P. RAMI REDDY MEMORIAL COLLEGE OF PHARMACY
(AUTONOMOUS)
44/35-1, Prakruthi Nagar, Utukur, Kadapa – 516 003 A.P.
(Approved by AICTE & PCI, New Delhi and Affiliated to JNTUA, Ananthapuramu)
Recognized u/s 2(f) & 12(b) of the UGC Act, 1956, New Delhi. Accredited by NAAC.

PRRMCP R25 REGULATIONS

Academic Regulations & Syllabus (R25) for M.Pharmacy (Regular – Full Time)

(Effective for the students admitted into I Year from the Academic Year 2025 – 2026 onwards)

P. Rami Reddy Memorial College of Pharmacy (Autonomous) offers **Two** Years (**Four** Semesters) full-time Master of Pharmacy (M.Pharm.) Post Graduate Degree programme, under Choice Based Credit System (CBCS) with different specializations.

P. Rami Reddy Memorial College of Pharmacy (Autonomous) shall confer M.Pharm. degree on candidates who are admitted to the programme and fulfill all the requirements for the award of the degree.

1. Award of the M.Pharm. Degree

A student will be declared eligible for the award of the M.Pharm. degree if he/she fulfils the following:

1.1 Pursues a course of study for not less than two academic years and not more than four academic years.

1.2 Registers for 95 credits and secures all 95 credits.

2. Students, who fail to fulfil all the academic requirements for the award of the degree within four academic years from the year of their admission, shall forfeit their seat in M.Pharm. course and their admission stands cancelled.

3. Programme of Study:

The following M.Pharm. specializations are offered at P. Rami Reddy Memorial College of Pharmacy (Autonomous):

S. No.	Discipline	Name of the Specialization	Code
1	Master of Pharmacy	Pharmacology	RRCOL
2		Pharmaceutics	RRCEU
4		Pharmaceutical Analysis	RRANA
5		Pharmacognosy	RRCOG

and any other specializations as approved by PCI/University from time to time.

4. Eligibility for Admissions:

4.1 Admission to the M.Pharm. programme shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University for each programme, from time to time.

4.2 Admissions shall be made on the basis of either the merit rank or Percentile obtained by the qualified student in the relevant qualifying GPAT Examination / the merit rank obtained by the qualified student in an entrance test conducted by A.P. State Government (APPGECET) for M.Pharm. programmes/an entrance test conducted by university/ on the basis of any other exams approved by the University, subject to reservations as laid down by the Govt. from time to time.

5. Programme related terms:

5.1 ***Credit:*** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

Credit definition:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit

5.2 ***Academic Year:*** Two consecutive (one odd + one even) semesters constitute one academic year.

5.3 ***Choice Based Credit System (CBCS):*** The CBCS provides choice for students to select from the prescribed courses.

6. Programme Pattern:

6.1 Total duration of the of M.Pharm. programme is two academic years

6.2 Each academic year of study is divided into two semesters.

6.3 Each Semester shall be of 22 weeks duration (inclusive of Examinations), with a minimum of 90 instructional days per semester.

6.4 The student shall not take more than four academic years to fulfill all the academic requirements for the award of M.Pharm. degree from the date of commencement of first year first semester, failing which the student shall forfeit the seat in M.Pharm. programme.

6.5 The medium of instruction of the programme (including examinations and project reports) will be in English only.

6.6 All subjects/courses offered for the M.Pharm. programme are broadly classified as follows:

S. No.	Broad Course Classification	Course Category	Description
1.	Core Courses	Foundational & Professional Core Courses (PC)	Includes subjects related to the parent discipline
2.	Elective Courses	Electives	Includes elective subjects related to the parent discipline/inter-disciplinary subjects or subjects in an area outside the parent discipline which are of importance in the context of special skill development
3.	Research	Research methodology & IPR	To understand importance and process of creation of patents through research
		Seminar	Ensures preparedness of students to undertake major projects/Dissertation, based on core contents related to specialization
		Cocurricular Activities/Journal Club	Attending conferences, scientific presentations and other scholarly activities
		Dissertation	Major Project
4.		Mandatory noncredit courses	Covering subjects of developing desired attitude among the learners is on the line of initiatives such as Unnat Bharat Abhiyan, Yoga, Value education etc.

6.7 The college shall take measures to implement Virtual Labs (https://www.vlab.co.in) which provide remote access to labs in various disciplines of science and will help

student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.

6.8 A faculty advisor/mentor shall be assigned to each specialization to advise students on the programme, its Course Structure and Curriculum, Choice of Courses, based on his competence, progress, pre-requisites and interest.

6.9 Preferably 25% course work for the theory courses in every semester shall be conducted in the blended mode of learning.

7. Attendance Requirements:

7.1 A student shall be eligible to appear for the Institutional external examinations if he/she acquires i) a minimum of 50% attendance in each course and ii) 75% of attendance in aggregate of all the courses.

7.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

7.3 Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence

7.4 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class.

7.5 A stipulated fee shall be payable towards condonation of shortage of attendance.

7.6 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek re-admission into that semester when offered next.

7.7 If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

7.8 If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.

8. Evaluation – Distribution and Weightage of Marks:

The performance of a student in each semester shall be evaluated subject - wise (irrespective of credits assigned), for a maximum of 100 marks for theory and 100 marks for practical, based on Internal Evaluation and End Semester Examination.

8.1 There shall be five units in each of the theory subjects. For the theory subjects 60 marks will be for the End Examination and 40 marks will be for Internal Evaluation.

8.2 Two Internal Examinations shall be conducted for 30 marks each, one in the middle of the Semester and the other immediately after the completion of instruction. First mid examination shall be conducted for I & II units of the syllabus and second mid examination for III, IV & V units. Each mid exam shall be conducted for a total duration of 120 minutes with 3 questions (without choice) each question for 10 marks. Final Internal marks for a total of 30 marks shall be arrived at by considering the marks secured by the student in both the internal examinations with 80% weightage to the better internal exam and 20% to the other. There shall be an online examination (TWO) conducted during the respective mid examinations by the college for the remaining 10 marks with 20 objective questions.

