Sri Padmavathi School of Pharmacy (Autonomous)

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(Conferred Autonomous status from the academic year 2024-25)
Accorded under Sections 2 (f) and 12 (B) of UGC act 1956 and Accredited by National Board of Accreditation (NBA) for UG and National Assessment & Accreditation Council (NAAC),Approved by PCI and AICTE, New Delhi

Academic Regulations-BR24
Program Structure
&
Syllabus

Effective from AY 2024-25 onwards

Bachelor of Pharmacy
(B.Pharm)

Awarding University
Jawaharlal Nehru Technological University Anantapur
JNTUA

Introduction to the Document

The regulations published in this document are official guidelines by the Board of studies (BoS) and Academic council of Sri Padmavathi School of Pharmacy (SPSP) - Autonomous, Andhra Pradesh. The document is a fusion product based on recommendations and guidelines stipulated for syllabus structure by UGC, AICTE, PCI, New Delhi.

- Academic regulations stipulated by Jawaharlal Nehru Technological University Anantapur (JNTUA), Ananthapuramu, Andhra Pradesh.
- Experts' opinion from the Board of Studies, Academic Council constituting approved Advisory boards members includes both academicians and researchers from reputed organizations at national and international levels.
- Suggestions and inputs from members of academic council and Board of studies.
- Recommendations based on feedback from alumni, employers, faculty, students, parents and other experts from allied area.
- This academic regulations, Program structure & Syllabus document has been prepared to ensure quality system in teaching and learning process, examination, assessment, and functioning of other academic related matters to the satisfaction of stakeholders, such as students, parents, alumni, employers, faculty, etc. This document provides core principles of academic regulations duly approved by academic council and board of studies of this institution. The Implementation of these academic regulations shall lead to be considered in the institute and thereby enrich the quality of education and research in the field of pharmaceutical sciences. The guidelines shall aid the transparency and accountability in the administration set up. The list of objectives for implementing academic regulations and course structure through these guidelines are listed below,
    - To improve the academic regulations and course structure.
    - To strengthen the Industry-Institute interaction.
    - To comply with rules and regulations of regulatory bodies like U G C , JNTUA, PCI, AICTE etc.,
    - To meet the requirements of accreditation council and board.
    - To enhance the quality of teaching-learning process and assessments.
    - To provide career support programs, training for enhancing quality in placements and higher education.
    - To place improved systems for feedback, self-appraisal of faculty and staff.
    - To create bench marking with other institutes of repute.

Preamble

The regulations stated herein below shall be called as a document of "Academic regulations, Program structure & Syllabus for B. Pharm" Sri Padmavathi School of Pharmacy (SPSP) - Autonomous, Andhra Pradesh.

These regulations shall be in force from the batch admitted from 2024 -2025 by the date of ratification by the Academic council and Board of studies (BoS) of the institute.

In the event of any doubt about the interpretation of these regulations, the matter shall be referred to Board of studies (BoS) and Academic council and their decision shall be final.

The Board of studies (BoS) and Academic council shall have the authority to modify, amend and repeal any of the provisions of these regulations from time to time.

Definitions

i. "College" means "Sri Padmavathi School of Pharmacy (SPSP) - Autonomous, Andhra Pradesh".

ii. "Student" means a candidate who has taken admission into B. Pharm course of this college as per the guidelines stipulated from time to time by the regulations of State Government of Andhra Pradesh and the Government of India for admissions into various courses of study and the affiliating university, i.e., Jawaharlal Nehru Technological University, Anantapur (JNTUA), Ananthapuramu, Andhra Pradesh.

iii. "Academic Council" means the Academic council constituted as per the guidelines of UGC.

iv. "Board of Studies" means Board of Studies constituted in each department as per the guidelines of UGC.

v. "Principal" means the Head of the institution

vi. "Head of the Department" means the Head of an Academic Department of the College.

vii. "Faculty member" means the teacher (Assistant/Associate/Professor) working on regular or ad-hoc basis in any of the Academic Departments of the College.

viii. "Program" means a candidate who has chosen to avail degree of B. Pharm of this college as per the marks/ rank awarded by the National/ University/ State common entrance tests, India.

ix. "Course" individual subjects described with content for instructions to the students.

x. "Assessment" means evaluation process for the outcome and grading in term of the marks.

xi. "Credit" means a weight to the time requirements of the academic course in the institute.

VISION OF THE INSTITUTE

To promote holistic learning, nurture ethically strong and highly competent Pharmacy graduates to serve the global healthcare system.

MISSION OF THE INSTITUTE

- ✓ **M1**. To provide innovative and contemporary educational experiences of the highest quality.
- ✓ **M2**. To instil ethics, sense of professionalism, communication and leadership skills.
- ✓ **M3**. To promote and nurture the research and scholarly activities.
- ✓ **M4**. To foster entrepreneurship and life-long learning.

Program Educational Objectives (PEOs)

- PEO1: To produce competent pharmacy graduates with adequate knowledge and technical skills in the core and allied areas of pharmaceutical sciences & technology and to serve the needs of the health care system.
- PEO2: To promote research and scholarly activities to identify, assess, formulate problem and execute solutions for the betterment or advancement of pharmaceutical sciences.
- PEO3: To develop communication skills, leadership qualities, team building skills and instill the sense of professional ethics and social responsibilities in graduates.

- PEO4: To prepare the graduates for life-long learning through their effective participation in professional and societal activities, integrate their knowledge and skills with contemporary needs of the society and for their highly productive career.

Program Outcomes (POs)

1. Pharmacy Knowledge: Possess adequate knowledge and comprehension of basic, core areas of pharmaceutical sciences, and apply in relevant areas.
2. Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
3. Problem analysis: Develop ability for in-depth analytical and critical thinking in order to identify and solve the issues related to pharmaceutical industry, regulatory agencies, hospital and community pharmacy.
4. Modern tool usage: Learn, select and apply appropriate methods & procedures, resources and modern pharmacy related computing tools with an understanding of the limitations.
5. Leadership skills: Demonstrate the ability to function effectively as an individual and as a member or leader in diverse teams in multidisciplinary settings.
6. Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care

professionals, promoters of health, educators, managers, employers, employees).

7. Pharmaceutical Ethics: Apply ethical principles and professional ethics and norms in practicing pharmacy profession.
8. Communication: Able to develop written and oral communication skills that contribute effectively with the pharmacy community and with the society.
9. The Pharmacist and society: Develop an understanding for the need of pharmaceutical sciences and role of pharmacist in giving quality life to people in society.
10. Environment and sustainability: Understand the impact of the pharmaceutical industry in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
11. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Academic Regulations for Bachelor of Pharmacy (BR-24)

1. Award of the Degree

a) Award of the B. Pharm. Degree

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

i) Pursues a course of study for not less than four academic years and not more than eight academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Eight years).

ii) Registers for 208 credits and secures all 208 credits.

b) Award of B. Pharm. degree with Honors / Research

A student will be declared eligible for the award of the B. Pharm. with Honors/Research if he/she fulfils the following:

i) A Student secures an additional 15 credits fulfilling all the requisites of a B. Pharm. programme i.e., 208 credits.

ii) A student is permitted to register either for Honors or Research but not for both.

iii) Registering for Honours/Research is optional.

iv) Honors/Research is to be completed simultaneously with B. Pharm. programme.

2. Students who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission shall forfeit their seat in B. Pharm. course and their admission stands cancelled. This clause shall be read along with clause 1 a) i).

3. Admissions

Admission to the B. Pharm. programme shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University from time to time. Admissions shall be made either based on the merit rank obtained by the student in the common entrance examination conducted by the A.P. Government/University or any other order of merit approved by the A.P. Government/University, subject to reservations as prescribed by the Government/University from time to time.

4. Program related terms:

i) ***Credit:*** A unit by which the course work is measured. It determines the number of hours of instruction 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
2 Hrs. Practical (Lab) per week	1 credit

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

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

5. Course Classification

All subjects/ courses offered for the B.Pharm. programme are broadly classified as follows. The college has followed the guidelines issued by UGC/PCI.

S.No.	Broad Course Classification	Course Category	Description
1.	Foundation Courses	Fundamental courses	Includes sciences, humanities, social sciences and engineering courses
2.	Core Courses	Professional Courses (PC) Core	Includes core subjects related to the programme
3.	Elective Courses	Professional Elective Courses (PE)	Includes elective subjects related to the programme
4.	Skill Courses	Skill Enhancement Courses (SEC)	Courses to develop and strengthen the necessary skills to gain, maintain, and advance in a chosen area.
5.	Project & Internships	Project	B. Pharm. Project or Major Project
		Internships	Community based and Industry Internships
6.	Audit Courses	Mandatory noncredit courses	Covering subjects of developing desired attitude among the learners

6. Programme Pattern

i) The total duration of the B. Pharm. (Regular) programme is four academic years.

ii) Each academic year of study is divided into two semesters.

iii) The minimum number of instruction days in each semester is 90.

iv) There shall be a mandatory student induction program for freshers, with a three-week duration before the commencement of the first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Branch & Innovations etc., are to be included as per the AICTE guidelines.

v) Increased flexibility for students through an increase in the elective component of the curriculum.

vi) A pool of job-oriented/domain skill courses which are relevant to the industry are integrated into the curriculum. There shall be 05 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain and the other shall be a soft skills course.

vii) Students shall undergo practice school and mandatory internships.

viii) An undergraduate degree either with Honours or Research is introduced by the University for the students having good academic record.

ix) Each college shall assign a faculty advisor/mentor after admission to a group of students to provide guidance in courses registration / career growth / placements / opportunities for higher studies / GPAT / other competitive exams etc.

