NATIONAL COLLEGE OF PHARMACY

Approved by Pharmacy Council of India, AICTE, DME & Govt. of Kerala
Affiliated to Kerala University of Health Sciences, Accredited by NBA

OBE MANUAL

B PHARM

Prepared by Curriculum Committee and IQAC

National college of Pharmacy

NATIONAL COLLEGE OF PHARMACY

Outcome Based Education (OBE)

Preamble

Outcome Based Education (OBE) is an educational model that forms the base of a quality education system. There is no single specified style of teaching or assessment in OBE. All educational activities carried out in OBE should helpthe students to achieve the set goals. The faculty may adapt the role of instructor, trainer, facilitator, and/or mentor, based on the outcomes targeted.

OBE enhances the traditional methods and focuses on what the Instituteprovides to students. It shows the success by making or demonstrating outcomes using statements "able to do" in favour of students. OBE provides clear standards for observable and measurable outcomes.

The University Grants Commission (UGC) has introduced a Learning Outcomes-based Curriculum Framework for Undergraduate Education in India. The framework is based on the premise that higher education qualifications such as Bachelor's Degree programs are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes, and values) and academic standards expected of graduates of a program of study.

The National Education Policy (NEP) 2023 has also emphasized the importance of outcome-based education in India. A strong focus on outcome-based education is crucial to achieving the goal of elevating the quality of education in India to global standards.

Overall, outcome-based education has been adopted in many technical institutes of higher learning in India. The UGC has introduced a Learning Outcomes- based Curriculum Framework for Undergraduate Education in India, and the NEP 2023 has emphasized the importance of outcome-based education in India .

Benefits of OBE

Clarity
The focus on outcome creates a clear expectation of what needs to be accomplished by the · end of the course.

Flexibility
With a clear sense of what needs to be accomplished, instructors will be able to · structure their lessons around the students' needs.

Comparison
OBE can be compared across the individual, class, batch, program and institute levels.

Involvement
Students are expected to do their own learning. Increased student involvement allows them to feel responsible for their own learning, and they should learn more through this individual learning.

Higher Education Quality

OBE delivers a higher quality of education since it focuses on learning outcomes and guarantees that students master the subject matter. This technique assists students in developing critical thinking abilities, problem-solving skills, and practical skills that are useful in the workplace.

Self-Directed Learning

OBE promotes self-directed learning, in which students are in charge of their own education and growth. In their future employment, students will benefit from having a sense of freedom and autonomy, which is fostered by this method.

Better Career Opportunities

OBE aids students in acquiring the knowledge and skills that employers value. This can increase their employment possibilities and assist them in achieving their career objectives.

BLOOM'S TAXONOMY: A FRAMEWORK FOR LEARNING OBJECTIVES

Bloom's Taxonomy, originally published in 1956, is a hierarchical framework that categorizes educational learning objectives into six levels of cognitive complexity. These levels range from lower-order thinking skills like remembering and understanding to higher-order thinking skills like analyzing, evaluating, and creating. Here's an overview of the six levels:

1. **Remembering:** This level focuses on recalling factual information. Examples include identifying, listing, defining, and describing.

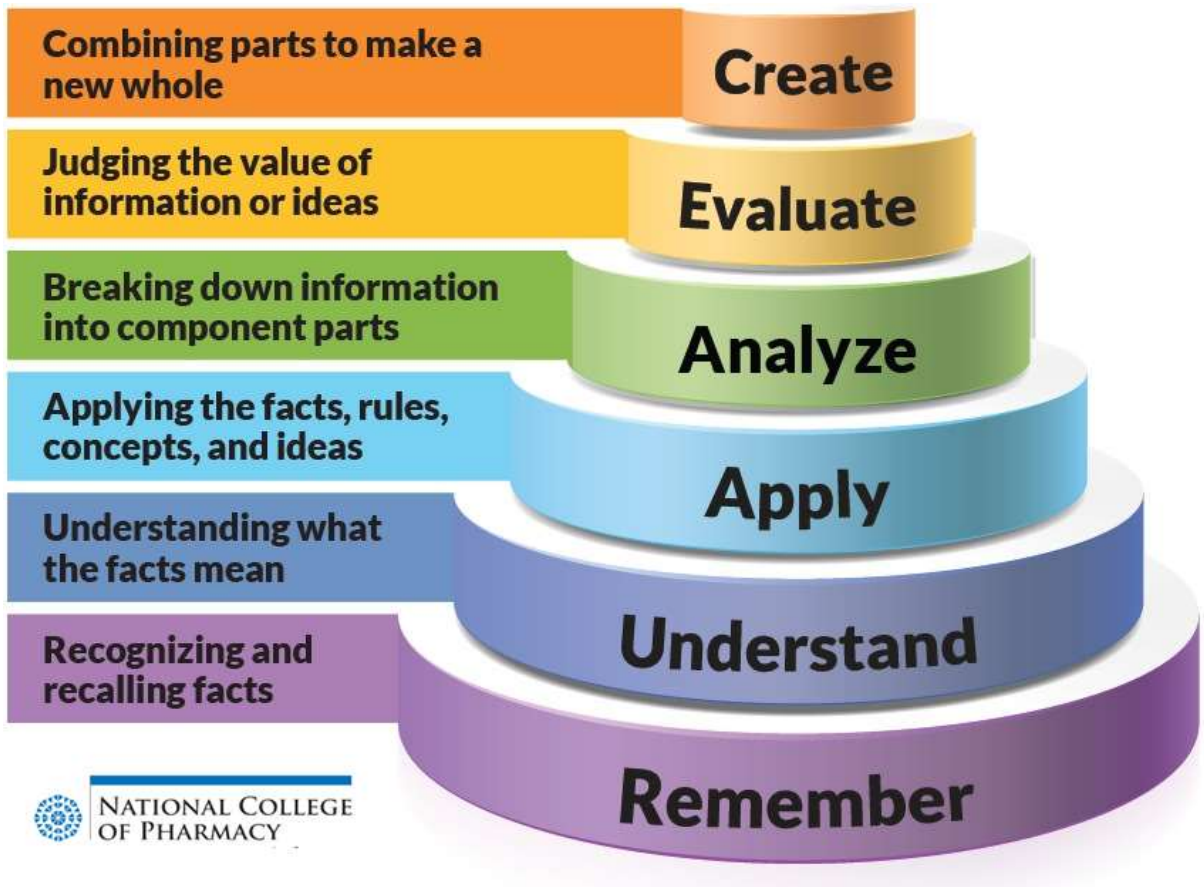
2. **Understanding:** This level requires grasp of the meaning and implications of information. Examples include interpreting, explaining, summarizing, and paraphrasing.