8.3 The following pattern shall be followed in the End Examination:

- Five questions shall be set from each of the five units with either/or type for 12 marks each.
- All the questions have to be answered compulsorily.
- Each question may consist of one, two or more bits.

8.4 For practical subjects, 60 marks shall be for the End Semester Examinations and 40 marks will be for internal evaluation based on the day-to-day performance.

The internal evaluation based on the day-to-day work-10 marks, record- 10 marks and the remaining 20 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the examiners, with a breakup mark of Procedure-10, Experimentation-25, Results-10, Viva- voce-15.

8.5 There shall be a **Seminar/Assignment** for internal evaluation of 100 marks. A student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee consisting of Head of the Department, supervisor/mentor and two other faculty members of the department. The student has to secure a minimum of 50% of marks, to be declared successful. If he fails to obtain the minimum marks, he has to reappear for the same as and when supplementary examinations are conducted. The seminar shall be conducted anytime during the semester as per the convenience of the Project Review Committee and students. There shall be no external examination for Technical Seminar.

8.6 For Teaching Practice/Assignments there will be an internal evaluation of 100 marks. A candidate has to secure a minimum of 50% to be declared successful. Student has to teach 10 Hours in his/her interesting subject/subjects in the entire III Semester instruction period for his juniors at PG level or Undergraduate students who are available on the campus. For each teaching hour maximum of 10 marks are allotted. The assessment will be made by the faculty allotted by the HoD.

8.7 There shall be Mandatory **Audit courses** for zero credits. There is no external examination for audit courses. However, attendance shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 50% or more in the internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates for 40 marks every six months/semester satisfying the conditions mentioned in item 1 & 2 of the regulations.

8.8 There shall be **Comprehensive Viva–Voce** in III semester**.** This will test the student's learning and understanding during the course of their specialization. The Comprehensive viva-voce will be conducted by the committee consisting of Head of the Department and two faculty members related to the specialization. The Comprehensive Viva-Voce shall be evaluated for 100 marks by the committee. There are no internal marks for the Comprehensive Viva-Voce. A student shall acquire 2 credits assigned to the Comprehensive Viva–voce when he/she secures 50% or more marks for the total of 100 marks. In case, if a student fails in Comprehensive Viva–voce he/she shall reappear as and when III semester supplementary examinations are conducted.

8.9 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

8.10 In case the candidate does not secure the minimum academic requirement in any of the subjects he/she has to reappear for the Semester Examination either supplementary or regular in that subject or repeat the course when next offered or do any other specified subject as may be required.

8.11 The laboratory records and mid semester test papers shall be preserved for a minimum of 3 years in the institution as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

9. Credit Transfer Policy (As per the guidelines of JNTUA)

As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the University shall allow up to a maximum of 40% of the total courses being offered in a particular Programme in a semester through the Online Learning courses through SWAYAM.

9.1 The Institute shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses through SWAYAM platform.

9.2 The online learning courses available on the SWAYAM platform will be considered for credit transfer. SWAYAM course credits are as specified in the platform

9.3 Student registration for the MOOCs shall be only through the institution, it is mandatory for the student to share necessary information with the institution

9.4 The institution shall select the courses to be permitted for credit transfer through SWAYAM. However, while selecting courses in the online platform institution would essentially avoid the courses offered through the curriculum in the offline mode.

9.5 The institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer in the forthcoming Semester.

9.6 The institution shall also ensure that the student has to complete the course and produce the course completion certificate as per the academic schedule given for the regular courses in that semester

9.7 The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.

9.8 The university shall ensure no overlap of SWAYAM MOOC exams with that of the university examination schedule. In case of delay in SWAYAM results, the university will re-issue the marks sheet for such students.

9.9 Student pursuing courses under MOOCs shall acquire the required credits only after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades.

9.10 The institution shall submit the following to the examination section of the university:

a) List of students who have passed MOOC courses in the current semester along with the certificates of completion.

b) Undertaking form filled by the students for credit transfer.

9.11 The Institute with the help of University shall resolve any issues that may arise in the implementation of this policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state govt.

Note: Students shall also be permitted to register for MOOCs offered through online platforms other than SWAYAM NPTEL. In such cases, credit transfer shall be permitted only after seeking approval of the University at least three months prior to the commencement of the semester.

10. Re-registration for Improvement of Internal Evaluation Marks:

A candidate shall be given one chance to re-register for each subject provided the internal marks secured by a candidate are less than 50% and has failed in the end examination

10.1 The candidate should have completed the course work and obtained examinations results for **I, II and III** semesters.

10.2 The candidate should have passed all the subjects for which the Internal Evaluation marks secured are more than 50%.

10.3 Out of the subjects the candidate has failed in the examination due to Internal Evaluation marks secured being less than 50%, the candidate shall be given one

chance for each Theory subject and for a maximum of **three** Theory subjects for Improvement of Internal evaluation marks.

10.4 The candidate has to re-register for the chosen subjects and fulfill the academic requirements.

10.5 For reregistration the candidates have to apply to the Institutional Exam Section by paying the requisite fees and get approval from the Controller of Examinations before the start of the semester in which re-registration is required

10.6 In the event of availing the Improvement of Internal evaluation marks, the internal evaluation marks as well as the End Examinations marks secured in the previous attempt(s) for the reregistered subjects stand cancelled.

11. Evaluation of Project/Research Work:

The Project work shall be initiated at the beginning of the III Semester and the duration of the Project is of two semesters. Evaluation of Project work is for 300 marks with 200 marks for internal evaluation and 100 marks for external evaluation. Internal evaluation of the Project Work – I & Project work – II in III & IV semesters respectively shall be for 100 marks each. External evaluation of final Project work viva voce in IV semester shall be for 100 marks.

A Project Review Committee (PRC) shall be constituted with the Head of the Department as Chairperson, Project Supervisor and one faculty member of the department offering the M.Pharm. programme.

11.1 A candidate is permitted to register for the Project Work in III Semester after satisfying the attendance requirement in all the subjects, both theory and laboratory (in I & II semesters).

