Academic Programme Guide

of

Pharm. D
(Post Baccalaureate)
(3 years)

Based on Choice Based Credit System (CBCS) / Elective Course System

w.e.f.
Academic Year: 2025-2026

Index

Chitkara University

Vision and Mission

Vision	To be a globally recognized organization promoting academic excellence through interdisciplinary applied research and to expand realms of knowledge through innovation.
Mission	• To carry out the academic processes in accordance with global standards through active teacher-student-industry participation.
	• To promote research, innovation and entrepreneurship in collaboration with industry, research laboratories and academic institutions of global repute.
	• To inculcate high moral, ethical and professional values amongst our students, faculty & staff.
	• To contribute in building skillful society.

Institute Vision and Mission

Vision	To excel as a premiere Centre of Excellence in Pharmaceutical Education, Research, Development & Innovation with Global Interaction.
Mission	• To contribute in building skillful society by preparing competent pharmacist.
	• To prepare globally recognized pharmaceutical professionals who can effectively contribute in new molecule research, formulation, preclinical and clinical growth and regulatory submissions.
	• To prepare efficient leaders providing academic and other interactions in various stages of pharmaceutical operations, marketing and distribution.
	• To provide applied, industry relevant pharmaceutical education relevant globally.
	• To enhance and impart innovation, entrepreneurship, and social skills.

1. General Information

The academic program Guide is a comprehensive document detailing course scheme, associated credits per course and the distribution of each course in lecture, tutorial and Practical hours. It also details the eligibility criteria for admission, for award of doctorate degree, the assessment and evaluation procedures along with a glimpse of the pedagogical aspects of the programs. This Guide is to be used in association with the Academic Regulations of the University to make a complete rule set. The course schemes given in this document are approved by respective Board of Studies and the Academic Council of Chitkara University. Post Baccalaureate Pharm. D program, as academic discipline makes for an enriching learning experience as it perfectly combines technology and health care system. The profession of pharmacy has transformed into a hub for the "Global Healthcare" and evolved as a multidisciplinary, multifaceted curriculum. Learning and working in harmony with other members of health care are the immediate needs for the ideal role and social relevance of pharmacist in the health care system of our country. So, the academic system at Chitkara College of Pharmacy has been framed taking into consideration the responsibility of undergraduate students to meet the demands of hospital & hi tech pharmaceutical industry, at the same time ensuring that they confidently serve the requirements of patient care and pharmacy practice. Conscious efforts to inculcate research aptitude in its students through elective research projects to keep them abreast of the requirements of the industry.

Program Objectives:

1. To provide exemplary education in a stimulating environment where delivery of superb pharmaceutical knowledge is integrated with nationally and internationally recognized research data to enable students to conduct and publish cutting-edge multidisciplinary research in the discovery, utilization and evaluation of therapeutic agents.
2. To prepare competent pharmacists at various levels for India.
3. To prepare globally capable pharmaceutical scientists.
4. To become efficient leaders in various stages of pharmaceutical production, marketing and distribution.

The Programme Educational Objectives (PEOs) and Programme Outcomes (POs) of Pharm. D. (PB) are summarized as below:

2. Program Outcomes (Graduate Attributes)

The proposed outcomes for the Pharm. D. (PB) program focus on the ability of a graduating student to develop himself/herself as a competent professional with appropriate scientific innovative skills in Pharmacotherapeutics, drug discovery and development, Clinical operations management skills. They are further classified as follows:

University Mission:

M1: To carry out the academic processes in accordance with global standards through active teacher-student-industry participation.

M2: To promote research, innovation and entrepreneurship in collaboration with industry,

researchlaboratories and academic institutions of global repute.

M3: To inculcate high moral, ethical and professional values amongst our students, faculty & staff.

M4: To contribute in building skillful society by preparing competent pharmacist.

M5: To prepare globally recognized pharmaceutical professional who can effectively contribute in newmolecule research, formulation, preclinical and clinical growth and regulatory submissions.

M6: To become efficient leaders providing academic and other interactions in various stages ofpharmaceutical operations, marketing and distribution.

Table 1: PO-Mission-Vision Mapping Matrix

PO No.	PO Statement	Mission Statement	Vision Statement
PO1	Life Sciences Knowledge: Impart fundamental knowledge of physiology, anatomy, formulation science, and applied biochemistry, Chemistry of organic and inorganic compounds as per the monographs.	M1	To be a globally recognized organization promoting academic excellence through interdisciplinary applied research and to expand realms of knowledge through innovation.
PO2	Pathophysiology and Pharmacology knowledge: Impart a thorough knowledge of relevant aspects of pathophysiological mechanisms, application of microbiology in pharmacy field, medical uses of natural drugs, and Pharmacological aspects of drugs.	M1, M2	
PO3	Community Pharmacotherapeutics knowledge and Expertise: To improve skills such as dispensing of drugs, ensure safe medication usage, patient counseling and improve patient care in community pharmacy set up.	M2	
PO4	Clinical Pharmacist	M4	

	Knowledge: To enhance practical clinical discussions, attending ward rounds, follow-up progress of patients, case presentation at discharge are imbibed through hospital postings.		
PO5	Environment, sustainability and Pharmaceutical Regulations: To understand the instrumental techniques applied in Good Laboratory Practice and following ICH-GCP guidelines, total quality management, quality review and documentation and study of regulatory bodies such as Drugs and Cosmetics Act, CDSCO guidelines, pertaining to regulatory environment.	M2	
PO6	Design/Development of solutions: To study the modern concept of rational drug design such as Quantitative Structure Activity Relationship, Computer Aided Drug Design, development, industrial technology and concept of antisense molecules.	M4	
PO7	Conduct investigations of complex problems: To understand biopharmaceutical principles and pharmacokinetic principles through different compartment models, multiple dosage regimens, non-linear pharmacokinetics, and assessment of bioavailability	M5	

	and bioequivalence.		
PO8	Toxicology Knowledge: To understand the toxicological aspects of microbes, pesticides, opiates, NSAIDs, Caustics, radiation, heavy metals, plant, food poisonings, snake bites, and envenomations.	M2	
PO9	Ethics: To understand the clinical aspects of drug development, such as phases, ethical issues, and roles and responsibilities of clinical trial personnel, design of clinical study documents, data management and safety monitoring in clinical trials.	M5	
PO10	Problem analysis and learning: In house scientific and social poster competition, Case study presentations, prescription auditing, and contribution to drug information centre.	M6	
PO11	The Clinical Pharmacist and society – Participation in hospital camps, disease awareness programs will inculcate the social responsibility of the clinical pharmacists.	M6	

Aiming at developing student's personality through community service, NSS activities are offered to students to in still the idea of social welfare and to provide service to society without bias. To enrich student's interpersonal skills, variety of extracurricular activities have been inculcated in the course curriculum in the form of national level technical and cultural festivals such as Pharma-fest, International Pharmacist Day and National Pharmacy Week respectively on a yearly basis under the student club CHAMP (Chitkara House of Aspirants and Multitalented Pharmacists). A vital role is played by CHAMP for overall progress & grooming

of the student through organizing industrial visits, workshops, debate, technical quizzes and research project paper presentation competitions in events like Pharma tech Trends, Pharmacy Practice Module and international conferences. The students are motivated to participate or organize such events. These value-added activities have been designed taken into account various Programme Objectives (POs) such as PO3, PO8, PO9, PO10 and PO11.

The main aim of service training with focus on good health and well-being is accomplished by delivering sport-related events, NSS and NCC. The programme also aims to develop professional with awareness of international standards as of global health has transcended beyond the idea of confining the pharmacist's work to a specific geographical location and broadened it to the global level. PO1, PO2, PO4, PO5 and PO6 promotes development of skills in graduates for pharmaceutical formulations, analytical experts, regulatory and dispensing skills for good practices in global health system. Pharmacists have the opportunity to play an important role in both public health and global health. In particular, pharmacists can look at the varied global health practices established in medicine and use this as a framework to understand the potential role of the pharmacist within global health practice and program delivery, research, and policy. According to the Consortium of Universities for Global Health, global health should refer to the scope of a wider problem rather than a geographical location. The scope of work of pharmacists in diverse settings faces challenges of global health such as self-care & self-medication, management of diseases through medication therapy management, resistance to existing drugs or recreational drugs being abused, medicines supplied through unregistered online pharmacies, online advertising of prescription drugs, direct-to-consumer websites and the distribution of substandard & spurious, falsely-labeled, falsified or counterfeit medicines. PEOs and POs are designed and oriented to meet the mission of university in professional ethics. The PEOs ensure that the graduating students are well equipped with pharmaceutical technical knowledge, to promote the development of trained human resource in Pharmaceutical Sciences for dissemination of quality education with highly professional and ethical attitude, strong communication and effective skills to work in a team with a multidisciplinary approach. Thus, the objective of the programme is to produce pharmacy graduates with strong fundamental concepts and high technical patient-centered care to diverse patients using the best available evidence and in consideration of patients' circumstances to devise, modify, implement, document and monitor pharmacotherapy care plans, either independently or as part of healthcare teams. To enhance the competence of the Student pharmacists to design, implement and assess initiatives to improve health and wellness with Medication use systems management. The POs helps to graduating students engage in innovative activities by using creative thinking to envision better ways of accomplishing professional goals.

3. Eligibility for Admission and Migration

A pass in B. Pharm from an institution approved by the Pharmacy Council of India under section 12 of the Pharmacy Act: Provided that there shall be reservation of seats for the students belonging to the Scheduled Castes, Scheduled Tribes and other Backward Classes in accordance with the instructions issued by the Central Government/State Government/Union Territory Administration as the case may be from time to time.

The admission is based purely on merit.
During admission process, the University follows reservation policy as decided by the State.

Migration/Credit Transfer Policy

The following procedures will be followed for credit transfer for student under migration, studied in other Universities in India and Abroad:
"*The credits earned by the student from the other universities in India or abroad shall be transferred as such. The Degree shall only be awarded to candidate subject to the condition that student earned the minimum no. of credit defined by Academic Regulation/APG of the Programme run by the Chitkara University*".
In case a student undergoes international exchange programme or internship for 1 semester/ 1 year, then the courses, credits and grades earned by the student in abroad during that period should be reflected on the grade card issued by the Chitkara University. The courses will be marked as (*) on the grade card/transcript. The description of the (*) will be "credits and grades as adopted university/institute name . . . . . during international exchange programme. The minimum credits requirement for being eligible for Pharm D degree will be 90 credits. If consolidated credits are less than 90 credits, then the student has to earn extra credits to attain minimum credits requirement for Pharm D degree. The instructions regarding this will be informed to the students by the department from time to time.

4. Programme Duration

The duration of the course shall be for three academic years (two years of study and one year internship or residency) full time with each academic year spread over a period of not less than two hundred working days. The period of three years duration is divided into two phases:

a. Phase I – consisting of First and Second academic year.
b. Phase II – consisting of Internship or residency training during third year involving posting in speciality units. It is a phase of training wherein a student is exposed to actual pharmacy practice or clinical pharmacy services and acquires skill under supervision so that he or she may become capable of functioning independently.

The maximum duration of completion of degree is 5 years.

5. Pedagogical Aspects

The structural layout of the program and its courses requires that each course be divided in lecture, tutorial and practical sessions. Duration of each session as given in the column against the course in the course scheme is 60 minutes.
Lecture sessions: Lectures are delivered by traditional - chalk board method, supplemented by modern Information Communication technology (ICT) methods. The students are encouraged to ask questions and involve in group discussion to the extent allowed by the teacher. In some subjects where case study-based methodology is adopted, the lectures are supplemented by discussions on case studies.
Tutorial Sessions: The tutorial sessions are small groups of students interacting with the teacher, solving application oriented analytical problems. The tutorial sessions are very interactive and inculcate problem solving skills in the students.

Lab / Practical Sessions: During lab / practical sessions, the students work on prescribed list of experiments and do what they have learnt in the Lecture / Tutorial sessions.

6. Apprenticeship/Internship embedded degree programs (AEDP)

6.1 Research Project: In the 2nd year of Post Baccalaureate Pharm. D. course, the students work on a unique integrated project allotted to them by an allotted project guide at hospital. The project is aimed at carrying out extensive review and summarization on the work done in the area in the past and proposes a new possible dimension and method to carry out research and then actually carry out their research work and present as research report. The evaluation is as per academic program guide for these. The projects may also be allotted to them in 5th year, depending on the interest of students but are not evaluated by the usual grade but by letter grades. All projects are designed by the faculty keeping in mind the courses the students have studied so far and are currently studying. Thus, the project statements are made such a way that the students while working on these projects apply the concepts learned so far and the deliverables are multi-faceted. The students work on the Integrated Project during their hospital clerkship hours.

Industry Oriented skills are imparted to students in three types of courses:

a. IOHT (Industry Oriented Hands-on Training)
b. IOHC (Industry Oriented Hands – on Courses)
c. Project work at Hospital & Industry

IOHT are very basic and low level industry skills which are essential for the students to build up their engineering profession on. The IOHT is placed after or during III year of graduate level degree. It has to be a minimum of 4 weeks training to be pursued in vacation period.