3. **Applying**: This level involves using knowledge and skills in new situations. Examples include demonstrating, calculating, illustrating, and implementing.

4. **Analysing:** This level requires breaking down information into its component parts and seeing how they relate. Examples include comparing, contrasting, differentiating, and classifying.

5. **Evaluating:** This level involves making judgments based on criteria and justifying those judgments. Examples include critiquing, judging, assessing, and recommending.

6. **Creating:** This level requires generating new ideas or products. Examples include designing, developing, composing, and constructing.



REVISED BLOOM'S TAXONOMY:

In 2001, a revised version of Bloom's Taxonomy was published, focusing on action verbs and gerunds rather than nouns. This revision emphasizes deeper and more active learning experiences.

he Revised Bloom's Taxonomy, published in 2001, offers an updated framework for classifying educational learning objectives. It builds upon the original 1956 version by shifting the focus from nouns to action verbs and gerunds, thereby emphasizing active learning and cognitive processes.

Here's a breakdown of the Revised Bloom's Taxonomy and its six levels:

1. Remembering (Knowing & Recalling):

Key words: Recognizing, recalling, retrieving, listing, defining, describing

Focus: Retrieving and recalling factual information.

2. Understanding (Comprehending & Interpreting):

Key words: Interpreting, explaining, summarizing, paraphrasing, classifying, comparing, contrasting

Focus: Grasping the meaning and implications of information, making connections.

3. Applying (Using & Implementing):

Key words: Executing, demonstrating, implementing, calculating, illustrating, solving

Focus: Applying knowledge and skills in new situations, solving problems with known procedures.

4. Analyzing (Breaking Down & Examining):

Key words: Differentiating, organizing, attributing, analyzing, investigating, experimenting

Focus: Breaking down information into parts, examining relationships, drawing connections.

5. Evaluating (Judging & Critiquing):

Key words: Checking, critiquing, judging, assessing, recommending, valuing

Focus: Making judgments based on criteria, evaluating quality and effectiveness.

6. Creating (Generating & Designing):

Key words: Generating, hypothesizing, planning, designing, constructing, composing

Focus: Producing new ideas or products, designing solutions, contributing original work.

Applications of Bloom's Taxonomy:

Bloom's Taxonomy can be used for various educational purposes, including:

Designing learning objectives: Clearly define what students should be able to do at the end of a lesson, unit, or course.

Creating assessments: Align assessments with the desired learning objectives and the appropriate level of Bloom's Taxonomy.

Planning instruction: Design activities and experiences that help students achieve the learning objectives at different levels.

Providing feedback: Offer feedback that helps students move towards mastery of the intended learning objectives.

Overall, Bloom's Taxonomy is a valuable tool for educators who want to encourage deeper learning and critical thinking in their students.

VISION AND MISSION OF INSTITUTION

Process of framing Vision and mission of institution

The Vision, Mission and PEOs are established through continuous interaction with the internal and external stakeholders of the programme. They are discussed and approved by the Program Assessment Committee and Department Advisory Committee.

In establishing the Vision and Mission of the program, the following steps were followed:

Step 1: Vision and Mission of the Institute and the Programme Outcomes defined by NBA are taken as an origin.

Step 2: Suggestions are taken by the Program Assessment Committee from the External and internal stakeholders about statements of Vision and Mission.

Step 3: The collected views are analyzed and reviewed to check the consistency with the vision and mission of the institute and summarized by the Program Assessment Committee.

Step 4: Finally, the programme Vision and Mission are made by the Academic Advisory Committee.

Step 5: After approval, dissemination is carried out through appropriate channels.

