

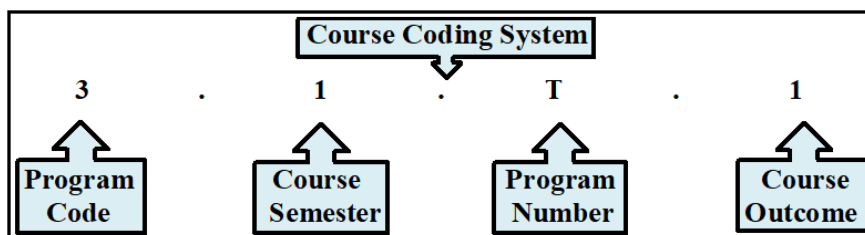


3. Course Outcomes (COs) and Program Outcomes (POs)

The Course Outcomes (COs) are defined in accordance with the University curriculum.

The following course outcomes for each course in the B. Pharmacy program.

Upon completion of this course the student should be able to:



The COs for one course each semester is presented in Table 3.1.1(a-h).

Table3.1.1(a): Course Name C 101: – Pharmaceutics-I Theory Year of Study:1 st	
CO's	Statements
C 101.1	Understand the growth of the pharmacy profession and its historical context.
C 101.2	Become familiar with the fundamentals of various dose forms, pharmaceutical incompatibilities, and pharmaceutical calculations.
C 101.3	Recognize the various calculation and know how to manage prescriptions in a professional manner.
C 101.4	Preparation of various conventional dosage forms.
C 101.5	Graduate gains knowledge of the ingredients, active ingredients, and additions in various official product formulations.

Table3.1.2(b): Course Name C102: – Human Anatomy and Physiology-II Theory Year of Study: 1 st	
CO's	Statements
C 102.1	Know the general morphology, structure, and purposes of the various human bodily organs.
C 102.2	Know the various homeostatic systems and the imbalances that result from them.
C 102.3	Know the numerous organs and tissues that make up the body's multiple systems.
C 102.4	Record blood pressure, heart rate, pulse, and breathing volume as well as haematological tests such blood cell counts, haemoglobin estimate, bleeding/clotting time, and blood cell counts.
C 102.5	Appreciate the interconnected systems that keep the human body's regular functioning intact, as well as the coordinated working patterns of each system's many organs.



Table3.1.3(c): Course Name C203: – Pharmaceutical Engineering Theory Year of Study: 2nd	
CO's	Statements
C 203.1	Know the different unit operations and material handling strategies utilized in the pharmaceutical industry.
C 203.2	Know the numerous steps required in the production of pharmaceuticals.
C 203.3	Know the numerous tests to stop environmental contamination.
C 203.4	Understand and respect the importance of plant layout design for the most effective utilization of resources.
C 203.5	Understand the various corrosion prevention techniques utilized in the pharmaceutical industry.

Table3.1.4(d): Course Name C204: – Pharmacognosy and Phytochemistry-I Theory Year of Study: 2nd	
CO's	Statements
C 204.1	Knowing the methods used in the manufacturing and development of simple medications.
C 204.2	Know the crude drugs, their uses and chemical nature with microscopic characteristics.
C 204.3	Know about few phyto components are produced and standardized for usage.
C 204.4	Understand the methods for evaluating herbal remedies and other treatments.
C 204.5	Know the morphological and microscopic analysis of crude medicines.

Table3.1.5(e): Course Name C305: – Medicinal Chemistry-I Theory Year of Study: 3rd	
CO's	Statements
C 305.1	Knowledge about the biological impacts and physiochemistry of pharmacological substances.
C 305.2	Have a basic understanding of the concept of a quantitative structural activity link.
C 305.3	Understand the classification, utilization, and links between specific fundamental therapeutic categories' structure and activities.
C 305.4	Become knowledgeable with the synthesis and identification tests for a few prescription drugs and their metabolites.
C 305.5	Describe the various chemical processes used in the manufacture of drugs.