Industry Oriented Hands-on Courses (IOHCs) are short term skill oriented courses and are more often than not, offered in association with an industry. They aim to train the students in a specific skill / platform/ tool/ technology which are stat-of-art. It fills the gap between present curricula and the specific industry needs. It also circumvents the problem of revising the curricula time and again, to align it to current industry requirements. The short duration IOHCs (2-5 days) can be offered during the academic semester and long duration IOHCs (4-6weeks) are offered as summer courses. Summer IOHCs can be taken up at the campus or at the Industry. The IOHC may result in certification by Industry in a specific skill set. HoD in consultation with Dean of the School has the authority to offer and assign IOHCs, as the case may be, for appropriate semesters or during summer, at various industries or at the campus. The students are may be given freedom to choose his/her own IOHC, but the decision of HoD is final while allotment.

In special cases, a student may take up a parallel project with a hospital and industry during vacations and submit a report for evaluation. For the same he may be allotted a faculty as a guide.

If a student disregards the allotment of any IOHT/IOHC, he/she may forfeit the IOH option entirely. The consequence of such an action could be that the concerned student may have to wait for the next academic year to get an opportunity to pursue IOHT/IOHC/IOHE, after paying the appropriate fee.

6.2 Practical training. Hospital posting – Every student shall be posted in constituent hospital for a period of not less than fifty hours to be covered in not less than 200 working days in each of second, third and fourth year course. Each student shall submit report duly certified by the preceptor and duly attested by the Head of the Department or Institution as prescribed. In the fifth year, every student shall spend half a day in the morning hours attending ward rounds on daily basis as a part of clerkship. Theory teaching may be scheduled in the afternoon.

A. Project work

a. To allow the student to develop data collection and reporting skills in the area of community, hospital and clinical pharmacy, a project work shall be carried out under the supervision of a teacher. The project topic must be approved by the Head of the Department or Head of the Institution. The same shall be announced to students within one month of commencement of the second-year classes. Project work shall be presented in a written report and as a seminar at the end of the year. External and the internal examiners shall do the assessment of the project work.
b. Project work shall comprise of objectives of the work, methodology, results, discussions, and conclusions.

B. **Objectives of project work –** The main objectives of the project work is to

a. Show the evidence of having made accurate description of published work of others and of having recorded the findings in an impartial manner; and
b. Develop the students in data collection, analysis and reporting and interpretation skills.

C. **Methodology –** To complete the project work following methodology shall be adopted, namely:

a. Students shall work in groups of not less than *two* and not more than *four* under an authorised teacher;
b. Project topic shall be approved by the Head of the Department or Head of the Institution;
c. Project work chosen shall be related to the pharmacy practice in community, hospital and clinical setup. It shall be patient and treatment (Medicine) oriented, like drug utilisation reviews, pharmacoepidemiology, pharmacovigilance or pharmacoeconomics;
d. Project work shall be approved by the institutional ethics committee;
e. Student shall present at least three seminars, one in the beginning, one at middle and one at the end of the project work; and
f. Two-page write-up of the project indicating title, objectives, methodology anticipated benefits and references shall be submitted to the Head of the Department or Head of the Institution.

D. Reporting

a. Student working on the project shall submit jointly to the Head of the Department or Head of the Institution a project report of about 40-50 pages. Project report

should include a certificate issued by the authorised teacher, Head of the Department as well as by the Head of the Institution

b. Project report shall be computer typed in double space using Times Roman font on A4 paper. The title shall be in bold with font size 18, sub-tiles in bold with font size 14 and the text with font size 12. The cover page of the project report shall contain details about the name of the student and the name of the authorised teacher with font size 14.
c. Submission of the project report shall be done at least one month prior to the commencement of annual or supplementary examination.

E. **Evaluation –** The following methodology shall be adopted for evaluating the project work:
   a. Project work shall be evaluated by internal and external examiners.
   b. Students shall be evaluated in groups for four hours (i.e., about half an hour for a group of four students).
   c. Three seminars presented by students shall be evaluated for twenty marks each and the average of best two shall be forwarded to the university with marks of other subjects.

d. **Evaluation shall be done on the following items:**	**Marks**
i. Write up of the seminar	(7.5)
ii. Presentation of work	(7.5)
iii. Communication skills	(7.5)
iv. Question and answer skills	(7.5)
Total	(30 marks)

e. **Final evaluation of project work shall be done on the following items:**	**Marks**
i. Write up of the seminar	(17.5)
ii. Presentation of work	(17.5)
iii. Communication skills	(17.5)
iv. Question and answer skills	(17.5)
Total	(70 marks)

Explanation: For the purposes of differentiation in the evaluation in case of topic being the same for the group of students, the same shall be done based on item numbers b, c and d mentioned above.

7. Programme Structure

Eligibility to award the degree

In addition to conditions given in section 8 of Academic Regulations, a CGPA of 5.5 is required to receive degree. The minimum credits to be earned are given in table 2. Every student is allotted a definite academic hour every week called as credit hour. On the basis of no. of

subjects and allotted hours, every year is assigned definite credit hours which hour which will be conducted as academic activity in that year. A student has to complete the credit hours with allowed attendance criteria.

Table 2: Minimum Credit Requirements to Award Degree under degree in Pharm D *(Post Baccalaureate)Programme*

Course / Year	Pharm. D (PB)
Year I	42
Year II	27
Year III	36
Total	**105**

Year I			
Course Code	**Title of the Course**	**Hours (L+T+P)**	**Credit**
PDL 4401	PHARMACOTHERAPEUTICS – III	3+1+0 = 4	4
PDL 4402	HOSPITAL PHARMACY	3+1+0 = 4	4
PDL 4403	CLINICAL PHARMACY	3+1+0 = 4	4
PDL 4404	BIOSTATISTICS & RESEARCH METHODOLOGY	3+1+0 = 4	4
PDL 4405	BIOPHARMACEUTICS & PHARMACOKINETICS	3+1+0 = 4	4
PDL 4406	CLINICAL TOXICOLOGY	3+1+0 = 4	4
PDL 4407	PHARMACOTHERAPEUTICS – I & II	3+1+0 = 4	4
DM 101	DISASTER MANAGEMENT	3+0+0 = 3	3
NSW1301	CLINICAL SKILLS & EMERGENCY INTERVENTIONS	2+0+0 = 2	2
PDP 2401	PHARMACOTHERAPEUTICS – III	0+0+3 = 3	2
PDP 2402	HOSPITAL PHARMACY	0+0+3 = 3	2
PDP 2403	CLINICAL PHARMACY	0+0+3 = 3	2
PDP 2405	BIOPHARMACEUTICS & PHARMACOKINETICS	0+0+3 = 3	2
PDP 2407	PHARMACOTHERAPEUTICS – I & II	0+0+ 3 = 3	2
Total		**48**	**43**

Year II			
Course Code	**Title of the Course**	**Hours (L+S+P)**	**Credit**
PDL 4501	CLINICAL RESEARCH	3+1+0 = 4	4
PDL 4502	PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS	3+1+0 = 4	4
PDL 4503	CLINICAL PHARMACOKINETICS & PHARMACOTHERAPEUTIC DRUG MONITORING	3+1+0 = 4	4
HR 101	HUMAN VALUES AND PROFESSIONAL ETHICS	2+0+0 = 2	2
AMR1201	AWARENESS ON ANTIMICROBIAL RESISTANCE	2+0+0 = 2	2
PDP 4504	CLERKSHIP	0+1+0 = 1	1
PDP 4505	PROJECT WORK (SIX MONTHS)	0+0+20 = 20	10
Total		**38**	**27**

Year III			
Course Code	**Title of the Course**	**Hours (L+S+P)**	**Credit**
PDP 6661	INTERNSHIP	6 hours per day 6X6=36 Hour per week	36
Total			**36**

8. Rules for attendance

As detailed in PharmD Regulations 2008, a minimum attendance of 80% is compulsory for the student to be eligible to appear for end semester examination. 10% concession in this mandatory requirement is possible only in extreme circumstances and at the sole discretion of the Vice Chancellor.

There is no weightage for attendance in evaluation criteria.

Students are encouraged to participate in co-curricular activities conducted by prestigious institutions at national/International level. Such students would be eligible for grant of special Duty Leaves (limited by a cap decided by the Vice Chancellor) to make up for the attendance, in case any class work is missed during this period. This privilege extended to students will not be termed as right and is limited to just the attendance benefit.

9. Grading System

Sample Course Code						
P	**D**	**L**	**4**	**1**	**0**	**4**

First two letters would indicate the academic Unit offering the course
Third letter would indicate the type of Course
First Number = Credits of the course = **Round up (Lecture hours per wk * 1 + Tutorial Hours per wk * 0.5 + Lab hours per wk * 0.5)**
Second Number = Year of Program
Last Two numbers = Sequencing of course

Allotment of first two letters	
AM	Maths
PY	Physics
CH	Chemistry
GE	General Education
CL	Languages
CS	Computer Science
EC	Electronics
EE	Electrical
ME	Mechanical
CE	Civil
CA	Computer Applications
BS	Business Studies
AR	Architecture
ED	Education
PH	Pharmacy
PC	M.Pharm. Pharmaceutics
PT	M.Pharm. Pharmaceutical Technology
PG	M.Pharm. Pharmacology
AS	Applied Science
PE	Physical Education
COMP	Courses of GBC(Canada)
HS	Health Sciences
JM	Journalism and Mass Communication
HM	Hotel management
PD	Pharm D
Third letter	
L	Course with only theory component
P	Course with only Lab component
T	Training, Dissertation
S	Self Study, Project, Seminar
W	Workshop course
First numeral	
1	1 credit course
2	1.5 or 2 credit course

3	2.5 or 3 credit course
4	3.5 or 4 credit course
5	4.5 or 5 credit course
6	5.5 or 6 credit course
7	6.5 or 7 credit course
8	7.5 or 8 Credit Course
9	8.5 or 9 or more credit course
Second Numeral (this number indicates the incremental year of study after 12th class)	
0	For courses are after 10th
1	Year 1
2	Year 2
3	Year 3
4	Year 4
5	Year 5
6	Year 6
7	Year 7
Third and Fourth Numerals (Sequencing of Course)	
01	Course Number 1
02	Course Number 2
03	Course Number 3
04	Course Number 4
05	Course Number 5
06	Course Number 6
07	Course Number 7

Table 3: Grade and grade points

Marks Range	**Grade**	**Grade Weightage**	**Qualitative Meaning**
90.00 - 100	O	10	Outstanding
80.00-89.99	A	9	Excellent
70.00-79.99	B	8	Good
60.00-69.99	C	7	Fair
50.00-59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

9.1 Computation of GPA and CGPA

The CGPA (calculated on a 10 point scale) would be used to describe the overall performance of a student (from the semester of admission till the point of reckoning) in all courses for which LETTER GRADES will be awarded. GPA will indicate the performance of student for any particular semester. Formulas for calculation of GPA and CGPA have been provided as below:

$$GPA_i = \frac{\sum_{j=1}^{n} C_{ij} G_j}{\sum_{j=1}^{n} C_{ij}} \qquad CGPA = \frac{\sum_{i=1}^{N}\left(GPA_i * \sum_{j=1}^{n} C_{ij}\right)}{\sum_{i=1}^{N}\left(\sum_{j=1}^{n} C_{ij}\right)}$$

Where n = number of subjects in the semester; N = number of semesters; GPA_i = GPA for the ith semester; C_{ij} = number of credits for the jth course in ith semester; and G_j = Grade point corresponding to the grade obtained in the jth course.

Table below shows the grade point for every valid grade that may be awarded to a student pursuing a particular course:

9.2 Illustration of Computation of GPA and CGPA and Format for Transcripts

i. Computation of GPA and CGPA

ii. Transcript: Based on the above criteria, the university may issue the transcript for each semester and a consolidated transcript indicating the performance in all semesters.

Suppose a student is registered in four courses 'W', 'X', 'Y' and 'Z' in a particular semester as mentioned below in the Column - I of the table. Column - II in the table below depicts the number of credits, which those courses carried. At the end of the semester, student was awarded with the grades as mentioned in Column – III in the table given below. Column – IV indicates the corresponding grade weight. Column – V and Column – VI indicate essentially the Credit value and Grade Points for every course completed by a student in that particular semester.

Table 4: Illustration for GPA

Courses in which student registered (Column – I)	**Credits (Column – II)**	**Letter Grade Column - III**	**Grade Value (Column – IV)**	**Credit Value (Column – V)**	**Grade Points (Column – VI)**
Course W	3	B	8	3 x 8	24
Course X	3	A	9	3 x 9	27
Course Y	3	C	7	3 x 7	21
Course Z	2	D	6	2 x 6	12
Total	**11**			**Total**	**84**

$$GPA = \frac{Total\ grade\ pts.}{Total\ no.\ of\ credits} = \frac{84}{11} = 7.636$$

Table 5: Illustration for CGPA

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Credit: 21 GPA:6.9	Credit: 22 GPA:7.8	Credit:25 GPA:5.6	Credit: 26 GPA:6.0	Credit: 26 GPA: 6.3	Credit 25 GPA 8.0
CGPA= **6.73** (21 x 6.9 + 22 x 7.8 + 25 x 5.6 + 26 x 6.0 + 26 x 6.3 + 25 x 8.0)/145					

The GPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

10. **Promotion and Registration**

A student shall not be declared to have passed examination unless he or she secures at least 50% marks in each of the subjects separately in the theory examinations, including sessional marks and at least 50% marks in each of the practical examinations including sessional marks. The students securing 60% marks or above in aggregate in all subjects in a single attempt at the Pharm.D. or as the case may be, Pharm. D. (Post Baccalaureate) course examination shall be declared to have passed in first class. Students securing 75% marks or above in any subject or subjects shall be declared to have passed with distinction in the subject or those subjects provided he or she passes in all the subjects in a single attempt.

