceutical Sciences

19. D.M. Brahmankar and Sunil B Jaiswal. Text Book of Biopharmaceutics and Pharmacokinetics – A treatise. Vallabh Prakashan. Delhi.

20. Biopharmaceutics by Swarbrik

21. Bio pharmaceutics and Clinical Pharmacokinetics by Milo Gibaldi.

22. Mithal , B M. Textbook of Forensic Pharmacy. Calcutta : National; 1988.

23. Singh, KK, Editor. Beotra's the Laws of Drugs, Medicines & Cosmetics. Allahabad: Law Book House; 1984.

24. Jain, NK. A Textbook of Forensic Pharmacy. Delhi: Vallabh Prakashan ; 1995.

25. Reports of the Pharmaceutical Enquiry Committee

26. I.D.M.A., Mumbai. DPCO 1995

27. Various Reports of Amendments,

28. Deshapande, S.W. The Drugs and Magic Remedies Act, 1954 and Rules 1955. Mumbai: Susmit Publications; 1998.

29. Eastern Book Company.The Narcotic and Psychotropic Substances Act, 1985, Lucknow: Eastern; 1987.

30. Drug Information About Commonly Used Drugs: P.P.Sharma, R.Sing

ARCHNA MUDGAL, Registrar-cum-Secy.

[ADVT. III/4/Exty./101/14]

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9. Course of study

The course of study for B. Pharm shall include Semester Wise Theory & Practical as given in Table – I to VIII. The number of hours to be devoted to each theory, tutorial and practical course in any semester shall not be less than that shown in Table – I to VIII.

Table-I: Course of study for semester I

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP101T	Human Anatomy and Physiology I– Theory	3	1	4
BP102T	Pharmaceutical Analysis I – Theory	3	1	4
BP103T	Pharmaceutics I– Theory	3	1	4
BP104T	Pharmaceutical Inorganic Chemistry– Theory	3	1	4
BP105T	Communication skills – Theory *	2	-	2
BP106RBT BP106RMT	Remedial Biology/ Remedial Mathematics – Theory*	2	-	2
BP107P	Human Anatomy and Physiology – Practical	4	-	2
BP108P	Pharmaceutical Analysis I – Practical	4	-	2
BP109P	Pharmaceutics I– Practical	4	-	2
BP110P	Pharmaceutical Inorganic Chemistry – Practical	4	-	2
BP111P	Communication skills – Practical*	2	-	1
BP112RBP	Remedial Biology – Practical*	2	-	1
	Total	**32/34$^{\$}$/36$^{\#}$**	**4**	**27/29$^{\$}$/30$^{\#}$**

$^{\#}$Applicable ONLY for the students who have studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB)course.

$^{\$}$Applicable ONLY for the students who have studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM)course.

* Non University Examination(NUE)

Table-II: Course of study for semester II

Course Code	Name of the course	No. of hours	Tutorial	Credit points
BP201T	Human Anatomy and Physiology II – Theory	3	1	4
BP202T	Pharmaceutical Organic Chemistry I – Theory	3	1	4
BP203T	Biochemistry – Theory	3	1	4
BP204T	Pathophysiology – Theory	3	1	4
BP205T	Computer Applications in Pharmacy – Theory *	3	-	3
BP206T	Environmental sciences – Theory *	3	-	3
BP207P	Human Anatomy and Physiology II –Practical	4	-	2
BP208P	Pharmaceutical Organic Chemistry I– Practical	4	-	2
BP209P	Biochemistry – Practical	4	-	2
BP210P	Computer Applications in Pharmacy – Practical*	2	-	1
	Total	**32**	**4**	**29**

*Non University Examination (NUE)

Table-III: Course of study for semester III

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

Table-IV: Course of study for semester IV

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP401T	Pharmaceutical Organic Chemistry III– Theory	3	1	4
BP402T	Medicinal Chemistry I – Theory	3	1	4
BP403T	Physical Pharmaceutics II – Theory	3	1	4
BP404T	Pharmacology I – Theory	3	1	4
BP405T	Pharmacognosy and Phytochemistry I– Theory	3	1	4
BP406P	Medicinal Chemistry I – Practical	4	-	2
BP407P	Physical Pharmaceutics II – Practical	4		2
BP408P	Pharmacology I – Practical	4	-	2
BP409P	Pharmacognosy and Phytochemistry I – Practical	4	-	2
	Total	**31**	**5**	**28**

Table-V: Course of study for semester V

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP501T	Medicinal Chemistry II – Theory	3	1	4
BP502T	Industrial PharmacyI– Theory	3	1	4
BP503T	Pharmacology II – Theory	3	1	4
BP504T	Pharmacognosy and Phytochemistry II– Theory	3	1	4
BP505T	Pharmaceutical Jurisprudence – Theory	3	1	4
BP506P	Industrial PharmacyI – Practical	4	-	2
BP507P	Pharmacology II – Practical	4	-	2
BP508P	Pharmacognosy and Phytochemistry II – Practical	4	-	2
	Total	**27**	**5**	**26**

Table-VI: Course of study for semester VI

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP601T	Medicinal Chemistry III – Theory	3	1	4
BP602T	Pharmacology III – Theory	3	1	4
BP603T	Herbal Drug Technology – Theory	3	1	4
BP604T	Biopharmaceutics and Pharmacokinetics – Theory	3	1	4
BP605T	Pharmaceutical Biotechnology – Theory	3	1	4
BP606T	Quality Assurance –Theory	3	1	4
BP607P	Medicinal chemistry III – Practical	4	-	2
BP608P	Pharmacology III – Practical	4	-	2
BP609P	Herbal Drug Technology – Practical	4	-	2
	Total	30	6	30

Table-VII: Course of study for semester VII

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP701T	Instrumental Methods of Analysis – Theory	3	1	4
BP702T	Industrial PharmacyII – Theory	3	1	4
BP703T	Pharmacy Practice – Theory	3	1	4
BP704T	Novel Drug Delivery System – Theory	3	1	4
BP705P	Instrumental Methods of Analysis – Practical	4	-	2
BP706PS	Practice School*	12	-	6
	Total	28	5	24

* Non University Examination(NUE)

Table-VIII: Course of study for semester VIII

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

Table-IX: Semester wise credits distribution

Semester	Credit Points
I	27/29^{S}/30$^{\#}$
II	29
III	26
IV	28
V	26
VI	26
VII	24
VIII	22
Extracurricular/ Co curricular activities	01*
Total credit points for the program	**209/211^{S}/212$^{\#}$**

* 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.

^{S}Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics course.

$^{\#}$Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology course.

OFFICE OF THE REGISTRAR

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)

Ref. No.: MU/RO/2017/ 623-C **02 June, 2017**

OFFICE ORDER

Sub.: Constitution of Board of Studies for Department of Physics

The Board of Studies for the Department of Physics is reconstituted as per Rule 12 of the Statutes of Mewar University, as under:

1) Prof. (Dr.) R. K. Paliwal, Dean, Faculty of Science & Technology - Chairman
2) Dr. S.C. Tiwari, Associate Professor, M L V Govt. College, Bhilwara - External Member
3) Ms. Pooja Bathra, Assistant Professor - Internal Member
4) Mr. Pramod Mehta, Assistant Professor - Internal Member
5) Mr. Deepak Suthar - Alumni
6) Dr. Gulzar Ahmed, Head & Assistant Professor - Convener

The terms of reference for the Board of Studies are as provided in Rule 12 of the Statutes.

The Chairman of the Board of Studies may associate any member in the meeting, as special invitee if it is considered his association will contribute in the task of the meeting with the approval of the President/Vice Chancellor.

The Convener of the Meeting is advised to hold the meeting of the BOS seeking convenience of the Chairman in the month of June 2017. The proceedings of the meeting may be sent to the VC/Registrar as early as possible.

The External Members shall be entitled for TA/DA and sitting fees as per the norms prescribed by the Mewar University.

Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:

- PS to Hon'ble Chairperson (for kind information)
- PS to Hon'ble President (for kind information)
- PS to Hon'ble Pro-President (for kind information)
- All concerned Deans/Directors/HoD's (for kind information & necessary action)
- Accounts/Examination/Library/Store/Warden/Security/IT Head.
- Coordinator, IQAC Cell.
- Record file.

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)

DEPARTMENT OF PHYSICS

DATE: 27.06.2017

Minutes of Meeting of Board of Studies

The Board of Studies Meeting of the Department of Physics, Faculty of Science and Technology was held on 27th June 2017 in Room No. ,135 at 10:00 am onwards to approve the new curriculum and Syllabus for session 2017-18.

The following members were present: **(Annexure 1)**

1) Prof. (Dr.) R. K. Paliwal, Dean, Faculty of Science & Technology - Chairman
2) Dr. S.C. Tiwari, Associate Professor, M L V Govt. College, Bhilwara - External Member
3) Ms. Pooja Bathra, Assistant Professor - Internal Member
4) Mr. Pramod Mehta, Assistant Professor - Internal Member
5) Mr. Deepak Suthar - Alumni
6) Dr. Gulzar Ahmed, Head & Assistant Professor - Convener

Dr. Gulzar Ahmed, (Convener) warmly welcomed all the board members. The Head also appreciated the presence of outside experts. The following discuissns were taken in the meeting:

Agenda 1: Brief presentation of academic activities of the department before the BOS Committee by the convener

Resolution: Dr. Gulzar Ahmed, (Head, Physics Department) presented a departmental activity report mentioning all the activities conducted related to curricular development, research development, faculty development and Industrial collaboration.

Agenda 2: Review and Approval of Existing Programmes/Courses

Resolution: Resolved to request the Board of Studies consider to review and approve the scheme and syllabus of the M.Sc. Physics Programme.

Agenda 3: To recommend the approved syllabus to Academic Council

Resolution: Members of the Board of Studies approved the proposed syllabus and recommended the same be forwarded to the Academic Council for their approval.

The meeting was dissolved with thanks to the Chair and all the Board of Studies Members.