Table3.1.6(f): Course Name C306: – Biopharmaceutics and Pharmacokinetics Theory Year of Study: 3rd	
CO's	Statements
C 306.1	Recognize the importance of and the fundamentals of biopharmaceutics and pharmacokinetics.
C 306.2	The pharmacokinetic parameters used to explain the kinetics of drug absorption, distribution, metabolism, excretion, and elimination are computed using plasma drug concentration-time data.
C 306.3	to comprehend the meaning of the terms "bioequivalence" and "bioavailability" as they apply to pharmaceutical drugs.
C 306.4	Recognize the numerous pharmacokinetic parameters, their importance, and their uses.
C 306.5	Aware of the history of nonlinear pharmacokinetics and the causes of nonlinearity.

Table3.1.7(g): Course Name C407: – Industrial Pharmacy II Theory Year of Study: 4th	
CO's	Statements
PT 407.1	Understand the basics of pharmaceutical product development.
PT 407.2	understand the scale-up and pilot plant processes for pharmaceutical dosage forms.
PT 407.3	Recognize the technology transfer procedure from lab size to commercial batch.
PT 407.4	Understand the many laws and ordinances that govern the pharmaceutical sector.
PT 407.5	Recognize how to comply with the legal and regulatory standards pharmaceutical items.

Table3.1.7(h): Course Name C408: – Biostatistics and Research Methodology Theory Year of Study: 4th	
CO's	Statements
C 408.1	Understand the applications of Biostatics in Pharmacy.
C 408.2	Recognize descriptive statistics, graphics, correlation, regression, logistic regression probability, sampling procedure, parametric tests, nonparametric tests, and ANOVA.
C 408.3	Be familiar with how to use Microsoft Excel, SPSS, R, and MINITAB®, DoE.
C 408.4	Able to answer statistical issues, be aware of the many statistical methodologies.
C 408.5	Know introduction of research and need for design of experiments with technique.



3.1.2. CO-PO matrices of courses selected in 3.1.1 (four matrices to be mentioned; one per semester from 1st to 8th semester; at least one per year)

The correlation between COs and POs are established through the process given below:

Step 1: Cos defined by the faculty in Table 3.1.1 (a-h) are mapped with the POs given below

Step 2: For each course, the average value of POs is obtained.

Step 3: Step 2 is carried out for all the courses in the program.

Table 3.1.2(a-g) presents the summary of CO-PO matrix for Course presented in Table 3.1.1(a-h)

Table 3.1.2(a) Course name: C 101

Course Outcomes	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C 101 Pharmaceutics-I	3.00	2.00	2.00	2.00	1.00	1.00	1.00	2.00	3.00	2.00	3.00
C 101.1	3	1	1	1	1	1	1	2	3	2	3
C 101.2	3	2	3	2	1	1	1	2	2	2	3
C 101.3	3	3	3	2	1	1	2	2	3	2	3
C 101.4	3	1	2	3	2	1	1	2	3	2	3
C 101.5	3	3	3	3	1	1	2	1	2	2	3

Table 3.1.2(b) Course name: C 102

Course Outcomes	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C 102 Human Anatomy and Physiology-II	3.00	0.00	3.00	3.00	-	2.00	2.00	2.00	3.00	2.00	3.00
C 102.1	3	-	3	3	-	2	2	2	2	2	3
C 102.2	3	-	3	3	-	2	2	2	3	2	3
C 102.3	3	-	3	3	-	2	-	2	3	2	3
C 102.4	3	-	3	3	-	2	3	2	3	2	3
C 102.5	3	2	3	3	-	2	3	2	3	2	3



Table 3.1.2(c) Course name: C 203

Course Outcomes	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C 203 Pharmaceutical Engineering	3.00	2.00	3.00	3.00	1.00	2.00	1.00	1.00	2.00	1.00	3.00
C 203.1	3	2	3	3	1	2	1	1	2	1	3
C 203.2	3	2	3	3	1	2	1	2	2	1	3
C 203.3	3	2	3	3	1	2	1	1	1	1	3
C 203.4	3	2	3	3	1	2	1	1	1	1	3
C 203.5	3	2	3	3	2	2	1	2	2	1	3

Table 3.1.2(d) Course name: C 204

Course Outcomes	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C 204 Pharmacognosy and Phytochemistry- I	3.00	2.00	3.00	3.00	1.00	1.00	1.00	2.00	3.00	1.00	3.00
C 204.1	3	2	3	3	1	1	1	2	3	1	3
C 204.2	3	2	3	3	1	1	1	3	3	1	3
C 204.3	3	1	3	3	1	1	1	2	3	1	3
C 204.4	3	3	3	3	1	2	1	2	3	1	3
C 204.5	3	3	3	3	1	2	1	1	3	1	3