The medium of examination is English.

Criteria to Pass Examination

Based on the marks obtained by the student in a particular course as described in tables above, the grade in that course is obtained, in accordance with the Table 4

Eligibility for promotion to next year:

All students who have appeared for all the subjects and passed the first-year annual examination are eligible for promotion to the second year and, so on. However, failure in more than two subjects shall debar him or her from promotion to the next year classes.

Provision of Grace-Marks

The University shall award grace-marks as per following:

"One percent of the total marks of theory examination of all the semesters may be given for improving the division of a candidate. Grace marks given to a candidate in semester examination may be deducted from total grace marks to be given for improvement of the division."

a) A maximum of One percent of the total marks of theory examination as grace marks at the end of the each semester/year, provided that a student secures a minimum of 15% marks in the respective subject/s of the End Semester/yearly Examination.
b) The remainder or part there of the 1% grace marks of first semester/year plus 1 percent grace-marks of second year, provided that a student secures a minimum of 15% marks in the respective subject/s of the End Semester Examination, similarly for next semesters/years.

For internal Examination:

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

11. Program Overview

The Program consists of subjects under the following categories:

Table 6: Program Scheme Pharm.D. (PB)

Year 1												
S. No.	**Course Name**	**Course Code**	**Level**	**Category (Type of Course)**	**Credits (Course wise)**	**Hours per Week**			**Marks Distribution**			**Total Credits (Semester wise)**
						L	**T**	**P**	**I**	**E**	**TL**	
1.	PHARMACOTHERAPEUTICS – III	PDL 4401	400-499	DC	4	3	1	0	30	70	100	**43**
2.	HOSPITAL PHARMACY	PDL 4402	400-499	DC	4	3	1	0	30	70	100	
3.	CLINICAL PHARMACY	PDL 4403	400-499	DC	4	3	1	0	30	70	100	
4.	BIOSTATISTICS AND RESEARCH METHODOLOGY	PDL 4404	400-499	DC	4	3	1	0	30	70	100	
5.	BIOPHARMACEUTICS AND PHARMACOKINETICS	PDL 4405	400-499	DC	4	3	1	0	30	70	100	
6.	CLINICAL TOXICOLOGY	PDL 4406	400-499	DC	4	3	1	0	30	70	100	
7.	PHARMACOTHERAPEUTICS – I & II	PDL 4407	400-499	DC	4	3	1	0	30	70	100	

8.	DISASTER MANAGEMENT	DM 101	400-499	VA	3	3	0	0	15	35	50	
9.	CLINICAL SKILLS-AND EMERGENCY INTERVENTIONS	NSW1301	400-499	VA	2	2	0	0	15	35	50	
10.	PHARMACOTHERAPEUTICS – III	PDP 2401	400-499	DC	2	0	0	3	30	70	100	
11.	HOSPITAL PHARMACY	PDP 2402	400-499	DC	2	0	0	3	30	70	100	
12.	CLINICAL PHARMACY	PDP 2403	400-499	DC	2	0	0	3	30	70	100	
13.	BIOPHARMACEUTICS AND PHARMACOKINETICS	PDP 2405	400-499	DC	2	0	0	3	30	70	100	
14.	PHARMACOTHERAPEUTICS – I & II	PDP 2407	400-499	DC	2	0	0	3	30	70	100	
Year 2												
15.	CLINICAL RESEARCH	PDL 4501	500-599	DC	4	3	1	0	30	70	100	**27**
16.	PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS	PDL 4502	500-599	DC	4	3	1	0	30	70	100	
17.	CLINICAL	PDL 4503	500-599	DC	4	3	1	0	30	70	100	

	PHARMACOKINETICS AND PHARMACOTHERAPEUTIC DRUG MONITORING											
18.	HUMAN VALUES AND PROFESSIONAL ETHICS	HR 101	500-599	VA	2	2	0	0	15	35	50	
19.	AWARENESS ON ANTIMICROBIAL RESISTANCE	AMR 1201	500-599	VA	2	2	0	0	15	35	50	
20.	CLERKSHIP	PDP 4504	500-599	DC	1	0	1	0	30	70	100	
21.	PROJECT WORK (SIX MONTHS)	PDP 4505	500-599	DC	10	0	0	20	0	100	100	
Year 3												
22.	INTERNSHIP	PDP 6661	500-599	DC	36	0	0	36	0	100	100	36

FIRST YEAR

PDL 4401 PHARMACOTHERAPEUTICS – III (THEORY)

Theory: 3 Hrs. /Week

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

Objectives: At completion of this subject it is expected that students will be able to understand –

- the pathophysiology of selected disease states and the rationale for drug therapy;
- the therapeutic approach to management of these diseases;
- the controversies in drug therapy;
- the importance of preparation of individualized therapeutic plans based on diagnosis;
- needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);
- describe the pathophysiology of selected disease states and explain the rationale for drug therapy;
- to summarize the therapeutic approach to management of these diseases including reference to the latest available evidence;
- to discuss the controversies in drug therapy;
- to discuss the preparation of in dividualised therapeutic plans based on diagnosis; and
- identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

Course outcomes: After completion of course students will be able to:

- **CO01:** Start the administration of medication and outline the expected therapeutic outcomes through targeted interventions.
- **CO02:** Know the effective use of pharmacological therapeutic interventions in the treatment of specific diseases, conditions and symptoms.
- **CO03:** Demonstrate effective communication and collaborative teamwork
- **CO04:** Have moral reasoning, ethical judgment and professionalism

Course materials:

Text Books

1. Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication
2. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange

Reference Books

1. Pathologic basis of disease - Robins SL, W.B.Saunders publication
2. Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice - Green and Harris, Chapman and Hall publication
3. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
4. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda -Kimble MA
5. Avery's Drug Treatment, 4th Edn, 1997, Adis International Limited.
6. Relevant review articles from recent medical and pharmaceutical literature.

Syllabus

Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases: Title of the topic:

1. **Gastrointestinal system:** Peptic ulcer disease, Gastro Esophageal Reflux Disease, Inflammatory bowel disease, Liver disorders - Alcoholic liver disease, Viral hepatitis including jaundice, and Drug induced liver disorders.
2 **Haematological system:** Anaemias, Venous thromboembolism, Drug induced blood disorders.
3 **Nervous system:** Epilepsy, Parkinsonism, Stroke, Alzheimer's disease,
4 **Psychiatry disorders:** Schizophrenia, Affective disorders, Anxiety disorders, Sleep disorders, Obsessive Compulsive disorders.
5 **Pain management** including Pain pathways, neuralgias, headaches.
6 **Evidence Based Medicine.**

PDP 2401- PHARMACOTHERAPEUTICS – III (PRACTICAL)

Practical : 3 Hrs./Week

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

Objectives: At completion of this subject it is expected that students will be able to understand –

- the pathophysiology of selected disease states and the rationale for drug therapy;
- the therapeutic approach to management of these diseases;
- the controversies in drug therapy;
- the importance of preparation of individualized therapeutic plans based on diagnosis;
- needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);
- describe the pathophysiology of selected disease states and explain the rationale for drug therapy;
- to summarize the therapeutic approach to management of these diseases including reference to the latest available evidence;

- to discuss the controversies in drug therapy;
- to discuss the preparation of in dividualised therapeutic plans based on diagnosis; and identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

Course outcomes: After completion of course students will be able to:

- **CO01:** Start the administration of medication and outline the expected therapeutic outcomes through targeted interventions.
- **CO02:** Know the effective use of pharmacological therapeutic interventions in the treatment of specific diseases, conditions and symptoms.
- **CO03:** Effective communication and collaborative teamwork
- **CO04:** Have moral reasoning, ethical judgment and professionalism

Practicals:

Hospital postings for a period of at least 50 hours is required to understand the principles and practice involved in ward round participation and clinical discussion on selection of drug therapy. Students are required to maintain a record of 15 cases observed in the ward and the same should be submitted at the end of the course for evaluation. Each student should present at least two medical cases they have observed and followed in the wards.

Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases covered during hospital posting:

Gastrointestinal system, Haematological system, Nervous system, Psychiatry disorders, Pain management, Evidence Based Medicine

Assignments:

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of Three assignments [1500 – 2000 words] should be submitted for evaluation.

Format of the assignment:

1. Minimum & Maximum number of pages
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year
4. It shall be computer draft copy
5. Name and signature of the student
6. Time allocated for presentation may be 8+2 Min.

PDL4402- HOSPITAL PHARMACY (THEORY)

Theory: 2 Hrs /Week

Scope: In the changing scenario of pharmacy practice in India, for successful practice of Hospital

Pharmacy, the students are required to learn various skills like drug distribution, drug dispensing, manufacturing of parenteral preparations, drug information, patient counselling, and therapeutic drug monitoring for improved patient care.

Objectives: Upon completion of the course, the student shall be able to –

- know various drug distribution methods;
- know the professional practice management skills in hospital pharmacies;
- provide unbiased drug information to the doctors;
- know the manufacturing practices of various formulations in hospital set up;
- appreciate the practice based research methods; and
- Appreciate the stores management and inventory control.

Course outcomes: After completion of course students will be able to:

- **CO01:** Create Basic understanding of organisational structure of a hospital as well as its pharmacy, infrastructure and budgeting
- **CO02:** Understand and remember the working and constitution of different hospital committees and drug formulary,
- **CO03:** Understand the process of procurement, warehousing, inventory control and distribution of drugs with especial emphasis on narcotic and controlled drugs; role of pharmacist in central sterile supply services
- **CO04:** Apply the basic knowledge of manufacturing process of sterile formulations, ointments, liquids, creams, tablets, granules, capsules, powders and total parentral nutrition
- **CO05:** Understand the role of pharmacist in professional relations, practices, education, training and handling, packaging of radiopharmaceuticals

Course materials:

Text books

1. Hospital pharmacy by William .E. Hassan
2. A text book of Hospital Pharmacyby S.H.Merchant & Dr. J.S. Qadry. Revised by R.K.Goyal & R.K. Parikh

References:

1. WHO consultative group report.
2. R.P.S. Vol.2. Part –B; Pharmacy Practice section.
3. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical press.

Syllabus

1 Hospital - its Organisation and functions

2 Hospital pharmacy-Organisation and management

a) Organizational structure-Staff, Infrastructure & work load statistics

b) Management of materials and finance
c) Roles & responsibilities of hospital pharmacist

3 The Budget – Preparation and implementation

4 Hospital drug policy

a) Pharmacy and Therapeutic committee (PTC)
b) Hospital formulary
c) Hospital committees
- Infection committee
- Research and ethical committee

d) developing therapeutic guidelines
e) Hospital pharmacy communication - Newsletter

5 Hospital pharmacy services

a) Procurement & warehousing of drugs and Pharmaceuticals
b) Inventory control -
Definition, various methods of Inventory Control ABC, VED, EOQ, Lead time, safety stock
c) Drug distribution in the hospital
i) Individual prescription method
ii) Floor stock method
iii) Unit dose drug distribution method
d) Distribution of Narcotic and other controlled substances
e) Central sterile supply services – Role of pharmacist

6 Manufacture of Pharmaceutical preparations

a) Sterile formulations – large and small volume parenterals
b) Manufacture of Ointments, Liquids, and creams
c) Manufacturing of Tablets, granules, capsules, and powders
d) Total parenteral nutrition

7 Continuing professional development programs

Education and training

8 Radio Pharmaceuticals – Handling and packaging

9 Professional Relations and practices of hospital pharmacist

PDP 2402- HOSPITAL PHARMACY (PRACTICAL)
Practical: 3 Hrs./Week

Scope: In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug dispensing, manufacturing of parenteral preparations, drug information, patient counselling, and therapeutic drug monitoring for improved patient care.

Objectives: Upon completion of the course, the student shall be able to –

- know various drug distribution methods;

- know the professional practice management skills in hospital pharmacies;
- provide unbiased drug information to the doctors;
- know the manufacturing practices of various formulations in hospital set up;
- appreciate the practice based research methods; and

Appreciate the stores management and inventory control.

Course outcomes: After completion of course students will be able to:

- **CO01:** Understand various drug distribution methods
- **CO02:** Apply various professional practice management skills in hospital pharmacies
- **CO03:** Evaluate and provide unbiased drug information to the doctors
- **CO04:** Know the manufacturing practices of various formulations in hospital set up
- **CO05:** Appreciate the practice based research methods
- **CO06:** Understand the stores management and inventory control management

List of experiments:

1. Assessment of drug interactions in the given prescriptions
2. Manufacture of parenteral formulations, powders.
3. Drug information queries.
4. Inventory control

List of Assignments:

1. Design and Management of Hospital pharmacy department for a 300 bedded hospital.
2. Pharmacy and Therapeutics committee – Organization, functions, and limitations.
3. Development of a hospital formulary for 300 bedded teaching hospital
4. Preparation of ABC analysis of drugs sold in one month from the pharmacy.
5. Different phases of clinical trials with elements to be evaluated.
6. Various sources of drug information and systematic approach to provide unbiased drug information.
7. Evaluation of prescriptions generated in hospital for drug interactions and find out the suitable management.