VISION OF INSTITUTION

Emerge as a center of eminence by creating responsible and resourceful citizens with commitment to excellence in pharmacy education and allegiance to ethical professional practices.

MISSION OF INSTITUTION

- Providing quality pharmacy education and training that enables pharmacists to facilitate the delivery of ethical, conscientious, cost-effective healthcare services to all.
- Cultivating an environment that is collaborative, interdisciplinary, innovative, and creative in approach.
- Partnering with individuals and institutions across the world who occupy leadership positions and promoting reciprocal exchanges in both academic and cultural spheres.

EDUCATIONAL PROGRAM OUTCOMES:

1. Course Outcome (CO):

Definition: Specific statements describing the knowledge, skills, and attitudes students should be able to demonstrate after completing a particular course.

Focus: Learning outcomes specific to an individual course within a program.

Example: By the end of the "Pharmacology" course, students will be able to identify the mechanisms of action of different drug classes.

2. Program Outcome (PO):

Definition: Statements outlining the broader knowledge, skills, and attributes that graduates of a specific program are expected to possess by the time of graduation.

Focus: Program-level learning outcomes encompassing the entire curriculum.

Example: Graduates will be able to apply their knowledge to develop safe and effective medication regimens for patients.

3. Program Specific Outcome (PSO):

Definition: Statements describing the unique knowledge, skills, and professional attributes that graduates from a particular specialization within a program are expected to attain.

Focus: Outcomes specific to a program specialization, differentiating it from other specializations within the same program.

Example: Graduates will be particularly skilled in providing medication therapy management services in rural communities.

4. Program Educational Objective (PEO):

Definition: Broad statements that describe the long-term career and professional aspirations for graduates of a program several years after graduation.

Focus: Overall vision for the program's contribution to graduates' professional development in the long term.

Example: Our pharmacy graduates will be recognized as leaders in improving medication adherence rates within their communities.

PROCESS OF ESTABLISHING PO, PEO AND PSO

The POs, PEOs and PSOs are established through the following process steps:

Step 1: Vision and Mission of the Institute and B pharm programme along with the Program Outcomes defined by NBA are taken as a basis to interact with various stake holders of the program.

Step 2:

Program Coordinator consults the stakeholders and collects their views.

Step 3: After various meetings, Benchmarking with other colleges and correlating alignment with curriculum contents the Program Coordinator submits the views to Program Assessment Committee

Step 4: Program Assessment Committee reviews and summarizes the collected views and expresses its opinion and forwards the same to Department Advisory Committee who defines the PEO, PO and PSO statements.

Step 5:

Academic Advisory Committee finalizes, formulates and establishes the PEO, PO and PSO statements.

Step 6

After approval dissemination is carried out through appropriate channels.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1. Pharmacy graduates will have high technical and professional expertise in various fields of pharmaceutical sciences to solve complex problems in the area of pharmaceutical Sciences.

2. Pharmacy graduates will have ethical attitude, human values, team spirit, strong communication skills, and attitude of lifelong learning to serve the needs of society.

3. Pharmacy graduates will have an attitude for patient-centered and community-based research to improve patient healthcare outcomes.

PROGRAM OUTCOMES (PO)

1. **Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

2. **Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills, and organizational skills. Develop and implement plans and organize work to meet deadlines.

3. **Problem Analysis:** Utilize the principles of scientific inquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate, and apply information systematically and shall make defensible decisions.

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.

5. **Leadership Skills:** Understand and consider the human reaction to change, motivation issues, leadership and team building when planning changes required for fulfillment 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.

6. **Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. healthcare professionals, promoters of health, educators, managers, employers, employees).

7. **Pharmaceutical Ethics:** Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior 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.

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.

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.

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.

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.

PROGRAM-SPECIFIC OUTCOMES (PSO)

PSO 1: Industry-Focused Excellence

Gain expertise in industry-focused areas paving the way for successful careers in various sectors

PSO2 Interdisciplinary Collaboration and Innovation:

Actively collaborate with healthcare professionals from diverse fields various disciplines to optimize patient care outcomes and contributing innovative solutions to complex healthcare challenges.

GRADUATE ATTRIBUTES

1. **DEEP DISCIPLINE KNOWLEDGE:** Graduates have comprehensive knowledge and understanding of their domain area, the ability to engage with different traditions of thought, and the ability to apply their knowledge in practice, including in multi-disciplinary or multi-professional contexts.
2. **ANALYSE, DESIGN/DEVELOPMENT OF SOLUTIONS TO PROBLEMS:** Graduates are effective problem-solvers, able to apply critical, creative, and evidence-based thinking to conceive innovative responses to future challenges.
3. **PROFESSIONALISM AND LEADERSHIP**: Graduates engage in professional behavior and have the potential to be entrepreneurial and take leadership roles in their chosen occupations or careers and communities.
4. **COMMUNICATION SKILLS AND TEAMWORK:** Graduates convey ideas and information effectively to a range of audiences for a variety of purposes and contribute in a positive and collaborative manner to achieving common goals**.**
5. **ENVIRONMENT AND SUSTAINABILITY:** Understand the impact of professional solutions in societal and environmental contexts and demonstrate knowledge of the need for sustainable development.
6. **RESPONSE TO ETHICS IN LIFE AND SOCIAL ISSUES:** Graduates are responsible and effective global citizens whose personal values and practices are consistent with their roles as responsible members of society.
7. **EFFICIENT PROJECT MANAGEMENT AND FINANCE:** Demonstrate knowledge and understanding of management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
8. **SELF-AWARENESS AND EMOTIONAL INTELLIGENCE:** Graduates are self-aware and reflective; they are flexible and resilient and have the capacity to accept and give constructive feedback; they act with integrity and take responsibility for their actions**.**
9. **MOTIVATION FOR LIFELONG LEARNING**: Recognize the need for and have the preparation and ability to engage in independent and lifelong learning.
10. **DIGITAL CAPABILITIES:** Graduates are well-prepared for living, learning, and working in a digital society