Mewar University, Chittorgarh

Scheme for M.Sc.: Physics

Effective from Year: 2019-20

PG-Course

M. SC. – I SEMESTER

S.No.	Code-M	COURSE OPTED	COURSE NAME	Credits	Internal Sessional Marks	End Term Theory Exam	Total Marks
1	MSPHY-101	Core course-I	Mathematical Methods In Physics	4	40	60	100
2	MSPHY-102	Core course-II	Classical Mechanics	4	40	60	100
3	MSPHY-103	Core course-III	Quantum Mechanics – I	4	40	60	100
4	MSPHY-104	Core course-IV	Electronics	4	40	60	100
5	MSPHY-105	Core course-V	Electrodynamics	4	40	60	100
6	MSPHY-106	Core Course- Practical	Electronics Lab	4	40	60	100
7	MSPHY-107	Skill Course	Skill Course	2	-	50	50
			Total	26	240	410	650

Dr. A. Ahmed

M. SC.- II SEMESTER

S.No.	Code-M	COURSE OPTED	COURSE NAME	Credits	Internal Sessional Marks	End Term Theory Exam	Total Marks
1	MSPHY-201	Core course-VI	Computational Methods in Physics	4	40	60	100
2	MSPHY-202	Core course-VII	Quantum Mechanics - II	4	40	60	100
3	MSPHY-203	Core course-VIII	Quantum Electrodynamics and Plasma Physics	4	40	60	100
4	MSPHY-204	Core course-IX	Statistical Mechanics	4	40	60	100
5	MSPHY-205	Core course-X	Atomic And Molecular Physics	4	40	60	100
6	MSPHY-206	Core Course- Practical	General Physics Lab	4	40	60	100
7	MSPHY-207	Core Course- Practical	Computational Physics Lab	2	-	50	50
			Total	**26**	**240**	**410**	**650**

Dr. G. Ahmad

M. SC. - III SEMESTER

S.No.	Code-M	COURSE OPTED	COURSE NAME	Credits	Internal Sessional Marks	End Term Theory Exam	Total Marks
1	MSPHY-301	Core course-XI	Solid State Physics	4	40	60	100
2	MSPHY-302	Core course-XII	Nuclear and Particle Physics	4	40	60	100
3	MSPHY-303	Core course-III (RM)	Research Methodology	4	40	60	100
4	MSPHY-304	Discpline Elective Subjects – I	Discpline Elective Subjects – I	4	40	60	100
5	MSPHY-305	Discpline Elective Subjects – 2	Discipline Elective Subjects - II	4	40	60	100
6	MSPHY-306	Core Course-Practical/Paper	Discpline - Any one Practical / Tute/Paper/Project/Training*	4	40	60	100
7	MSPHY-307	Core Course- Practical	Solid State and Nuclear Physics Lab	4	40	60	100
			Total	28	280	420	700

Dr. G. Mund

M. SC. - IV SEMESTER

S.No.	Code-M	COURSE OPTED	COURSE NAME	Credits	Internal Sessional Marks	End Term Theory Exam	Total Marks
1	MSPHY-401	Discpline Elective Subjects – 3	Open Elective (Project Base paper/assignment)	4	40	60	100
2	MSPHY-402	Projects	(Research work)/Training**	16	150	250	400
			Total	20	190	310	500
			Grand Total	100	950	1550	2500

Dr. G. Ahmad

Internal Sessional Marks	**Assignments**	**Presentation/ Seminar**	**Teacher Assessment**
	15	15	10
Discpline Elective Subjects – I	Materials Science		
	Industrial Electronics		
	Nanoscience And Nanotechnology		
Discipline Elective Subjects - II	Condensed Matter Physics		
	Any other Specialization		
Discpline - Any one Practical / Tute/Paper/Project/Training*	Material Science/NanoTechnology and Condensed Matter Physics lab		
Open Elective (Project Base paper/assignment)	Advanced Materials And Experimental Techniques		

Dr G. Ahmad

OFFICE OF THE REGISTRAR

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)

Ref. No.: MU/RO/2017/594-B **27 May 2017**

OFFICE ORDER

Sub.: Reconstitution of Board of Studies for Department of Life Science

The Board of Studies for the Department of Life Science reconstituted as per Rule 12 of the Statutes of Mewar University, as under:

1) Prof. (Dr.) R. K. Paliwal, Dean, Faculty of Science & Technology - Chairman
2) Prof.(Dr). Anil Bhatnagar, Ex Joint Director, College of Education, Jaipur - External Member
3) Prof. (Dr.) B. L. Yadav, Professor - Internal Member
4) Ms. Nalini Tomer, Assistant Professor - Internal Member
5) Mr. Deepak Kumar Bairwa - Alumni
6) Prof. (Dr.) Chetan Kumar Sharma, Professor & Head - Convener

The terms of reference for the Board of Studies are as provided in Rule 12 of the Statutes.

The Chairman of the Board of Studies may associate any member in the meeting, as a special invitee if it is considered his association will contribute to the task of the meeting with the approval of the President/Vice-Chancellor.

The Convener of the Meeting is advised to hold the meeting of the BOS seeking the convenience of the Chairman in the second week of June 2017. The proceedings of the meeting may be sent to the VC/Registrar as early as possible.

The External Members shall be entitled to TA/DA and sitting fees as per the norms prescribed by Mewar University.

Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:

- PS to Hon'ble Chairperson (for kind information)
- PS to Hon'ble President (for kind information)
- PS to Hon'ble Pro-President (for kind information)
- All concerned Deans/Directors/HoDs (for kind information & necessary action)
- Accounts/Examination/Library/Store/Warden/Security/IT Head.
- Coordinator, IQAC Cell.
- Record file.

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)

DEPARTMENT OF LIFE SCIENCE

DATE: 13.06.2017

Minutes of Meeting of Board of Studies

Minutes of the BOS of the Department of Life Science meeting held on 13-06-2017 at 11.30 AM.

The following members were present: **(Annexure 1)**

1) Prof. (Dr.) R. K. Paliwal, Dean, Faculty of Science & Technology - Chairman
2) Prof.(Dr). Anil Bhatnagar, Ex Joint Director, College of Education, Jaipur - External Member
3) Prof. (Dr.) B. L. Yadav, Professor - Internal Member
4) Ms. Nalini Tomer, Assistant Professor - Internal Member
5) Mr. Deepak Kumar Bairwa - Alumni
6) Prof. (Dr.) Chetan Kumar Sharma, Professor & Head - Convener

At the outset, Prof. (Dr.) Chetan Kumar Sharma, Head of the Department of Life Science, warmly welcomed all the board members. The Head also appreciated the presence of outside experts who took the pain and keen interest to attend this meeting.

Agenda 1: To approve minutes of the previous BOS, held on 13-06-2016

Resolution: Minutes of the previous BOS of the Life Science department held on 13-06-2016 were discussed and approved.

Agenda 2: Brief presentation of academic activities of the department before the BOS Committee by the convener

Resolution: Prof. (Dr.) Chetan Kumar Sharma, (Head, Department of Life Science) presented a departmental activity report mentioning all the activities conducted related to curricular development, research and development, and faculty development.

Agenda 3: Review of Existing Programmes/ Courses

Resolution: The scheme and syllabus for courses B.Sc Biotechnology and B.Sc General (CBZ) were reviwed and discussed. From July 2017 approved course curriculum as discussed by the committee will be applied to the new batch of B.Sc Biotechnology and B.Sc General (CBZ).

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Agenda 4: Introduction of New Programmes/Course

Resolution:

1. M.Sc Environmental Science a new program will be started from the session 2017-18. A listing of practical and marks distribution (scheme of practical) should be done and appended with the syllabus. **(Annexure 2)**
2. As per the recommendation of the previous BOS committee, it has been decided to add four new courses related to Botany and Zoology to B.Sc (BCZ) General programme for the upcoming session 2017-18. The courses are mentioned below. **(Annexure 3)**
   - Plant Genetics
   - Plant Evolutionary Biology
   - Ornithology
   - Parasitology
3. As per the recommendation of the previous BOS committee, it has been decided to add three new courses to B.Sc (Honors) Biotechnology programme for the upcoming session 2017-18. The courses are mentioned below. **(Annexure 4)**
   - Industrial Biotechnology
   - Structural Biology
   - Environmental Biotechnology
4. As per the recommendation of the previous BOS committee, it has been decided to add three new courses in the M.Sc Botany programme from the upcoming session 2017-18. The courses are mentioned below. **(Annexure 5)**
   - Plant Biotechnology and Resource Utilization
   - Advanced Plant Systematics
   - Pathogens and Pests of Crop Plants
5. As per the recommendation of the previous BOS committee, it has been decided to add three new courses in the M.Sc Zoology programme from the upcoming session 2017-18. The courses are mentioned below. **(Annexure 6)**
   - Economic Zoology
   - Population Ecology
   - Aquarium Management

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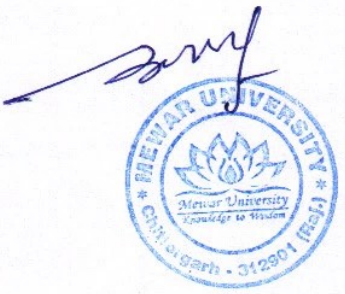
6. The suggestion received from the previous BOS committee, it is decided that three new courses were introduced in the M.Sc Biotechnology programme from in the upcoming session 2017-18. The courses are mentioned below. **(Annexure 7)**
    - Biomolecules
    - Enzyme and Reaction Kinetics
    - Medical Biotechnology and Gene Therapy

Agenda 5: To recommend the approved syllabus to Academic Council.

Resolution: Members of the Board of Studies approved the revised syllabus and recommended the same be forwarded to the Academic Council for their approval.

The meeting was dissolved with thanks to the Chair and all the Board of Studies Members.



MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)

DEPARTMENT OF LIFE SCIENCE

Annexure 1: Attendance Sheet

DATE: 13.06.2017

S.NO.	Name & Designation	Designation in BOS	Signature
1	Dean, Faculty of Science & Technology	Chairman	
2	Prof.(Dr). Anil Bhatnagar, Ex Joint Director, College of Education, Jaipur	External Member	
3	Dr. B. L. Yadav, Professor, Dept. of Botany	Internal Member	
4	Ms. Nalini Tomer, Assistant Professor	Internal Member	13/6/2017
5	Deepak Kumar Bairwa	Alumni	
6	Prof. (Dr.) Chetan Kumar Sharma, Head, Life Science	Convener	13/6/17

Department of Life Science
(Environmental Science)

Syllabus & Detailed Scheme

of

M.Sc. Environmental Science (2 years)

{2017-18}

Mewar University

Knowledge to Wisdom

DEPARTMENT OF LIFESCIENCE
(ENVIRONMENTAL SCIENCE)
FACULTY OF SCIENCE AND TECHNOLOGY
MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)

DEPARTMENT OF ENVIRONMENTAL SCIENCE
MEWAR UNIVERSITY, GANGRAR (CHITTORGARH)

M.Sc. I Semester

Session 2017-18 onwards

The examination shall consist of four theory papers and two practical

S. No.	Paper Code	CC/DSE/ SEC	Title	Credit
1	M1EVS-CT01	CC	Basic Concepts of Ecology and Environment	4
2	M1EVS-CT02	CC	Earth Processes and Natural Cycles	4
3	M1EVS-CT03	CC	Natural Resources and Their Conservation	4
4	M1EVS-CT04	CC	Environmental Pollution and Monitoring	4
5	M1EVS-CP01	CC	Core Practical-I	4
6	M1EVS-CP02	CC	Core Practical-II	4
	Total			**24**

Note:

CC - Core Course

M.Sc. Environmental Science

SEMESTER I

BASIC CONCEPTS OF ECOLOGY AND ENVIRONMENT

Unit I

Basic concept of ecology and Environment: components- Topographic, climatic, edaphic factors; Scope of ecology and its relations with other disciplines; Principles pertaining to ecosystem; ecosystem components: food chains, food web, ecological pyramids; Ecosystem energetics; energy budget and ecological efficiency; Processes of primary productivity, gross and net productivity; Homeostasis.