Special requirements:

1. Each college should sign MoU with nearby local hospital having minimum 150 beds for providing necessary training to the students' on hospital pharmacy activities.
2. Well equipped with various resources of drug information.

PDL 4403- CLINICAL PHARMACY (THEORY)

Theory: 3 Hrs. /Week

Objectives of the Subject:

Upon completion of the subject student shall be able to (Know, do, appreciate) –

- monitor drug therapy of patient through medication chart review and clinical review;
- obtain medication history interview and counsel the patients;

- identify and resolve drug related problems;
- detect, assess and monitor adverse drug reaction;
- interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states; and
- Retrieve, analyse, interpret and formulate drug or medicine information.

Course outcomes: After completion of course students will be able to:

- **CO01:** Monitor patient drug therapy through reviewing medication charts and conducting clinical assessments.
- **CO02:** Conduct medication history interviews with patients about their diseases and provide counseling as needed.
- **CO03:** Identify, evaluate, and monitor adverse drug reactions.
- **CO04:** Analyze specific disease states by interpreting relevant laboratory results used as therapeutic monitoring parameters.
- **CO05:** Retrieve, analyze, interpret and formulate drug or medicine information.

Course materials:

Text books

a. Practice Standards and Definitions - The Society of Hospital Pharmacists of Australia.
b. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc.
c. Biopharmaceutics and Applied Pharmacokinetics - Leon Shargel, Prentice Hall publication.
d. A text book of Clinical Pharmacy Practice; Essential concepts and skills, Dr.G.Parthasarathi etal, Orient Orient Langram Pvt.Ltd. ISSBN8125026

Reference books

a. Australian drug information -Procedure manual. The Society of Hospital Pharmacists of Australia.
b. Clinical Pharmacokinetics - Rowland and Tozer, Williams and Wilkins Publication.
c. Pharmaceutical statistics. Practical and clinical applications. Sanford Bolton, Marcel Dekker, Inc.

Syllabus

1. **Definitions, development and scope of clinical pharmacy**
2. **Introduction to daily activities of a clinical pharmacist**
   a. Drug therapy monitoring (medication chart review, clinical review, pharmacist interventions)
   b. Ward round participation
   c. Adverse drug reaction management
   d. Drug information and poisons information
   e. Medication history
   f. Patient counseling
   g. Drug utilization evaluation (DUE) and review (DUR)

h. Quality assurance of clinical pharmacy services.

3. **Patient data analysis**

The patient's case history, its structure and use in evaluation of drug therapy & Understanding common medical abbreviations and terminologies used in clinical practices.

4. Clinical laboratory tests used in the evaluation of disease states, and interpretation of test results

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

5. Drug & Poison information

f. Introduction to drug information resources available
g. Systematic approach in answering DI queries
h. Critical evaluation of drug information and literature
i. Preparation of written and verbal reports
j. Establishing a Drug Information Centre
k. Poisons information- organization & information resources

6. Pharmacovigilance

l. Scope, definition and aims of pharmacovigilance
m. Adverse drug reactions - Classification, mechanism, predisposing factors, causality assessment [different scales used]
n. Reporting, evaluation, monitoring, preventing & management of ADRs
o. Role of pharmacist in management of ADR.

7. Communication skills, including patient counselling techniques, medication history interview, presentation of cases.

8. Pharmaceutical care concepts

9. Critical evaluation of biomedical literature

10. 10. Medication errors.

PDP 2403- CLINICAL PHARMACY (PRACTICAL)

Practical: 3 Hrs/Week

Objectives of the Subject:

Upon completion of the subject student shall be able to (Know, do, appreciate) –

- monitor drug therapy of patient through medication chart review and clinical review;
- obtain medication history interview and counsel the patients;
- identify and resolve drug related problems;
- detect, assess and monitor adverse drug reaction;
- interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states;

and Retrieve, analyse, interpret and formulate drug or medicine information.

Course outcomes: After completion of course students will be able to:

- **CO0**1. Monitor drug therapy of patient through medication chart review and clinical review
- **CO0**2. Obtain medication history interview and counsel the patients
- **CO0**3. Identify and resolve drug related problems
- **CO0**4. Detect, assess and monitor adverse drug reaction
- **CO0**5. Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states
- **CO0**6. Retrieve, analyze, interpret and formulate drug or medicine information.

Students are expected to perform 15 practicals in the following areas covering the topics dealt in theory class.

a. Answering drug information questions (4 Nos)
b. Patient medication counselling (4 Nos)
c. Case studies related to laboratory investigations (4 Nos)
d. Patient medication history interview (3 Nos)

Assignment:

Students are expected to submit THREE written assignments (1500 – 2000 words) on the topics given to them covering the following areas dealt in theory class.

Drug information, Patient medication history interview, Patient medication counselling, Critical appraisal of recently published articles in the biomedical literature which deals with a drug or therapeutic issue.

Format of the assignment:

1. Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year.
4. It shall be computer draft copy.
5. Name and signature of the student.
6. Time allocated for presentation may be 8+2 Min.

PDL 4404- BIOSTATISTICS AND RESEARCH METHODOLOGY (THEORY)

Theory: 2 Hrs. /Week

Objectives:

Upon completion of the course the student shall be able to

- Know the operation of M.S. Excel, SPSS, MINITAB,R, DOE (Design Experiment)
- Know the various statistical techniques to solve statistical problems
- Appreciate statistical techniques in solving the problems.

Course outcomes: After completion of course students will be able to:

- **CO01:** Know the various statistical methods to solve different types of problems
- **CO02:** Operate various statistical software packages

- **CO03:** Appreciate the importance of Computer in hospital and Community Pharmacy
- **CO04:** Appreciate the statistical technique in solving the pharmaceutical problems.

Course contents:

Reference books:

a. Pharmaceutical statistics- practical and clinical applications, Sanford Bolton 3rd edition, publisher Marcel Dekker Inc. New York.
b. Drug Information- A Guide for Pharmacists, Patrick M Malone, Karen L Kier, John E Stanovich, 3rd edition, McGraw Hill Publications 2006.

Syllabus

1 **Research Methodology**

a) Types of clinical study designs:
Case studies, observational studies, interventional studies,
b) Designing the methodology
c) Sample size determination and Power of a study
Determination of sample size for simple comparative experiments, determination of sample size to obtain a confidence interval of specified width, power of a study
d) Report writing and presentation of data

2 **Biostatistics**

2.1 a) Introduction
b) Types of data distribution
c) Measures describing the central tendency distributions- average, median, mode
d) Measurement of the spread of data-range, variation of mean, standard deviation, variance, coefficient of variation, standard error of mean.

2.2 **Data graphics**

Construction and labelling of graphs, histogram, pie-charts, scatter plots, semi-logarthimic plots

2.3 **Basics of testing hypothesis**

a) Null hypothesis, level of significance, power of test, P value, statistical estimation of confidence intervals.
b) Level of significance (Parametric data)- students t test (paired and unpaired), chi Square test, Analysis of Variance (one-way and two-way)
c) Level of significance (Non-parametric data)- Sign test, Wilcoxan's signed rank test, Wilcoxan rank sum test, Mann Whitney U test, Kruskal-Wall is test (one way ANOVA)
d) Linear regression and correlation- Introduction, Pearsonn's and Spearmann's correlation and correlation co-efficient.
e) Introduction to statistical software: SPSS, Epi Info, SAS.

2.4 Statistical methods in epidemiology

Incidence and prevalence, relative risk, attributable risk

3. Computer applications in pharmacy

Computer System in Hospital Pharmacy: Patterns of Computer use in Hospital Pharmacy – Patient record database management, Medication order entry – Drug labels and list – Intravenous solution and admixture, patient medication profiles, Inventory control, Management report & Statistics. **Computer in Community Pharmacy**: Computerizing the Prescription Dispensing process. Use of Computers for Pharmaceutical Care in community pharmacy Accounting and General ledger system**. Drug Information Retrieval & Storage: Introduction**: Advantages of Computerized Literature Retrieval Use of Computerized Retrieval

PDL 4405- BIOPHARMACEUTICS AND PHARMACOKINETICS (THEORY)

Theory: 3 Hrs. /Week

Objectives: Objectives of Biopharmaceutics course are to gain a basic understanding of the processes of drug absorption, distribution and elimination + the potentials of dosage form effects on these processes that can be applied to optimization of therapeutic benefit for a patient.

Scope: Biopharmaceutics explore the interrelationship of the physical/chemical properties of the drug, the dosage form (drug product) in which the drug is given, and the route of administration on the rate and extent of systemic drug absorption and the use of this information to optimise the therapeutic efficacy of the drug

Course outcomes: After completion of course students will be able to:

- **CO01:** Understand the concepts of biopharmaceutics and pharmacokinetics.
- **CO02:** Identify and critically assess the various factors affecting drug absorption, distribution, metabolism and elimination
- **CO03:** Describe need for different pharmacokinetic models and differentiate between compartment and non-compartment models.
- **CO04:** Apply various mathemathetical models to calculate different pharmacokinetic parameters following different routes of administration
- **CO05:** Understand nonlinear kinetics and non-compartmental analysis inclusive of factors affecting non-linear pharmacokinetics
- **CO06:** Define various terms related to bioavailability and bioequivalence, understand the biopharmaceutical classification system and assess the significance of in vitro/ in vivo correlation

Syllabus

1. Biopharmaceutics

1. Introduction to Biopharmaceutics
   a. Absorption of drugs from gastrointestinal tract.
   b. Drug Distribution.
   c. Drug Elimination.

2. Pharmacokinetics

2. Introduction to Pharmacokinetics.
   a. Mathematical model
   b. Drug levels in blood.
   c. Pharmacokinetic model
   d. Compartment models
   e. Pharmacokinetic study.
3. One compartment open model.
   a. Intravenous Injection (Bolus)
   b. Intravenous infusion.
4. Multicompartment models.
   a. Two compartment open model.
   b. IV bolus, IV infusion and oral administration
5. Multiple – Dosage Regimens.
   a. Repititive Intravenous injections – One Compartment Open Model
   b. Repititive Extravascular dosing – One Compartment Open model
   c. Multiple Dose Regimen – Two Compartment Open Model
6. Nonlinear Pharmacokinetics.
   a. Introduction
   b. Factors causing Non-linearity.
   c. Michaelis-menton method of estimating parameters.
7. Noncompartmental Pharmacokinetics.
   a. Statistical Moment Theory.
   b. MRT for various compartment models.
   c. Physiological Pharmacokinetic model.
8. Bioavailability and Bioequivalence.
   a. Introduction.
   b. Bioavailability study protocol.
   c. Methods of Assessment of Bioavailability.

PDP 2405- BIOPHARMACEUTICS AND PHARMACOKINETICS (PRACTICAL)
Practical: 3 Hrs/Week

Objectives: Objectives of Biopharmaceutics course are to gain a basic understanding of the processes of drug absorption, distribution and elimination + the potentials of dosage form effects on these processes that can be applied to optimization of therapeutic benefit for a patient.
Scope: Biopharmaceutics explore the interrelationship of the physical/chemical properties of the drug, the dosage form (drug product) in which the drug is given, and the route of administration on the rate and extent of systemic drug absorption and the use of this information to optimise the therapeutic efficacy of the drug
Course outcomes: After completion of course students will be able to:

- **CO01:** Understand about the concepts of biopharmaceutics and pharmacokinetics.
- **CO02:** Calculate the various pharmacokinetic parameters by using various mathematical models.
- **CO03:** Design a basic protocol for the conduct of Bioavailability/Bioequivalence study and the interpretation of the Bioavailability/Bioequivalence data.
- **CO04:** Use the concepts of pharmacokinetic principles in the clinical contexts and process simulated data
- **CO05:** Design and perform in-vitro dissolution studies for various drugs as per the standards of official monographs applicable to pharmaceutical industry.

List of experiments:

1. Improvement of dissolution characteristics of slightly soluble drugs by some methods.
2. Comparison of dissolution studies of two different marketed products of same drug.
3. Influence of polymorphism on solubility and dissolution.
4. Protein binding studies of a highly protein bound drug and poorly protein bound drug.
5. Extent of plasma-protein binding studies on the same drug (i.e. highly and poorly protein bound drug) at different concentrations in respect of constant time.
6. Bioavailability studies of some commonly used drugs on animal/human model.
7. Calculation of Ka, Ke, $t_1/2$, Cmax, AUC, AUMC, MRT etc. from blood profile data.
8. Calculation of bioavailability from urinary excretion data for two drugs.
9. Calculation of AUC and bioequivalence from the given data for two drugs.
10. In vitro absorption studies.
11. Bioequivalency studies on the different drugs marketed.(eg) Tetracycline, Sulphamethoxzole, Trimethoprim, Aspirin etc., on animals and human volunteers.
12. Absorption studies in animal inverted intestine using various drugs.
13. Effect on contact time on the plasma protein binding of drugs.
14. Studying metabolic pathways for different drugs based on elimination kinetics data.
15. Calculation of elimination half-life for different drugs by using urinary elimination data and blood level data.
16. Determination of renal clearance.