COURSE OUTCOME DESIGN PROCESS

1. Define the Context:

- Understand the course's specific context, including its level, subject matter, and fit into the larger program or student journey.
- Identify institutional regulations or accreditation standards that might influence the outcomes.

2. Identify Learning Objectives:

- Brainstorm the key knowledge, skills, and abilities you want students to gain by the end of the course.
- Consider Bloom's Taxonomy to ensure diverse learning levels.
- Articulate these objectives as clear, concise statements.

3. Translate into Course Outcomes:

- Shift focus from instructor activities to student achievements.
- Use action verbs that describe what students will be able to do (e.g., analyze, design, interpret, solve).
- Ensure outcomes are measurable through assessments and exams.

4. Align with Program Goals and Learning Objectives:

- Ensure course outcomes contribute to the broader program's learning objectives.
- Create a cohesive learning experience and help students see the bigger picture.

5. Consider Different Course Types:

- Adapt the process for different course types, such as foundational subjects versus advanced courses.

6. Draft and Refine:

- Start with a draft and seek feedback from colleagues, students, and stakeholders.
- Iteratively refine and revise outcomes based on feedback.

7. Share and Utilize:

- Communicate course outcomes clearly to students at the beginning of the course.
- Use outcomes to guide teaching, assessment, and feedback strategies.
- Regularly review and update outcomes to ensure they remain relevant and effective.

Sample Action Verbs:

- Analyze
- Design
- Interpret
- Solve
- Create

Lower Order of Thinking(LOT)			Higher Order of Thinking (HOT)		
Remember	**Understand**	**Apply**	**Analyse**	**Evaluate**	**Create**
Define	Explain	Solve	Analyse	Reframe	Design
Describe	Describe	Apply	Compare	Criticize	Create
List	Interpret	Illustrate	Classify	Judge	Plan
State	Summarise	Calculate	Distinguish	Recommend	Formulate
Match	Compare	Sketch	Explain	Grade	Invent
Tabulate	Discuss	Prepare	Differentiate	Measure	Develop
Record	Estimate	Chart	Appraise	Test	Organize
Label	Express	Choose	Conclude	Evaluate	Produce

Note: If Laboratory is given as a separate course (with course code), then there should be separate course outcomes for Laboratory.

CHECKLIST FOR COs

Number of Cos	**2 to 6**
CO essentials	**Action Verb, Subject Content, Level of Achievement, Modes of Performing task (If Applicable)**
Based on BTL	**Understand, Remember, Apply, Analyse, Evaluate, Create**
Number of BTL Considered in one course	**Minimum 2**
Technical Content/ point of curriculum	**All curriculum contents are covered**

COURSE OUTCOMES		
BACHELOR OF PHARMACY		
FIRST SEMESTER		
BP101T	**HUMAN ANATOMY AND PHYSIOLOGY – I**	
	CO1	To understand, analyse and appreciate about the gross morphology, structure and functions of cell, tissues and introduction to scope of anatomy and physiology of human body and principles of cell communication.
	CO2	To understand, analyse and appreciate the anatomy and physiology of skin and sense organs.
	CO3	To understand, analyse and appreciate the structure and working of skeletal system, joints and skeletal muscle in human body.
	CO4	To understand, analyse and appreciate about various body fluids, blood, lymphatic system, peripheral nervous system and cardiovascular system of the human body and its physiology
BP102T	**PHARMACEUTICAL ANALYSIS – I**	
	CO1	To understand the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs
	CO2	To understand principles of volumetric and electrochemical analysis.
	CO3	To analyse various volumetric and electrochemical titrations.
	CO4	To create analytical skills
BP103T	**PHARMACEUTICS - I**	
	CO1	To understand the history of profession of pharmacy and pharmacopeia
	CO2	To analyze and apply the basics of different dosage forms and calculations
	CO3	To understand and remember the various drug incompatibilities
	CO4	To create and evaluate the preparation of different dosage form
BP104T	**PHARMACEUTICAL INORGANIC CHEMISTRY**	
	CO1	To understand about sources of impurities and methods to determine impurities in inorganic chemistry and apply the principles of limit test to limit the impurities in a drug sample.
	CO2	To understand about acids, bases, and buffers in pharmaceutical systems and measurement, calculation and adjustment of tonicity and functions of major physiological ions and electrolytes.
	CO3	Understand and remember the medicinal and pharmaceutical importance of inorganic compounds.
	CO4	Understand the medicinal importance of radioactive compounds
BP105T	**COMMUNICATION SKILLS**	
	CO1	Understand the behavioural needs for a pharmacist to function effectively in the areas of pharmaceutical operation
	CO2	Analyze communication effectively and effectively manage the team as a team player
	CO3	Create interview skills
	CO4	Create Leadership qualities and essentials
BP107P	**HUMAN ANATOMY AND PHYSIOLOGY-PRACTICAL**	
	CO1	To understand and identify the various tissues