Unit II

Biogeochemical cycles in Environment- concepts and significance, Carbon, Nitrogen, Phosphorus, oxygen, hydrological, Sulphur cycle; Autecology and synecology- Basic principles; Concept of population growth and survivorship; population characteristics and dynamics; population growth forms and concept of carrying capacity; Population regulation K and R selection.

Unit III

Biotic community: concept and classification; community characteristics- Qualitative, Quantitative, phytosociological methods: quadrats, Transects & IVI; Ecotone concept, Ecological dominance and ecological niche; ecological succession, concept of climax and community stability; Biotic interactions, ecads; Ecological succession- types, causes and effects, climax community.

Unit IV

Aquatic ecosystems: Lantic and lotic- Physicochemical characteristics of fresh water environment, Biotic communities of pond and lakes, thermal stratification of lakes, conservation and management of fresh water habitats; Physicochemical characteristics of biotic communities Marine ecosystem of oceanic regions, coral reefs and mangroves estuarine ecology; Concepts of wetland ecosystem.

Unit V

Terrestrial Environment: Physicochemical characteristics; Biomes of the world- Forest, Grassland, Desert and Tundra, Role of ecotone in conservation and management of Biomes.

Recommended Books:

1. Basic ecology - E. P. Odum
2. Ecology and field biology - R.L. Smith
3. Ecology - P.D. Sharma
4. Fundamentals of ecology -E.P. Odum
5. Principles of ecology – Rickleff

M.Sc. Environmental Science

SEMESTER I

EARTH PROCESSES AND NATURAL CYCLES

Unit I

Evolution of atmosphere; Chemical composition and thermal stratification of present day atmosphere; Atmosphere and Earth radiation balance, Hydrological cycle.

Unit II

Elements of climate: temperature, pressure, wind, Altitude, latitude, longitude, Interrelationship between various elements of climate, properties of air masses, air circulation system in the tropic; Climate classification, World climate regimes; Climate types of India, Indian Monsoon; El Nino & La Nina; Climate control and distribution of plants and animals, Gaia hypothesis.

Unit III

Climate and habitable areas; climate and rural housing; climate and buildings; Micro climate and architectural design, modification of macro and micro climates with special reference to urban areas; Human body and heat balance; climate and human health.

Unit IV

Meteorology fundamentals– Pressure, temperature, wind, humidity, radiation, Emission and absorption of terrestrial radiation, radiation windows, Net Radiation Budget- thermodynamic diagram; thermal inversion process ; entropy and enthalpy, thermodynamics of dry and moist air and adiabatic processes; Application of meteorological principles to transport and diffusion of pollutants.

Unit V

Scavenging processes; Effects of meteorological parameters on pollutants and vice versa; Wind roses; Topographic effects; Preliminary concepts of climate change – global warming , sea level rise, ozone depletion, green house gases, smog, fog formation and dispersal.

Recommended Books:

1. Ecology - P.D. Sharma
2. Elements of Environmental Science – PK Gaur
3. Environmental Biology - Arvind Kumar

M.Sc. Environmental Science

SEMESTER I

NATURAL RESOURCES AND THEIR CONSERVATION

Unit-I

Natural Resources : Definition, Types & Classification, Concepts of Reserves & Resource availability, Environmental impacts of resource exploitation, Understanding Resource Ecology & life supporting capacity of Natural Resources- Economic models: Green Building concept & Green technology concept, Natural Resource Management.

Unit-II

Definition of Energy-Types & units; Energy production and consumption pattern of world & India; Renewable and Non renewable Energy Resources, Principles of generation of Hydro electric power, Tidal power, Thermal energy conversion, wind and geothermal energy, Solar energy- Solar collectors, Photovoltaics, Solar ponds & Solar equipments- Heaters, driers, cookers; Harnessing Solar energy, solar electricity generation; Impact of large scale exploitation of solar, wind, hydro and ocean energy, Energy conservation policies.

Unit-III

Non-renewable energy resources: Fossil fuel classification, composition and physico-chemical characteristics; energy content of petroleum and natural gas -formation, reserves, exploration/ Mining and uses of Coal.

Unit-IV

Bio energy: Biomass, Biogas, Refuse, Organic residues; Biomass fuel types- Solid, liquid and gaseous fuels, Availability of Biomass fuels in India; Biogas production and uses; Conversion processes– pyrolysis, charcoal production, compression, gasification and liquefaction; Anaerobic digestion; Energy weeds.

Unit-V

Mineral resources- origin, distribution and uses of economic minerals; Impact of mineral exploitation on environment, conservation of mineral resources; Forest Resource Management: distribution, wood Production, forest land-use changes in India, future demand of forests, carbon sequestrations; Nuclear energy resources-fission and fusion, nuclear fuel types, sustainable use.

Recommended Books:

1. Ecology and Environmental Biology- Saha
2. Environmental Biology- Mike Calver, Alan Lymbery, Jennifer McComb and Mike
3. Ecology- P.D. Sharma

M.Sc. Environmental Science

SEMESTER I

ENVIRONMENTAL POLLUTION AND MONITORING

Unit I

Environmental Pollution – concepts & Introduction, Natural and anthropogenic sources of pollution; primary and secondary pollutants; Air pollution: source, effect of gaseous air pollutants on plants and animals, TSP and their effect on plants and animals; Air Pollution Tolerance Index,; Lotka-voltera, prey-predator model, Gaussian plume model.

Unit II

Water pollution: types, Sources and consequences of water pollution; Principles of water quality monitoring, ecological and biochemical aspects of water pollution; water quality standards; water pollutants and their control; Ganga Action Plan; Marine pollution; Thermal pollution.

Unit III

Radiation sources in environment- natural and man made; Sources and classification of Radioactive pollution, effect of radioactive pollution on biological system; Basic properties of noise, noise exposure levels and standards; noise pollution control and abatement measures.

Unit IV

Physicochemical and bacteriological sampling and analysis of soil, Sources of Soil pollution, Heavy metals sources and effects on biological systems, Pesticides sources and effect on biological systems, Detrimental effects of soil pollutants on soil micro biota, Ecological consequences and soil pollution control.

Unit V

Sources and characteristics of solid wastes, Environmental Problems associated with solid wastes disposal practices; Solid waste disposal and management, concept of indicator species and their environmental significance, environmental impacts of biomedical wastes: sources and waste minimization.

Recommended Books:

1. Air pollution and control - K.V.S.G. Murlikrishan

M.Sc. Environmental Science
SEMESTER-I

Core Practical - I

1. To determine minimum size of quadrate by species area curve method.
2. To study the vegetation by line transect method
3. To determine frequency, Density and Abundance of the given area
4. Find out the IVI of specified vegetational area
5. Find out the similarity and dissimilarity indices between disturbed and undisturbed grassland.
6. Determination of pattern (non randomness) in vegetation.
7. Estimation of total chlorophyll content of herbaceous vegetation on per square meter of land area basis
8. Study of biotic interactions and their ecological significance
9. Representation of climate data by

(1) Simple graph
(2) Hytherograph
(3) Rainfall variability graph
(4) Wind rose

Spotting:

- Thermometer
- Rain gauze
- Anemomete
- Barometer
- Pedometer
- Compass
- lux meter
- hygrometer,
- wind rose
- Biotic interactions: proto cooperation, mutualism, parasitism, amensalism, symbiosis
- Plant interactions: lichens, root nodules, epiphytes, insectivorous plants

M.Sc. Environmental Science

SEMESTER-I

Core Practical – II

1. Analysis of water samples:

a) PHYSICAL ANALYSIS: Temperature, Turbidity, Conductivity, PH

b) CHEMICAL ANALYSIS: Total dissolved solids, Total suspended particulates, Free CO_2, Alkalinity, Dissolved oxygen, BOD, Primary productivity, Total hardness, Chlorides

2. To study faecal coli forms in water sample by M.P.N. method

3. Qualitative and quantitative analysis of water samples for zooplanktons and phytoplanktons.

4. Preparation of field report of any case study carried out in any areas to assess the pollution status.

5. Temporary slide preparation of phyto and zooplanktons

SPOTTING:

- Sampling equipments: BOD Bottle, Sechhi disc, Plankton net, components of simple and compound microscope
- Phytoplanktons: microcystis, anabena, volvox, nostoc, occillatoria,
- Zooplanktons: moina, Cyclops, Daphnia, zoea larva, chyronomus larva, nauplius larva, ticks, mites

DEPARTMENT OF ENVIRONMENTAL SCIENCES
MEWAR UNIVERSITY, GANGRAR (CHITTORGARH)

M.Sc. II Semester

Session 2017-18 onwards

The examination shall consist of four theory papers, two practical and one skill enhancement course

S. No.	Paper Code	CC/DSE/SEC	Title	Credit
1	M2EVS-CT05	CC	Biodiversity Conservation	4
2	M2EVS-CT06	CC	Environmental Impact Assessment	4
3	M2EVS-CT07	CC	Environmental and Occupational Health	4
4	M2EVS-CT08	CC	Instrumentation and Environmental Analysis	4
5	M2EVS-CP03	CC	Core Practical-I	4
6	M2EVS-CP04	CC	Core Practical-II	4
7	M2EVS-SEC01	SEC	Green Products	2
	M2EVS-SEC01	SEC	Composting and Vermicomposting	2
	Total			**26**

Note:

- CC - Core Course
- SEC - Skill Enhancement Course
- Students will opt any one Skill Enhancement Course (SEC) out of given options

M.Sc. Environmental Science

SEMESTER-II

BIODIVERSITY CONSERVATION

Unit I

Concepts and component of biodiversity- genetic, species and ecosystem biodiversity, evolution of organisms & distribution in space and time, levels of biodiversity, biodiversity indices, value of biodiversity, biodiversity trends, modern techniques of measurement and monitoring of biodiversity, bio prospecting, patent protection and bio piracy .