References:

a. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi
b. Remington's Pharmaceutical Sciences, By Mack Publishing Company, Pennsylvnia.
c. Pharmacokinetics: By Milo Glbaldi Donald, R. Mercel Dekker Inc.
d. Hand Book of Clinical Pharmacokinetics, By Milo Gibaldi and Laurie Prescott by ADIS Health Science Press.
e. Biopharmaceutics and Pharmacokinetics; By Robert F Notari
f. Biopharmaceutics; By Swarbrick
g. Bio pharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmankar and Sunil B.Jaiswal, Vallabh

Prakashan Pitampura, Delhi
h. Cilincal Pharmacokinetics, Concepts and Applications: By Malcolm Rowland and Thomas, N. Tozen, Lea and Febrger, Philadelphia, 1995.
i. Dissolution, Bioavailability and Bioequivalence, By Abdou H.M, Mack, Publishing Company, Pennsylvania 1989.
j. Biopharmaceutics and Clinical Pharmacokinetics-An introduction 4th edition Revised and expanded by Rebort F Notari Marcel Dekker Inn, New York and Basel, 1987.
k. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James, C. Roylan, Marcel Dekker Inc, New York 1996.

PDL 4406- CLINICAL TOXICOLOGY (THEORY)

Theory: 2 Hrs. /Week

Objectives: The goal of toxicology is to contribute to the general knowledge of the harmful actions of chemical substances, to study their mechanisms of action, and to estimate their possible risks to humans on the basis of experimental work on biological test systems.

Scope: The scope of toxicology is very wide, and contains three principal categories: environmental (pollution, residues, industrial hygiene); economic (medicines, food, food additives, pesticides, dyestuffs, chemicals); and forensic (intoxication, diagnosis, therapy). An overall assessment of the toxicological profile of natural or man-made chemical substances consists of acute, subacute and chronic toxicity studies, mutagenecity, carcinogenecity and teratogenecity studies, and a series of specially designed experiments. In this paper, the relevance of these toxicological studies as well as the place of mutagenecity, carcinogenecity, and teratogenecity studies within the frame of toxicological evaluation are discussed.

Course outcomes: After completion of course students will be able to:

- **CO01:** Understand the basic principles for the management of poisoning.
- **CO02:** Demonstrate the understanding of the health implications and management for acute toxic exposures and overdose of commonly involved chemicals and drugs including environmental impact.
- **CO03:** Demonstrate and apply an understanding of general toxicology principles and clinical management for the chronic exposure of heavy metals.
- **CO04:** Demonstrate and apply the understanding of the clinical symptoms and treatment approaches related to envenomations, contaminated food, poisonous plants.
- **CO05:** Comprehend the basics of clinical symptoms and treatment strategies for abused substances.

Course materials:

References books

a. Matthew J Ellenhorn. Ellenhorns Medical Toxicology – Diagnosis and Treatment of Poisoning. Second edition. Williams and Willkins publication, London
b. V V Pillay. Handbook of Forensic Medicine And Toxicology. Thirteenth edition 2003 Paras Publication,

Hyderabad.

Syllabus

1. General principles involved in the management of poisoning
2. Antidotes and the clinical applications.
3. Supportive care in clinical Toxicology.
4. Gut Decontamination.
5. Elimination Enhancement.
6. Toxicokinetics.
7. **Clinical symptoms and management of acute poisoning with the following agents:**
   a) Pesticide poisoning: organophosphorous compounds, carbamates, organochlorines, pyrethroids.
   b) Opiates overdose.
   c) Antidepressants
   d) Barbiturates and benzodiazepines.
   e) Alcohol: ethanol, methanol.
   f) Paracetamol and salicylates.
   g) Non-steroidal anti-inflammatory drugs.
   h) Hydrocarbons: Petroleum products and PEG.
   i) Caustics: inorganic acids and alkali.
   j) Radiation poisoning
8. Clinical symptoms and management of chronic poisoning with the following agents – Heavy metals: Arsenic, lead, mercury, iron, copper
9. Venomous snake bites: Families of venomous snakes, clinical effects of venoms, general management as first aid, early manifestations, complications and snake bite injuries.
10. Plants poisoning. Mushrooms, Mycotoxins.
11. Food poisonings
12. Envenomations – Arthropod bites and stings.

Substance abuse:

Signs and symptoms of substance abuse and treatment of dependence

a) CNS stimulants :amphetamine
b) Opioids
c) CNS depressants
d) Hallucinogens: LSD
e) Cannabis group
f) Tobacco

PDL 4407 PHARMACOTHERAPEUTICS I & II (THEORY)

Theory: 3Hrs/week

Scope: This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will

enable the student to understand the pathophysiology of common diseases and their management.

Objectives: At completion of this subject it is expected that students will be able to understand –

- the pathophysiology of selected disease states and the rationale for drug therapy;
- the therapeutic approach to management of these diseases;
- the controversies in drug therapy;
- the importance of preparation of individualized therapeutic plans based on diagnosis;
- needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);
- describe the pathophysiology of selected disease states and explain the rationale for drug therapy;
- to summarize the therapeutic approach to management of these diseases including reference to the latest available evidence;
- to discuss the controversies in drug therapy;
- to discuss the preparation of in dividualised therapeutic plans based on diagnosis; and
- identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

Course outcomes: After completion of course students will be able to:

- **CO01:** Understand pharmacotherapeutic principles tailored to address a spectrum of health conditions including cardiovascular, respiratory, endocrine diseases, Infectious Diseases, Musculoskeletal Disorders, Renal System Dysfunctions, Oncological Maladies, and Dermatological Concerns.
- **CO02:** Develop proficiency in selecting optimal pharmaceutical interventions by integrating patient-specific variables including medical history, concurrent illnesses, and potential drug interactions, fostering judicious prescribing practices aimed at maximizing therapeutic efficacy while mitigating adverse outcomes.
- **CO03:** Acquire knowledge in pharmacotherapy tailored to diverse health conditions, focusing on patient-specific factors for optimal prescribing and treatment outcomes.
- **CO04:** Evaluate medical literature and apply evidence-based practices in pharmacotherapy decision-making.Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases.

Syllabus

1. Cardiovascular system: Hypertension, Congestive cardiac failure, Angina Pectoris, Myocardial infarction, Hyperlipidaemias, Electrophysiology of heart and Arrhythmias.

2. Respiratory system: Introduction to Pulmonary function test, Asthma, Chronic obstructive airways disease, Drug induced pulmonary diseases

3. Endocrine system: Diabetes, Thyroid diseases, Oral contraceptives, Hormone replacement therapy, Osteoporosis

4. General prescribing guidelines for

a. Paediatric patients

b. Geriatric patients

c. Pregnancy and breast feeding

5. Ophthalmology: Glaucoma, Conjunctivitis- viral & bacterial

6. Introduction to rational drug use Definition, Role of pharmacist Essential drug concept rational drug formulations

7. Infectious disease: Guidelines for the rational use of antibiotics and surgical Prophylaxis, Tuberculosis, Meningitis, Respiratory tract infections, Gastroenteritis, Endocarditis, Septicemia, Urinary tract infections, Protozoal infection- Malaria, HIV & Opportunistic infections, Fungal infections, Viral infections, Gonarrhoea and Syphillis **8. Musculoskeletal disorders** Rheumatoid arthritis, Osteoarthritis, Gout, Spondylitis, Systemic lupus erythematosus

9. Musculoskeletal disorders Rheumatoid arthritis, Osteoarthritis, Gout, Spondylitis, Systemic lupus erythematosus

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

11. Dermatology: Psoriasis, Scabies, Eczema, Impetigo

PDP 2407 PHARMACOTHERAPEUTICS – I & II (PRACTICAL)

Practicals: 3 Hrs./Week

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

Objectives: At completion of this subject it is expected that students will be able to understand –

- the pathophysiology of selected disease states and the rationale for drug therapy;
- the therapeutic approach to management of these diseases;
- the controversies in drug therapy;
- the importance of preparation of individualized therapeutic plans based on diagnosis;
- needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);
- describe the pathophysiology of selected disease states and explain the rationale for drug therapy;
- to summarize the therapeutic approach to management of these diseases including reference to the latest available evidence;
- to discuss the controversies in drug therapy;

- to discuss the preparation of in dividualised therapeutic plans based on diagnosis; and identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

  Course outcomes: After completion of course students will be able to:

  - **CO01:** Remember the medication selection tailored to diverse patient needs.
  - **CO02:** Assess drug interactions and adverse effects for safe prescribing.
  - **CO03:** Create a therapeutic plan to optimise treatment outcomes.
  - **CO04**: Apply pharmacotherapeutic principles to real-world clinical scenarios.
  - **CO05:** Evaluate drug efficacy and adjusts treatment plans accordingly.

Practicals:

Hospital postings in various departments designed to complement the lectures by providing practical clinical discussion; attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients; case presentation upon discharge. Students are required to maintain a record of cases presented and the same should be submitted at the end of the course for evaluation. A minimum of 20 cases should be presented and recorded covering most common diseases.

Assignments:

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

Format of the assignment:

1. Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year.
4. It shall be computer draft copy.
5. Name and signature of the student.
6. Time allocated for presentation may be 8+2 Min.

DM 101- DISASTER MANAGEMENT (THEORY)

Theory: 2 Hrs. /Week

Objectives & Scope

1. To provide students an exposure to disasters, their significance and types
2. To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
3. To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
4. To enhance awareness of institutional processes in the country
5. To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

Course outcomes: After completion of course students will be able to:

- **CO01:** Understand foundations of hazards, disasters and associated natural/social phenomena
- **CO02:** Familiar with disaster management theory (cycle, phases)
- **CO03:** Know about Climate change, existing global frameworks and existing agreements
- **CO04:** Understand the methods of community involvement as an essential part of successful DRR, Humanitarian Assistance before and after disaster
- **CO05:** Understand technological innovations in Disaster Risk Reduction: Advantages and problems
- **CO06:** Experience on conducting independent DM study including data search, analysis and presentation of disaster case study

Syllabus

1 – Disasters: Classification, Causes, Impacts

- Introduction to Disasters: Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks)
- Impacts (including social, economic, political, environmental, health, psychosocial, etc. Differential impacts- in terms of caste, class, gender, age, location, disability)
- Classification of hazards/disasters and causes

2- Principles of disaster management

- Approaches to Disaster Risk reduction: Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness,
- Community based DRR, Components of Disaster Relief: Water, Food, Sanitation, Shelter, and Health,
- Structural and non-structural measures.

3 –Hazard Profile (India) , Disaster Risk Management in India

- Hazard and Vulnerability profile of India
- Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation),Role of Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake-holders.

4 – Disaster and Development

- Inter-relationship between Disasters and Development: Factors affecting Vulnerabilities, impact of Development projects such as dams, embankments, changes in Land-use etc. urban disasters, Waste Management
- Global trends in disasters & Adaptation: Global Trends, Complex emergencies, Pandemics Climate change and Adaptation, Relevance of indigenous knowledge, appropriate technology and local resources

NSW1301- CLINICAL SKILLS-AND EMERGENCY INTERVENTIONS

Theory: 2 Hrs. /Week

Objectives & Scope:

- History and physical examination: obtain a patient's history and physical exam in a logical, organized and thorough manner while adapting to the urgency of the medical situation and the time available.
- Diagnostic decision making: formulate a differential diagnosis based on the key findings from the history and physical examination.
- Therapeutic decision making: understand risks, benefits, and compliance issues in choosing a treatment.
- Procedures: be able to perform such procedures as throat cultures, PAP smears, gram stains, wet mounts, and EKGs.

Course outcomes: After completion of course students will be able to:

- **CO01: Understand various clinical procedures on patient.**
- **CO02: Make decision on formulating a differential diagnosis.**
- **CO03: Develop clinical skills and emergency intervention.**
- **CO04: Do various clinical procedures on patient for promoting good health**

Course materials:

Textbooks

- Lippincott Manual of Nursing Practice, Williams & Wilkins, 10th Edition
- Potter Perry, Fundamentals of Nursing, 7th edition, Elsevier
- First Aid and Emergency Care, Dr. Swapna Naskar Williamson, Kumar Publishing House
- Berman and Synder, Kozier and Erb's Fundamentals of Nursing, 9thedition,Pearson.

Reference Books

- Taylor C. Lillis C. Lemone P. Fundamentals Of Nursing- The Art And Scienceof Nursing Care. 4th Edition, Lippincott Publishers
- Student manual of BLS for health care providers, American heart association.

Syllabus

1. Vital signs monitoring: Temperature, Pulse, Respiration, Blood Pressure

2. Venipuncture
3. Regulating Intravenous(IV) flow rates
4. Changing IV dressings &IV solutions and tubing
5. Administering blood transfusions
6. Fluid Electrolytes and Acid Base Balance
7. Drug Administration- Intradermal, subcutaneous, intramuscular,intravenous (Purpose, Site of injection, Equipment, Procedure, Special considerations)
8. Wound dressing & Bandaging
9. Infection Control
10. Cardio-pulmonary Resuscitation

SECOND YEAR

PDL 4501- CLINICAL RESEARCH (THEORY)

Theory: 3 Hrs. /Week

Objectives: The objective of clinical research is to establish the effect of an intervention. Treatment effects are efficiently isolated by controlling for bias and confounding and by minimizing variation. Key features of clinical research that are used to meet this objective are randomization (possibly with stratification), adherence to intent-to-treat (ITT) principles, blinding, prospective evaluation, and use of a control group. Compared to other types of study designs (e.g., case-control studies, cohort studies, case reports), randomized trials have high validity but are more difficult and expensive to conduct.