	CO2	To understand and analyse various hematological experiments like WBC count, RBC count etc.
	CO3	To understand and analyse experiments like BP monitoring, pulse rate monitoring etc
	CO4	To understand and identify different bones in human body
BP108P	**PHARMACEUTICAL ANALYSIS I –PRACTICAL**	
	CO1	To understand the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs
	CO2	To understand principles of volumetric and electrochemical analysis.
	CO3	To apply various volumetric and electrochemical titrations.
	CO4	To create analytical skills
BP109P	**PHARMACEUTICS I-PRACTICAL**	
	CO1	To analyse and evaluate formulation and dispensing of different pharmaceutical dosage forms
	CO2	To remember calculations of pharmaceutical dosage forms
	CO3	To understand and evaluate prescription and solving errors.
	CO4	To apply iinterpretation of latin terms and metric conversions
BP110P	**PHARMACEUTICAL INORGANIC CHEMISTRY-PRACTICAL**	
	CO1	To evaluate the level of specific impurities in the given inorganic compounds by performing different limit tests.
	CO2	To apply different chemical methods to prepare inorganic compounds.
	CO3	To analyze identification tests as per pharmacopoeia
	CO4	To evaluate purity of an inorganic compound qualitatively by performing test for purity.
BP111P	**COMMUNICATION SKILLS-PRACTICAL**	
	CO1	Understand effective pronunciation of consonant sounds and Vowel sounds
	CO2	To create comprehension listening
	CO3	To apply speech effective communication writing skill
	CO4	Create effective writing, interview handling skills, E-mail etiquette presentation skill
SECOND SEMESTER		
BP201T	**HUMAN ANATOMY AND PHYSIOLOGY – II**	
	CO1	To understand and explain the gross morphology, structure and functions of nervous and endocrine system in human body.
	CO2	To understand about the gross morphology, structure and functions of digestive system and principles of energy and metabolism
	CO3	To understand and analyse about the morphology, structure and working pattern of respiratory and urinary system
	CO4	To understand and analyse the interlinked mechanisms of male and female reproductive system and basic principles of genetics.
BP202T	**PHARMACEUTICAL ORGANIC CHEMISTRY – I**	
	CO1	Remember the basic concept of structure, name and the type of isomerism of the organic compound.

	CO2	Understand to write the reaction, mechanism and orientation
	CO3	Understand reactivity/stability of compounds.
	CO4	Explain the ideas of the identification of organic compound
BP203T	**BIOCHEMISTRY**	
	CO1	To understand the metabolism of nutrient biomolecules in physiological and pathological condition.
	CO2	To understand and remember the role, importance and regulation of enzymes.
	CO3	To understand the concept of bioenergetics and biological oxidation.
	CO4	To understand the genetic organization and functions of genome and synthesis of RNA and proteins.
BP204T	**PATHOPHYSIOLOGY**	
	CO1	To understand the basic principles involved in cell injury and adaptation.
	CO2	To understand the pathogenesis of inflammation and wound healing
	CO3	To understand the pathogenesis, clinical manifestations and complications of common non-communicable diseases
	CO4	To understand the pathogenesis, clinical manifestations and mode of transmission of communicable diseases.
	C05	To understand the etio-pathogenesis and diagnosis of cancer
BP205T	**COMPUTER APPLICATION IN PHARMACY**	
	CO1	To known the various types of application of computer in pharmacy
	CO2	To understand different types of databases
	CO3	To know the application of databases in pharmacy
	CO4	To understand the concept of bioinformatics
BP206T	**ENVIRONMENTAL SCIENCE**	
	CO1	To create the awareness about environmental problems among learners
	CO2	To analyze basic knowledge about the environment audits allied problems
	CO3	Create learnership quality to participate in environment protection and environment improvement.
	CO4	Create skills to help the concerned individuals in identifying and solving environmental problems.
BP207P	**HUMAN ANATOMY AND PHYSIOLOGY II-PRACTICAL**	
	CO1	To understand about the integumentary and special senses, nervous system, endocrine system using specimen, models and diagnosis kit etc
	CO2	To analyse and perform various experiments on visual activity, taste, sensation etc
	CO3	To analyse and perform to record temperature, reflex action, BMI and other neurological examination
	CO4	To analyse the function of olfactory nerve, lung function tests
BP208P	**PHARMACEUTICAL ORGANIC CHEMISTRY I-PRACTICAL**	
	CO1	Remember the basic concept for writing the structure, name and the type of isomerism of the organic compound.
	CO2	Understand how to write the reaction, name the reaction and orientation of reactions. .