11.2 A candidate is permitted to submit Project dissertation with the approval of PRC. The candidate has to pass all the theory, practical and other courses before submission of the Thesis.

11.3 Project work shall be carried out under the supervision of teacher in the parent department concerned.

11.4 A candidate shall be permitted to work on the project in an industry/research organization on the recommendation of the Head of the Department. In such cases, one of the teachers from the department concerned would be the internal guide and an expert from the industry/ research organization concerned shall act as co-supervisor/ external guide. It is mandatory for the candidate to make full disclosure of all data/results on which they wish to base their dissertation. They cannot claim confidentiality simply because it would come into conflict with the Industry's or R&D laboratory's own interests. A certificate from the external supervisor is to be included in the dissertation.

11.5 Continuous assessment of Project Work - I and Project Work – II in III & IV semesters respectively will be monitored by the PRC.

11.6 The candidate shall submit status report by giving seminars in three different phases (two in III semester and one in IV semester) during the project work period. These seminar reports must be approved by the PRC before submission of the Project Thesis.

11.7 After registration, a candidate must present in Project Work Review - I, in consultation with his Project Supervisor, the title, objective and plan of action of his Project work to the PRC for approval within four weeks from the commencement of III Semester. Only after obtaining the approval of the PRC can the student initiate the project work.

11.8 The Project Work Review - II in III semester carries internal marks of 100.

Evaluation should be done by the PRC for 50 marks and the Supervisor will evaluate the work for the other 50 marks. The Supervisor and PRC will examine the Problem Definition, Objectives, Scope of Work, Literature Survey in the same domain and progress of the Project Work.

11.9 A candidate has to secure a minimum of 50% of marks to be declared successful in Project Work Review - II. Only after successful completion of Project Work Review – II, candidate shall be permitted for Project Work Review – III in IV Semester. The unsuccessful students in Project Work Review - II shall reappear for it as and when supplementary examinations are conducted.

11.10 The Project Work Review - III in IV semester carries 100 internal marks. Evaluation should be done by the PRC for 50 marks and the Supervisor will evaluate it for the other 50 marks. The PRC will examine the overall progress of the Project Work and decide whether or not eligible for final submission. A candidate has to secure a minimum of 50% of marks to be declared successful in Project Work Review - III. If he fails to obtain the required minimum marks, he has to reappear for Project Work Review - III after a month.

11.11 For the approval of PRC the candidate shall submit the draft copy of dissertation to the Head of the Department and make an oral presentation before the PRC.

11.12 After approval from the PRC, the students are required to submit a report showing that the plagiarism is within 30%. The dissertation report will be accepted only when the plagiarism is within 30%, which shall be submitted along with the dissertation report.

11.13 Research paper related to the Project Work shall be published in conference proceedings/UGC recognized journal. A copy of the published research paper shall be attached to the dissertation.

11.14 After successful plagiarism check and publication of research paper, three copies of the dissertation certified by the supervisor and HOD shall be submitted to the College.

11.15 The dissertation shall be adjudicated by an external examiner selected by the Controller of Examination. For this, the HOD of the respective department shall submit a panel of three examiners as submitted by the supervisor concerned. However, the dissertation will be adjudicated by one examiner nominated by the Controller of Examination.

11.16 If the report of the examiner is not satisfactory, the candidate shall revise and resubmit the dissertation, in the time frame as decided by the PRC. If report of the examiner is unfavorable again, the thesis shall be summarily rejected. The candidate has to reregister for the project and complete the project within the stipulated time after taking the approval from the Exam Section.

11.17 If the report of the examiner is satisfactory, the Head of the Department shall coordinate and make arrangements for the conduct of Project Viva voce exam.

11.18 The Project Viva voce examinations shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who has adjudicated the dissertation. For Dissertation Evaluation (Viva voce) in IV Sem. there are external marks of 100 and it is evaluated by external examiner. The candidate has to secure a minimum of 50% marks in Viva voce exam.

11.19 If he fails to fulfill the requirements as specified, he will reappear for the Project Viva voce examination only after three months. In the reappeared examination also, if he fails to fulfill the requirements, he will not be eligible for the award of the degree.

12. Credits for Co-curricular Activities

The credits assigned for co-curricular activities shall be given by the HOD of the respective departments and the same shall be submitted to the Exam section.

A Student shall earn 02 credits under the head of co-curricular activities, viz., attending Conference, Scientific Presentations and Other Scholarly Activities.

Following are the guidelines for awarding Credits for Co-curricular Activities

Name of the Activity	Maximum Credits / Activity
Participation in National Level Seminar/ Conference / Workshop/Training programs (related to the specialization of the student)	1
Participation in International Level Seminar / Conference /workshop/Training programs held outside India (related to the specialization of the student)	2
Academic Award/Research Award from State Level/National	1

Note:

i) Credit shall be awarded only for the first author. Certificate of attendance and participation in a Conference/Seminar is to be submitted for awarding credit.
ii) Certificate of attendance and participation in workshops and training programs (Internal or External) is to be submitted for awarding credit. The total duration should be at least one week.
iii) Participation in any activity shall be permitted only once for acquiring required credits under cocurricular activities.

13. Grading:

As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed:

After each course is evaluated for 100 marks, the marks obtained in each course will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Grade	Grade points Assigned
≥ 90	S (Superior)	10
≥ 80 < 90	A (Excellent)	9
≥ 70 < 80	B (Very Good)	8
≥ 60 < 70	C (Good)	7
≥ 50 < 60	D (Pass)	6
< 50	F (Fail)	0
Absent	Ab (Absent)	0

i) A student obtaining Grade 'F' or Grade 'Ab' in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.
ii) For noncredit audit courses, "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA/Percentage.

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$SGPA = \Sigma (C_i \times G_i)/\Sigma C_i$$

where, C_i is the number of credits of the i^{th} subject and G_i is the grade point scored by the student in the i^{th} course.

i) The Cumulative Grade Point Average (CGPA) will be computed in the same manner considering all the courses undergone by a student over all the semesters of a program, i.e.,

$$CGPA = \Sigma (C_i \times S_i)/ \Sigma C_i$$

where "S_i" is the SGPA of the i^{th} semester and C_i is the total number of credits up to that semester.

ii) Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
iii) While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale. Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D and F.

14. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of M. Pharm. Degree, he shall be placed in one of the following three classes:

Class Awarded	Percentage of Marks to be secured
First Class with Distinction	≥70%
First Class	< 70% ≥ 60%
Pass Class	< 60% ≥ 50%

15. Exit Policy: The student shall be permitted to exit with a PG Diploma based on his/her request to the university through the respective institution at the end of first year subject to passing all the courses in first year.

The University shall resolve any issues that may arise in the implementation of this policy from time to time and shall review the policy in the light of periodic changes brought by UGC, PCI, AICTE and State government.

16. Withholding of Results:

If the candidate has any case of in-discipline pending against him, the result of the candidate shall be withheld, and he will not be allowed/promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

17. Transitory Regulations

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

18. General:

18.1 The academic regulations should be read as a whole for purpose of any interpretation.

18.2 Disciplinary action for Malpractice/improper conduct in examinations is appended.

18.3 There shall be no places transfer within the constituent colleges and affiliated colleges of Jawaharlal Nehru Technological University Anantapur.

18.4 Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

18.5 In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

18.6 The University may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the University.

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RULES FOR

DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	**Punishment**
	If the candidate:	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for four consecutive semesters from class work and all University examinations, if his involvement is established. Otherwise, the candidate is debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from classwork and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject only.
6.	Refuses to obey the orders of the Chief Superintendent /Assistant - Superintendent /any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. If the candidate physically assaults the invigilator/ officer-in-charge of the Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person (s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject only or in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester / year examinations, depending on the recommendation of the committee.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators.

i) Punishments to the candidates as per the above guidelines.
ii) Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices)
iii) A show cause notice shall be issued to the college.
iv) Impose a suitable fine on the college.
v) Shifting the examination center from the college to another college for a specific period of not less than one year.

Note: Whenever the performance of a student is cancelled in any subject/subjects due to Malpractice, he/she has to register for End Examinations in that subject/subjects consequently and has to fulfil all the norms required for the award of Degree.

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M.PHARM. IN PHARMACOLOGY
COURSE STRUCTURE & SYLLABI

SEMESTER – I

S. No.	Course code	Course Name	Hours per week			Credits
			L	T	P	
1.	25S01101	Modern Pharmaceutical Analytical Techniques	4	-	-	4
2.	25S01102	Advanced Pharmacology-I	4	-	-	4
3.	25S01103	Clinical Pharmacology and Pharmacotherapeutics	4	-	-	4
4.	25S01104	Cellular and Molecular Pharmacology	4	-	-	4
5.	25S01105	Modern Pharmaceutical Analytical Techniques Lab	-	-	6	3
6.	25S01106	Advanced Pharmacology – I Lab	-	-	6	3
7.	25DAC101a 25DAC101b 25DAC101c	**Audit Course – I** English for Research paper writing Disaster Management Sanskrit for Technical Knowledge	2	-	-	0
8.	25S01107	Seminar/Assignment	-	1	6	4
		Total	18	1	18	26

SEMESTER – II

S. No.	Course code	Course Name	Hours per			Credits
			L	T	P	
1.	25S01201	Advanced Pharmacology- II	4	-	-	4
2.	25S01202	Pharmacological Screening Methods & Toxicology	4	-	-	4
3.	25S01203	Principles of Drug Discovery	4	-	-	4
4.	25S01204	Clinical research and Pharmacovigilance	4	-	-	4
5.	25S01205	Advanced Pharmacology -II Lab	-	-	6	3
6.	25S01206	Pharmacological Screening Methods & Toxicology Lab	-	-	6	3
7.	25DAC201a 25DAC201b 25DAC201c	**Audit Course – II** Pedagogy Studies Stress Management from Yoga Personality Development through Life Enlightenment Skills	2	-	-	0
8.	25S01207	Seminar/Assignment	-	1	6	4
		Total	18	1	18	26

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SEMSTER - III

S. No.	Course code	Course Name	Hours per			Credits
			L	T	P	
1.	25DRM101	Research Methodology and Intellectual Property Rights	4	-	-	4
2.	25SOE301a 25SOE301b 25SOE301c	**Open Elective** Pharmaceutical Validation Biostatistics Entrepreneurship Management	3	-	-	3
3.	25S01302	Teaching Practice/Assignment	-	-	4	2
4.	25S01303	Comprehensive viva voce	-	-	-	2
	25S01304	Research Work – I	-		24	12
		Total	7	-	32	23

SEMESTER - IV

S. No.	Course code	Course Name	Hours per			Credits
			L	T	P	
1.	25S01401	Co-Curricular Activities	2			2
2.	25S01402	Research Work – II	3		30	18
		Total	5		30	20

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Course Code	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES	L	T	P	C
25S01101		4	0	0	4
	Semester	I			

Course Objectives:

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

Course Outcomes (CO): Student will be able to

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

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

Chromatography

Introduction to chromatography and classification of chromatographic methods based on the mechanism of separation, Principle, instrumentation, selection of solvents;
chromatographic parameters, factors affecting resolution, applications of the following:

a) Thin Layer chromatography; b) High Performance Thin Layer Chromatography
c) Paper Chromatography; d) Column chromatography
e) Gas chromatography; f) High Performance Liquid chromatography
g) Affinity chromatography; h) Gel Chromatography
i)Hyphenated techniques :

- Ultra High Performance Liquid chromatography- Mass spectroscopy
- Gas Chromatography-Mass Spectroscopy

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Reference Books:

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
3. Spectrometric Identification of Organic compounds - Robert M Silverstein,Sixth edition, John Wiley & Sons, 2004.
4. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler,Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
5. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
6. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4thedition, CBS Publishers, New Delhi, 1997.
7. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
8. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi,3rd Edition, CBS Publishers, New Delhi, 1997.
9. Pharmaceutical Analysis - Modern Methods – Part B - J W Munson, Vol11, Marcel. Dekker Series
10. Spectroscopy of Organic Compounds, 2nd edn., P.S/Kalsi, Wiley esternLtd., Delhi.
11. Textbook of Pharmaceutical Analysis, KA.Connors, 3rd Edition, John Wiley& Sons, 1982.
12. Organic Chemistry by I. L. Finar
13. Quantitative Analysis of Drugs by D. C. Garrett
14. HPTLC by P.D. Seth
15. Indian Pharmacopoeia 2007
16. High Performance thin layer chromatography for the analysis of medicinal plants by Eike
17. Reich, Anne Schibli
18. Introduction to instrumental analysis by Robert. D. Braun

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COURSE STRUCTURE & SYLLABI

Course Code	ADVANCED PHARMACOLOGY- I	L	T	P	C
25S01102		4	0	0	4
	Semester	I			

Course Objectives:

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

Course Outcomes (CO): Student will be able to

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

UNIT – I

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

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

UNIT – II

Neurotransmission

a. General aspects and steps involved in neurotransmission.

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

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

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

Systemic Pharmacology: A detailed study on pathophysiology of diseases, mechanism of action, pharmacology and toxicology of existing as well as novel drugs used in the following systems Autonomic Pharmacology: Parasympathomimetics and lytics, sympathomimetics and lytics, agents affecting neuromuscular junction

UNIT - III

Central nervous system Pharmacology

General and local anesthetics, Sedatives and hypnotics, drugs used to treat anxiety. Depression, psychosis, mania, epilepsy, neurodegenerative diseases. Narcotic and non-narcotic analgesics.

UNIT - IV

Cardiovascular Pharmacology

Diuretics, antihypertensives, antiischemics, anti- arrhythmics, drugs for heart failure and hyperlipidemia. Hematinics, coagulants, anticoagulants, fibrinolytics and antiplatelet drugs

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COURSE STRUCTURE & SYLLABI

UNIT - V		
Autacoid Pharmacology The physiological and pathological role of Histamine, Serotonin, Kinins Prostaglandins Opioid autacoids. Pharmacology of antihistamines, 5HT antagonists		
Reference Books:		
1. The Pharmacological Basis of Therapeutics, Goodman and Gillman‘s 2. Principles of Pharmacology. The Pathophysiologic basis of drug Therapy by David E Golan, Armen H, Tashjian Jr, EhrinJ, Armstrong, April W, Armstrong, Wolters, Kluwer-Lippincott Williams & Wilkins Publishers. 3. Basic and Clinical Pharmacology by B. G Katzung 4. Hand book of Clinical Pharmacokinetics by Gibaldi and Prescott. 5. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel and Andrew B. C. Yu. 6. Graham Smith. Oxford textbook of Clinical Pharmacology. 7. Avery’s Drug Treatment 8. Dipiro Pharmacology, Pathophysiological approach. 9. Green Pathophysiology for Pharmacists		

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COURSE STRUCTURE & SYLLABI

Course Code	CLINICAL PHARMACOLOGY AND PHARMACOTHERAPEUTICS	L	T	P	C
25S01103		4	0	0	4
	Semester	I			

Course Objectives:

This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.

Course Outcomes (CO): Student will be able to

- The pathophysiology of selected disease states and the rationale for drug therapy; the controversies in drug therapy;
- The importance of preparation of individualized therapeutic plans based on diagnosis;
- Needs to identify the patient-specific parameters relevant in initiating drug therapy, and
- Monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);
- Summarize the therapeutic approach to management of these diseases including reference
- To the latest available evidence;
- Therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).
- Pathophysiology and applied Pharmacotherapeutics of diseases associated with following system/diseases with of special reference to the drug of choice

UNIT - I

Principles of Pharmacokinetics
1. Revision of basic concepts.
2. Clinical Pharmacokinetics.
a. Dose – response in man
b. Influence of renal and hepatic disease on Pharmacokinetics
c. Therapeutics drug monitoring & individualization of drug therapy
d. Population Pharmacokinetics.

UNIT - II

Adverse Drug Reactions, Drug Interactions, ADR monitoring & Pharmacovigilance

UNIT - III

Pathophysiology and drug therapy of the following disorders. Schizophrenia, anxiety, depression, epilepsy, Parkinson's, alzheimer's diseases, migraine, hypertension, angina pectoris, arrhythmias, atherosclerosis, myocardial infarction.

UNIT - IV

Pathophysiology and drug therapy of the following disorders. TB, leprosy, leukemia, solid tumors, lymphomas, psoriasis, respiratory, urinary, G.I. tract infections, endocarditis, fungal and HIV infection, rheumatoid arthritis, glaucoma, menstrual disorders, menopause.

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COURSE STRUCTURE & SYLLABI

UNIT - V		
Drug therapy in a) Geriatrics b) Paediatrics c) Pregnancy & Lactation. d) Renal & hepatic insufficiency		

Reference 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. Pathologic basis of disease - Robins SL, W.B. Saunders publication.
4. Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice - Green and Harris, Chapman and Hall publication.
5. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication.
6. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA
7. Avery's Drug Treatment, 4th Edn, 1997, Adis International Limited.
8. Relevant review articles from recent medical and pharmaceutical literature.
9. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange
10. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
11. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA

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COURSE STRUCTURE & SYLLABI

Course Code	CELLULAR AND MOLECULAR PHARMACOLOGY	L	T	P	C
25S01104		4	0	0	4
	Semester	I			

Course Objectives:

The subject imparts a fundamental knowledge on the structure and functions of cellular components and help to understand the interaction of these components with drugs. This information will further help the student to apply the knowledge in drug discovery process

Course Outcomes (CO): Student will be able to

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

UNIT – I

Cell biology

Structure and functions of cell and its organelles Genome organization. Gene expression and its regulation, importance of siRNA and micro RNA, gene mapping and gene sequencing Cell cycles and its regulation. Cell death– events, regulators, intrinsic and extrinsic pathways of apoptosis. Necrosis and autophagy

UNIT – II

Cell signaling

Intercellular and intracellular signaling pathways.