Scope: Clinical research is a current knowledge-intensive and booming industry. It is one of the industry growing at an astonishing rate and opening up a wide scope of employment opportunities for trained professionals. It provides scientific analysis of the impact, risks and benefits of medicines or a medicinal product.

Course outcomes: After completion of course students will be able to:

- **CO0**1: Know the new drug development process.
- **CO0**2: Understand the regulatory and ethical requirements.
- **CO0**3: Appreciate and conduct the clinical trials activities
- **CO0**4. Know safety monitoring and reporting in clinical trials
- **CO0**5. Manage the trial coordination process
- **CO0**6.

Course materials:

References

a. Central Drugs Standard Control Organization. Good Clinical Practices-Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health; 2001.
b. International Conference on Harmonisation of Technical requirements for registration of Pharmaceuticals for human use. ICH Harmonised Tripartite Guideline. Guideline for Good Clinical Practice.E6; May 1996.
c. Ethical Guidelines for Biomedical Research on Human Subjects 2000. Indian Council of Medical Research, New Delhi.
d. Textbook of Clinical Trials edited by David Machin, Simon Day and Sylvan Green, March 2005, John Wiley and Sons.
e. Principles of Clinical Research edited by Giovanna di Ignazio, Di Giovanna and Haynes.
f. Clinical Data Management edited by R K Rondels, S A Varley, C F Webbs. Second Edition, Jan 2000, Wiley Publications.
g. Goodman & Gilman: JG Hardman, LE Limbard, 10th Edn. McGraw Hill

Publications, 2001.

Syllabus

1. **Drug development process:**
   Introduction
   Various Approaches to drug discovery
   1. Pharmacological
   2. Toxicological
   3. IND Application
   4. Drug characterization
   5. Dosage form
2. **Clinical development of drug:**
   1. Introduction to Clinical trials
   2. Various phases of clinical trial.
   3. Methods of post marketing surveillance
   4. Abbreviated New Drug Application submission.
   5. Good Clinical Practice – ICH, GCP, Central drug standard control organization (CDSCO) guidelines
   6. Challenges in the implementation of guidelines
   7. Ethical guidelines in Clinical Research
   8. Composition, responsibilities, procedures of IRB / IEC
   9. Overview of regulatory environment in USA, Europe and India.
   10. Role and responsibilities of clinical trial personnel as per ICH GCP
       a. Sponsor
       b. Investigators
       c. Clinical research associate
       d. Auditors
       e. Contract research coordinators
       f. Regulatory authority
   11. Designing of clinical study documents (protocol, CRF, ICF, PIC with assignment)
   12. Informed consent Process
   13. Data management and its components
   14. Safety monitoring in clinical trials.

PDL4502-PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS (THEORY)

Theory: 3 Hrs /Week

Objectives: Pharmacoepidemiology concentrates on clinical patient outcomes from therapeutics by using methods of clinical epidemiology and applying them to understanding the determinants of beneficial and adverse drug effects, effects of genetic

variation on drug effect, duration-response relationships etc. Pharmacoeconomics is the science of measuring costs and outcomes associated with the use of pharmaceuticals in health-care delivery. Its objective is to improve public health through rational decision making when selecting among alternative therapies, e.g., for formularies and their impact on costs and outcomes.

Scope: Pharmacoeconomics is a branch of health economics related to the most economical and efficient use of pharmaceuticals. Pharmacoeconomics research identifies measures and compares the costs and outcomes of pharmaceutical products and services. Pharmacoepidemiology is the application of the principles of epidemiology to drug effects and drug use. Hence, Pharmacoepidemiology is the study of the use of and the effects of drugs in larger population. It involves the examination of a single individual or large groups of people followed for many years.

Course outcomes: After completion of course students will be able to:

- **CO01:** Understand the key principles of Pharmacoepidemiology and its significance in public health, focusing on access to safe and affordable medicines.
- **CO02:** Apply pharmacoepidemiology principles to enhance medication use and improve patient outcomes, addressing healthcare disparities.
- **CO03:** Demonstrate skills in designing and evaluating Pharmacoepidemiology studies, ensuring ethical research practices and accountability.
- **CO04:** Understand basic pharmacoeconomic methods for evaluating healthcare costs and outcomes, promoting resource efficiency.
- **CO05:** Demonstrate competency in designing and evaluating Pharmacoeconomic studies, fostering collaborations to improve healthcare delivery and sustainability.

Syllabus

1. Pharmacoepidemiology :

- **Definition and scope:**
  Origin and evaluation of pharmacoepidemiology need for pharmacoepidemiology, aims and applications.
- **Measurement of outcomes in pharmacoepidemiology**
  Outcome measure and drug use measures
  Prevalence, incidence and incidence rate. Monetary units, number of prescriptions, units of drugs dispensed, defined daily doses and prescribed daily doses, medication adherence measurement

- **Concept of risk in pharmacoepidemiology**
  Measurement of risk, attributable risk and relative risk, time-risk relationship and odds ratio
- **Pharmacoepidemiological methods**
  Includes theoretical aspects of various methods and practical study of various methods with the help of case studies for individual methods
  Drug utilization review, case reports, case series, surveys of drug use, cross – sectional studies, cohort studies, case control studies, case –cohort studies, meta–analysis studies, spontaneous reporting, prescription event monitoring and record linkage system.
- **Sources of data for pharmacoepidemiological studies**
  Ad Hoc data sources and automated data systems.
- **Selected special applications of Pharmacoepidemiology**
  Studies of vaccine safety, hospital pharmacoepidemiology, pharmacoepidemiology and risk management, drug induced birth defects.

2. Pharmacoeconomics:

- **Definition, history, needs of Pharmacoeconomics evaluations**
  Role in formulary management decisions
- **Pharmacoeconomic evaluation**
  Outcome assessment and types of evaluation
  Includes theoretical aspects of various methods and practical study of various methods with the help of case studies for individual methods:
  Cost – minimization, cost- benefit, cost – effectiveness, cost utility

3. **Applications of Pharmacoeconomics:** Software and case studies

PDL 4503- CLINICAL PHARMACOKINETICS AND PHARMACOTHERAPEUTIC & DRUG MONITORING (THEORY)

Theory: 2 Hrs. /Week

Objectives & Scope: Therapeutic drug monitoring (TDM) is generally defined as the clinical laboratory measurement of a chemical parameter that, with appropriate medical interpretation, will directly influence drug prescribing procedures. It involves the use of drug concentration measurements in body fluids as an aid to the management of drug therapy for the cure, alleviation or prevention of disease. TDM enables the assessment of the efficacy and safety of a particular medication in a variety of clinical settings. The goal of this process is to individualize therapeutic regimens for optimal patient benefit.

Course outcomes: After completion of course students will be able to:

- **CO01:** Understand principles of clinical pharmacokinetics and utilize the concepts of Pharmacokinetics to individualize the drug dosage regimen in clinical settings
- **CO02:** Apply nomograms and tabulations in dosage regimen design, ability to convert intravenous to oral dosing and understand Therapeutic Drug Monitoring Services
- **CO03:** Review the various pharmacokinetic drug interactions issues and assess their implications in the clinical settings.
- **CO04:** Adjust the dosage regimen for patients with renal / hepatic impairments
- **CO05:** Understand the significance of population pharmacokinetics, pharmacogenetics and polymorphism in drug metabolism, drug transporters and targets

Syllabus

1. Introduction to Clinical pharmacokinetics.

2. Design of dosage regimens:

Nomograms and Tabulations in designing dosage regimen, Conversion from intravenous to oral dosing, Determination of dose and dosing intervals, Drug dosing in the elderly and pediatrics and obese patients.

3. Pharmacokinetics of Drug Interaction:

a. Pharmacokinetic drug interactions
b. Inhibition and Induction of Drug metabolism
c. Inhibition of Biliary Excretion.

4. Therapeutic Drug monitoring:

a. Introduction
b. Individualization of drug dosage regimen (Variability – Genetic, Age and Weight , disease, Interacting drugs).
c. Indications for TDM. Protocol for TDM.
d. Pharmacokinetic/Pharmacodynamic Correlation in drug therapy.

e. TDM of drugs used in the following disease conditions: cardiovascular disease, Seizure disorders, Psychiatric conditions, and Organ transplantations.

5. Dosage adjustment in Renal and hepatic Disease.

a. Renal impairment
b. Pharmacokinetic considerations
c. General approach for dosage adjustment in Renal disease.
d. Measurement of Glomerular Filtration rate and creatinine clearance.
e. Dosage adjustment for uremic patients.
f. Extracorporeal removal of drugs.
g. Effect of Hepatic disease on pharmacokinetics.

6. Population Pharmacokinetics.

a. Introduction to Bayesian Theory.
b. Adaptive method or Dosing with feedback.
c. Analysis of Population pharmacokinetic Data.

7. Pharmacogenetics

a. Genetic polymorphism in Drug metabolism: Cytochrome P-450 Isoenzymes.
b. Genetic Polymorphism in Drug Transport and Drug Targets.
c. Pharmacogenetics and Pharmacokinetics/Pharmacodynamic considerations.

HR 101- HUMAN VALUES AND PROFESSIONAL ETHICS

Theory: 2 Hrs. /Week

Scope & Objective of the Course:

The course provides a wide scope of learning & understanding of the subject and after completion of the subject the student will have the ability to develop human values and its importance in their professional life. The student will also have good knowledge of human rights.

Course outcomes: After completion of course students will be able to:

- **CO01:** Develop critical thinking about character formation, Personal development and value education
- **CO02:** Recognise the National and Professional Values.
- **CO03:** Prioritise the knowledge regarding fundamental rights and promote compliance with international and national concepts of human rights.
- **CO04:** Appraise the respect to women and children by clearing he concept of their human rights
- **CO05:** Demonstrate the need of meditation, yoga and physical exercise in maintaining a healthy lifestyle

Syllabus

1 **General Concepts:** Introduction about human rights and value education, aim of education, concept of human values and its types. Personal development: Self-analysis, gender equality, respect to age, experience, maturity, family member, coworker. Personality development and

its importance in professional world. Character formation through human values: Truthfulness, sacrifice, sincerity ,self-control, tolerance, positive attitude, dignity, ethics.

2 **National values:** Democracy, socialism, secularism, equality, justice, liberty, freedom, Social values: Sympathy, universal brother-hood, duty towards our society, Professional Values: Knowledge thirst, sincerity towards responsibility, ethics, regularity, punctuality, and faith, Religious values: Accept and respect others believes, tolerance, understanding, faith.

3 **Fundamental rights :** Introduction and importance of fundamental rights of Indian constitution , Right to Equality: Introduction and its importance, types of right of equality, equality before law, abolition of untouchability, abolition of titles, Right to freedom: Introduction and its importance, types of right, freedom of speech ,freedom to reside and settle , freedom to practice any profession, Rights against exploitation and right to freedom of religion: Introduction and its importance and its effect on human life.

4 **Cultural and educational rights and rights to constitutional remedies, Right to property and right to education :** Introduction and its importance, importance of education on our life, Human rights-general : concepts of human rights and its Indian and international perspective, evolution of human rights, UDHR, significance and purpose of UDHR.

5 **Therapeutic Measures:** Control of mind through physical exercise, meditation, Meditation and yoga : Introduction and its effects on human mind , types of yoga , how to control our thought through yoga and meditation .

6 **Human rights of women and children :** Social practice and constitutional safeguards, gender discrimination in workplace, Female feticide , physical assault and harassment, domestic violence, condition of working of women, child labor, violation by individuals, nuclear weapons and terrorism safeguard.

AMR 1201- AWARENESS ON ANTIMICROBIAL RESISTANCE

Theory: 2 Hrs. /Week

Scope & Objective of the Course:

This course will help the students to understand the concept of antibiotic resistance, its impact on environment and health along with the basics of existing management perspectives for individual care. It will also make them understand their role as pharmacists and its impact on society's health.

The main objectives of the course are:

- To introduce the basic concepts of antibiotics and antibiotic resistance
- To understand the statistics of the incidence and prevalence of ABR
- To understand concept of "One health" related to Environment and ABR
- To aware the "future pharmacists" about the role in lowering the incidence of drug resistant infections
- To enable the students to understand the basic concept of antibiotic stewardship program at hospitals for managing ABR
- To aware the "future healthcare professionals" about the role of "human behavior" in managing ABR

Course outcomes: After completion of course students will be able to:

- **CLO 01:** Define the basic terminology related to AMR and ABR. Define the mode of action of antibiotics. Define the mechanism of antibiotic resistance. Understand the concept of 'One Health' in view of AMR.
- **CLO 02:** Describe the status of surveillance system for AMR in humans, animals and plants.
- **CLO 03:** Explain the key goals of global and national action plans to combat AMR.
- **CLO 04:** Understand and apply advances in antimicrobial stewardship program during on-field practice.
- **CLO 05:** To understand the need and importance of antibiotic prescriptions for diseased conditions.