	CO3	Understand reactivity/stability of compounds.
	CO4	Explain ideas to identify and confirm the identification of organic compound
BP209P	**BIOCHEMISTRY- PRACTICAL**	
	CO1	To analyze proteins, amino acids and carbohydrates by various qualitative as well as quantitative tests
	CO2	To analyze the biomolecules from different biological samples
	CO3	To understand the action of salivary amylase on starch.
	CO4	To understand the preparation of buffer solution and determination of pH
BP210P	**COMPUTER APPLICATIONS IN PHARMACY-PRACTICAL**	
	CO1	To apply the principles to retrieve the information of a drug and its adverse effects using online tools
	CO2	To create patient record in databases and to generate report
	CO3	To create HTML web page to show personal information
	CO4	To understand drug information storage and retrieval using MS Access
THIRD SEMESTER		
BP301T	**PHARMACEUTICAL ORGANIC CHEMISTRY II-THEORY**	
	CO1	To understand the structure, name and type of isomerism of the organic compounds
	CO2	To understand the preparation, reaction mechanism, and orientation of aromatic organic compounds
	CO3	To understand the chemistry, application and analysis of fats and oils
	CO4	To understand the reactivity/stability of organic compounds
BP302T	**PHYSICAL PHARMACEUTICS – I**	
	CO1	To understand the various principles of solubility of drugs and factors affecting solubility and application of these principles in the development of dosage forms
	CO2	To understand the various physicochemical properties of drugs and states of matters and apply these principles in formulation and quality assurance of dosage forms
	CO3	Create an idea about the principles of micromeritics and its importance in drug action and apply the same in the development of solid dosage forms
	CO4	To apply the principles of complexation in the enhancement of bioavailability and stability of drugs
	CO5	To understand and apply the principles of pH, buffers and isotonicity in the formulation of dosage forms with better safety, stability and effectiveness
BP303T	**PHARMACEUTICAL MICROBIOLOGY – I**	
	CO1	To understand methods of identification, cultivation and preservation of various microorganisms.
	CO2	To understand the importance and implementation of sterilization in pharmaceutical processing and industry.
	CO3	To demonstrate sterility testing of pharmaceutical products.

	CO4	To demonstrate microbiological standardization of pharmaceuticals.
	C05	To understand cell culture technology and its applications in pharmaceutical industries.
BP304T	**PHARMACEUTICAL ENGINEERING**	
	CO1	To understand various unit operations used in pharmaceutical industries
	CO2	To understand the material handling techniques
	CO3	To understand the theories, objectives, advantages and disadvantages of various operations involved in pharmaceutical manufacturing.
	CO4	To understand the various types and preventive methods used for corrosion
BP305P	**PHARMACEUTICAL ORGANIC CHEMISTRY II-PRACTICAL**	
	CO1	To understand the structure, name and the type of isomerism of the organic compound.
	CO2	To understand about how to write the reaction, name the reaction and analyze orientation of reactions.
	CO3	To understand the account for reactivity/stability of compounds.
	CO4	To understand about preparation of organic compounds.
BP306P	**PHYSICAL PHARMACEUTICS I-PRACTICAL**	
	CO1	To understand the knowledge about solubility parameters
	CO2	To understand the partition co efficient of solute in immiscible liquid
	CO3	To understand and identify the various micromeritic parameters
	CO4	To understand the complexation process and its parameters
BP307P	**PHARMACEUTICAL MICROBIOLOGY-PRACTICAL**	
	CO1	To understand the different methods of preparation of culture media and sub culturing.
	CO2	To understand knowledge about aseptic transfer and different methods of isolation of pure culture.
	CO3	To identify the microorganism by using staining, microscopy, various chemical tests and apply this knowledge in microbiology lab and ability to identify bacterial motility by hanging drop method.
	CO4	To understand procedure for standardization of antibiotics
	CO5	To apply the sterility testing procedure in pharmaceutical preparations.
BP308P	**PHARMACEUTICAL ENGINEERING- PRACTICAL**	
	CO1	To understand and perform various unit operations used in pharmaceutical industries
	CO2	To understand and perform the material handling techniques
	CO3	To evaluate various processes involved in pharmaceutical manufacturing processes
	CO4	To evaluate the various preventive methods used for corrosion control in pharmaceutical industries
FOURTH SEMESTER		