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

7. Evaluation Process

The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for theory and 100 marks for practical subject. Practice School and Internships shall be evaluated for 50 marks, Project work in the final semester shall be evaluated for 200 marks, mandatory courses with no credits shall be evaluated for 30 mid semester marks.

A student has to secure not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester and end examination marks taken together for the theory, practical or project etc. In the case of a mandatory course, he/she should secure 40% of the total marks.

i) For the theory subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.

ii) For practical subjects, the distribution shall be 30 marks for the Internal Evaluation and 70 marks for the End- Examination.

iii) If any subject has both theory and practical components, they will be evaluated separately as theory subject and practical subject.

A. Theory Courses

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	100

Continuous Internal Evaluation

i) For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination shall be evaluated for 30 marks of which 10 marks for objective paper (20 minutes duration), 15 marks for subjective paper (90 minutes duration) and 5 marks for assignment.

ii) Objective paper shall contain for 05 short answer questions with 2 marks each or maximum of 20 bits for 10 marks. Subjective paper shall contain 3 either or type questions (totally six questions from 1 to 6) of which student has to answer one from each either-or type of questions. Each question carries 10 marks. The marks obtained in the subjective paper are condensed to 15 marks.

Note:

- The objective paper shall be prepared in line with the quality of competitive examinations questions.
- The subjective paper shall contain 3 either or type questions of equal weightage of 10 marks. Any fraction shall be rounded off to the next higher mark.
- The objective paper shall be conducted by the respective institution on the day of subjective paper test.
- Assignments shall be in the form of mini projects, slip tests, quizzes etc., depending on the course content. It should be continuous assessment throughout the semester and the average marks shall be considered.

iii) If the student is absent for the mid semester examination, no re-exam shall be conducted and mid semester marks for that examination shall be considered as zero.

iv) First midterm examination shall be conducted for I, II units of syllabus with one either or type question from each unit and third either or type question from both the units. The second midterm examination shall be conducted for III, IV and V units with one either or type question from each unit.

v) Final mid semester marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage given to the better mid exam and 20% to the other.

For Example:

Marks obtained in first mid: 25

Marks obtained in second mid: 20

Final mid semester Marks: (25x0.8) + (20x0.2) = 24

If the student is absent for any one midterm examination, the final mid semester marks shall be arrived at by considering 80% weightage to the marks secured by the student in the appeared examination and zero to the other. For Example:

Marks obtained in first mid: Absent

Marks obtained in second mid: 25

Final mid semester Marks: (25x0.8) + (0x0.2) =20

End Examination Evaluation:

End examination of theory subjects shall have the following pattern:

i) There shall be 6 questions and all questions are compulsory.

ii) Question I shall contain 10 compulsory short answer questions for a total of 20marks such that each question carries 2 marks.

iii) There shall be 2 short answer questions from each unit.

iv) In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.

v) The questions from 2 to 6 shall be set by covering one unit of the syllabus for each question.

B.Practical Courses

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	100

i) For practical courses, there shall be a continuous evaluation during the semester for 30 sessional marks and the end examination shall be for 70 marks.

ii) Day-to-day work in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the record/viva and 15 marks for the internal test.

iii) The end examination shall be evaluated for 70 marks, conducted by the concerned laboratory teacher and a senior expert in the subject from the same department.

Procedure: 20 marks

Experimental work & Results: 30 marks

Synopsis: 10 marks

Viva voce: 10 marks

C. There shall be no external examination for mandatory courses with zero credits. 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 40% or more in the internal examinations. In case the student fails, a re-examination shall be conducted for failed candidates for 30 marks satisfying the conditions mentioned in item 1 & 2 of the regulations.

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

8. Skill oriented Courses

i) There shall be five skill-oriented courses offered during III to VII semesters.

ii) Out of the five skill courses, four shall be domain specific and other soft skills course.

iii) The course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an expert in the subject nominated by the principal.

iv) The Head of the Department shall identify a faculty member as coordinator for the course. A committee consisting of the Head of the Department, coordinator and a senior Faculty member nominated by the Head of the Department shall monitor the evaluation process. The marks/grades shall be assigned to the students by the above committee based on their performance.

v) The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies or any other accredited bodies. If a student chooses to take a Certificate Course offered by external agencies, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency. A committee shall be formed at the level of the college to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.

vi) The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the University/BoS at the beginning of the semester. The principal of the respective college shall forward such proposals to the University for approval.

vii) If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the University/BoS.

9. Massive Open Online Courses (MOOCs):

A Student has to pursue and complete one course compulsorily through MOOCs approved by the BoS. A student can pursue courses other than core through MOOCs and it is mandatory to complete one course successfully through MOOCs for awarding the degree. A student is not permitted to register and pursue core courses through MOOCs.

A student shall register for the course (Minimum of either 8 weeks or 12 weeks) offered through MOOCs with the approval of Head of the Department. The Head of the Department shall appoint one mentor to monitor the student's progression. The student needs to earn a certificate by passing the exam. The student shall be awarded the credits assigned in the curriculum only by submission of the certificate. Examination fee, if any, will be borne by the student.

Students who have qualified in the proctored examinations conducted through MOOCs platform can apply for credit transfer as specified and are exempted from appearing internal as well as external examination (for the specified equivalent credit course only) conducted by the college.

Necessary amendments in rules and regulations regarding adoption of MOOC courses would be proposed from time to time.

10. Credit Transfer Policy

Adoption of MOOCs is mandatory, to enable Blended model of teaching-learning as also envisaged in the NEP 2020. As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the University shall allow up to a maximum of 20% of the total courses being offered in a particular programme through MOOCs platform.

i) The University shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses.

ii) Student registration for the MOOCs shall be only through the respective department of the institution, it is mandatory for the student to share necessary information with the department.

iii) Credit transfer policy will be applicable to the Professional & Open Elective courses only.

iv) The concerned department shall identify the courses permitted for credit transfer.

v) The University/institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.

vi) 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.

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

viii) 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.

ix) The institution shall submit the following to the examination section of the college:

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

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

x) The universities 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 government.

Note: Students shall be permitted to register for MOOCs offered through online platforms approved by the University from time to time.

11. Academic Bank of Credits (ABC)

The University has implemented Academic Bank of Credits (ABC) to promote flexibility in curriculum as per NEP 2020 to

i. provide option of mobility for learners across the universities of their choice
ii. provide option to gain the credits through MOOCs from approved digital platforms.
iii. facilitate award of certificate/diploma/degree in line with the accumulated credits in ABC
iv. execute Multiple Entry and Exit system with credit count, credit transfer and credit acceptance from students' account.

12. Summer Internships & Project Work

Summer Internships: Two summer internships either onsite or virtual each with a minimum of 08 weeks duration, done at the end of second and third years, respectively are mandatory. One of the two summer internships at the end of second year (Community Service Project) shall be society oriented and shall be completed in collaboration with government organizations/NGOs & others. The other internship at the end of third year is Industry Internship and shall be completed in collaboration with Industries. The student shall register for the internship as per course structure after commencement of academic year. The guidelines issued by the APSCHE / University shall be followed for carrying out and evaluation of Community Service Project and Industry Internship.

Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee comprising of Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate of successful completion from industry shall be included in the report. The report and the oral presentation shall carry 50% weightage each. It shall be evaluated for 50 external marks. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the college.

Full Semester Internship and Project work:

In the final semester, the student should mandatorily register and undergo internship (onsite/virtual) and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship.

The project report shall be evaluated with an external examiner. The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses

the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner appointed by the college and is evaluated for 140 marks.

The college shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.

13. Guidelines for offering B. Pharm. with Honors / Research

The objective is to facilitate the students to choose specialized courses of their choice and build their competence in a specialized area at the UG level. The is an opportunity for students who have a good academic record and interest in higher studies and research.

B. Pharm. with Honors / Research is applicable to all the Regular and Lateral Entry students.

i) A student shall earn an additional 15 credits for the award of B. Pharm. (Honors / Research) degree. This is in addition to the credits essential for obtaining the B. Pharm. degree (i.e., 208 credits).

ii) A student is permitted to register for Honors / Research in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to the Honors / Research from V Semester onwards.

iii) The Concerned Principal of the college shall arrange separate class work and timetable of the courses offered under Honors / Research program.

iv) Courses that are used to fulfil the student's primary major may not be double counted towards the Honors / Research.

v) Courses with content substantially equivalent to courses in the student's primary Major may not be counted towards the Honors / Research.

vi) Students can complete the courses offered under Honors / Research either in the college or in online platforms like SWAYAM with a minimum duration of 12 weeks for a 3-credit course and 8 weeks duration for a 2-credit course satisfying the criteria for credit mobility. If the courses under Honors / Research are offered in conventional mode, then the teaching and evaluation procedure shall be like the regular B. Pharm. programme.

vii) The attendance for the registered courses under Honors / Research and regular courses offered for Major degree in a semester are to be considered separately.

viii) A student shall maintain an attendance of 75% in all registered courses under Honors / Research to be eligible for attending semester end examinations.

ix) A student registered for Honors / Research shall pass in all subjects that constitute the requirement for the Honors / Research degree program. No class/division (i.e., second class, first class and distinction, etc.) shall be awarded.

x) If a student drops or is terminated from the Honors / Research program, the additional credits so far earned cannot be converted into open or core electives; they will remain extra. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

xi) The Honors / Research will be mentioned in the degree certificate as Bachelor of Pharmacy (Honors / Research).