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

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

Detailed study of following intracellular signaling pathways: cyclic AMP signaling pathway, mitogen-activated protein kinase (MAPK) signaling, Janus kinase (JAK)/signal transducer and activator of transcription (STAT) signaling pathway

UNIT – III

Principles and applications of genomic and proteomic tools DNA electrophoresis, PCR (reverse transcription and real time), Gene sequencing, micro array technique, SDS page, ELISA and western blotting, Recombinant DNA technology and gene therapy.

Basic principles of recombinant DNA technology-Restriction enzymes, various types of vectors. Applications of recombinantDNA technology.

Gene therapy- Various types of gene transfer techniques, clinical applications and recent advances in gene therapy

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COURSE STRUCTURE & SYLLABI

UNIT – IV		
Pharmacogenomics Gene mapping and cloning of disease gene. Genetic variation and its role in health/ pharmacology Polymorphisms affecting drug metabolism Genetic variation in drug transporters Genetic variation in G protein coupled receptors Applications of proteomics science: Genomics, proteomics, metabolomics, functionomics, nutrigenomics. Immunotherapeutics Types of immunotherapeutics, humanization antibody therapy, Immunotherapeutics in clinical practice		

UNIT – V		
a. Cell culture techniques Basic equipments used in cell culture lab. Cell culture media, various types of cell culture, general procedure for cell cultures; isolation of cells, subculture, cryopreservation, characterization of cells and their application. Principles and applications of cell viability assays, glucose uptake assay, Calcium influx assays Principles and applications of flow cytometry b. Biosimilars		
Reference Books:		
1. The Cell, A Molecular Approach. Geoffrey M Cooper. 2. Pharmacogenomics: The Search for Individualized Therapies. Edited by J.Licinio and M -L. Wong 3. Handbook of Cell Signaling (Second Edition) Edited by Ralph A. et.al 4. Molecular Pharmacology: From DNA to Drug Discovery. John Dickensonet.al 5. Basic Cell Culture protocols by Cheril D.Helgason and Cindy L.Miller 6. Basic Cell Culture (Practical Approach) by J. M. Davis (Editor) 7. Animal Cell Culture: A Practical Approach by John R. Masters (Editor) 8. Current porotocols in molecular biology vol I to VI edited by FrederickM.Ausuvel et al.		

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COURSE STRUCTURE & SYLLABI

Course Code	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES LAB	L	T	P	C
25S01105		0	0	6	3
	Semester	I			

1. Analysis of Pharmacopoeial compounds and their formulations by UV Vis Spectrophotometer.
2. Simultaneous estimation of multi component containing formulations by UV Spectrophotometry
3. Effect of pH and solvent on UV –Spectrum
4. Determination of Molar absorption coefficient
5. Estimation of riboflavin/ quinine sulphate by fluorimetry
6. Study of quenching effect by fluorimetry
7. Estimation of sodium or potassium by flame photometry
8. Colorimetric determination of drugs by using different reagents
9. Qunatitative determination of functional groups
10. Experiments based on Column chromatography
11. Experiments based on HPLC
12. Experiments based on Gas Chromatography

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Course Code	ADVANDED PHARMACOLOGY – I LAB	L	T	P	C
25S01106		4	0	0	4
	Semester	I			

List of experiments

Handling of laboratory animals.

1. Various routes of drug administration.
2. Study of techniques of blood sampling, anesthesia and euthanasia of experimental animals.
3. To record the dose response curve of Ach using isolated ileum/rectus abdominis muscle preparation.
4. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by interpolation method.
5. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by three point method.
6. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by four point method.
7. Estimation of pA2 value on isolated tissues
8. Bioassay of 5-HT using rat fundus strip
9. Bioassay of oxytocin using rat uterus

Reference Books:

1. CPCSEA, OECD, ICH, USFDA, Schedule Y, EPA guidelines,
2. Fundamentals of experimental Pharmacology by M. N. Ghosh
3. Handbook of Experimental Pharmacology by S.K. Kulkarni.
4. Drug discovery and Evaluation by Vogel H.G.
5. Practical Manual of Experimental and Clinical Pharmacology by Bikash Medhi (Author), Ajay Prakash (Author) Jaypee brothers' medical publishers Pvt. Ltd

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COURSE STRUCTURE & SYLLABI

Course Code	ADVANCED PHARMACOLOGY – II	L	T	P	C
25S01201		4	0	0	4
	Semester	II			

Course Objectives:

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

Course Outcomes (CO): Student will be able to

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

UNIT – I

Endocrine Pharmacology: Molecular and cellular mechanism of action of hormones such as growth hormone, prolactin, thyroid, insulin and sex hormones Anti-thyroid drugs, Oral hypoglycemic agents, Oral contraceptives, Corticosteroids. Drugs affecting calcium regulation.

UNIT – II

Chemotherapy: Cellular and molecular mechanism of actions and resistance of antimicrobial agents such as ß-lactams, aminoglycosides, quinolones, Macrolide antibiotics. Antifungal, antiviral, and anti-TB drugs

UNIT – III

Chemotherapy: Drugs used in Protozoal Infections Drugs used in the treatment of Helminthiasis Chemotherapy of cancer Immunopharmacology Cellular and biochemical mediators of inflammation and immune response. Allergic or hypersensitivity reactions. Pharmacotherapy of asthma and COPD. Immunosuppressants and Immunostimulants.