Syllabus

1 Introduction to AMR/ABR

- Definition of Antimicrobial resistance
- Overview on resistance mechanisms
- Spread of AMR
- Impact on health of humans, animals and plants

2 AMR surveillance system

- Introduction to GLASS
- AMR burden in the global and national level

3 Action plans for prevention of ABR

- GAP, NAP and KARSAP, WHO guidelines on AMR

4 Role of clinical pharmacists in preventing AMR as per standard guidelines

- Introduction to antimicrobial Stewardship
- Role of clinical pharmacist in infection control practices

5 Guidelines for appropriate antimicrobial use

- Infectious disease including UTI, pneumonia, skin and soft tissue infections, CNS infections, abdominal infections, sepsis

PDP 4504- CLERKSHIP (PRACTICAL)

Practical: 1 Hr. /Week

Course outcomes: After completion of course students will be able to:

- **CO01:** Deliver clinical pharmacy services
- **CO02:** Manage Pharmaceutical care planning with knowledge of diseases and therapeutics
- **CO03:** Communicate effectively with patients, caregivers, and healthcare providers.
- **CO04:** Interpret and apply relevant laboratory and diagnostic data in therapeutic decision-making.

PDP 4505- PROJECT WORK (PRACTICAL)

Practical: 20 Hrs. /Week

Course outcomes: After completion of course students will be able to:

- **CO01:** Conduct comprehensive medication histories and patient assessments. Address a problem related to Pharmacy practice in hospital, community service or clinical set up with a wider perspective and generality
- **CO02:** Select appropriate methodology for investigative work, taking into account the pros and cons of the alternatives available and develop solution proposals based on reasoned judgement
- **CO03:** Present a coherent, logically argued, fully referenced report and engage in a professional manner in a viva-voce discussion about the project drug
- **CO04:** Utilize evidence-based practices and clinical guidelines to enhance patient care and safety.

THIRD YEAR

Year III			
Course Code	**Title of the Course**	**Hours (L+S+P)**	**Credit**
PDP 6661	INTERNSHIP	6 hours per day 6X6=36 Hour per week	36
Total			**36**

PDP 6661- INTERNSHIP (PRACTICAL)

Practical: 36 Hrs. /Week

Course outcomes: After completion of course students will be able to:

- **CO01:** Apply pharmaceutical knowledge and skills in real-world clinical settings
- **CO02:** Demonstrate proficiency in medication therapy management.
- **CO03:** Collaborate effectively with healthcare teams to optimize patient health care through knowledge sharing.
- **CO04:** Conduct comprehensive medication histories and patient

assessments

Integration of Swayam

Swayam and MOOCs offer a diverse range of online courses across various disciplines, providing students with access to high-quality educational content from esteemed institutions and instructors worldwide. Integrating these courses into our curriculum presents a valuable opportunity to enhance the learning experience of our students, broaden their academic horizons, and equip them with relevant skills for their future endeavors.

12. Assessment and Evaluation

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

(2) A Student who fails in theory or practical examination of a subject shall re-appear both in theory and practical of the same subject.

(3) Practical examination shall also consist of a viva –voce (Oral) examination.

(4) Clerkship examination – Oral examination shall be conducted after the completion of clerkship of students. An external and an internal examiner will evaluate the student. Students may be asked to present the allotted medical cases followed by discussion. Students' capabilities in delivering clinical pharmacy services, pharmaceutical care planning and knowledge of therapeutics shall be assessed.

(A) A regular record of both theory and practical class work and examinations conducted in an institution imparting training for Pharm.D. (Post Baccalaureate) course, shall be maintained for each student in the institution and 30 marks for each theory and 30 marks for each practical subject shall be allotted as sessional.

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

(C) The sessional marks in practical's shall be allotted on the following basis:- (i) Actual performance in the sessional examination (20 marks); (ii) Day to day assessment in the practical class work, promptness, viva-voce record maintenance, etc. (10 marks).

The evaluation will be continuous and the weightage of various components are as given in Table 7 (For Theory courses) and in Table 8 (for Practical Courses).

Table 7: Evaluation components for Theory Courses

For Theory Courses	
Sessional Tests (STs)	30
End Term Examination	70
Total	100

There are three Sessional Tests (STs) for all theory papers, the average of best two are considered.

The End Term examination for practical courses includes conduct of experiment and an oral examination (viva voce)

Table82: Evaluation Components for Practical Courses

For Lab Courses	
Lab Performance / File work	20
practical class work, promptness, internal viva-voce record maintenance	10

End Term	70
Total	100

(D). Internship (1) Internship is a phase of training wherein a student is expected to conduct actual practice of pharmacy and health care and acquires skills under the supervision so that he or she may become capable of functioning independently. (2) Every student has to undergo one year internship.

Table 9: Evaluation Components for Integrated Project

For Integrated Projects	
Performance / Presentation / Project report	100
Total	100

13. Examples of few questions statements pertaining to different levels of Bloom's Taxonomy

Remember

A lot of emphasis is laid on, so as to make sure that all assessment components are conducted while following different levels of Bloom's Taxonomy as mentioned in figure.

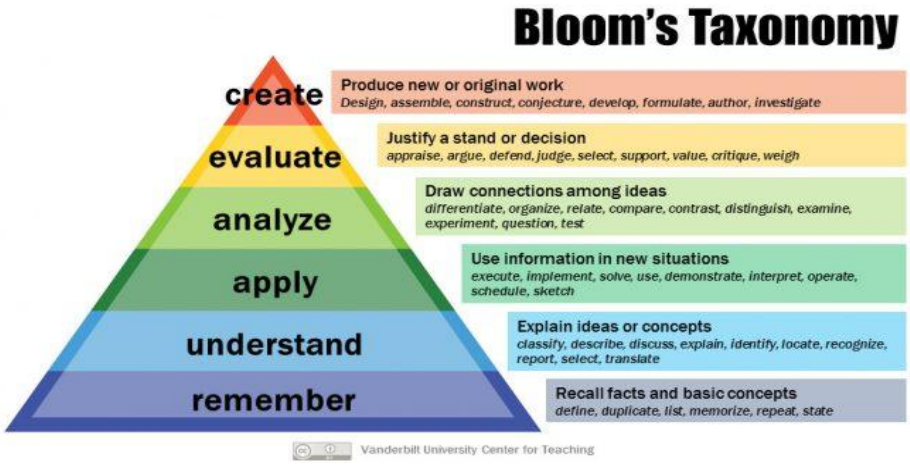

Figure 1. Bloom's Taxonomy [7]

Further a focused effort if also made to align every single Further a focused effort if also made to align every single test item in assessment components with one or the other course learning outcome.

Retrieving, recognizing, and recalling relevant knowledge from long-term memory.

Sample Questions

1. List the neurotransmitter deficits commonly associated with Alzheimer's disease.
2. Name the classes of medications commonly used to treat inflammatory bowel disease.

Understand

Constructing meaning from oral, written and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing and explaining.

Sample Questions

1. Summarize the rationale behind using anticholinergic medications in managing tremors associated with Parkinsonism.
2. Explain the differences between primary insomnia and secondary insomnia to another medical condition.

Applying

Carrying out or using a procedure through executing or implementing.

Sample Questions

1. Design a monitoring plan for a patient undergoing pharmacological therapy for alcoholic liver disease to assess treatment efficacy and safety.
2. Propose strategies for managing medication interactions between pharmacotherapy for alcoholic liver disease and medications for co-existing conditions like hypertension or diabetes.

Analyzing

Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing and attributing

Sample Questions

1. Analyze how drug-drug interactions can impact the effectiveness of pain management therapies.
2. Evaluate the efficacy and safety profiles of different antipsychotic agents in the long-term management of schizophrenia.

Creating & Evaluating

Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning or producing. Making judgments based on criteria and standards through checking and critiquing

Sample Questions

1. Develop a proposal for a community outreach initiative aimed at reducing stigma associated with epilepsy, integrating education on the neurological basis of seizures and the role of pharmacotherapy in managing the condition.
2. Evaluate the impact of non-pharmacological interventions (e.g., cognitive behavioral therapy, acupuncture) in complementing pharmacotherapy for neuralgia. Discuss their potential to enhance treatment outcomes and reduce reliance on medication.

14. Course Handout

Institute/School Name			
Department Name			
Programme Name			
Course Name		Session	
Course Code		Semester/Batch	
L-T-P(Per Week)		Course Credits	
Pre-requisite		NHEQF Level[1]	
Course Coordinator			
SDG			

1. Objectives of the Course

<< Provide a brief overview and objectives of this course in not more than 100 words. >>

2. Course Learning Outcomes (CLOs)

Student should be able to:

	CLOs	Program Outcomes (PO)	NHEQF Level Descriptor[2]	No. of Lectures
CLO01				
CLO02				
CLO03				
CLO04				
CLO05				
CLO06 (Only for lab components)				
Total Contact Hours				

CLO-PO Mapping

CLO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO01												
CLO02												
CLO03												
CLO04												
CLO05												

[1] National Higher Education Qualification Framework Level, Refer to annexure
[2] NHEQF Level Descriptor, Refer to Annexure & Learning outcomes descriptors for qualification for all levels on the NHEQF

CLO06												

H=High, M=Medium, L=Low

3. **Recommended Books:**

B01:
B02:
B03:
B04:
B05

4. **Other readings and relevant websites:**

SerialNo	Link of Journals, Magazines, websites and Research Papers
1.	
2.	
3.	
4.	
5.	

5. **Recommended Tools and Platforms**

<<Mention Tools and Platforms required for the course if required>>

6. **Course Plan: Theory+ Lab Plan Theory Plan**

Lect. No.	Topic(s)
ST1	
	ST2
	End Term Exam

Lab Plan

Lab No.	Topic(s)
Continuous Evaluation1 (15marks)	
Continuous Evaluation2 (15Marks)	

7. **Delivery/Instructional Resources Theory Plan:**

Lect. No.	Topics	Book No, CH No, Page No	TLM[3]	ALM[4]	Web References	Audio-Video

		B01, CH 1.1-1.5, Page no 3-13				

Lab Plan:

Lab No.	Experiment	TLM	ALM	Web References	Audio-Video

8. **Remedial Classes[5]**

<<Supplement course handout, which may perhaps include special lectures and discussions that would be planned, and schedule notified accordingly.>>

9. **Self-Learning[6]**

Assignments to promote self-learning, survey of contents from multiple sources.

S.No	Topics	CO	ALM	References/MOOCS

10. **Delivery Details of Content Beyond Syllabus[7]**

Content beyond syllabus covered (if any) should be delivered to all students that would be planned, and schedule notified accordingly.

S.No	Advanced Topics, Additional Reading, Research papers and any	CO	POs	ALM	References/MOOCS

11. **Evaluation Scheme & Components:**

Assessment Type[8]	Evaluation Component[9]	Type of Component[10]	No. of Assessments[11]	% Weightage of Component	Max. Marks	Mode of Assessment
Formative	Component1	Continuous Lab Evaluations	02*	30%		Offline
Summative	Component2	Sessional Tests(STs)	02**	20%		Offline
Summative	Component3	End Term Examination	01***	50%		Offline
	Total		**100%**			

Note: Details in above table are sample for the reference, The department decides the assessment policy for each course.

12. **Syllabus of the Course:**

Subject:			
S.No.	**Topic(s)**	**No. of Lectures**	**Weightage %**

13. **Academic Integrity Policy:**

Education at Chitkara University builds on the principle that excellence requires freedom where Honesty and integrity are its prerequisites. Academic honesty in the advancement of knowledge requires that all students and Faculty respect the integrity of one another's work and recognize the importance of acknowledging and safeguarding intellectual property. Any breach of the same will be tantamount to severe academic penalties.