Enrolment into Honors / Research:

i) The enrolment of students into Honors / Research is based on the percentage of marks obtained in the major degree program.

ii) The percentage of marks shall be taken up to III semester in case of regular entry students and only III semester in case of lateral entry students.

iii) Students having 7 CGPA without any backlog subjects will be permitted to register for Honors / Research.

iv) If a student is detained due to lack of attendance either in Major or in Honors / Research, registration shall be cancelled.

v) The minimum strength required for offering Honors / Research offline is considered as 20% of the sanctioned intake. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department satisfying criteria for credit mobility.

vi) Transfer of credits from Honors / Research to regular B. Pharm. degree and vice versa shall not be permitted.

vii) Honors / Research is to be completed simultaneously with a Major degree program.

Registration for Honors / Research:

i) The institution will announce courses offered under Honors / Research before the start of the semester.

ii) The eligible and interested students shall apply through the HOD of the department. The whole

i) process should be completed within one week before the start of every semester. Selected students shall be permitted to register for the courses under Honors / Research.

ii) The selected students shall submit their willingness to the Principal through the department and the department shall maintain the record of students pursuing the Honors / Research.

iii) The students enrolled for the Honors/Research courses will be monitored continuously. An advisor/mentor from the department shall be assigned to monitor the progress.

iv) There is no fee for registration of subjects for Honors / Research program offered in offline at the respective institutions.

14. Attendance Requirements:

i) A student shall be eligible to appear for the external examinations if he/she acquires a minimum of 40% attendance in each subject and 75% of attendance in aggregate of all the subjects. b) 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.

ii) Shortage of Attendance below 65% in aggregate shall in NO CASE be condoned.

iii) A stipulated fee shall be payable towards condonation of shortage of attendance to the college.

iv) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.

v) A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester from the date of commencement of class work.

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

vii) 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.

viii) For induction programme attendance shall be maintained as per AICTE norms.

15. Promotion Rules:

The following academic requirements must be satisfied in addition to the attendance requirements mentioned in section 16.

i) A student shall be promoted from first year to second year if he/she fulfils the minimum attendance requirement as per college norms.

ii) A student will be promoted from II to III year if he/she fulfils the academic requirement of securing 40% of the credits (any ***decimal*** fraction should be ***rounded off*** to ***lower*** digit) up to in the subjects that have been studied up to III semester.

iii) A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any ***decimal*** fraction should be ***rounded off*** to ***lower*** digit) in the subjects that have been studied up to V semester.

And in case a student is detained for want of credits for a particular academic year by ii) & iii) above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V semester or VII semester respectively as the case may be.

iv) When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

16. 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 & above	Superior	10
80-89	A (Excellent)	9
70-79	B (Very Good)	8
60-69	C (Good)	7
50-59	D (Average)	6
40-49	E (Pass)	5
< 40	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 non-credit 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):

i) 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., $SGPA = \Sigma (Ci \times Gi)/\Sigma Ci$, where, Ci is the number of credits of the ith subject and Gi is the grade point scored by the student in the ith course.

ii) 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., $CGPA = \Sigma (Ci \times Si)/\Sigma Ci$, where "Si" is the SGPA of the ith semester and Ci is the total number of credits up to that semester.

iii) Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

iv) While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

v) 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 the letters S, A, B, C, D and F.

Award of Class:

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

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 5.0 < 5.5

CGPA to Percentage conversion Formula – (CGPA – 0.5) x 10

17. With–holding of Results

If the candidate has any dues not paid to the college or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld in such cases.

18. Multiple Entry / Exit Option

(a) Exit Policy:

The students can choose to exit the four-year programme at the end of first/second/third year.

i) **UG Certificate in (Field of study/discipline)** - Programme duration: First year (first two semesters) of the undergraduate programme, 52 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6-credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.

ii) **UG Diploma (in Field of study/discipline)** - Programme duration: First two years (first four semesters) of the undergraduate programme, 104 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6-credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.

iii) **Bachelor of Science (in Field of study/discipline)** - Programme duration: First three years (first six semesters) of the undergraduate programme, 160 credits.

(b) Entry Policy:

Modalities on multiple entry by the student into the B. Pharm. programme will be provided in due course of time.

Note: The Universities shall resolve any issues that may arise in the implementation of Multiple Entry and Exit policies from time to time and shall review the policies in the light of periodic changes brought by UGC, AICTE and State government.

19. Gap Year Concept:

Gap year concept for Student Entrepreneur in Residence is introduced and outstanding students who wish to pursue entrepreneurship / become entrepreneur are allowed to take a break of one year at any time after II year to pursue full-time entrepreneurship programme/to establish startups. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. The principal of the respective college shall forward such proposals submitted by the students to the University/Academic Council. An evaluation committee constituted by the University/Academic Council shall evaluate the proposal submitted by the student and the committee shall decide whether to permit the student(s) to avail the Gap Year or not.

20. 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.
Candidates who are permitted to avail Gap Year shall be eligible for re-joining into the succeeding year of their B. Pharm. from the date of commencement of class work, subject to Section **2** and they will follow the academic regulations into which they are readmitted.

21. Minimum Instruction Days for a Semester:
The minimum instruction days including exams for each semester shall be 90 days.

22. Medium of Instruction:
The medium of instruction of the entire B. Pharm. undergraduate programme (including examinations and project reports) will be in English only.

23. Student Transfers:
Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh and the Universities from time to time.

24. General Instructions:

i. The academic regulations should be read as a whole for purpose of any interpretation.
ii. Malpractices rules-nature and punishments are appended.
iii. Where the words “he”, “him”, “his”, occur in the regulations, they also include “she”, “her”, “hers”, respectively.
iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
v. The Universities 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 Universities.
vi. In the case of any doubt or ambiguity in the interpretation of the guidelines given, the decision of the Vice-Chancellor / Head of the institution is final.

ACADEMIC REGULATIONS (BR24)
FOR B.PHARM. (LATERAL ENTRY SCHEME)

*(Effective for the students admitted into II year through Lateral Entry Scheme from the Academic Year **2025-26** onwards)*

1. Award of the Degree

a) Award of the B.Pharm. Degree if he/she fulfils the following:

(i) Pursues a course of study for not less than three academic years and not more than six academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Six years).

(ii) Registers for 156 credits and secures all 156 credits.

b) Award of B.Pharm. degree **with Honors** / Research if he/she fulfils the following:

(i) A Student secures an additional 15 credits fulfilling all the requisites of a B. Pharm. programme i.e., 208 credits.

(ii) A student is permitted to register either for Honors or Research but not for both.

(iii) Registering for Honours/Research is optional.

(iv) Honors/Research is to be completed simultaneously with B. Pharm. programme.

2. Students who fail to fulfil the requirement for the award of the degree within six consecutive academic years from the year of admission, shall forfeit their seat.

3. Minimum Academic Requirements:

The following academic requirements must be satisfied in addition to the requirements mentioned for the regular B. Pharm. programme:

i) A student has to secure not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester and end examination marks taken together for the theory, practical or project etc. In the case of a mandatory course, he/she should secure 40% of the total marks.

ii) A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) in the subjects that have been studied up to V semester.

And in case if student is already detained for want of credits for particular academic year, the student may make up the credits through supplementary exams of the above exams before the commencement of IV year I semester class work of next year.

4. All other regulations applicable for B. Pharm. four-year degree course (Regular) will hold good for B. Pharm. (Lateral Entry Scheme).

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.
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 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 examinations if his involvement is established. Otherwise, the candidate is debarred for two consecutive semesters from class work and all 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 class work and all 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 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
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the college exam branch for further action to award suitable punishment.	

1. Malpractices identified by squad or special invigilators
2. Punishments to the candidates as per the above guidelines.
3. Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices)
4. A show cause notice shall be issued to the college.
5. Impose a suitable fine on the college.
6. 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 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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B.PHARM.

COURSE STRUCTURE & SYLLABI

I YEAR – I SEMESTER

S. No.	Course codes	Course Name	Hours per week			Credits
			L	T	P	
1.	24BPH101T	Human Anatomy and Physiology - I	3	1	-	4
2.	24BPH102T	Pharmaceutical Analysis	3	1	-	4
3.	24BPH103T	Pharmaceutics - I	3	-	-	3
4.	24BPH104T	Pharmaceutical Inorganic Chemistry	3	-	-	3
5.	24BPH105T	Communication Skills	2	-	-	2
6.	24BPH106RBT 24BPH106RMT	Remedial Biology[$] / Remedial Mathematics	2/3	-	-	2/3
7.	24BPH101P	Human Anatomy and Physiology – I Lab	-	-	3	1.5
8.	24BPH102P	Pharmaceutical Analysis Lab	-	-	3	1.5
9.	24BPH103P	Pharmaceutics – I Lab	-	-	3	1.5
10.	24BPH104P	Pharmaceutical Inorganic Chemistry Lab	-	-	3	1.5
11.	24BPH105P	Communication Skills Lab	-	-	2	1
12.	24BPH106RBP	Remedial Biology Lab[$]	-	-	2	1
		Total	16/17	2	16/14	26