Table 3.1.2(e) Course name: C 305

Course Outcomes	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C 305 Medicinal Chemistry-I	3.00	2.00	3.00	3.00	0.00	3.00	2.00	1.00	2.00	2.00	3.00
C 305.1	3	2	3	3	-	3	2	1	2	2	3
C 305.2	3	1	1	3	-	3	2	1	2	2	3
C 305.3	3	3	3	3	-	3	2	1	2	2	3
C 305.4	3	3	3	3	-	3	2	1	2	2	3
C 305.5	3	3	3	2	-	3	2	1	2	2	3



Table 3.1.2(f) Course name: C 306

Course Outcomes	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C 306 Biopharmaceutics and Pharmacokinetics	3.00	1.00	3.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	3.00
C 306.1	3	1	3	1	1	2	1	1	2	1	3
C 306.2	3	1	3	3	1	2	3	1	3	3	3
C 306.3	3	3	3	1	1	2	3	1	2	2	3
C 306.4	3	1	3	3	1	2	1	1	2	1	3
C 306.5	3	1	3	1	1	2	1	1	2	1	3

Table 3.1.2(g) Course name: C 407

Course Outcomes	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C 407 Industrial Pharmacy II	3.00	2.00	3.00	3.00	1.00	1.00	1.00	2.00	3.00	1.00	3.00
PT 407.1	3	2	3	3	1	1	1	2	3	1	3
PT 407.2	3	2	3	3	1	1	1	3	3	1	3
PT 407.3	3	1	3	3	1	1	3	2	3	1	3
PT 407.4	3	3	3	3	1	2	1	2	3	1	3
PT 407.5	3	3	3	3	1	2	1	1	3	1	3

Table 3.1.2(h) Course name: C 408

Course Outcomes	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C 408 Biostatistics and Research Methodology	3.00	2.00	3.00	2.00	2.00	2.00	2.00	1.00	2.00	2.00	2.00
C 408.1	3	1	3	3	1	2	2	1	1	1	2
C 408.2	3	2	3	3	1	2	2	1	2	1	2
C 408.3	3	2	3	2	3	2	3	1	3	3	2
C 408.4	3	2	3	2	2	2	3	1	3	2	2
C 408.5	3	2	3	2	2	2	2	1	1	1	2

Note: Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

there is no correlation '-'.



The programme outcomes are given by the NBA as given below.

PO 1	Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioural, social, and administrative pharmacy sciences; and manufacturing practices.
PO 2	Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
PO 3	Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyse, evaluate and apply information systematically and shall make defensible decisions.
PO 4	Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
PO 5	Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfilment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.
PO 6	Professional Identity: Understand, analyse and communicate the value of their Professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
PO 7	Pharmaceutical Ethics: Honour personal values and apply ethical principles in Professional and social contexts. Demonstrate behaviour that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
PO 8	Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
PO 9	The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
PO 10	Environment and sustainability: Understand the impact of the professional Pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 11	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.



3.1.3. Course-PO matrix of courses for all four years of study

The mapping of all the courses with PO's in accordance with procedure followed in 3.1.2 is summarized and presented in table 3.1.3.