Unit II

Major threats to biodiversity, IUCN threat categories, Red data book, threatened plants & animals of India; Endangered flora and fauna of India and Rajasthan, Mega diversity zones of India, Hot spot concept and hot spots of India, Biodiversity informatics, International efforts in biodiversity conservation

Unit III

Conservation of biodiversity- *In-situ*- Sanctuaries, biospheres Reserves, National Parks, Nature Reserves, Preservations plots; *Ex- situ* - Botanical gardens, Zoos, Aquaria, Home Garden & Herbarium, In vitro conservation: Germplasm & gene banks, tissue culture, pollen and spore bank, DNA bank; Wildlife reserves in India, Theory of reserve design, Restoration of biodiversity.

Unit IV

National and International programmes for biodiversity conservation; Conservation of wildlife - significance and status of India, Wildlife reserves- Biosphere and nature reserves, Project tiger, sanctuaries and national parks in India; Impact of tourism on wildlife and problem in wildlife protection; Role of WWF,WCU,CITES, TRAFFIC .

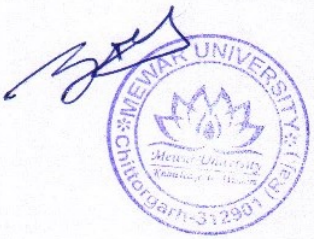
Unit V

Conservation of forests; Indian strategies and planning; Agroforestry, Social forestry; Management of forest products; Forests and tribals; Chipko Aandolan; Coral reefs, mangroves and estuarine biodiversity and their conservation; wetland conservation with special reference to Rajasthan; Biodiversity and agenda-21; Biodiversity conventions.

Recommended Books:

1. Biodiversity and Conservation - P. C. Joshi
2. Biodiversity and Conservation - M. P. Singh and Aravind Kumar
3. Biodiversity Conservation - Ghosh Asish

4. Systematic Conservation Planning (Ecology, Biodiversity and Conservation) - Chris Margules and Sahotra Sarka



M.Sc. Environmental Science

SEMESTER-II

ENVIROMENTAL IMPACT ASSESSMENT

Unit-I

Introduction to environmental impact assessment; origin and development of environmental impact assessment; relationship of environmental impact assessment to sustainable development; basic concepts, objectives and its significance of EIA; EIA guidelines -1994 and modified in 2006; Generalized approach to impact analysis.

Unit II

Environmental Impact statement process; environmental impact assessment methodologies- Adhoc method; Check list methodologies- Matrix method, LCA method

Unit III

Introduction to environmental planning, Baseline Information and predictions- land, water, atmosphere, energy and socio-economic status and demographic profile; environmental audit-guidelines concept and process; concept of public participation- public hearing

Unit IV

ISO 9000, 14000 & 18001, Prediction and assessment of impact on water, air, Noise, soil and biological systems; cost benefit analysis

Unit V

R & R plan (Act).2007; Green belt development; National environmental policies and guidelines in India; Condition and approach for EIS review; Case–studies-River valley projects, Thermal power plants, Mining projects, Dams and reservoirs, Oil refineries, Petro chemicals, national Highway Projects; Identification and prediction of Impact mitigation measures.

Recommended Books:

1. Handbook of Environmental Impact Assessment (Vol. I): Judith Petts, Blackwell Science, USA (1999).
2. Methods of Environmental Impact Assessment: Peter Morris, Ricky Therivel, UGC Press Limited, London (1994).

M.Sc. Environmental Science

SEMESTER-II

ENVIRONMENTAL AND OCCUPATIONAL HEALTH

Unit I

Basic principle of environmental health; Environmental factors and human health; Physiological responses of man to relevant stresses in the environment; Disease causing infectious organisms (Virus, bacteria, and parasites); teratogens and mutagens; Detailed account of AIDS and sexually transmitted diseases (STD); Environmental health management.

Unit II

Air pollution and human health; causes of air pollution and air borne diseases, Soil pollution- Sources and effect on human health; Water pollution- sources and effects on human health; water borne diseases; Risk assessment and preventive measures; Toxico genomics- interaction of pollutants with biological systems at different levels-organism ,organ and organelles.

Unit III

Environmental health management in India; Occupational health safety and health administration; Environmental health in indigenous tribal communities- problems and remedies; Environmental health protection- Issues and problems; Industrial safety management techniques and standards.

Unit IV

Definition of occupational health, Occupational hazards and associated diseases- silicosis, anthrax and other lung diseases; WHO standards of working conditions; factors affecting occupational health (physical, chemical and biological); prevention of occupational diseases; Various international organizations (WHO, ILO, UNICEF) on human health, Lead poisoning, occupational cancers, Dermatitis.

Unit V

Nuclear pollution and human health- case studies; Agriculture chemicals and human health; Hazardous wastes- human health and management; Noise pollution and human health hazards; Human health education and awareness. Hazard evaluation in polluted environment with specific emphasis on radiological health; causes and consequences of hazardous wastes in soil.

Recommended Books:

1. Water Toxicology: V. V. Metelev, A. I. Kanaev, N. G. Dzasokhova, Amerind Publishiing Company, Pvt, Ltd, New Delhi (1971).
2. Water Pollution and Toxicology: S. K. Shukla & P. R. Srivastava, Commonwealth Publisher, New Delhi (1992).
3. Toxicology – Principles & Methods: M. A. Subramanian, MJP, Publishers, Chennai (2004).
4. Industrial Toxicology: Raymond D Harbison, A Times Mirror Company, 5th Edition,

New Delhi (2006).
5. Environmental Science: S.C. Santra, New Central Book Agency, Kolkata (2001).
6. Environmental Pollution Health & Toxicology : S V S Rana, Narosa Publishing House, New Delhi (2006).
7. Environmental Science Hazardous Gas & Waste : R K Sinha, Commonwealth Publisher, New Delhi (1994).
8. Toxicology: P D Sharma, Rastogi & Company, Meerut (1995).

M.Sc. Environmental Science

SEMESTER-II

INSTRUMENTATION AND ENVIRONMENTAL ANALYSIS

Unit I

Basic concepts of instrumentation, current, voltage and power; pH meter, conductivity meter, TDS meter, Visible spectrophotometer, Homogenizer, Autoclave, colony counter.

Unit II

Introduction of basic field instruments: Handy air sampler, Noise level/ Sound level meter; lux meter; pedometer; compass; Anemometer; High volume air sampler- construction, principle and working .

Unit III

Introduction to advance concepts of Instrumentation –theory, principle & working and application of UV- Spectrophotometer, flame photometer, CO2 analyzer, AAS, methane analyzer, refrigerated centrifuge, plant growth chamber, HPLC, gas chromatography, Paper chromatography, NMR, X-ray, Infrared gas analyzer.

Unit IV

Introduction to solution preparation; calculation of concentration of solution using specific gravity and molecular weight; units of concentration of solution; inter conversion; ionic product of water, pH, poH, buffer solutions.

Unit V

Selection of sampling sites, analytical methods and selection of appropriate analytical technique; sample blank preparation and solvent blank preparation ; efficiency of sampling; preparation of serial dilutions and standard curves for air, water, soil and plant analysis.

Recommended Books:

1. Environmental Chemistry: A. K. De
2. Text Book of Environmental Chemistry and Pollution Control: S. S. Dara
3. Instrumental method Analysis: G. W. Ewing
4. Environmental Pollution Analysis: S. N. Khopkar

M.Sc. Environmental Science

SEMESTER-II

Core Practical I

1. Find out the percentage frequency values of grassland species using 1 x 1 size quadrat. Classify the species into frequency classes A to E and prepare the frequency diagram. Compare result with Raunkiers standard frequency diagram.
2. Determine the biomass of producers.
3. Find out the effect of various quadrat size 50 x 50 and 1 x 1 m on percentage frequency result on same grassland plot considered in exercise I
4. Find out the species diversity index in disturbed and protected vegetation area.
5. Find out the leaf area index of crop field.
6. Study of anatomical features of ecological adaptation in selected hydrophytes and xerophytes.

Spotting:

- **Xerophytes**: Nerium – Stem & leaf; calotropis stem; capparis stem; pinus needle; opuntia; euphorbia, casurina
- **Hydrophytes**: Ecchornia, Hydrilla, trapa, nymphea, chara, potemogeton, scirpus, nelumbo
- **Aquatic animals**: exocetus, hyla, gappi, katla, Rohu, gambusea

M.Sc. Environmental Science

SEMESTER-II

Core Practical –II

1. Working and principles of handling various equipments:

a) High volume air sampler

b) Spectrophotometer

c) Refrigerated centrifuge

d) Homogenizer

e) Flame photometer

f) Gas analyzer

g) Growth chamber

h) Atomic Absorption Spectrophotometer

i) Autoclave

j) Muffle furnace

k) Bomb calorimeter

Diagram, working and instrumentation of all the equipments mentioned above

Spotting:

- pH meter
- conductivity meter
- TDS meter
- turbidity meter
- weigh balance
- Identification and study of local and migratory birds in and around the wetlands of our area
- Study and ecological significance of endemic plants and animals of southern Rajasthan

M.Sc. Environmental Science
SEMESTER-II

Skill Enhancement Course-I

GREEN PRODUCTS

Industrial Ecology and Waste Minimization Waste Management for Resource Recovery, Recycling, Waste Oil Utilization and Recovery, Recovery of solutes from Wastewater, Recovery of Water from Wastewater, Solvent Recovery

Industrial Ecology and Waste Treatment Physical methods of waste Treatment, Chemical Treatment of Wastes, Acid/Base Neutralization, Chemical Precipitation, Chemical Flocculation, Oxidation/Reduction, Electrolysis, Chemical Extraction, Chemical, Thermal Treatment

Industrial Ecology of Waste Disposal Immobilization, Chemical Fixation, Physical Fixation

Future of Industrial Ecology Industrial Ecology in the Midst of Change, The Industrial Ecology Hardware Store – Tools for Product and Process, Service Provider, Systematist and Policy Maker, Industrial Ecology as an Emerging Science, An Industrial Ecology Research Roadmap

Recommended Books:

1. Industrial Ecology: Environmental Chemistry and Hazardous Wastes, Stanley E Manahan, (1999). Lewis, New York, USA.
2. Industrial Ecology. T. E. Graedel and B. R. Allenby, (2003). Printice Hall, New Jersey, USA.