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

I YEAR – II SEMESTER

S. No.	Course codes	Course Name	Hours per week			Credits
			L	T	P	
1.	24BPH201T	Human Anatomy and Physiology - II	3	1	-	4
2.	24BPH202T	Pharmaceutical Organic Chemistry - I	3	1	-	4
3.	24BPH203T	Biochemistry	3	1	-	4
4.	24BPH204T	Computer Applications in Pharmacy	3	-	-	3
5.	24BPH205T	Environmental Sciences	2	-	-	2
6.	24BPH206T	Social and Preventive Pharmacy	3	-	-	3
7.	24BPH201P	Human Anatomy and Physiology – II Lab	-	-	3	1.5
8.	24BPH202P	Pharmaceutical Organic Chemistry – I Lab	-	-	3	1.5
9.	24BPH203P	Biochemistry Lab	-	-	3	1.5
10.	24BPH204P	Computer Applications in Pharmacy Lab	-	-	3	1.5
		Total	17	3	12	26

Schemes for internal assessments and end semester examinations semester wise

Course Code	Course	Internal Assessment				End Semester Examinations		Total marks
		Continuous Internal Evaluation (Assignment)	Sessional Examinations		Total	Marks	Duration	
		Marks	Marks	Duration				
Semester-I								
24BPH101T	Human Anatomy and Physiology - I	5	25	2 Hrs	30	70	3 Hrs	100
24BPH102T	Pharmaceutical Analysis	5	25	2 Hrs	30	70	3 Hrs	100
24BPH103T	Pharmaceutics - I	5	25	2 Hrs	30	70	3 Hrs	100
24BPH104T	Pharmaceutical Inorganic Chemistry	5	25	2 Hrs	30	70	3 Hrs	100
24BPH105T	Communication Skills	5	25	2 Hrs	30	70	3 Hrs	100
24BPH106RBT	Remedial Biology	5	25	2 Hrs	30	70	3 Hrs	100
24BPH106RMT	Remedial Mathematics	5	25	2 Hrs	30	70	3 Hrs	100
24BPH101P	Human Anatomy and Physiology – I Lab	15	15	3 Hrs	30	70	3 Hrs	100
24BPH102P	Pharmaceutical Analysis Lab	15	15	3 Hrs	30	70	3 Hrs	100
24BPH103P	Pharmaceutics – I Lab	15	15	3 Hrs	30	70	3 Hrs	100
24BPH104P	Pharmaceutical Inorganic Chemistry Lab	15	15	3 Hrs	30	70	3 Hrs	100
24BPH105P	Communication Skills Lab	15	15	3 Hrs	30	70	3 Hrs	100
24BPH106RBP	Remedial Biology Lab$	15	15	3 Hrs	30	70	3 Hrs	100
Total Marks		**105/120**	**375/ 390**	**-**	**330/ 360**	**770/ 840**	**-**	**1100 / 1200**

Course Code	Course	Internal Assessment				End Semester Examinations		Total marks
		Continuous Internal Evaluation (Assignment)	Sessional Examinations		Total	Marks	Duration	
		Marks	Marks	Duration				
Semester-I								
24BPH201T	Human Anatomy and Physiology - II	5	25	2 Hrs	30	70	3 Hrs	100
24BPH202T	Pharmaceutical Organic Chemistry - I	5	25	2 Hrs	30	70	3 Hrs	100
24BPH203T	Biochemistry	5	25	2 Hrs	30	70	3 Hrs	100
24BPH204T	Computer Applications in Pharmacy	5	25	2 Hrs	30	70	3 Hrs	100
24BPH205T	Environmental Sciences	5	25	2 Hrs	30	70	3 Hrs	100
24BPH206T	Social and Preventive Pharmacy	5	25	2 Hrs	30	70	3 Hrs	100
24BPH201P	Human Anatomy and Physiology – II Lab	15	15	3 Hrs	30	70	3 Hrs	100
24BPH202P	Pharmaceutical Organic Chemistry – I Lab	15	15	3 Hrs	30	70	3 Hrs	100
24BPH203P	Biochemistry Lab	15	15	3 Hrs	30	70	3 Hrs	100
24BPH204P	Computer Applications in Pharmacy Lab	15	15	3 Hrs	30	70	3 Hrs	100
Total Marks		**90**	**210**	**-**	**300**	**700**	**-**	**1000**

SEMESTER-I

Course Code	HUMAN ANATOMY AND PHYSIOLOGY-I	L	T	P	C	MARKS
24BPH101T		3	1	0	4	100

Course Category	Core Course

Course Objective

This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Course Outcomes

CO1	Distinguish various anatomical terms, homeostatic mechanisms, general principles of cell communication and tissues of different systems in the human body.
CO2	Outline the framework and operation of the integumentary system and musculoskeletal system
CO3	Describe the gross anatomy and functioning of body fluids, hemopoietic, cardiovascular and lymphatic system
CO4	Describe the gross anatomy and physiology of the peripheral nervous system and special senses

UNIT I — **10 Hrs**

Introduction to human body

Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.

Cellular level of organization

Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine

Tissue level of organization

Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues

UNIT II — **10 Hrs**

Integumentary system

Structure and functions of skin

Skeletal system

Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction

Joints

Structural and functional classification, types of joints movements and its articulation

UNIT III — **10 Hrs**

Body fluids and blood

Body fluids, composition and functions of blood, hemopoeis is, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rhfactors, transfusion, its significance and disorders of blood, Reticuloendothelial system.

Lymphatic system

Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system

UNIT IV — **10 Hrs**

Peripheral nervous system:

Classification of peripheral nervous system: Structure and functions ofsympathetic and parasympathetic nervous system. Origin and functions of spinal and cranial nerves.

Special senses

Structure and functions of eye, ear, nose and tongue and their disorders.		
UNIT V		**10 Hrs**

Cardiovascular system

Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, lements of conduction system of heart and heartbeat, its regulation by autonomic nervous system, cardiac output, cardiaccycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.

Reference textbooks/Additional reading

1.Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers' medical publishers, New Delhi.

2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York

3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA

4. Textbook of Medical Physiology- Arthur C, GuytonandJohn.E. Hall. Miamisburg, OH, U.S.A.

5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.

6. Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.

7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.

8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference textbooks/Additional reading

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA

2. Textbook of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.

3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje, Academic Publishers Kolkata

Course Code	PHARMACEUTICAL ANALYSIS	L	T	P	C	MARKS
24BPH102T		3	1	0	4	100 M

Course Category	Core Course

Course Objective

This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs, To carryout various volumetric and electro chemical titrations and develop analytical skills.

Course Outcomes

CO1	Understand the general concepts and basic methods of pharmaceutical analysis and to apply them in quality control labs.
CO2	Select and apply appropriate titration technique in the quantitative analysis of drugs and formulations.
CO3	Analyze the physico-chemical and electrical properties of analytes by electro-analytical techniques, refractometry and polarimetry.

UNIT I — **6 Hrs**

Errors: Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures

Pharmaceutical analysis-Definition and scope

- Different techniques of analysis
- Methods of expressing concentration
- Primary and secondary standards.
- Preparation and standardization of various molar and normal solutions-Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate .

UNIT II — **12 Hrs**

Acid base titration: Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves.

Non aqueous titration: Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCL

UNIT III — **12 Hrs**

Precipitation titrations: Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.

Complexometric titration: Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.

Gravimetry: Principle and steps involved in gravimetric analysis. Purity of the precipitate: coprecipitation and post precipitation, Estimation of barium sulphate.

Basic Principles, methods and application of diazotization titration.

UNIT IV — **7 Hrs**

Redox titrations

(a) Concepts of oxidation and reduction

(b) Types of redox titrations (Principles and applications) Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate

UNIT V — **8 Hrs**

Electrochemical methods of analysis

Conductometry- Introduction, Conductivity cell, Conductometric titrations, applications

Potentiometry- Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.

Polarography-Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications.

Reference textbooks/Additional reading
1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London 2. A.I. Vogel, Textbook of Quantitative Inorganic analysis 3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry 4. Bentley and Driver's Textbook of Pharmaceutical Chemistry 5. John H. Kennedy, Analytical chemistry principles 1. 6. Indian Pharmacopoeia

Course Code	PHARMACEUTICS - I	L	T	P	C	MARKS
24BPH103T		3	0	0	3	100

Course Category	Core Course

Course Objective

This course is designed to impart fundamental knowledge on arts and science of formulating different conventional dosage forms by understanding and following the standards of pharmacy, Pharmacopoeias. It lays foundation to the students with most basics which can be applied all over the field of pharmacy.

Course Outcomes

CO1	Understand formulation aspects of different dosage forms along with prescription handling with calculation of doses
CO2	Design and dispense different dosage forms.
CO3	Identify and resolve incompatibilities in various dosage forms including liquid dosage forms and suppositories
CO4	Design and develop semi solid dosage forms

UNIT I	10 Hrs

Historical background and development of profession of pharmacy: History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia. Latin terms used in prescription.

Dosage forms: Introduction to dosage forms, classification and definitions

Prescription: Definition, Parts of prescription, handling of Prescription and Errors in prescription.

Posology: Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.

UNIT II	10 Hrs

Pharmaceutical calculations: Weights and measures–Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight.

Powders: Definition, classification, advantages and disadvantages, Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions.

Liquid dosage forms: Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques

UNIT III	10 Hrs

Monophasicliquids: Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Ear drops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions.

Biphasic liquids:

Suspensions: Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome.

Emulsions: Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability problems and methods to overcome.

UNIT IV	10 Hrs

Suppositories: Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.

Pharmaceutical incompatibilities: Definition, classification, physical, chemical, and therapeutic incompatibilities with examples.