BP401T	**PHARMACEUTICAL ORGANIC CHEMISTRY – III**	
	CO1	To understand the stereo chemical aspects of organic compounds and stereo chemical reactions
	CO2	To understand the medicinal uses and other applications of some organic compounds
	CO3	To understand the chemistry of important heterocyclic compounds
	CO4	To understand reactions of synthetic importance
BP402T	**MEDICINAL CHEMISTRY – I**	
	CO1	To understand about medicinal chemistry, history and development of medicinal chemistry, physicochemical properties in relation to biological action (ionization, solubility, partition coefficient, hydrogen bonding, protein binding, chelation, bioisosterism, optical and geometrical isomerism) and drug metabolism, factors affecting drug metabolism including stereo chemical aspects
	CO2	To understand the chemistry of drugs with respect to their biological activity. Know the classification, structures, synthesis and uses of cholinergic, anticholinergic, adrenergic and antiadrenergic agents.
	CO3	To understand the metabolism, adverse effects and therapeutic value of drugs and the classification, structures, synthesis and uses of sedatives and hypnotics, anti convulsants and antipsychotic agents
	CO4	To analyze the importance of SAR of drugs of general anaesthetics, narcotic and non-narcotic drugs
BP403T	**PHYSICAL PHARMACEUTICS II**	
	CO1	To understand the principles of chemical kinetics and apply the same in the stability of drugs
	CO2	To create an idea about assigning expiry date for formulations and different factors affecting stability of drugs
	CO3	To understand various rheological properties of drug molecules and apply those in the designing of dosage forms
	CO4	To understand and apply the use of interfacial properties in formulation research and development.
	CO5	To apply the principles of various dispersion systems in formulation research and development
BP404T	**PHARMACOLOGY – I**	
	CO1	To understand the basics of pharmacology, drug development process and apply the information about drugs absorption, distribution, metabolism and excretion (pharmacokinetics) in therapeutics.
	CO2	To understand the information about the drugs like mechanism of action, physiological and biochemical effects (pharmacodynamics)
	CO3	To understand and apply the knowledge about the pharmacology of peripheral nervous system.
	CO4	To understand and apply the knowledge about the pharmacology of central nervous system.
BP405T	**PHARMACOGNOSY AND PHYTOCHEMISTRY – I**	

	CO1	To understand the fundamentals of pharmacognosy, crude drug and evaluate it with basic concepts in quality control techniques.
	CO2	To understand and apply different techniques in cultivation and production of crude drug and to create new aspects in the production of plants and phytochemicals through plant tissue culture.
	CO3	To understand and remember the role of pharmacognosy in various system of medicine.
	CO4	To understand and analyze primary and secondary metabolite of crude drugs, their uses, chemical nature and general test for evaluation.
BP406P	**MEDICINAL CHEMISTRY I-PRACTICAL**	
	CO1	To create medicinally important compounds or intermediates by conventional method.
	CO2	To evaluate the purity of the drug by using different assay methods.
	CO3	To evaluate partition co-efficient of medicinal compounds
	CO4	To create medicinally important compounds or intermediates by microwave irradiation techniques.
BP407P	**PHYSICAL PHARMACEUTICS II-PRACTICAL**	
	CO1	Apply the principles of chemical kinetics & to use them in assigning expiry date for formulations
	CO2	To evaluate the various interfacial properties and their effect in dosage form design
	CO3	To evaluate the rheological properties of liquids for dosage form design
	CO4	Evaluate the stability of various pharmaceutical dispersion systems
BP408P	**PHARMACOLOGY I-PRACTICAL**	
	CO1	To apply the knowledge about the common laboratory animals, instruments in experimental pharmacology, animal handling, physiological salt solutions, laboratory anesthetics.
	CO2	To demonstrate the various methods of dose calculation and drug administration by various routes in mice/rat.
	CO3	To evaluate the dose response curve of acetylcholine and effect of agonist, antagonist on chick ileum preparation.
	CO4	To understand the various concepts of simulated animal experiment
BP409P	**PHARMACOGNOSY AND PHYTOCHEMISTRY I-PRACTICAL**	
	CO1	To analyze different crude drug by means of qualitative chemical tests.
	CO2	To evaluate a crude drug by means of quantitative microscopy and to understand various leaf constants.
	CO3	To understand and evaluate adulteration in crude drug and to identify new cellular characteristics
	CO4	To evaluate crude drug by physical methods of evaluation
FIFTH SEMESTER		

BP501T	**MEDICINAL CHEMISTRY – II**	
	CO1	To understand the chemistry of drugs with respect to their pharmacological activity
	CO2	To understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
	CO3	To analyze the structural activity relationship of different class of drugs
	CO4	To understand the chemical synthesis of selected drugs
BP502 T	**FORMULATIVE PHARMACY**	
	CO1	To understand the preformulation consideration in pharmaceutical drug formulation
	CO2	To create and evaluate formulations and to perform the evaluation and packaging of solid dosage forms.
	CO3	To analyse, formulate and develop sterile products and perform their evaluation
	CO4	To create and evaluate formulation and to perform the packaging of cosmetics and aerosols
	CO5	To understand about the preparation and evaluation of packaging material.
BP503 T	**PHARMACOLOGY – II**	
	CO1	To understand and apply the knowledge on the classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications of drugs acting on cardiovascular system and renal system.
	CO2	To understand and apply the knowledge about autocoids and related drugs
	CO3	To understand and apply the knowledge about all endocrine and other hormones in our body and their analogues and inhibitors.
	CO4	To apply the knowledge about different bioassay (principles, applications and types) and analyze the drug sample.
BP504 T	**PHARMACOGNOSY AND PHYTOCHEMISTRY – II**	
	CO1	To understand about basic metabolic pathways which are involved in the formation of different secondary metabolites.
	CO2	To understand and analyze the source, phytochemistry, composition, therapeutic and commercial utilization of various medicinally important constituents present in crude drug.
	CO3	To create knowledge about industrial production, estimation and utilization of therapeutically useful phytoconstituents.
	CO4	To understand and apply knowledge about modern extraction techniques, characterization and identification/quality control of herbal drugs through spectroscopy.
BP 505 T	**PHARMACEUTICAL JURISPRUDENCE**	
	CO1	To understand the pharmaceutical legislations and their implications in the development and marketing
	CO2	To understand various Indian pharmaceutical Acts, Laws and schedule
	CO3	To understand the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
	CO4	To understand code of ethics during the pharmaceutical practice
BP 506P	**FORMULATIVE PHARMACY-PRACTICAL**	