M.Sc. Environmental Science
SEMESTER-II

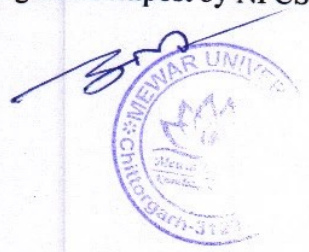
Skill Enhancement Course-II

COMPOSTING AND VERMICOMPOSTING

- Knowledge of General Safety, health and hygiene Concept of Vermitechnology: What & Why. Definition and justification Vermitechnology
- Importance of Vermicompost in Agricultural practices.
- Vermicomposting for Organic Farming- an Eco-Friendly Approach
- Earthworms: Type, identification & usefulness
- Anaerobic (Pit) & Aerobic (Heap) composting: techniques & their comparison
- Vermicomposting techniques, standard composition of vermicompost
- Collection of wastes & their segregation & processing
- Bed preparation for Anaerobic & Aerobic composting
- Bed preparation for Vermicomposting.
- Earthworm collection & application on beds
- Inspection of beds & watering
- Vermicompost collection
- Earthworms separation
- Air drying of vermicompost, sieving & storing

Recommended Books:

The Complete Book on Organic Farming and Production of Organic Compost by NPCS Board of Consultants & Engineers, Asia Pacific Business Press Inc



DEPARTMENT OF ENVIRONMENTAL SCIENCE
MEWAR UNIVERSITY, GANGRAR (CHITTORGARH)
M.Sc. III Semester
Session 2017-18 onwards

The examination shall consist of four theory papers and two practical

S. No.	Paper Code	CC/DSE / SEC	Title	Credit
1	M3EVS-CT09	CC	Environmental Engineering and Waste Management	4
2	M3EVS-CT10	CC	Environmental Laws and Ethics	4
3	M3EVS-ET01/ M3EVS-ET02	DSE	Environmental Toxicology	4
4	M3EVS-ET01/ M3EVS-ET02	DSE	Environmental Chemistry	4
5	M3EVS-ET01/ M3EVS-ET02	DSE	Environmental Sustainability and Management	4
6	M3EVS-ET01/ M3EVS-ET02	DSE	Environmental Hazards and Management	4
7	M3EVS-CP04	CC	Practical	4
8	M3EVS-EP01	DSE PR	Practical	4
	Total			**24**

Note:

- CC - Core Course
- DSE - Discipline Specific Elective Courses
- Students will opt any two Discipline Specific Elective Courses (DSE) out of given options

M.Sc. Environmental Science

SEMESTER-III

ENVIRONMENTAL ENGINEERING AND WASTE MANAGEMENT

Unit I

Waste water treatment-primary, secondary and tertiary treatment; various technologies related to water treatment- ozonation, chlorination, reverse osmosis, ion exchange, disinfection, coagulation, UV treatment

Unit II

Air pollution control technologies-wet scrubbers, electro static precipitators, cyclone separator, gravitational settling chambers, bag filters, adsorption and absorption methods, incineration.

Unit III

Solid waste treatment technologies: land fill & sanitary land fill, composting, incineration; hazardous and industrial waste management; municipal solid waste management.

Unit IV

Energy conservation: renewable energy technologies-solar, wind, bio energy, geothermal, hydro power; nuclear energy production-process and functioning of nuclear reactors.

Unit V

Effluent treatment plant (ETP) & sewage treatment plant (STP) - design and working; eutrophication – control and management procedure; reuse and recycling of plastic and metals

Recommended Books:

1. Solid Waste Management - V.K. Prabhakar
2. Solid Waste Management - Hari Mohan Singh
3. Solid Waste Management: A Local Challenge with Global Impacts – U.S Environmental Protection Agency.

M.Sc. Environmental Science

SEMESTER-III

ENVIRONMENTAL LAWS AND ETHICS

Unit – I

Environment (protection) act 1986; Environmental (prevention) rules 1986; Central and state boards for prevention and control of air and water pollution; provision of constitution of India regarding environment (Article 48 A & 51 A).

Unit - II

Air (prevention and control of pollution) Act 1981; Air (prevention and control of pollution) Amendment Act 1987 and rules 1982; The Water (prevention and control of pollution) Act 1974;

Unit - III

The water (prevention & control of pollution) amendment 1988 & rules 1975; Legislation related to forest and wild life conservation; Forest Conservation Act 1980; Indian Forest Act, 1970, revised 1982; Wildlife Protection Act 1972 and amendment 1991; Biological Diversity Act, 2002.

Unit - IV

Code of criminal procedure and environmental protection; guidelines issued by the government of India for inspection of Industries under pollution control laws; Scheme of labeling of environmentally friendly products (ecomark); Public liability Insurance Act. 1991; Environment guidelines for industries which required industrial licensing, Industrial licensing procedure; Environmental Clearance Process; Consents for handling hazard substances; Environment protection issues & problems, international & national efforts for environment protection.

Unit - V

Environmental ethics: Concept and definition; Anthropocentrism and Ecocentrism; Indian situation of ethics; shallow and deep ecology

Recommended Books:

1. Environmental Laws of India - An Introduction: CPR Environmental Education Centre, Chennai (2001).
2. Introduction to Social Forestry : Sitram Rao, Oxford and IBH Pub. Co. Pvt. Ltd.
3. An Introduction to Environmental Management : Dr. Anand S. Bal, Himalaya Publishing House (2005).
4. Environmental Pollution – Management & Control for Sustainable Development : R. K. Hitoliya, S.Chand and Co.Ltd.New Delhi (2004).
5. Environmental Science : S. C. Santra, New Central Book Agency, Kolkata, 2005
6. Environmental Law and Policy in India: Divan S and Rosencraz A,Oxford University Press, New Delhi. (2001)

M.Sc. Environmental Science

SEMESTER-III

ENVIRONMENTAL TOXICOLOGY

Unit I

Toxicology: definition, Origin, classification & general nature of toxicants in environment; Principles in toxicology: Concept of dose response relationship, Chronic toxicity, Sub acute toxicity and acute toxicity, concept of LC 50 & LD 50, Median tolerance limit, Statistical concepts of LD50; Safe limits, MATC, threshold concentration, NOEL, NOAEL & bioaccumulation; Risk assessment; Biological and chemical factors that influence toxicity; Influence of ecological factors on the effects of toxicity.

Unit II

Toxicity testing: Holistic and numeric approach; Drug toxicity and abuse; Heavy Metal toxicity in animals; mutagenesis, Teratogenicity and carcinogenicity; Practical problems in toxicity testing; Global dispersion of toxic substance; Dispersion and circulating mechanisms of pollutants; degradable and non-degradable toxic substances in food chain.

Unit III

Route of entry of pollutants into ecosystem- Surface water, land, Air; Uptake of toxic substances by plants, metabolic basis of toxicity of SO_2, NO_2, O_3 and heavy metals in plants; Microbial transport of toxic metals; Air and water borne toxins and diseases; Radiation toxicity and safety measures.

Unit IV

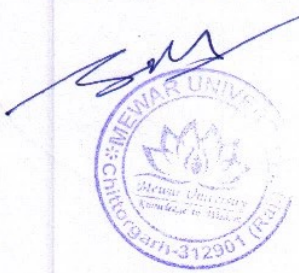
Uptake of toxic substances by animals; Accumulation and chemical localization of toxic substances by animals; detoxification and excretion of toxic substances by animals; Metabolism of toxic substances by animals.; Aquatic toxicity testing, Response of planktons to animals.

Unit V

Toxic effect of pollution on terrestrial animals; xenobiotics in environment, bioconcentration, biological and non biological degradation, detoxification; chemical hazard assessment and communication; Information management system in Eco-toxicology; fumicatoris and masticatoris;

Recommended Books:

1. Water Toxicology: V. V. Metelev, A. I. Kanaev, N. G. Dzasokhova, Amerind Publishiing Company, Pvt, Ltd, New Delhi (1971).
2. Water Pollution and Toxicology: S. K. Shukla & P. R. Srivastava, Commonwealth Publisher, New Delhi (1992).



M.Sc. Environmental Science

SEMESTER – III

ENVIRONMENTAL CHEMISTRY

Unit –I

Concept and Scope of Environmental Chemistry; segments of environment; Principles and cyclic pathways in the environment; Chemistry of Biologically Important Molecules; Chemistry of Water: Unusual physical properties, unusual solvent properties.

Unit - II

Basic chemistry: Structure of atoms, their properties, their nuclear stabilities and their arrangement in the periodic table; fundamentals of chemical thermodynamics and solution formation-Normality, Molarity, Molality, Molecular weight, Equivalent weight, Mole concept; basic organic chemistry and biochemistry; Stochiometry, Gibb's energy, Chemical potential, chemical equilibria, acid-base reactions; Solubility product, solubility of gases in water, unsaturated and saturated hydrocarbons.

Unit – III

Classification of elements, chemical speciation, Particles, ions and radicals in the atmosphere. Chemical processes for formation of inorganic and organic particulate matter; Thermochemical and photochemical reactions in the atmosphere; Basic concepts of surface and interface chemistry: Absorption, adsorption, catalysis; collides, surfactants; carbonate system.

Unit – IV

First law of thermodynamics, enthalphy, adiabatic transformations; second law of thermodynamics, Carnot's cycle, entropy, Gibb's free energy, chemical potential, phase equilibria, Gibb's Donnan equilibrium; third law of thermodynamics, enzymes catalysis.

Unit – V

Oxygen and ozone chemistry, Chemistry of air pollutants, Photochemical Smog, Chemistry of water, concept of D.O., B.O.D., and C.O.D. Water treatment: Sedimentation, Coagulation, Filtration, tertiary and advanced treatment. Concept, principle and utility of green chemistry, green reagents, green catalysts, industrial interest in green chemistry Bio transformation and bio magnification.

Recommended Books:

1. A.K. De, Environmental Chemistry, New Age International Publishers, New Delhi.
2. A.Singh and R. Singh (2005), Surface Chemistry, Campus Book International, New Delhi, India.
3. B.K. Sharma, (2001), Instrumental Methods of Chemical Analysis, Goal Publishing House, Meerut, India.

4. Dara S S,.(1998), A text book of environmental chemistry and pollution control, S. Chand & Company Ltd, New Delhi
5. Ewing G.W, (1985), Instrumental Methods of Chemical Analysis, 5th Edition McGraw Hill, U.K.