UNIT V	10 Hrs

Semi solid dosage forms: Definitions, classification, mechanisms and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams and gels. Excipients used in semi solid dosage forms. Evaluation of semi solid dosages forms

Reference textbooks/Additional reading

1. Cooper and Gunns Dispensing for pharmacy students.
2. A text book Professional Pharmacy by N.K.Jain and S.N.Sharma.
3. Introduction to Pharmaceutical dosage forms by Howard C. Ansel.
4. Remington's Pharmaceutical Sciences.
5. Register of General Pharmacy by Cooper and Gunn.
6. GeneralPharmacy by M.L.Schroff.
7. Dispensing Pharmacy by RM Mehta
8. Modern Dispensing Pharmacy by Atmaram Pawar
9. Pharmaceutics I by Dr.A.A.Hajare & Dr.D.A.Bhagawat

Course Code	PHARMACEUTICAL INORGANIC CHEMISTRY	L	T	P	C	MARKS
24BPH104T		3	1	0	4	100

Course Category	Core Course

Course Objective

This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs, To carryout various volumetric and electro chemical titrations and develop analytical skills.

Course Outcomes

CO1	Understand the composition, importance of different pharmacopoeias and application of monograph data in the evaluation of qualitative and quantitative parameters of various inorganic medicinal substances.
CO2	Summarize the sources of impurities and methods to determine them in pharmaceuticals.
CO3	Understand the composition, preparation and application of buffers in pharmaceutical system
CO4	Understand the classification, method of preparation, assay, test for purity ,applications, therapeutic uses of inorganic pharmaceuticals
CO5	Understand the concept of radio isotopes and their application in pharmaceuticals

UNIT I	6 Hrs
Impurities in pharmaceutical substances: History of Pharmacopoeia, Sources and types of impurities, principle in volvedin the limittest for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate General methods of preparation, assay for the compounds super scripted with asterisk (*), properties and medicinal uses of inorganic compounds belonging to the following classes	
UNIT II	**12 Hrs**
Acids, Bases and Buffers: Buffer equations and buffer capacity in general, buffers inpharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity. Majorextra and intracellular electrolytes: Functions of major physiologicalions, Electroly tesusedinthe replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance. Dental products: Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.	
UNIT III	**12 Hrs**
Gastrointestinal agents Acidifiers: Ammonium chloride* and Dil. HCl Antacid: Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture Cathartics: Magnesiumsulphate, Sodium orthophosphate, Kaolin and Bentonite Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinatedlime*, Iodineandits preparations	
UNIT IV	**7 Hrs**
Miscellaneous compounds Expectorants: Potassium iodide, Ammonium chloride*. Emetics: Copper sulphate*, Sodium potassium tartarate Haematinics: Ferroussulphate*,Ferrous gluconate Poison and Antidote: Sodium thiosulphate*, Activated charcoal, Sodiumnitrite 333 Astringents: ZincSulphate, Potash Alum	
UNIT V	**8 Hrs**
Radio pharmaceuticals: Radioactivity, Measurement of radioactivity, Properties of α, β, γ radiations, Half life, radio isotopes and study of radioisotopes-SodiumiodideI131 , introduction to radio contrast agents used in diagnosis, Storage conditions, precautions & pharmaceutical application of radioactive substances.	

Reference textbooks/Additional reading

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London

2. A.I. Vogel, Textbook of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry
4. Bentley and Driver's Textbook of Pharmaceutical Chemistry
5. John H. Kennedy, Analytical chemistry principles
6. Indian Pharmacopoeia
7. M.L Schroff, Inorganic Pharmaceutical Chemistry
8. Bentley and Driver's Textbook of Pharmaceutical Chemistry
9. Anand & Chatwal, Inorganic Pharmaceutical Chemistry

Course Code	COMMUNICATION SKILLS	L	T	P	C	MARKS
24BPH105T		2	0	0	2	100

Course Category	Skill Enhancement Course

Course Objective

This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business

Course Outcomes

CO1	Understand the behavioral needs for a pharmacist to function effectively in the areas of pharmaceutical operation
CO2	Communicate effectively (Verbal and Non-Verbal)
CO3	Effectively manage the team as a team player
CO4	Able to develop interview skills.
CO5	Able to develop Leadership qualities and essentials

UNIT I	10 Hrs

Communication Skills: Introduction, Definition, The Importance of Communication, The Communication Process–Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context
Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers **Perspectives in Communication:** Introduction, Visual Perception, Language, Other factors affecting our perspective-Past Experiences, Prejudices, Feelings, Environment.

UNIT II	10 Hrs

Elements of Communication: Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication
Communication Styles: Introduction, The Communication Styles Matrix with example for each-Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style.

UNIT III	10 Hrs

Basic Listening Skills: Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations.
Effective Written Communication: Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication
Writing Effectively: Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message

UNIT IV	10 Hrs

Interview Skills: Purpose of anointer view, Do's and Don'ts of and interview.
Giving Presentations: Dealing with Fears, planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

UNIT V	10 Hrs

Group Discussion: Introduction, Communication skills in group discussion, Do's and Dont's of group discussion.

Reference textbooks/Additional reading

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011.
2. Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011
3. Organizational Behaviour, Stephen.P. Robbins, 1stEdition, Pearson, 2013
4. Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011

5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013
6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green Hall, 1st Edition Universe of Learning LTD, 2010
7. Communication skills for professionals, Konar nira, 2ndEdition, New arrivals – 8. PHI, 2011
8. Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011
9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning indiapvt.ltd, 2011
10. Soft skills and professional communication, Francis Peters SJ, 1stEdition, Mc Graw Hill Education, 2011
11. Effective communication, John Adair, 4thEdition, Pan Mac Millan,2009
12. Bringing out the best in people, Aubrey Daniels, 2ndEdition, Mc Graw Hill, 1999.
13. Elements of style – Strunk and white
14. Industrial Psychology and sociology for B. Pharmacy students. The author is Prof. B.V. Pathak.
15. Schermerhorn, Hunt, and Osborn, Organizational Behavior, Seventh Edition, Wiley, 2010
16. Stephen.P. Robbins, OrganizationBehavior, Prentive-Hall, India

Course Code	REMEDIALBIOLOGY	L	T	P	C	MARKS
24BPH106RBT		2	0	0	2	100

Course Category	Core Course

Course Objective

To learn and understand the components of the living world, structure and functional system of plants and animal kingdom.

Course Outcomes

CO1	Know the classification and salient features of five kingdoms of life.
CO2	Understand the basic components of anatomy & physiology of plants
CO3	Know the basic components of anatomy & physiology animal with special reference to human

UNIT I — **10 Hrs**

Living world:
Definition and characters of living organisms Diversity in the living world
Binomial nomenclature
Five kingdoms of life and basis of classification. Salient features of Monera, Protista, Fungi, Animalia and Plantae, Virus,
Morphology of Flowering plants
Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed. General Anatomy of Root, stem, leaf of monocotyledons & Dicotylidones.

UNIT II — **10 Hrs**

Body fluids and circulation
Composition of blood, blood groups, coagulation of blood Composition and functions of lymph
Human circulatory system
Structure of human heart and blood vessels Cardiac cycle, cardiac output and ECG **Digestion and Absorption**
Human alimentary canal and digestive lands Role of digestive enzymes
Digestion, absorption and assimilation of digested food
Breathing and respiration
Human respiratory system
Mechanism of breathing and its regulation
Exchange of gases, transport of gases and regulation of respiration Respiratory volumes

UNIT III — **10 Hrs**

Excretory products and their elimination
Modes of excretion
Human excretory system- structure and function Urine formation
Rennin angiotensin system
Neural control and coordination
Definition and classification of nervous system
Structure of a neuron
Generation and conduction of nerve impulse Structure of brain and spinal cord
Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata
Chemical coordination and regulation
Endocrine glands and their secretions.
Functions of hormones secreted by endocrine glands.
Human reproduction
Parts of female reproductive system Parts of male reproductive system Spermatogenesis and Oogenesis Menstrual cycle

UNIT IV — **10 Hrs**

Plants and mineral nutrition:
Essential mineral, macro and micronutrients

Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation **Photosynthesis** Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis.

UNIT V	**10 Hrs**
Plantrespiration: Respiration, glycolysis, fermentation (anaerobic). **Plantgrowth and development** Phasesandrate of plant growth, Condition of growth, Introduction to plant growth regulators **Cell-Theunitoflife** Structure and functions of cell and cell or ganelles. Cell division **Tissues** Definition, types of tissues, location and functions.	

Reference textbooks/Additional reading

1. Textbook of Biology by S.B. Gokhale
2. A Textbook of Biology by Dr. Thulajappaand, Dr. Seetaram.
3. A Textbook of Biology by B.V. SreenivasaNaidu
4. A Textbook of Biology by Naidu and Murthy
5. Botany for Degree students By A.C. Dutta.
6. Outlines of Zoology by M. Ekambaranatha ayyer and T.N. Ananthakrishnan.
7. A manual for pharmaceutical biology practical by S.B. Gokhale and C.K. Kokate

Course Code	REMEDIAL MATHEMATICS	L	T	P	C	MARKS
24BPH106RMT		3	0	0	3	100

Course Category	Skill Enhancement Course

Course Objective

This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

Course Outcomes

CO1	Know the theory and their application in Pharmacy
CO2	Solve the different types of problems by applying theory.
CO3	Appreciate the important application of mathematics in Pharmacy
CO4	

UNIT I — **10 Hrs**

Partial fractions

Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction, Resolving into Partial fraction.

Logarithms

Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples.