This Document is approved by:

Designation	**Name**	**Signature**
Course Coordinator		
Head-Academic Delivery		
Dean		
Date(DD/MM/YYYY)		

15. Program level Course-PO matrix of all courses

Table 10: CO-PO Matrix

S. No.	Course Name	Course Code	Course Learning Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11
			After completion of course students will be able to:											
1.	Pharmacotherapeutics- III	PDL 4401	**CO01:** Start the administration of medication and outline the expected therapeutic outcomes through targeted interventions.		**M**	H						**L**		
			CO02: Know the effective use of pharmacological therapeutic interventions in the treatment of specific diseases, conditions and symptoms.		**H**	**M**		**L**						
			CO03: Demonstrate effective communication and collaborative teamwork			H							**M**	**L**
			CO04: Have moral reasoning, ethical judgment	M							**M**	**H**		H

			and professionalism											
2.	Hospital Pharmacy	PDL 4402	**CO01:** Create Basic understanding of organisational structure of a hospital as well as its pharmacy, infrastructure and budgeting			H	M	L		**H**		L	L	M
			CO02: Understand and remember the working and constitution of different hospital committees and drug formulary,			**H**	M					M	H	L
			CO03: Understand the process of procurement, warehousing, inventory control and distribution of drugs with especial emphasis on narcotic and controlled drugs; role of pharmacist in central sterile supply services			**H**	L	L				L	L	M
			CO04: Apply the basic knowledge of manufacturing process of sterile formulations, ointments, liquids, creams, tablets, granules, capsules, powders and total parentral nutrition			**H**	L	L				L	L	M
			CO05: Understand the role of pharmacist in professional relations,			L	L	M				L	L	M

			practices, education, training and handling, packaging of radiopharmaceuticals;											
3.	Clinical Pharmacy	PDL 4403	**CO01:** Monitor patient drug therapy through reviewing medication charts and conducting clinical assessments.			**H**	M						L	
			CO02: Conduct medication history interviews with patients about their diseases and provide counseling as needed.			**H**	M							L
			CO03: Identify, evaluate, and monitor adverse drug reactions.			M	M						**H**	
			CO04: Analyze specific disease states by interpreting relevant laboratory results used as therapeutic monitoring parameters.		L	M	**H**							
			CO05: Retrieve, analyze, interpret and formulate drug or medicine information.	M						L			**H**	
4.	Biostatistics & Research Methodology	PDL 4404	**CO01:** Know the various statistical methods to solve different types of problems						M			H		
			CO02: Operate various statistical software packages									H		
			CO03: Appreciate the			H	M							

			importance of Computer in hospital and Community Pharmacy												
			CO04: Appreciate the statistical technique in solving the pharmaceutical problems						M			H			
5.	Biopharmaceutics & Pharmacokinetics	PDL 4405	**CO01:** Understand the concepts of biopharmaceutics and pharmacokinetics.		L				M	**H**					
			CO02: Identify and critically assess the various factors affecting drug absorption, distribution, metabolism and elimination		M					**H**					
			CO03: Describe need for different pharmacokinetic models and differentiate between compartment and non-compartment models.			L			M	**H**					
			CO04: Apply various mathematical models to calculate different pharmacokinetic parameters following different routes of administration							H					
			CO05: Understand nonlinear kinetics and non-compartmental analysis inclusive of factors affecting non-linear		L					**H**	M				

			pharmacokinetics											
			CO06: Define various terms related to bioavailability and bioequivalence, understand the biopharmaceutical classification system and assess the significance of in vitro/ in vivo correlation							**H**	L			
6.	Clinical Toxicology	PDL 4406	**CO01:** Understand the basic principles for the management of poisoning.							M	H			
			CO02: Demonstrate the understanding of the health implications and management for acute toxic exposures and overdose of commonly involved chemicals and drugs including environmental impact.				H			M	H			
			CO03: Demonstrate and apply an understanding of general toxicology principles and clinical management for the chronic exposure of heavy metals.							M	H			
			CO04: Demonstrate and apply the understanding of the clinical symptoms and treatment approaches related to envenomations,				M			L	H			

			contaminated food, poisonous plants.											
			CO05: Comprehend the basics of clinical symptoms and treatment strategies for abused substances.					H			L	M		
7.	Pharmacottherapeutics I & II	PDL 4407	**CO01:** Understand pharmacotherapeutic principles tailored to address a spectrum of health conditions including cardiovascular, respiratory, endocrine diseases, Infectious Diseases, Musculoskeletal Disorders, Renal System Dysfunctions, Oncological Maladies, and Dermatological Concerns.		H	M	M		H				H	M
			CO02: Develop proficiency in selecting optimal pharmaceutical interventions by integrating patient-specific variables including medical history, concurrent illnesses, and potential drug interactions, fostering judicious prescribing practices aimed at maximizing therapeutic efficacy while mitigating adverse outcomes.			M		M						

			CO03: Acquire knowledge in pharmacotherapy tailored to diverse health conditions, focusing on patient-specific factors for optimal prescribing and treatment outcomes.	M	H	H	M	M	M				H
			CO04: Evaluate medical literature and apply evidence-based practices in pharmacotherapy decision-making.	M	M	M	H						M	M
8.	Disaster Management	DM 101	**CO01:** Understand foundations of hazards, disasters and associated natural/social phenomena							H				
			CO02: Familiar with disaster management theory (cycle, phases)	M									M	
			CO03: Know about Climate change, existing global frameworks and existing agreements						H					L
			CO04: Understand the methods of community involvement as an essential part of successful DRR, Humanitarian Assistance before and after disaster			H			L					L
			CO05: Understand technological innovations in Disaster Risk Reduction:							M				

			Advantages and problems											
			CO06: Experience on conducting independent DM study including data search, analysis and presentation of disaster case study			M								L
9.	Clinical Skills & Emergencey Interventions	NSW 1301	**CO01:** Understand various clinical procedures on patient.	H				M		M				L
			CO02: Make decision on formulating a differential diagnosis.											
			CO03: Develop clinical skills and emergency intervention.											
			CO04: Do various clinical procedures on patient for promoting good health											
10.	Pharmacotherapeutics- III	PDP 2401	**CO01:** Start the administration of medication and outline the expected therapeutic outcomes through targeted interventions.	**H**	H						**L**		**M**	
			CO02: Know the effective use of pharmacological therapeutic interventions in the treatment of specific diseases, conditions and symptoms.	H	**M**		**L**						H	

			CO03: Demonstrate communication and collaborative teamwork		H								
			CO04: Have moral reasoning, ethical judgment and professionalism	M						**M**	**H**			H
11.	Hospital Pharmacy	PDP 2402	**CO01:** Understand Various Drug Distribution Methods;			H	M							
			CO02: Apply various Professional Practice Management Skills In Hospital Pharmacies;			H							L	H
			CO03: Evaluate and Provide Unbiased Drug Information To The Doctors;			H	M						M	H
			CO04: Know The Manufacturing Practices Of Various Formulations In Hospital Set Up;			H		M			M			H
			CO05: Appreciate The Practice Based Research Methods;			H	M						M	M
			CO06: Understand the stores management and inventory control management										M	
12.	Clinical Pharmacy	PDP 2403	**CO01:** Monitor drug therapy of patient through medication chart review and Clinical review			H	M						L	
			CO02: Obtain medication		H	M							L	

			history interview and counsel the patients;											
			CO03: Identify and resolve drug related problems;		M	M						H		
			CO04: Detect, assess and monitor adverse drug reaction;	L	M	H								L
			CO05: Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific states of diseases ; and				H		M					
			CO06: Retrieve, analyze, interpret and formulate drug or medicine information.						L			H		
13.	Biopharmaceutics & Pharmacokinetics	PDP 2405	**CO01:** Understand about the concepts of biopharmaceutics and pharmacokinetics.		M					H				
			CO02: Calculate the various pharmacokinetic parameters by using various mathematical models.		M					H				
			CO03: Design a basic protocol for the conduct of Bioavailability/Bioequivalence study and the interpretation of the Bioavailability/Bioequivalence data.		L			M		H				
			CO04: Use the concepts of pharmacokinetic principles					L	H		M			

			in the clinical contexts and process simulated data											
			CO05: Design and perform in-vitro dissolution studies for various drugs as per the standards of official monographs applicable to pharmaceutical industry.		L					H				
14.	Pharmacottherapeutics I & II	PDP 2407	**CO01:** Remember the medication selection tailored to diverse patient needs.		M		H	M		L				H
			CO02: Assess drug interactions and adverse effects for safe prescribing.			M								H
			CO03: Create a therapeutic plan to optimise treatment outcomes.			H		H						
			CO04: Apply pharmacotherapeutic principles to real-world clinical scenarios.	M		H	M		L	H				
			CO05: Evaluate drug efficacy and adjusts treatment plans accordingly.			M	H							H
15.	Clinical Research	PDL 4501	**CO01:** Know the new drug development process as per pharmaceutical industry standards					H						
			CO02: Understand the regulatory and ethical requirements.					M				H		

			CO03: Appreciate and conduct the Clinical trials activities					M				H		
			CO04: Know safety monitoring and reporting in Clinical trials					M				H		
			CO05: Manage the clinical trial Coordination process						H			L		M
16.	Pharmacoepidemiology and Pharmacoeconomics	PDL 4502	**CO01:** Understand the key principles of Pharmacoepidemiology and its significance in public health, focusing on access to safe and affordable medicines.			H						H		
			CO02: Apply pharmacoepidemiology principles to enhance medication use and improve patient outcomes, addressing healthcare disparities.			H						H	H	H
			CO03: Demonstrate skills in designing and evaluating Pharmacoepidemiology studies, ensuring ethical research practices and accountability.			L						H	H	
			CO04: Understand basic pharmacoeconomic methods for evaluating healthcare costs and outcomes,			L						H		M

			promoting resource efficiency.											
			CO05: Demonstrate competency in designing and evaluating Pharmacoeconomic studies, fostering collaborations to improve healthcare delivery and sustainability.			L						H	H	
17.	Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring	PDL 4503	**CO01:** Understand principles of clinical pharmacokinetics and utilize the concepts of Pharmacokinetics to individualize the drug dosage regimen in clinical settings		**L**		**M**			**H**				
			CO02: Apply nomograms and tabulations in dosage regimen design, ability to convert intravenous to oral dosing and understand Therapeutic Drug Monitoring Services		**L**		**M**			**H**				
			CO03: Review the various pharmacokinetic drug interactions issues and assess their implications in the clinical settings.		**L**	**L**	**M**			**H**				
			CO04: Adjust the dosage regimen for patients with renal / hepatic impairments		**M**					**H**				

			CO05: Understand the significance of population pharmacokinetics, pharmacogenetics and polymorphism in drug metabolism, drug transporters and targets				**M**					**H**	
18.	Human Values and Professional Ethics	HR 101	**CO01:** Develop critical thinking about character formation, Personal development and value education			L	L	L				H	H	H
			CO02: Recognise the National and Professional Values.			H	H	L				H	H	H
			CO03: Prioritise the knowledge regarding fundamental rights and promote compliance with international and national concepts of human rights.			L		L				M	M	M
			CO04: Appraise the respect to women and children by clearing he concept of their human rights			L		L				M	L	M
			CO05: Demonstrate the need of meditation, yoga and physical exercise in maintaining a healthy lifestyle					L				M	L	H

19.	Awareness on Antimicrobial Resistance	AMR 1201	**CO01:** Define the basic terminology related to AMR and ABR. Define the mode of action of antibiotics. Define the mechanism of antibiotic resistance. Understand the concept of 'One Health' in view of AMR.	H					M					
			CO02: Describe the status of surveillance system for AMR in humans, animals and plants.						M		L			
			CO03: Understand the key goals of global and national action plans to combat AMR.			H								
			CO04: Understand and apply advances in antimicrobial stewardship program during on-field practice.						H					
			CO05: Understand the need and importance of antibiotic prescriptions for diseased conditions.			H						L		
20.	Clerkship	PDP 4504	**CO01:** Deliver clinical pharmacy services			M	H						H	H
			CO02: Manage Pharmaceutical care planning with knowledge of diseases and therapeutics		M							H	H	

			CO03: Communicate effectively with patients, caregivers, and healthcare providers.		M	H							H
			CO04: Interpret and apply relevant laboratory and diagnostic data in therapeutic decision-making.					M		H			
21.	Project work (Six Months)	PDP 4505	**CO01:** Conduct comprehensive medication histories and patient assessments. Address a problem related to Pharmacy practice in hospital, community service or clinical set up with a wider perspective and generality			H	H					L	M
			CO02: Select appropriate methodology for investigative work, taking into account the pros and cons of the alternatives available and develop solution proposals based on reasoned judgement	M			H				H		M	
			CO03: Present a coherent, logically argued, fully referenced report and engage in a professional manner in a viva-voce		M				H			H		

			discussion about the project drug											
			CO04: Utilize evidence-based practices and clinical guidelines to enhance patient care and safety.			M				H				
22.	Internship (1 year)	PDP 6661	**CO01:** Apply pharmaceutical knowledge and skills in real-world clinical settings			H	H						H	H
			CO02: Demonstrate proficiency in medication therapy management.	H						H				H
			CO03: Collaborate effectively with healthcare teams to optimize patient health care through knowledge sharing.		M	H			M					
			CO04: Conduct comprehensive medication histories and patient assessments	M				H			H	M		

16. Flexibilities: NA

17. Opportunities for international exposure

Chitkara University boasts of having very strong collaboration with more than 200 international university partners. Students are encouraged to draw the maximum benefit from the same by being in regular touch with #Go Global office at university and participating in various opportunities like short term mobility, internships modules etc. Credits earned by student through these opportunities at international university partners are suitably mapped to eventually get those reflected in the student's grade card.

Placement Opportunities

The Pharm. D. program in Pharmacy provides ample opportunity to a postgraduate to join various areas in pharmaceutical industry set up as well as in a hospital pharmacy support. The level of appointment andcompensation there upon may depend upon the job profile and need for further additional post graduate specialization in specific areas. The possible positions are:

I. Research and Formulation Development Executive: Development of new formulations
II. Production Executive: Managing and supervising production of formulations
III. Project Executive (New Products): Coordinating the research, production and marketing activities in a Pharmaceutical organization, deciding as to what and how to develop a new product and plan production and marketing activity as per available capacity.
IV. Project Executive (New Plant): coordinating and erection, installation commissioning of production in a new plant / facility and ensuring that all installation and procedures are as per compliance norms laid out by regulatory agencies.
V. Executive (Administration and Finance)/ management Trainee: in a pharmaceutical organization.
VI. Executive /Astt Manager, Regulatory affairs: Helping the research team to compile drug master files for new drug products for registration and approval with the food and Drug authority of different countries.
VII. Hospital Pharmacist: He may further diversify into Clinical Pharmacist and then specialize into Geriatric, Pediatric or other specific area in a government or private setup in India or in other countries including USA, UK, UAE and others.
VIII. Sales and Marketing: He may take up a career in marketing starting as a sales person and then diversifying into Product Management, training and market research.