UNIT – IV

GIT Pharmacology: Antiulcer drugs, Prokinetics, antiemetics, anti-diarrheals and drugs for constipation and irritable bowel syndrome. Chronopharmacology Biological and circadian rhythms, applications of chronotherapy in various diseases like cardiovascular disease, diabetes, asthma, and peptic ulcer

UNIT – V

Free radicals Pharmacology: Generation of free radicals, role of free radicals in etiopathology of various diseases such as diabetes, neurodegenerative diseases and cancer. Protective activity of certain important antioxidant Recent Advances in Treatment: Alzheimer's disease, Parkinson's disease, Cancer, Diabetes mellitus

Reference Books:

1. The Pharmacological basis of therapeutics- Goodman and Gill man's
2. Principles of Pharmacology. The Pathophysiologic basis of drug therapy by David E Golan et al.
3. Basic and Clinical Pharmacology by B. G -Katzung
4. Pharmacology by H.P. Rang and M.M. Dale.
5. Hand book of Clinical Pharmacokinetics by Gibaldi and Prescott.
6. Text book of Therapeutics, drug and disease management by E T. Herfindal and Gourley.
7. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel and Andrew B. C. Yu.
8. Handbook of Essential Pharmacokinetics, Pharmacodynamics and Drug Metabolism for Industrial Scientists

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9. Robbins & Cortan Pathologic Basis of Disease, 9th Ed. (RobbinsPathology)
10. A Complete Textbook of Medical Pharmacology by Dr. S. K Srivastava published by A P C Avichal Publishing Company.
11 K D. Tripathi. Essentials of Medical Pharmacology Principles of Pharmacology.
12.The Pathophysiologic basis of drug Therapyby David E Golan, Armen H, Tashjian Jr., EhrinJ, Armstrong, April W, Armstrong, Wolters, Kluwer-Lippincott Williams & Wilkins Publishers

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COURSE STRUCTURE & SYLLABI

Course Code	PHARMACOLOGICAL SCREENING METHODS & TOXICOLOGY	L	T	P	C
25S01202		4	0	0	4
	Semester	**II**			

Course Objectives:

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

Course Outcomes (CO): Student will be able to

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

UNIT – I

Laboratory Animals: Common laboratory animals: Description, handling and applications of different species and strains of animals. Transgenic animals: Production, maintenance and applications Anesthesia and euthanasia of experimental animals. Maintenance and breeding of laboratory animals.
CPCSEA guidelines to conduct experiments on animals Good laboratory practice. Bioassay-Principle, scope and limitations and methods

UNIT – II

Preclinical screening of new substances for the pharmacological activity using *in- vivo, in -vitro*, and other possible animal alternative models. General principles of preclinical screening. CNS Pharmacology: behavioral and muscle co ordination, CNS stimulants and depressants, anxiolytics, anti-psychotics, anti epileptics and nootropics. Drugs for neurodegenerative diseases like Parkinsonism, Alzheimers and multiple sclerosis. Drugs acting on Autonomic Nervous System.

UNIT – III

Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Respiratory Pharmacology: anti-asthmatics, drugs for COPD and anti allergics. Reproductive Pharmacology: Aphrodisiacs and antifertility agents Analgesics, anti-inflammatory and antipyretic agents. Gastrointestinal drugs: anti ulcer, anti -emetic, antidiarrheal and laxatives.

UNIT – IV

Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Cardiovascular Pharmacology: antihypertensives, antiarrhythmics, antianginal, antiatherosclerotic agents and diuretics. Drugs for metabolic disorders like anti-diabetic, antidyslipidemic agents. Anti cancer agents. Hepatoprotective screening methods.

UNIT – V

Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Immunomodulators, Immunosuppressants and immunostimulants General principles of immunoassay: theoretical basis and optimization of immunoassay, heterogeneous and homogenous immunoassay systems. Immunoassay methods evaluation; protocol outline, objectives and preparation. Immunoassay for digoxin and insulin.
Limitations of animal experimentation and alternate animal experiments. Extrapolation of in vitro data to preclinical and preclinical to humans

Reference Books:

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

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COURSE STRUCTURE & SYLLABI

Course Code	PRINCIPLES OF DRUG DISCOVERY	L	T	P	C
25S01203		4	0	0	4
	Semester	1I			

Course Objectives:

The subject imparts basic knowledge of drug discovery process. This information will make the student Competent in drug discovery process.

Course Outcomes (CO):

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

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

UNIT – I

An overview of modern drug discovery process: Target identification, target validation, lead identification, and lead Optimization. Economics of drug discovery. Target Discovery and validation- Role of Genomics, Proteomics and Bioinformatics. Role of Nucleic acid microarrays, Protein microarrays, Antisense technologies, siRNAs, antisense oligonucleotides, Zinc finger proteins. Role of transgenic animals in target validation.

UNIT – II

Lead Identification: combinatorial chemistry & high throughput screening, *in silico* lead discovery techniques; Assay development for hit identification. Protein structure Levels of protein structure, Domains, motifs, and folds in protein structure. Computational prediction of protein structure: Threading and homology modeling methods. Application of NMR and X-ray crystallography in protein structure prediction.

UNIT – III

Rational Drug Design: Traditional vs rational drug design, Methods followed in traditional drug design, High throughput screening, Concepts of Rational Drug Design, Rational Drug Design Methods: Structure and Pharmacophore based approaches. Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening

UNIT – IV

Molecular docking: Rigid docking, flexible docking, manual docking; Docking based screening. Denovo drug design. Quantitative analysis of Structure Activity Relationship History and development of QSAR, SAR versus QSAR, Physicochemical parameters, Hansch analysis, Fee Wilson analysis, and relationship between them.

UNIT – V

QSAR Statistical methods: regression analysis, partial least square analysis (PLS) and other multivariate statistical methods. 3D-QSAR approaches like COMFA and COMSIA Prodrug design-Basic concept, Prodrugs to improve patient acceptability, Drug solubility, Drug absorption, and distribution, site specific drug delivery and sustained drug action. Rationale of prodrug design and practical consideration of prodrug design.

Reference Books:

1. Mouldy Sioud. Target Discovery and Validation Reviews and Protocols: Volume 2 Emerging Molecular Targets and Treatment Options. 2007 Humana Press Inc.
2. Darryl León. Scott MarkelIn. Silico Technologies in Drug Target Identification and Validation 2006 by Taylor and Francis Group, LLC.