Sl. No.	Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
1	PT 1.1 Communication skills	3	3	3	3	1	2	1	3	3	1	3
2	PT 1.2 Pharmaceutical analysis	3	3	3	3	-	3	3	1	2	1	3
3	PT 1.3 Pharmaceutical inorganic chemistry	3	3	3	2	-	3	3	1	2	1	3
4	PT 1.4 Human anatomy and physiology-I	3	-	2	2	-	2	2	2	3	2	3
5	PT 1.5 Pharmaceutics- I	3	3	3	3	1	3	2	2	3	3	3
6	PT 1.6 Remedial biology	1	2	3	2	1	1	1	2	3	2	2
7	PT 1.7 Remedial mathematics	2	-	3	1	-	-	-	-	-	-	3
8	PT 2.1 Human anatomy and physiology-II	3	2	3	3	-	3	2	1	3	2	3
9	PT 2.2 Pharmaceutical organic chemistry –I	3	3	3	2	-	3	2	1	2	1	3
10	PT 2.3 Biochemistry	3	1	2	2	-	3	2	1	3	3	3
11	PT 2.4 Pathophysiology	3	-	2	3	-	2	2	3	3	3	3
12	PT 2.5 Environmental sciences	1	3	2	1	2	1	1	2	2	3	3
13	PT 2.6 Computer applications in pharmacy	3	3	2	1	2	1	1	2	2	3	3
14	PT 3.1 Pharmaceutical organic chemistry –II	3	3	3	2	-	3	2	1	2	2	3
15	PT 3.2 Physical pharmaceutics-I	3	3	3	3	1	2	1	2	3	1	3
16	PT 3.3 Pharmaceutical microbiology	3	2	2	2	1	3	1	2	2	2	3
17	PT 3.4 Pharmaceutical engineering	3	2	3	3	1	2	1	2	2	1	3
18	PT4.1 Pharmaceutical organic chemistry–III	3	3	3	2	-	3	2	1	2	2	3
19	PT4.2 Physical pharmaceutics-II	3	3	3	3	1	2	1	2	3	1	3
20	PT 4.3 Pharmacology-I	3	-	3	1	-	1	3	1	2	1	3
21	PT 4.4 Pharmacognosy and phytochemistry-I	3	3	3	3	1	2	1	2	3	1	3
22	PT 4.5 Industrial pharmacy-I	3	3	3	3	1	2	1	2	3	1	3
23	PT 5.1 Medicinal chemistry – I	3	2	3	3	1	3	2	2	1	2	3
24	PT 5.2 Medicinal chemistry – II	3	3	3	3	-	3	2	1	2	2	3
25	PT 5.3 Pharmacology-II	3	-	3	1	-	2	2	2	3	2	3
26	PT 5.4 Pharmacognosy and phytochemistry-II	3	3	3	3	1	2	1	2	3	1	3
27	PT 5.5 Pharmaceutical jurisprudence	3	1	1	2	2	2	3	1	3	2	2
28	PT 6.1 Medicinal chemistry – III	3	3	3	3	-	3	2	1	2	2	3



29	PT 6.2 Pharmacology-III	3	-	2	1	-	3	2	1	2	1	3
30	PT 6.3 Herbal drug technology	3	1	1	2	2	2	3	1	3	2	3
31	PT 6.4 Biopharmaceutics and pharmacokinetics	3	2	3	3	1	2	3	3	2	2	3
32	PT 6.5 Pharmaceutical biotechnology	3	2	3	3	1	2	1	2	3	1	3
33	PT 6.6 Pharmaceutical quality assurance	3	3	3	1	2	2	3	2	3	2	3
34	PT 7.1 Instrumental methods of analysis	3	3	3	3	-	3	2	1	2	2	3
35	PT 7.2 Industrial pharmacy-II	3	2	3	3	2	2	2	3	3	2	3
36	PT 7.3 Pharmacy practice	3	3	3	3	1	2	1	2	3	1	3
37	PT 7.4 Novel drug delivery systems	3	3	3	3	1	2	1	2	3	1	3
38	PT 8.1 Biostatistics and research methodology	3	2	3	2	2	2	2	1	2	2	2
39	PT 8.2 Social and preventive pharmacy	3	2	3	3	2	1	1	3	3	3	3
40	PT 8.3 Pharma marketing management(elective)	2	3	3	2	3	3	2	3	2	1	3
41	PT 8.4 Computer aided drug design(elective)	3	3	3	3	1	1	1	-	-	-	3
42	PT 8.5 Advanced instrumentation techniques	3	3	3	3	-	-	-	-	-	-	3
TOTAL PO		120	92	115	100	35	89	71	69	98	68	123
Attainment Level		2.8	2.5	2.7	2.4	1.4	2.2	1.8	1.8	2.5	1.7	2.9
		93	83	89	79	46	73	59	59	83	56	96

Note: Correlation levels 1, 2 or 3, as defined below:

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

It there is no correlation, put ‘ - ’

It may be noted that contents of Table 3.1.2 must be consistent with information available in Table 3.1.3 for all the courses.