M.Sc. Environmental Science

SEMESTER – III

ENVIRONMENTAL SUSTAINABILITY AND MANAGEMENT

Unit I

Introduction, concept and scope of environmental management; Systems and approaches, environmental management of resources-water, forest, biological, minerals and agriculture; International summits and treaties-Vienna convention, Montreal protocol, Kyoto protocol, Copenhagen convention

Unit II

Sustainable development –concept & growth of idea, indicators of sustainability, Sustainable use of natural resources, Sustainability in industry and agriculture, eco restoration, green funding

Unit III

Basic concept of environmental economics, International trade & environmental integrity, eco labeling, eco marketing, current environmental issues in India-case studies, Narmada Dam, Tehri & Almeti dam; the role of risk assessment in environmental Management decisions.

Unit IV

Management systems-Quality, environment, Health and safety, Social responsibility (ISO 9000, 14000, 18000, 8000); international organization of standardization (ISO) and their clarification; Relation of EIA to Sustainable development

Unit V

Environmental Management of Industrial pollution, Management of Pollution due to mining, chemical & manufacturing industries (Petroleum, coal, cement, Paper & fertilizer)

Recommended Books:

1. Fundamentals of Environmental Engineering-D.D.Reible
2. Environmental Economics and Natural Resource Management - Muralidhar Majhi

M.Sc. Environmental Science

SEMESTER-III

ENVIRONMENTAL HAZARDS AND MANAGEMENT

Unit I

Introduction to hazards, classification and types: –Natural Hazards, Chemical hazards, Physical hazards, Biological hazards; Basics of hazard management and mitigation, natural Hazards – causes, plate tectonics and sea floor's spreading; hazard analysis; Human perturbation and natural hazards – impact of deforestation, land use and developmental activities on natural hazards, Role of climate change; Man Made hazards - Dams & reservoirs, NPP; Desertification-causes, evaluation, Mitigation.

Unit II

Natural Disasters: nature, causes and effect, Cyclone, tornadoes, floods, earthquakes, avalanches, Tsunami, land slides, drought, fires, volcanism, Case study of disasters-community reaction to disasters, coping mechanism; disaster management-pre disaster phase, actual disaster phase, post disaster phase.

Unit III

Disaster assistance-technological assistance, relief camps, food requirement, water needs, sanitation security, information administration, fire fighting training, Safety Measures– a general account, emergency rescue, disaster education- alternatives and new direction, Forecasting and warning systems

Unit IV

Concept of disaster recovery- mitigation and preparedness, program planning and management, Vulnerability analysis, Training needs – Target Groups, emergency preparedness plan, occupational risk analysis survey and health evaluation, behavioral studies, Man-made disasters-occupational injury, Industrial Safety Management Techniques – Industrial Safety Standards.

Unit V

Environmental hazards, protective measure while handling hazardous substance, hazardous waste disposal. Hospital waste handling and disposal, guidelines for their disposal, fire and explosion hazards, radiation hazards. Case studies related to hazardous waste accidents, simplified measures for their assessment. Various diseases related to handling of hazardous waste. Nasal cancer and other fatal diseases; their symptoms, prevention and control

Recommended Books:

1. Environmental Chemical Hazards -Manish Rathi
2. Natural and Man-Made Disasters-Sharma
3. Natural Hazards and Disasters-Hyndman
4. Environmental Disasters - K. K. Singh, Lotfi Aleya and Mahadevi Singh
5. Environmental Disaster: Causes, Impact and Remedies - Mahesh V. Joshi
6. The Chernobyl Nuclear Disaster (Environmental Disasters) - Scott Ingram

M.Sc. Environmental Science

SEMESTER-III

Core Practical

1. Determination of the dust capturing capacity and percent leaf area injury of selected plant species.

2. Effect of heavy metals on seed germination and early seedling growth.

4. Effect of heavy metals on chlorophyll content and carbohydrates.

5. To calculate the LC 50 in fishes for heavy metals calculation of MATC and threshold concentration.

6. Short term bioassay lists of industrial pollutants in relation to fresh water animals.

a) Calculation of 96 hours LC 50

b) Assessment of threshold concentration.

c) Calculation of MATC (Maximum acceptable toxicant concentration)

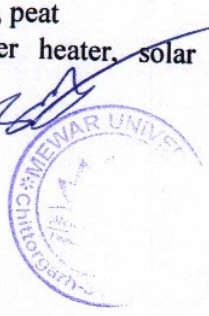
d) Calculation of application factor or safe concentration

7. Determine the structure and functions of stomata

8. Principle, construction and working of biogas plant

Spotting

- Study and identification of minerals and rocks
- Toxicity curves
- Heavy metal identification
- Principle & working of STP's and ETP's
- Identification and study of coal: bituminous, lignite, anthracite, peat
- Solar equipments: solar cooker, solar lantern, solar water heater, solar dryer, photovoltaic cell



M.Sc. Environmental Science

SEMESTER-III

(PRACTICAL COURSE – DSE PR)

1. Analysis of Soil samples

(1) Texture

(2) Moisture

(3) pH

(4) Conductivity

(5)Water Holding Capacity

(6) Bulk density &porosity

(7) Calcium carbonate

(8) Sulphate

(9) Carbonate and bicarbonate

(10) Organic carbon & organic matter

(11) Chlorides

2. Assessment of noise pollution in different zones of the city by Sound level meter.

3. To find out the dirt content of different zones of your area.

Spotting:

- Instruments- Spectrophotometer, sound level meter, colorimeter, refrigerated centrifuge
- Foot prints- of wild animals as available for demarcation of territory.
- Soil fauna-Micro & macro fauna: Millipede, centipede, earthworm, nematodes, actinomycetes
- Sieves set for soil texture

DEPARTMENT OF ENVIRONMENTAL SCIENCE
MEWAR UNIVERSITY, GANGRAR (CHITTORGARH)

M.Sc. IV Semester

Session 2017-18 onwards

Choice of A or B				
A				
S. No.	**Paper Code**	**CC/DSE/ SEC**	**Title**	**Credit**
1	M4EVS-PJ01		Projects (Research Work/ Training)	26
B				
1	M4EVS-PJ02	CC	Minor Research Project	14
2	M4EVS-ET03/ M4EVS-ET04	DSE	Research Methodology	4
3	M4EVS-ET03/ M4EVS-ET04	DSE	Environmental Biotechnology	4
4	M4EVS-ET03/ M4EVS-ET04	DSE	Meteorology	4
5	M4EVS-ET03/ M4EVS-ET04	DSE	Remote Sensing and GIS in Environmental Science	4
6	M3EVS-EP02	DSE PR	Practical DSE	4
	Total			**26**

Note:

- CC - Core Course
- DSE - Discipline Specific Elective Courses
- Students will opt any two Discipline Specific Elective Courses (DSE) out of given options.

MEWAR UNIVERSITY Chittorgarh-312901 (Raj.)

M.Sc. Environmental Science

SEMESTER – IV

RESEARCH METHODOLOGY

UNIT-1

Foundations of Research: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method – Understanding the language of research – Concept, Construct, Definition, Variable. Research Process, Problem Identification & Formulation – Research Question, Investigation Question, Measurement Issues, Hypothesis– Qualities of a good Hypothesis, Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance

UNIT-2

Research Design: Concept and Importance in Research, Features of a good research design, Exploratory Research Design– concept, types and uses, Descriptive Research Designs– concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.

UNIT-3

Sampling: Concepts of Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size, Non Response. Characteristics of a good sample. Probability Sample – Simple Random Sample, Systematic Sample, Stratified Random Sample & Multi-stage sampling. Determining size of the sample – Practical considerations in sampling and sample size

UNIT-4

Data Analysis: Data Preparation– Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations and Chi-square test including testing hypothesis of association. Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals in Science, Impact factor of Journals, When and where to publish? Ethical issues related to publishing, Plagiarism and Self-Plagiarism

UNIT-5

Use of Encyclopedias, Research Guides, Handbook etc., Use of tools / techniques for Research: methods to search required information effectively, Reference Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism

Recommended Books:

1. Business Research Methods – Donald Cooper & Pamela Schindler, TMGH, 9th edition
2. Business Research Methods – Alan Bryman & Emma Bell, Oxford University Press
3. Research Methodology – C.R.Kothari

M.Sc. Environmental Science

SEMESTER – IV

ENVIRONMENTAL BIOTECHNOLOGY

Unit I

Applications of microbes in biodegradation and bioremediation: Microbial degradation of cellulose, lignin, pesticides, xenobiotics and other recalcitrant chemicals, petroleum and hydrocarbons and its ecological significance. Bioprospecting and bioleaching, Bioaccumulation of heavy metals ions from industrial effluents

Unit II

Biomagnification and degradative plasmids, biotransformation, Biodeterioration and its control, Biological control and biopesticides: definition, significance, types, sources, manufacture, use and mode of action. Entemopathogenic fungi, viral insecticides. Significance of *Bacillus thuringiensis* in biocontrol

Unit III

Microbes and pollution: Waste water; Types, Sources, Microbiology. Methods of waste water treatment. Eutrophication: Definition, causes and effects. Algal blooms, Red tides. Solid waste: Source, types and characterization. Methods of treatment: Physical, chemical, biological, aerobic, anaerobic, primary, secondary and tertiary treatments. Use of genetically engineered organisms for control of pollution

Unit IV

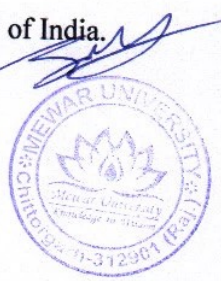
Bioconversion of Solid Waste: Composting, vermi composting and vermi culture. Microbial biofertilizers: types, sources, manufacture and significance. Green manuring, Mycorrhizae as fertilizers: Rhizhobia and other symbiotic and non symbiotic nitrogen fixing microbes as biofertilizer. Application of microbes as biofertilizers. Significance and application of PSB (Phosphate Solubilizing Bacteria) and PGPR (Plant Growth Promoting Rhizobacteria)

Unit V

Microbes as biological weapons, Role of microbes in production of Biofuels, Biogas production and factors affecting methane formation. Biosensors: Principle, working, Types of biosensors Applications of biosensors in environmental monitoring. Application of microbes as biosensors

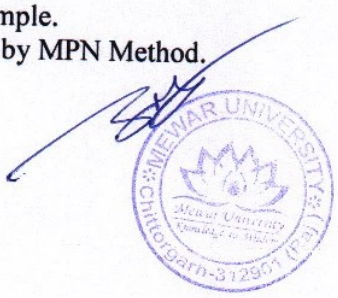
Recommended Books:

1. Mooray Moo-Young. (Eds). Comprehensive Biotechnology (Vol. I, II, III) Pergamon Press, England.
2. Metcalf and Eddy. Waste water engineering treatment and uses. McGraw Hill.
3. Jogdand, S.N. Environmental Biotechnology. Himalaya Publication House.
4. De, A.K. Environmental Chemistry. Wiley Eastern Ltd.
5. Abbasi and Abbasi. Renewable Energy Sources and their environmental impact. Prentice Hall of India, Pvt. Ltd.
6. Chatterji, A.K. Introduction to Environmental Biotechnology. Prentice Hall of India. New Delhi.