Functions, Limits and Continuity*:*

Real Valued function, Classification of real valued functions, Introduction to Limit of a function, Definition of limit of a function (ϵ - δ definition),

$$\lim_{x\to a}\left(\frac{x^n-a^n}{x-a}\right)=na^{n-1}, \qquad \lim_{\theta\to 0}\left(\frac{\sin\theta}{\theta}\right)=1$$

UNIT II — **10 Hrs**

Matrices and Determinant:

Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants, Product of determinants, Minors and co- Factors, Adjoint or adjugate of a square matrix, Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix method.

UNIT III — **10 Hrs**

Calculus

Differentiation: Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function, Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula)–**Without Proof**, Derivative of x_n *w.r.t* x, where *n* is any rational number, Derivative of e_x, Derivative of $\log_e x$, Derivative of a_x, Derivative of trigonometric functions from first principles **(without Proof)**, Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point.

UNIT IV — **10 Hrs**

Analytical Geometry

Introduction: Signs of the Coordinates, Distance formula,

Straight Line: Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope– intercept form of a straight line.

UNIT V — **10 Hrs**

Integration: Introduction, Definition, Standard formulae, Rules of integration, Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

Differential Equations: Some basic definitions, Order and degree, Equations in separable form, Homogeneous equations, Linear Differential equations, Exact equations

Reference textbooks/Additional reading

1. Differential Calculus by Shanthinarayan
2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
3. Integral Calculus by Shanthinarayan
4. Higher Engineering Mathematics by Dr.B.S. Grewal
5. Intermediate mathematics books from Telugu Academy
6. An introduction to Differential Equation by R.K. Gosh & K.C. Maity
7. Bali NP, Gupta PN, Gandhi CP, A Textbook of Pharmaceutical Mathematics (Remedial Mathematics Vol.I and Vol. II).
8. Jain RK, Iyengar SRK, Advanced Engineering Mathematics, 3rd Edition, Naros, 2007
9. Wartikar PN, Wartikar JN, Elements of Applied Mathematics,6th Edition, Pune VidyarthiGraha, 1997

Course Code	HUMAN ANATOMY AND PHYSIOLOGY LAB	L	T	P	C	MARKS
23BP101P		0	0	3	1.5	100

Course Category	Core Course

Course Objective

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This helps develop an insight on the subject.

Course Outcomes

CO1	Identify different bones of the skeletal system and various models/specimens/slides of human organs and tissues
CO2	Perform the hematological tests like blood grouping, blood cell counts, hemoglobin, bleeding clotting time, erythrocyte sedimentation rate
CO3	Perceive the knowledge regarding heart rate, pulse rate and blood pressure

List of Experiments

1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones
6. Introduction to hemocytometry.
7. Enumeration of white blood cell (WBC) count
8. Enumeration of total red blood corpuscles (RBC) count
9. Determination of bleeding time
10. Determination of clotting time
11. Estimation of hemoglobin content
12. Determination of blood group.
13. Determination of erythrocyte sedimentation rate (ESR).
14. Determination of heartrate and pulse rate.
15. Recording of blood pressure.

Course Code	PHARMACEUTICAL ANALYSIS LAB	L	T	P	C	MARKS
24BPH102P		0	0	3	1.5	100

Course Category	Core Course

Course Objective

Understand and perform the assay of various Pharmaceutical compounds.

Course Outcomes

CO1	Acquaint with basic instruments and apparatus used in pharmaceutical laboratory and understand the importance of calibration and perform the calibration of volumetric glassware.
CO2	Perform volumetric analysis such as acidimetry, alkalimetry, non-aqueous, redox, complexometry and precipitation titrations.
CO3	Determine the assay of a titration by applying potentiometric and conductometric titrations.
CO4	Understand and apply the principles of refractometry and polarimetry in the determination of specific physic-chemical properties of substances.
CO5	Able to determine the assay method for various drugs as per IP.

List of Experiments

1. Preparation and standardization of
   (1) Sodium hydroxide
   (2) Sulphuric acid
   (3) Sodium thiosulfate
   (4) Potassium permanganate
   (5) Ceric ammonium sulphate
2. Assay of the following compounds along with Standardization of Titrant
   (1) Ammonium chloride by acid base titration
   (2) Ferrous sulphate by Cerimetry
   (3) Copper sulphate by Iodometry
   (4) Calcium gluconate by complexometry
   (5) Hydrogen peroxide by Permanganometry
   (6) Sodium benzoate by non-aqueous titration
   (7) Sodium Chloride by precipitation titration
3. Determination of Normality by electro-analytical methods
   (1) Conductometric titration of strong acid against strong base
   (2) Conductometric titration of strong acid and weak acid against strong base
   (3) Potentiometric titration of strong acid against strong base

Course Code	PHARMACEUTICS - I LAB	L	T	P	C	MARKS
24BPH103P		0	0	3	1.5	100

Course Category	Core Course

Course Objective

This course is designed to acquire fundamental knowledge and skills in the art and science of formulating different conventional dosage forms.

Course Outcomes

CO1	To work with the formula for the compounding of a dosage form.
CO2	To compound various types of dosage forms, select of suitable container for a dosage form, label the dosage form suitably with specific directions to the patient.
CO3	To know special conditions for storing a dosage form.
CO4	To predict the practical problems that arises while compounding a dosage form with respect to theory.

List of Experiments

1. Syrups
- a. Syrup IP'66
- b. Compound syrup of Ferrous Phosphate BPC'68

2. Elixirs
- a. Piperazine citrate elixir
- b. Paracetamol pediatric elixir

3. Linctus
- a. Terpin Hydrate Linctus IP'66
- b. Iodine Throat Paint (Mandles Paint)

4. Solutions
- a. Strong solution of ammonium acetate
- b. Cresol with soap solution
- c. Lugol's solution

5. Suspensions
- a. Calamine lotion
- b. Magnesium Hydroxide mixture
- c. Aluminimum Hydroxide gel

6. Emulsions
- a. Turpentine Liniment
- b. Liquid paraffin emulsion

7. Powders and Granules
- a. ORS powder (WHO)
- b. Effervescent granules
- c. Dusting powder
- d. Divided powders

8. Suppositories
- a. Glycero gelatin suppository
- b. Coca butter suppository
- c. Zinc Oxide suppository

9. Semisolids
- a. Sulphur ointment
- b. Non-staining-Iodine Ointment with methyl salicylate
- c. Carbopal gel

10. Gargles and Mouthwashes

a. Iodine gargle

b. Chlorhexidine mouthwash

Course Code	PHARMACEUTICAL INORGANIC CHEMISTRY LAB	L	T	P	C	MARKS
24BPH104P		0	0	3	1.5	100

Course Category	Core Course
Course Objective	
Understand and perform the assay of various Pharmaceutical compounds.	
Course Outcomes	
CO1	Demonstrate the ability to identify and use relevant equipment, glassware, chemicals to perform various inorganic lab experiments by adopting laboratory safety protocol.
CO2	Perform limit test for chlorides, sulphates, and heavy metals as a tool to assess the purity of different pharmaceutical substances.
CO3	Prepare and purify different inorganic medicinal compounds

List of Experiments

1. Limit tests for following ions
    - i) Limit test for Chlorides and Sulphates
    - ii) Modified limit test for Chlorides and Sulphates
    - iii) Limit test for Iron
    - iv) Limit test for Heavy metals Limit test for Lead
    - v) Limit test for Arsenic
2. Identification test
    - i) Magnesium hydroxide,
    - ii) Ferrous sulphate,
    - iii) Sodium bicarbonate,
    - iv) Calcium gluconate,
    - v) Copper sulphate
3. Test for purity
4. Swelling power of Bentonite
5. Neutralizing capacity of aluminum hydroxide gel
6. Determination of potassium iodate and iodine in potassium Iodide
7. Preparation of inorganic pharmaceuticals
    - i) Boric acid
    - ii) Potash alum
    - iii) Ferrous sulphate

Course Code	COMMUNICATION SKILLS LAB	L	T	P	C	MARKS
24BPH105P						

Course Category	Core Course
Course Objective	
Course Outcomes	
CO1	
CO2	
CO3	
CO4	

List of Experiments

1. Basic communication covering the following topics.
2. Meeting People Asking Questions Making Friends What did you do? Do's and Dont's
3. Pronunciations covering the following topics Pronunciation (Consonant Sounds) Pronunciation and Nouns
4. Pronunciation (Vowel Sounds)
5. Advanced Learning
6. Listening Comprehension / Direct and Indirect Speech Figures of Speech
7. Effective Communication Writing Skills
8. Effective Writing Interview Handling Skills E-Mail Etiquette Presentation Skills

Course Code	REMEDIAL BIOLOGY LAB	L	T	P	C	MARKS
24BPH106RBP		0	0	2	1	100

Course Category	Core Course
Course Objective	
Course Outcomes	
CO1	
CO2	
CO3	
CO4	

List of Experiments

1. Introduction to experiments in biology
   a) Study of Microscope
   b) Section cutting techniques.
   c) Mounting and staining
   d) Permanent slide preparation
2. Study of cell and its inclusions
3. Study of Stem, Root, Leaf, seed, fruit, flower and their modifications
4. Detailed study of frog by using computer models.
5. Microscopic study and identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower
6. Identification of bones
7. Determination of blood group
8. Determination of blood pressure
9. Determination of tidal volume

1. Textbook of Biology by S. B. Gokhale b.
2. A Textbook of Biology by Dr. Thulajappa and Dr. Seetaram
3. Practical human anatomy and physiology. by S.R. Kale and R.R. Kale.
4. A Manual of pharmaceutical biology practical by S.B. Gokhale, C.K. Kokate and S.P. Shriwastava.
5. Biology practical manual according to National core curriculum. Biology forum of Karnataka., Prof.M.J.H. Shafi

SEMESTER –II

Course Code	HUMAN ANATOMY AND PHYSIOLOGY-II	L	T	P	C	MARKS
24BPH201T		3	1	0	4	100

Course Category	Core Course

Course Objective

This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Course Outcomes

CO1	Recognize the gross morphology and functions of CNS and respiratory system
CO2	Interpret and apply knowledge in understanding GIT physiology and energetics
CO3	Able to explain the physiology and anatomy of the urinary system and endocrine system
CO4	Recalling about basic concepts of reproductive system and genetics

UNIT I — **10 Hrs**

Nervous system:

Organization of nervous system, neuron, neuroglia, classification and properties of nerve fiber, electro physiology, action potential, nerve impulse, receptors, synapse, neurotransmitters.