P. RAMI REDDY MEMORIAL COLLEGE OF PHARMACY (AUTONOMOUS), KADAPA – 516 003 (A.P) INDIA

M.PHARM. IN PHARMACOLOGY

COURSE STRUCTURE & SYLLABI

3. Johanna K. DiStefano. Disease Gene Identification. Methods and Protocols. Springer New York Dordrecht Heidelberg London.
4. Hugo Kubiny. QSAR: Hansch Analysis and Related Approaches. Methods and Principles inMedicinal Chemistry. Publisher Wiley-VCH
5. Klaus Gubernator, Hans-Joachim Böhm. Structure-Based Ligand Design.
6. Methods and Principles in Medicinal Chemistry. Publisher Wiley-VCH
7. Abby L .Parrill. M. Rami Reddy. Rational Drug Design. Novel Methodology and Practical Applications. ACS Symposium Series; American Chemical Society: Washington, DC, 1999.
8. J. Rick Turner. New drug development design, methodology and, analysis. John Wiley & Sons, Inc., New Jersey.

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M.PHARM. IN PHARMACOLOGY

COURSE STRUCTURE & SYLLABI

Course Code	CLINICAL RESEARCH AND PHARMACOVIGILANCE	L	T	P	C
25S01204		4	0	0	4
	Semester	**I1**			

Course Objectives:

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

Course Outcomes (CO): Student will be able to

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

UNIT - I		12Hrs

Regulatory Perspectives of Clinical Trials: Origin and Principles of International Conference on Harmonization - Good Clinical Practice (ICH-GCP) guidelines Ethical Committee: Institutional Review Board, Ethical Guidelines for Biomedical Research and Human Participant-Schedule Y, ICMR, Informed Consent Process: Structure and content of an Informed Consent Process Ethical principles governing informed consent process.

UNIT - II		12Hrs

Clinical Trials: Types and Design: Experimental Study- RCT and Non RCT, Observation Study: Cohort, Case Control, Cross sectional Clinical Trial Study Team Roles and responsibilities of Clinical Trial Personnel: Investigator, Study Coordinator, Sponsor, Contract Research Organization and its management.

UNIT - III		12Hrs

Clinical Trial Documentation: Guidelines to the preparation of documents, Preparation of protocol, Investigator Brochure, Case Report Forms, Clinical Study Report Clinical Trial Monitoring-Safety Monitoring in CT Adverse Drug Reactions: Definition and types. Detection and reporting methods. Severity and seriousness assessment. predictability and preventability assessment. Management of adverse drug reactions; Terminologies of ADR.

UNIT - IV		12Hrs

Basic aspects, terminologies and establishment of pharmacovigilance: History and progress of pharmacovigilance, Significance of safety monitoring, Pharmacovigilance in India and international aspects, WHO international drug monitoring programme, WHO and Regulatory terminologies of ADR, evaluation of medication safety, Establishing pharmacovigilance centres in Hospitals, Industry and National programmes related to pharmacovigilance. Roles and responsibilities in Pharmacovigilance.

UNIT - V		12Hrs

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COURSE STRUCTURE & SYLLABI

Methods, ADR reporting and tools used in pharmacovigilance: International classification of diseases, International Nonproprietary names for drugs, Passive and Active surveillance, Comparative observational studies, targeted clinical investigations and Vaccine safety surveillance. Spontaneous reporting system and Reporting to regulatory authorities, Guidelines for ADRs reporting. Argus, Aris G Pharmacovigilance, Vigi Flow, Statistical methods for evaluating medication safety data.
Reference Books:
1. Central Drugs Standard Control Organization- Good Clinical Practices, Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health; 2001. 2. International Conference on Harmonization of Technical requirements for registration of Pharmaceuticals for human use. ICH Harmonized Tripartite Guideline. Guideline for Good Clinical Practice. E6; May 1996.230 3. Ethical Guidelines for Biomedical Research on Human Subjects 2000. Indian Council of Medical Research, New Delhi. 4. Textbook of Clinical Trials edited by David Machin, Simon Day and Sylvan Green, March 2005, John Wiley and Sons. 5. Clinical Data Management edited by R K Rondels, S A Varley, C F Webbs. Second Edition, Jan 2000, Wiley Publications. 6. Handbook of clinical Research. Julia Lloyd and Ann Raven Ed. Churchill Livingstone. 7. Principles of Clinical Research edited by Giovanna di Ignazio, Di Giovanna and Haynes. 8. Textbook of Pharmacovigilance: Concept and Practice. G. P. Mohanta and P. K. Manna. 2016, Pharma Med Press. 9. A textbook of Clinical Pharmacy Practice: Essential Concepts and Skills. Second Edition, 2012, University Press

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M.PHARM. IN PHARMACOLOGY

COURSE STRUCTURE & SYLLABI

Course Code	ADVANDED PHARMACOLOGY – II LAB	L	T	P	C
25S01205		0	0	6	3
	Semester	1I			

1. Effect of drugs on chick/rat mean arterial blood pressure (MABP) by using Condon's mercury manometer.
2. Isolation and identification of DNA from various sources (Bacteria, Cauliflower, onion, Goat liver).
3. Isolation of RNA from yeast
4. Gene amplification by PCR.
5. Enzyme based in-vitro assays (MPO, AChEs, α amylase, α glucosidase).
6. Cell viability assays (MTT/Trypan blue/SRB).
7. DNA fragmentation assay by agarose gel electrophoresis.
8. DNA damage study by Comet assay.
9. Apoptosis determination by fluorescent imaging studies.
10. Enzyme inhibition and induction activity

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M.PHARM. IN PHARMACOLOGY
COURSE STRUCTURE & SYLLABI

Course Code	PHARMACOLOGICAL SCREENING METHODS AND TOXICOLOGY LAB		L	T	P	C
25S01206			0	0	6	3
Pre-requisite		Semester	I1			

1. Analgesic property of drug using analgesiometer.
2. Anti-inflammatory effect of drugs using rat-paw edema method.
3. Anticonvulsant activity of drugs using maximal electroshock and pentylenetetrazole methods.
4. Antidepressant activity of drugs using pole climbing apparatus and pentobarbitone induced sleeping time methods.
5. Locomotor activity evaluation of drugs using actophotometer and rotarod.
6. Cardiotonic activity of drugs using isolated frog heart and mammalian heart preparations.
7. Antidiabetic activity using rats / mice
8. Hepatoprotective activity
9. Anti ulcer activity
10. Antioxidant activity
11. Toxicity studies as per OECD guidelines.
12. Functional observation battery tests (modified Irwin test)