Environmental Biotechnology Practical:

1. Calculation of Total Dissolved Solids (TDS) of water sample.
2. Calculation of DO (Dissolved oxygen) of water sample.
3. Calculation of BOD of water sample.
4. Calculation of COD of water sample.
5. Bacterial Examination of Water by MPN Method.



M.Sc. Environmental Science

SEMESTER – IV

METEOROLOGY

UNIT-1

Basic concepts, scope and importance of Meteorology, Concept of weather and climate. Atmospheric composition, structure of atmosphere, atmospheric stability, Koeppen's scheme of classification of climate, types of precipitation (rainfall, hailstorm, etc.)

UNIT-2

Meteorological parameter eg. Rainfall, pressure , wind speed, humidity, temperature, sunshine, etc. types of cloud and its formation, Atmospheric circulation, Inter Tropical Convergence Zone (ITCZ), Energy transfer within the earth– atmosphere system

UNIT- 3

Heating Earth's Surface and Atmosphere, Tropical and polar climate, The South Asian monsoon, Winter, Spring, Early summer, Summer, Autumn . Indian monsoon, Optical Phenomena of the Atmosphere

UNIT-4

Atmospheric radiation, meteorological disaster (cyclone, tornado, hurricane), Lightening, dust storm, Remote sensing in climatic studies

UNIT-5

Green house gas effect, global warming, climate change, natural causes of climate change, human impact on climate change, ozone hole formation

Recommended Books:

1. The atmosphere: an introduction to meteorology by Lutgens & Tarbuck.
2. Atmosphere, Weather and Climate by Roger G. Barry and Richard J. Chorley
3. An Introduction to Physical Geography and the Environment by Joseph Holden

Meteorology Practical:

1. Measurement of maximum, minimum temperatures and soil temperature
2. Measurement of rainfall and evaporation measuring instruments
3. Analysis of rainfall data for climatological studies
4. Estimation of Potential Evapotranspiration
5. Measurement of atmospheric pressure and analysis of atmospheric conditions

M.Sc. Environmental Science

SEMESTER – IV

REMOTE SENSING AND GIS IN ENVIRONMENTAL SCIENCE

UNIT-1

Principles of Remote Sensing, History, Stages of Remote Sensing, Remote Sensing In India, Types of Remote Sensing and Types of Resolution: Spectral, Spatial, Temporal, Radiometric, Spectral Signatures. Electro Magnetic Radiation, EM Spectrum, Energy Interaction with the Atmosphere and Earth Surface.

UNIT-2

Types of platform, Types of sensor and cameras, processes of sensor & its characteristics. Element of Image Interpretation: Tone, Color, Texture, Pattern, Shape, Size and associated features

UNIT- 3

Definition, History, Objectives of GIS, components of GIS, Application of GIS

UNIT- 4

Types of Geographical Data: Raster Data Model, Vector Data Model. GIS Tasks: Input, Manipulation, Management, Query, Analysis and Visualization. Layer, Geographic Reference

UNIT- 5

Types of data: Spatial Data, Non Spatial Data, Level of measurement: Nominal, Ordinal, Interval, Ratio. Definition, Advantages of Topology, Concept of Arc, Node and Vertices, Connectivity, Containment, Contiguity

Recommended Books:

1. Fundamentals of Remote Sensing: George Joseph
2. Remote Sensing and Image Interpretation: Lillesand & Keifer
3. Remote Sensing Principles and Interpretation: F.F. Sabins
4. Introduction to Remote Sensing: J.B. Campbell

Remote Sensing and GIS in Environmental Science Practical:

1. Map composition
2. Use of model maker for band rationing
3. Data import and export
4. Geometric correction and mosaicing of image
5. Pattern analysis, measures of arrangement & dispersion autocorrelation, semivariogram analysis

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH
DEPARTMENT OF LIFE SCIENCE

Plant Genetics

UNIT I

Unique genetic features of plants - Ability to photosynthesize, Totipotency of plant cells, Hermaphroditism and ability to reproduce both sexually and asexually, Double fertilization, Polyploidy, Alternation of generations, Mitosis in haploid state.

UNIT II

Molecular Biology of Plant Reproduction - Molecular genetic basis of plant reproduction, Emphasis on understanding developmentally regulated gene expression as it relates to the major changes that occur during plant reproduction and on the genetic control of flowering.

UNIT III

Genes controlling flower development in Plants – genes responsible for steps of flower development, genes for floral organ identity, MADS-Box genes, molecular expression of floral organ genes, molecular expression of floral commitment genes, analyzing gene expression with in situ hybridization.

UNIT IV

Regulatory Mechanisms in Plant Development - Molecular mechanisms whereby endogenous and environmental regulatory factors control development; emphasis on stimulus perception and primary events in the signal chain leading to modulated gene expression and cellular development.

UNIT V

Plant Genome Organization and Function - Analysis of Genomes by Reassociation Experiments, Repeated Sequences, Organization of Single-copy Sequences, Evolution of Repeated Sequences in Cereals, Estimating the Number of Expressed Genes, Chloroplast Genome Organization, Mitochondrial Genome Organization, RNA editing.

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH
DEPARTMENT OF LIFE SCIENCE

Plant Evolutionary Biology

UNIT I

Introduction to Evolutionary Biology, Basic principles of evolution, Natural selection and adaptation, Speciation and species concepts

UNIT II

Principles of Evolutionary Genetics, Genetic variation and its sources, Genetic drift and gene flow, Molecular evolution and phylogenetics

UNIT III

Plant Evolutionary Ecology, Adaptation and ecological strategies in plants, Plant interactions with other organisms, Evolutionary responses to environmental changes

UNIT IV

Paleobotany and Fossil Record, Fossilization processes and plant fossils, Evolutionary trends in plant evolution, Study of ancient plant lineages

UNIT V

Evolutionary Adaptation in Plants, Plant reproductive strategies, Plant defense mechanisms

Plant adaptations to different environments

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH
DEPARTMENT OF LIFE SCIENCE

Ornithology

UNIT I

Introduction to Ornithology: History and scope of ornithology, Bird classification and taxonomy

Evolutionary relationships of birds

UNIT II

Bird Anatomy and Physiology: Structural adaptations for flight, Skeletal, muscular, and respiratory systems, Digestive, circulatory, and reproductive systems

UNIT III

Bird Behavior and Communication: Breeding behavior and mate selection, Parental care and nest building, Vocalizations, displays, and communication

UNIT IV

Avian Ecology: Bird habitats and distribution patterns, Migration and navigation, Bird populations and community ecology

UNIT V

Bird Identification and Field Techniques: Field identification of birds, Use of field guides and identification keys, Field survey methods and data collection

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH
DEPARTMENT OF LIFE SCIENCE

Parasitology

Unit I: Introduction to Parasitology

Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector) Host parasite relationship

Unit II: Parasitic Protists

Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Entamoeba histolytica, Giardia intestinalis, Trypanosoma gambiense, Leishmania donovani, Plasmodium vivax

Unit III: Parasitic Platyhelminthe

Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Fasciolopsis buski, Schistosoma haematobium, Taenia solium and Hymenolepis nana

Unit IV: Parasitic Nematodes

Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Ascaris lumbricoides, Ancylostoma duodenale, Wuchereria bancrofti and Trichinella spiralis. Study of structure, life cycle and importance of Meloidogyne (root knot nematode), Pratylencus (lesion nematode)

Unit V: Parasitic Arthropoda

Biology, importance and control of ticks, mites, Pediculus humanus (head and body louse), Xenopsylla cheopis and Cimex lectularius

Parasitic Vertebrates

A brief account of parasitic vertebrates; Cookicutter Shark, Candiru, Hood Mockingbird and Vampire bat

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH
DEPARTMENT OF LIFE SCIENCE

Industrial Biotechnology

UNIT I

Introduction to Industrial Biotechnology, Definition and scope of industrial biotechnology

Historical developments and key milestones, Industrial biotechnology sectors and their applications

UNIT II

Enzyme Technology, Enzyme production and isolation techniques, Enzyme immobilization and stabilization, Enzyme kinetics and enzyme engineering

UNIT III

Fermentation Processes, Microbial growth kinetics, Batch, fed-batch, and continuous fermentation, Scale-up considerations and process optimization

UNIT IV

Bioreactors and Downstream Processing, Types of bioreactors and their design principles

Bioreactor operation and control, Downstream processing techniques for product recovery and purification

UNIT V

Industrial Production of Biofuels, Bioethanol production from lignocellulosic biomass

Biodiesel production from microbial and plant sources, Biogas production and anaerobic digestion

Recommended Textbooks:

- "Industrial Biotechnology: Sustainable Growth and Economic Success" by David R. Shonnard
- "Bioprocessing for Value-Added Products from Renewable Resources: New Technologies and Applications" edited by Shang-Tian Yang and Hesham El-Enshasy
- "Industrial Biotechnology: Products and Processes" by Christoph Wittmann and James C. Liao

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH
DEPARTMENT OF LIFE SCIENCE

Structural Biology

UNIT I

Introduction to Structural Biology, Introduction to biomolecular structure and function, Historical developments and key milestones in structural biology, Overview of the protein folding problem and the central dogma of molecular biology

UNIT II

Protein Structure Determination Techniques, X-ray crystallography: principles, data collection, and structure determination, NMR spectroscopy: principles, data acquisition, and structure, determination, Electron microscopy: principles, sample preparation, and image reconstruction

UNIT III

Computational Methods in Structural Biology, Homology modeling and comparative protein structure prediction, Protein structure prediction using ab initio methods, Molecular dynamics simulations and free energy calculations

UNIT IV

Protein Structure Analysis and Visualization, Protein structure databases and resources

Protein structure visualization software and tools, Analysis of protein structure and function relationships

UNIT V

Nucleic Acid Structure and Analysis, DNA and RNA structure and folding, Experimental techniques for nucleic acid structure determination, Computational modeling and analysis of nucleic acid structures

Recommended Textbooks:

- "Introduction to Protein Structure" by Carl Branden and John Tooze
- "Principles of Protein X-ray Crystallography" by Jan Drenth
- "NMR Spectroscopy: Principles and Practice" by Peter Hore, Jon W. Emsley, and John Feeney
- "Molecular Modeling and Simulation: An Interdisciplinary Guide" by Tamar Schlick