Central nervous system:

Meninges, ventricles of brain and cerebrospinal fluid. Structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity)

UNIT II — **10 Hrs**

GIT

Anatomy of GI Tract with special reference to anatomy and functions of stomach, (Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine and large intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT.

Energetics

Formation and role of ATP, Creatinine Phosphate and BMR.

UNIT III — **10 Hrs**

Respiratory system

Anatomy of the respiratory system with special reference to the anatomy of lungs, mechanism of respiration, regulation of respiration, Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods.

Urinary system

Anatomy of the urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of the kidney

UNIT IV — **10 Hrs**

Endocrine system Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders.

UNIT V — **10 Hrs**

Reproductive system

Anatomy of the male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition

Introduction to genetics
Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance

Recommended books

1.Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers' medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
4. Textbook of Medical Physiology- Arthur C, GuytonandJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference textbooks/Additional reading

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Textbook of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje, Academic Publishers Kolkata

Course Code	PHARMACEUTICAL ORGANIC CHEMISTRY–I	L	T	P	C	MARKS
24BPH202T		3	1	0	4	100

Course Category	Core Course

Course Objective

This subject deals with classification and nomenclature of simple organic compounds, structural & Geometrical isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions and applications.

Course Outcomes

CO1	To Know the principles of IUPAC Nomenclature and classification of Alphatic and Heterocyclic compounds.
CO2	To know the reactive mechanism of Addition, Elimination & Substition of various organic components its application in field of organic chemistry
CO3	Understand the Qualitative test to distiguesh the alcohols and carbonyl compounds, various reaction mechanism to form product and its application in sysntheic approches. To know the effect of substitution on reactivity, acidity and basisity of Aliphatic and Aromatic acids, amines and Phenols.
CO4	Understand the Sterioisomesim of the organic compounds based on Optical and geometrical ways, Stereospecific and stereo selective reactions of isomeric compounds

UNIT I	**Classification, nomenclature and isomerism** Classification of Organic Compounds Common and IUPAC systems of nomenclature of organic compounds (upto10 Carbons open chain and Cyclic compounds) **Alkanes*, Alkenes*, Alkynes and Conjugated dienes*** SP3 hybridization in alkanes, Halogenation of alkanes, uses of paraffins. Stabilities of alkenes, SP2 hybridization in alkenes **Heterocyclic compounds:** Nomenclature and classification Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrrole, Furan, and Thiophene. Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene	**10 Hrs**
UNIT II	**E1 and E2 reactions** – Kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidence. E1 verses E2 reactions, Factors affecting E1 and E2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation. **Alkyl halides* SN1 and SN2 reactions –** Kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations. SN1 versus SN2 reactions, Factors affecting SN1 and SN2 reactions. Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetra chloromethane and iodoform. **Conjugated system:** Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement	**10 Hrs**
UNIT III	**Alcohols*-** Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol **Carbonyl compounds* (Aldehydes and ketones)**	**10 Hrs**

	Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde	
UNIT IV	**Carboxylic acids*** Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid **Aromatic Acids*** –Acidity, effect of substituents on acidity and important reactions of benzoic acid. **Phenols*** - Acidity of phenols, effect of substituents on acidity, qualitative tests, Structure and uses of phenol, cresols, resorcinol, naphthols Aliphatic amines* - Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine **Aromatic Amines*** - Basicity of amines, effect of substituents on basicity, and synthetic uses of aryl diazonium salts	**10 Hrs**
UNIT V	**Stereo isomerism** Optical isomerism – Optical activity, enantiomerism, diastereoisomerism, meso compounds Elements of symmetry, chiral and achiral molecules, DL system of nomenclature of optical isomers, sequence rules, RS system of nomenclature of optical isomers Reactions of chiral molecules, Racemic modification and resolution of racemic mixture. Asymmetric synthesis: partial and absolute **Geometrical isomerism** Nomenclature of geometrical isomers (Cis / Trans, E/Z, Syn /Anti systems) Methods of determination of configuration of geometrical isomers. Conformational isomerism in Ethane, n-Butane and Cyclohexane. Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity. Stereospecific and stereoselective reactions	**10 Hrs**

Reference textbooks/Additional reading

1.Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar, Volume-I
3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4. Organic Chemistry by P.L. Soni
5. Practical Organic Chemistry by Mann and Saunders.
6. Vogel's textbook of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N.K. Vishnoi.
8. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.
9. Reaction and reaction mechanism by Ahluwaliah/Chatwal.

Course Code	BIOCHEMISTRY	L	T	P	C	MARKS
24BPH203T		3	1	0	4	100

Course Category	Core Course

Course Objective

Biochemistry deals with complete understanding of the metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA

Course Outcomes

CO1	Understand the biochemical organization of cell, different cellular processes and energy changes involved to regulate homeostasis condition of the cell
CO2	Understand the structure, classification, properties and biological functions of biomolecules
CO3	Understand the composition and role of mammalian genetic material in different cellular processes.
CO4	Understand and summarize the metabolic pathways and metabolic disorders of nucleic acids , carbohydrates, amino acids and lipids
CO5	Understand structure and catalytic functions of enzymes and clinical applications of enzymes as drug targets.

UNIT I — **6 Hrs**

Biomolecules

Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.

Bioenergetics

Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential.

Energy rich compounds; classification; biological significances of ATP and cyclic AMP

UNIT II — **12 Hrs**

Carbohydrate metabolism

Glycolysis – Pathway, energetics and significance Citric acid cycle- Pathway, energetics and significance

HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency Glycogen metabolism Pathways and glycogen storage diseases (GSD) Gluconeogenesis- Pathway and its significance

Hormonal regulation of blood glucose level and Diabetes mellitus

Biological oxidation

Electron transport chain (ETC) and its mechanism.

Oxidative phosphorylation & its mechanism and substrate phosphorylation Inhibitors ETC and oxidative phosphorylation/Uncouplers level

UNIT III — **11 Hrs**

Lipid metabolism

β-Oxidation of saturated fatty acid (Palmitic acid) Formation and utilization of ketone bodies; ketoacidosis De novo synthesis of fatty acids (Palmitic acid) Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D

Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity

Amino acid metabolism

General reactions of amino acid metabolism:

Transamination, deamination & decarboxylation, urea cycle and its disorders

Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia)

Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline Catabolism of heme; hyperbilirubinemia and jaundice		
UNIT IV		**10 Hrs**
Nucleic acid metabolism and genetic information transfer Biosynthesis of purine and pyrimidine nucleotides Catabolism of purine nucleotides and Hyperuricemia and Gout disease Organization of mammalian genome Structure of DNA and RNA and their functions DNA replication (semi conservative model) Transcription or RNA synthesis Genetic code, Translation or Protein synthesis and inhibitor		
UNIT V		**6 Hrs**
Enzymes Introduction, properties, nomenclature and IUB classification of enzymes Enzyme kinetics (Michaelis plot, Line Weaver Burke plot) Enzyme inhibitors with examples **Regulation of enzymes:** Enzyme induction and repression, allosteric enzymes regulation Therapeutic and diagnostic applications of enzymes and isoenzymes Coenzymes –Structure and biochemical functions		

Reference textbooks/Additional reading

1. Principles of Biochemistry by Lehninger.
2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
3. Biochemistry by Stryer.
4. Biochemistry by D. Satyanarayan and U. Chakrapani
5. Textbook of Biochemistry by Rama Rao.
6. Textbook of Biochemistry by Deb.
7. Outlines of Biochemistry by Conn and Stumpf
8. Practical Biochemistry by R.C. Gupta and S. Bhargavan.
9. Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
10. Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
11. Practical Biochemistry by Harold Varley.

Course Code	COMPUTER APPLICATIONS IN PHARMACY	L	T	P	C	MARKS
24BPH204T		3	0	0	3	100

Course Category	Skill Enhancement Course

Course Objective

This subject deals with the introduction of Database, Database Management system, computer application in clinical studies and use of databases

Course Outcomes

CO1	Know the various types of application of computers in pharmacy.
CO2	Know the various types of databases.
CO3	Know the various applications of databases in pharmacy
CO4	

UNIT I	10 Hrs

Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement, Two's complement method, binary multiplication, binary division.