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH
DEPARTMENT OF LIFE SCIENCE

Environmental Biotechnology

UNIT I

Introduction to Environmental Biotechnology, Definition and scope of environmental biotechnology

Historical developments and key milestones, Interdisciplinary nature of environmental biotechnology

UNIT II

Microbial Processes in Environmental Biotechnology, Microorganisms in biogeochemical cycles, Microbial diversity and functional roles in environmental systems, Microbial interactions and biofilm formation

UNIT III

Bioremediation of Environmental Pollutants, Principles of bioremediation and pollutant degradation

Bioremediation strategies: bioaugmentation, biostimulation, phytoremediation, Case studies of bioremediation applications

UNIT IV

Waste Treatment and Resource Recovery, Anaerobic digestion and biogas production, Composting and vermicomposting, Microbial fuel cells and waste-to-energy technologies

UNIT V

Bioenergy Production and Sustainable Resource Management, Biofuels: bioethanol, biodiesel, and biohydrogen, Algal biofuels and microalgal biotechnology, Biotechnological approaches for sustainable agriculture and forestry

Recommended Textbooks:

- "Environmental Biotechnology: Principles and Applications" by Bruce E. Rittmann and Perry L. McCarty
- "Environmental Microbiology: From Genomes to Biogeochemistry" by Eugene L. Madsen

PLANT BIOTECHNOLOGY AND RESOURCE UTILIZATION

UNIT I

Plant tissue culture: History, concepts of cell differentiation and totipotency; pathways for *in vitro* regeneration: organogenesis, somatic and gametic embryogenesis; protoplast

UNIT II

Isolation, culture and regeneration; somatic hybridization; Applications: micropropagation, meristem culture, embryo rescue, synseed production, somaclonal and androclonal variations, cryopreservation and germplasm storage.

UNIT III

Principles, methods and applications of genetic transformation: *Agrobacterium* biology and biotechnology; Plant - *Agrobacterium* interactions; Direct gene transfer methods: particle bombardment, electroporation

UNIT IV

Marker and reporter genes; case studies of transgenic traits in plants; marker-free transgenics; transgene silencing; environmental, social and legal issues.

UNIT V

Plant resource utilization: World centres of primary diversity and secondary centres of cultivated plants; crop domestication genes; Uses and introduction to current research paradigms in major cereals, oilseeds, legumes, medicinal plants, forest trees and non-alcoholic beverages.

SUGGESTED READINGS:

1. Adrian S, Nigel WS, Mark RF (2008). Plant Biotechnology: The genetic manipulation of Plants, Oxford University Press.
2. Buchanan B, Gruissem G and Jones R (2000) Biochemistry and Molecular Biology of Plants, American Society of Plant Physiologists, USA.
3. Butenko RG (2000) Plant Cell Culture, University Press of Pacific.

4. Davies PJ (2004) Plant Hormones, Kluwer Academic Publishers, Netherlands.
5. Halford N (2006) Plant Biotechnology - Current and future applications of genetically modified crops, John Wiley and Sons, England.
6. Wickens GE (2004) Economic Botany: Principles and Practices, Springer, ISBN 978-07923-6781-9.

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH
DEPARTMENT OF LIFE SCIENCE

ADVANCED PLANT SYSTEMATICS

UNIT I

Plant systematics: The Components of systematics, Major objectives of systematics; Relevance to society and science.

Taxonomic History: Natural systems to cladistics: Natural systems; Phyletic systems; Phenetics; Cladistics.

UNIT II

Botanical Nomenclature: Kinds of names; International Code of Botanical Nomenclature, Names according to rank; Citation of authors; Priority; Type method; Naming a new species; Legitimacy; Synonyms.

Classification: The components of classification; Characters and their states; Sources of characters; Evaluation of characters.

UNIT III

Systematic evidence: Morphology, Anatomy and ultrastructure; Embryology; Palynology; Cytology; Phytochemistry.

Molecular Systematics: Plant genomes: nuclear, mitochondrial, chloroplast; Molecular markers; Generating molecular data: restriction site mapping, gene sequencing; Analysis of molecular data: alignment of sequences, methods of phylogeny reconstruction.

UNIT IV

Phylogenetics: The nature of phylogeny; How we depict phylogeny?; The importance of homology, Polarizing characters of homology; Rooting Trees; The problem of homoplasy.

The plant systematics community: Professional organizations; Work environment; Activities; The role of field studies; The role of the herbarium.

UNIT V

Introduction to the angiosperms: General characteristics; Evolutionary history; Basal angiosperms and Magnoliids; Basal monocots; Petaloid monocots; Commelinids; Basal eudicots and Caryophyllids; Rosids; Asterids.

SUGGESTED READINGS:

1. Angiosperm Phylogeny Group 2003. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG II. Botanical Journal of the Linnaean Society 141: 399-436.
2. Crawford, D.J. 2003. Plant Molecular Systematics. Cambridge University Press, Cambridge, UK.
3. Cronquist, A. 1981. An integrated system of classification of flowering

Botanical Nomenclature: Kinds of names; International Code of Botanical Nomenclature, Names according to rank; Citation of authors; Priority; Type method; Naming a new species; Legitimacy; Synonyms.

Classification: The components of classification; Characters and their states; Sources of characters; Evaluation of characters.

Oxford University Press, New York.
7. Radford, A. E., W.C. Dickison, J.R. Massey and C.R. Bell 1974. Vascular Plant Systematics. Harper and Row, New York.
8. Semple, C. and M.A. Steel 2003. Phylogenetics. Oxford University Press, Oxford.
9. Simpson, M.G. 2006. Plant Systematics. Elsevier, Amsterdam.
10. Stuessy, T.F. 2009. Plant Taxonomy: The systematic Evaluation of Comparative Data.

Columbia University Press, New York.

PATHOGENS AND PESTS OF CROP PLANTS

UNIT I

General characteristics of plant pathogenic organisms and pests including viruses, bacteria, fungi, insects and nematodes with reference to the following:

- Life cycles
- Nature of disease(s) and damage caused
- Host range

UNIT II

Control mechanisms based on genetics, chemical treatments, biological control and genetic engineering.

UNIT III

Case studies of economically important causative agents with specific references to crop plants:

- Plant-virus interactions with emphasis on potyviruses and horticultural crops.
- Plant-bacterial interactions with emphasis on *Erwinia* sp. and potatoes.
- Plant-fungus interactions with emphasis on *Magnaporthe* sp. and rice.
- Plant-nematode interactions with emphasis on *Meloidogyne* sp. and tomato.
- Plant-Insect interactions with emphasis on *Pieris* sp. and crucifers.

UNIT IV

Methods of sterilization; Media preparation (selective media); inoculation procedures. Characterization of disease symptoms and identification of pathogenic organisms.

UNIT V

Isolation and estimation of DNA from fungus. Biochemical markers of enhanced resistance

SUGGESTED READINGS:

1. Agrios GN (2005) Plant Pathology, 5th Edition.
2. Buchanan B, Gruissem G and Jones R (2000) Biochemistry and Molecular Biology of Plants", American Society of Plant Physiologists, USA.

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH
DEPARTMENT OF LIFE SCIENCE

Economic Zoology

UNIT I

Introduction to Economic Zoology, Definition and scope of economic zoology, Historical perspectives and key concepts, Animal Agriculture, Livestock production systems

UNIT II

Breeds and breeding techniques, Animal nutrition and feed management, Insect Pests and Pest Control, Common insect pests in agriculture and public health

UNIT III

Integrated Pest Management (IPM) strategies, Biological control methods, Medical Entomology

Disease vectors and their control, Zoonotic diseases transmitted by arthropods

UNIT IV

Insecticide resistance and its implications, Aquaculture and Fisheries, Fish farming techniques and management, Sustainable fisheries practices, Conservation of aquatic ecosystems, Wildlife Management and Conservation

UNIT V

Principles of wildlife management, Human-wildlife conflicts and mitigation strategies, Conservation approaches and protected areas, Emerging Trends in Economic Zoology

Suggested reading

"Economic Zoology" by G. S. Shukla and V. B. Upadhyay

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH
DEPARTMENT OF LIFE SCIENCE

Population Ecology

UNIT I

Introduction to Population Ecology

Definition and scope of population ecology

Historical perspectives and key concepts

Population Parameters and Data Collection

UNIT II

Population size, density, and structure, Sampling techniques and data collection methods, Population Growth Models, Exponential growth model, Logistic growth model

UNIT III

Density-dependent and density-independent factors, Population Interactions, Competition and resource partitioning, Predation and predator-prey dynamics, Mutualism and symbiotic relationships

Life History Strategies

UNIT IV

Life cycles and development patterns, Adaptations to environmental conditions, Dispersal and Migration, Patterns and mechanisms of dispersal, Migration and its ecological significance

UNIT V

Sustainable resource management, Fieldwork and Data Analysis, Field techniques for studying populations, Data collection, analysis, and interpretation

Textbook: "Population Ecology: A Unified Study of Animals and Plants" by Michael Begon, John L. Harper, and Colin R. Townsend

MEWAR UNIVERSITY, GANGRAR, CHITTORGARH
DEPARTMENT OF LIFE SCIENCE

Aquarium Management

UNIT I

Introduction to Aquarium Management, Scope and importance of aquarium management, Ethical considerations and responsible aquarium keeping, Aquarium Design and Setup, Types of aquariums (freshwater, marine, reef), Tank selection, location, and equipment setup

UNIT II

Aquascaping and aesthetic considerations, Water Chemistry and Quality, Importance of water chemistry for aquarium health, pH, temperature, hardness, and other parameters, Water testing methods and interpretation of results

UNIT III

Filtration Systems, Mechanical, biological, and chemical filtration, Types of filtration systems (canister filters, protein skimmers, etc.), Maintenance and troubleshooting of filtration equipment, Fish and Invertebrate Selection, Species compatibility and community planning

UNIT IV

Proper acclimation and introduction procedures, Considerations for selecting fish and invertebrates

Feeding and Nutrition, Dietary requirements of aquarium inhabitants, Types of fish food and feeding techniques, Nutritional supplementation and balanced diets, Aquarium Maintenance, Water changes and cleaning procedures

UNIT V

Algae control and management, Preventive maintenance and troubleshooting common issues

Disease Prevention and Treatment, Common diseases in aquariums and their causes,

Quarantine protocols and disease prevention strategies

Textbook: "The Simple Guide to Freshwater Aquariums" by David E. Boruchowitz