UNIT II	10 Hrs

Web technologies: Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products

Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database

UNIT III	10 Hrs

Application of computers in Pharmacy – Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring

Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System

UNIT IV	10 Hrs

Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery

UNIT V	10 Hrs

Computers as data analysis in Preclinical development: Chromatographic dada analysis (CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS)

Reference textbooks/Additional reading

1. Computer Application in Pharmacy – William E. Fassett –Lea and Febiger, 600 South Washington Square, USA.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3. Bioinformatics (Concept, Skills and Applications) – S.C. Rastogi-CBS Publishers and Distributors.
4. Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N. Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi.
5. Bryon S. Gottfried: McGraw Hill Book Co. (Schaum's Series) Programming with C.
6. E. Balagumswamy: Tata McGraw Hill Publishing Co., Programming in C.
7. John Sheeley and Roger Hunt: Computer Studies, First Course, Delhi: A.K. Wheeler & Co 1986.

Course Code	ENVIRONMENTAL SCIENCES	L	T	P	C	MARKS
23BP205T		2	0	0	2	100

Course Category	Core Course

Course Objective

Create awareness about environmental problems among learners, Impart basic knowledge about the environment and its allied problems, To develop an attitude of concern for the environment and motivate learners to participate in environment protection and environment improvement.

Course Outcomes

CO1	Understand the Multidisciplinary nature of environmental studies, Natural Resources Renewable and non-renewable resources, role of an individual in the conservation of natural resources
CO2	Understand the types of natural resources like forest resources, water resources, mineral resources, food resources, energy resources, land resources and their associated problems
CO3	Understand the concept, structure and function of an ecosystem, overview and characteristics of different ecosystems like forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystem
CO4	Understand the concept of pollution and different types of environmental pollution like air pollution, water pollution and soil pollution

UNIT I	**06 Hrs**
Introduction to Environmental Studies and Natural Resources: The multidisciplinary nature of environmental studies Role of an individual in the conservation of natural resources	
UNIT II	**06 Hrs**
Natural Resources and Associated Problems: a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.	
UNIT III	**06 Hrs**
Ecosystems and Their Types: • Concept of an ecosystem • Structure and function of an ecosystem • Overview of ecosystem types • Characteristics of different ecosystems	
UNIT IV	**06 Hrs**
Detailed Study of Ecosystems: • Forest ecosystem and its components • Grassland ecosystem and its features • Desert ecosystem and challenges faced. • Aquatic ecosystems: ponds, streams, lakes, rivers, oceans, estuaries	
UNIT V	**06 Hrs**
Environmental Pollution: Air pollution; Water pollution; Soil pollution	

Reference textbooks/Additional reading

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd, Ahmedabad, India.
4. Down of Earth, Centre for Science and Environment

Course Code	SOCIAL AND PREVENTIVE PHARMACY	L	T	P	C	MARKS
24BPH206T		3	0	0	3	100

Course Category	Core Course

Course Objective

The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programs. The roles of the pharmacist in these contexts are also discussed.

Course Outcomes

CO1	Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide
CO2	Have a critical way of thinking based on current healthcare development
CO3	Evaluate alternative ways of solving problems related to healing it and pharmaceutical issues
CO4	

UNIT I — **10 Hrs**

Concept of health and disease: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick.
Social and health education: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention.
Sociology and health: Sociocultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health.
Hygiene and health: personal hygiene and health care; avoidable habits

UNIT II — **10 Hrs**

Preventive medicine: General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse

UNIT III — **10 Hrs**

National health programs, its objectives, functioning and outcome of the following: HIV AND AIDS control program, TB, Integrated disease surveillance program (IDSP), National leprosy control program, National mental health program, Nationalprogram for prevention and control of deafness, Universal immunization program, National program for control of blindness, Pulse polio program.

UNIT IV — **10 Hrs**

National health intervention program for mother and child, National family welfare program, National tobacco control program, National Malaria Prevention Program, National program for the health care for the elderly, social health program; role of WHO in Indian national program

UNIT V — **10 Hrs**

Community services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school.

Reference textbooks/Additional reading

1. Textbook of Preventive and Social Medicine, Prabhakara GN, 2nd Edition, 2010, ISBN: 9789380704104, JAYPEE Publications.
2. Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy Rabindra Nath, Saha Indranil, 4th Edition, 2013, ISBN: 9789350901878, JAYPEE Publications.
3. Review of Preventive and Social Medicine (Including Biostatistics), Jain Vivek, 6th Edition, 2014, ISBN: 9789351522331, JAYPEE Publications.
4. Essentials of Community Medicine—A Practical Approach, Hiremath Lalita D, Hiremath Dhananjaya A, 2nd Edition, 2012, ISBN: 9789350250440, JAYPEE Publications.

5. Park Textbook of Preventive and Social Medicine, K Park, 21st Edition, 2011, ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS.
6. Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad.

Course Code	HUMAN ANATOMY AND PHYSIOLOGY II	L	T	P	C	MARKS
24BPH201P	LAB	0	0	3	1.5	100

Course Category	Core Course

Course Objective

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This helps develop an insight on the subject.

Course Outcomes

CO1	Identify different bones of the skeletal system and various models/specimens/slides of human organs and tissues
CO2	Perform the hematological tests like blood grouping, blood cell counts, hemoglobin, bleeding clotting time, erythrocyte sedimentation rate
CO3	Perceive the knowledge regarding heart rate, pulse rate and blood pressure

List of Experiments

1. To study the integumentary and special senses using specimen, models, etc.,
2. To study the nervous system using specimen, models, etc.,
3. To study the endocrine system using specimen, models, etc
4. To demonstrate the general neurological examination
5. To demonstrate the function of olfactory nerve
6. To examine the different types of taste.
7. To demonstrate the visual acuity
8. To demonstrate the reflex activity
9. Recording of body temperature
10. To demonstrate positive and negative feedback mechanism.
11. Determination of tidal volume and vital capacity.
12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.
13. Recording of basal mass index.
14. Study of family planning devices and pregnancy diagnosis test.
15. Demonstration of total blood count by cell analyzer
16. Permanent slides of vital organs and gonads.

Recommended Textbooks:

1. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.

2. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Course Code	PHARMACEUTICAL ORGANIC CHEMISTRY – I LAB	L	T	P	C	MARKS
24BPH202P		0	0	3	1.5	100

Course Category	Core Course

Course Objective

The practical of organic chemistry gives the complete information about qualitative analysis of organic compounds, its elucidation by physical and chemical test, differentiate saturated and unsaturated, open chain aliphatic or aromatic, solubility, extra elements determination, and specified functional group determination. It also gives information of intermediate synthesis and its characterization.

Course Outcomes

CO1	Analyze the organic compound by Melting point or boiling point of it
CO2	Structural characterization by chemical methods
CO3	Preparation of derivatives or intermediate of the compounds
CO4	Easily determine the aliphatic or aromatic types of the compounds

List of Experiments

1. Systematic qualitative analysis of unknown organic compounds like

a. Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.
b. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test
c. Solubility test
d. Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.
e. Melting point/Boiling point of organic compounds
f. Identification of the unknown compound from the literature using melting point/ boiling point.
g. Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point.
h. Minimum **5 unknown organic compounds** to be analyzed systematically

2. Preparation of suitable solid derivatives from organic compounds

3. Construction of molecular models

Recommended Books: (Latest Edition)

1. Practical Organic Chemistry by Mann and Saunders.
2. Vogel's textbook of Practical Organic Chemistry
3. Advanced Practical organic chemistry by N.K. Vishnoi.
4. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz

Course Code	BIOCHEMISTRY LAB	L	T	P	C	MARKS
24BPH203P		0	0	3	1.5	100

Course Category	Core Course

Course Objective
Understand and perform the estimation of various biochemical parameters.

Course Outcomes	
CO1	Prepare and utilize different standard buffers as a medium in various biochemical tests
CO2	Perform the systematic qualitative analysis to Identify carbohydrates, amino acids and lipids
CO3	Estimate different biochemical parameters in blood/urine and utilize the analysis as diagnostic tool.
CO4	Examine the factors effecting enzymatic activity

List of Experiments

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Identification tests for Proteins (albumin and Casein)
3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Qualitative analysis of urine for abnormal constituents
5. Determination of blood creatinine
6. Determination of blood sugar
7. Determination of serum total cholesterol
8. Preparation of buffer solution and measurement of pH
9. Study of enzymatic hydrolysis of starch
10. Determination of Salivary amylase activity
11. Study the effect of Temperature on Salivary amylase activity.
12. Study the effect of substrate concentration on salivary amylase activity.

Course Code	COMPUTER APPLICATIONS IN PHARMACY LAB	L	T	P	C	MARKS
24BPH204P		0	0	3	1.5	100

Course Category	Core Course
Course Objective	
Course Outcomes	
CO1	
CO2	
CO3	
CO4	

List of Experiments

1. Design a questionnaire using a word processing package to gather information about a particular disease.
2. Create an HTML web page to show personal information.
3. Retrieve the information of a drug and its adverse effects using online tools
4. Creating mailing labels Using Label Wizard, generating label in MS WORD
5. Create a database in MS Access to store the patient information with the required fields Using access.
6. Design a form in MS Access to view, add, delete and modify the patient record in the database
7. Generating report and printing the report from patient database
8. Creating invoice table using – MS Access
9. Drug information storage and retrieval using MS Access
10. Creating and working with queries in MS Access
11. Exporting Tables, Queries, Forms and Reports to web pages
12. Exporting Tables, Queries, Forms and Reports to XML pages.

Reference textbooks/Additional reading

1. Computer Application in Pharmacy – William E. Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3. Bioinformatics (Concept, Skills and Applications) – S.C. Rastogi-CBS Publishers and Distributors.