	CO1	To evaluate the physicochemical properties of drugs and excipients.
	CO2	Apply the basic knowledge in the formulation and evaluation of various types of tablets and hard gelatin capsules
	CO3	Apply basic knowledge in formulation and evaluation of parenterals.
	CO5	Apply knowledge in the formulation of various liquid and semisolid dosage forms.
	CO4	To evaluate containers used in pharmaceutical formulations.
BP 507P	**PHARMACOLOGY II-PRACTICAL**	
	CO1	To analyze and evaluate various drug actions on isolated tissue.
	CO2	To analyze and evaluate various drug actions on experimental animals.
	CO3	To apply the knowledge about different bioassays and analyze the drug sample.
	CO4	To interpret and analyze diuretic activity of drugs by simulated experiment method.
BP 508P	**PHARMACOGNOSY AND PHYTOCHEMISTRY II-PRACTICAL**	
	CO1	To evaluate macroscopic and microscopic diagnostic characters of crude drug.
	CO2	To understand and analyze the extraction and identification of therapeutically useful phytoconstituents.
	CO3	To understand and analyze separation and purification of phytoconstituents by chromatographic techniques.
	CO4	To understand and perform the chemical analysis and quality control of the unorganized crude drugs as per regulatory guidelines.
SIXTH SEMESTER		
BP601T	**MEDICINAL CHEMISTRY- III**	
	CO1	To understand the importance of drug design and different techniques of drug design such as prodrugs, and Combinatorial Chemistry.
	CO2	To understand the chemistry of drugs with respect to their biological activity. Know the classification, structures, synthesis and uses of antibiotics, antimalarials, antitubercular agents, urinary tract anti-infective agents and anti-viral agents.
	CO3	To understand the metabolism, adverse effects and therapeutic value of drugs and the classification, structures, synthesis and uses of antifungal agents, anti-protozoal agents.
	CO4	To understand the importance of SAR of drugs of anthelmintics and sulphonamides and sulphones.
BP602 T	**PHARMACOLOGY-III**	

	CO1	To understand and apply knowledge about the classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications of drugs acting on respiratory, gastrointestinal system and Drugs on skin
	CO2	To understand and apply the knowledge about chemotherapeutic agents including principles, classification, microbial resistance, chemoprophylaxis
	CO3	To understand and Apply the mechanism of drug action and its relevance in the treatment of different infectious disease and Cancer
	CO4	To understand the knowledge on immune pharmacology and in addition on the basic concepts of gene therapy
BP 603 T	**HERBAL DRUG TECHNOLOGY**	
	CO1	To understand and remember selection of herbs from its sources, good agricultural practices, processing and development of herbal medicinal products. Also to understand about Indian systems of medicines, formulation and standardization of medicines. Understand GMP of Indian systems of medicines.
	CO2	Understand the importance and applications of nutraceuticals in healthcare and its market demand. Analyze herbal drug interactions and its importance in health care.
	CO3	To understand the sources and description of raw materials from herbs used in personal care products. Also learn about the use/application of herbal excipients in formulations and in novel dosage forms.
	CO4	To understand the evaluation and stability testing of herbal drugs as per WHO & ICH guidelines. Also to explain about the patenting aspects of natural products.
BP 604 T	**BIOPHARMACEUTICS AND PHARMACOKINETICS**	
	CO1	Understand and analyze the basic concepts in biopharmaceutics and pharmacokinetics and apply the concept of drug absorption to derive the pharmacokinetic parameters to describe the process of drug absorption. Understand the concept of drug distribution and gain knowledge about volume of drug distribution and plasma protein binding
	CO2	Understand the concept of drug elimination and apply the knowledge to describe parameters like clearance and extraction ratio. Apply the basic knowledge about bioavailability and bio equivalency to design and analyze drug product equivalency studies.
	CO3	Understand the knowledge about the theory of compartmental pharmacokinetics and apply and analyze the plasma or urine data to derive and describe pharmacokinetic parameters
	CO4	Analyze the theory of multicompartment models multiple dosage regimens and concept of nonlinearity and apply it in the multiple dosage regimen.
BP605 T	**PHARMACEUTICAL BIOTECHNOLOGY**	

	CO1	To understand and apply various biotechnology techniques used for production of biologicals in pharmaceutical industry
	CO2	To apply the principles of genetic engineering and innovations by rDNA technology
	CO3	To understand and apply immunology and its all related disciplines
	CO4	To understand knowledge blood products, mutation, microbial genetics, microbial biotransformation and apply them to research and health care
BP606T	**QUALITY ASSURANCE**	
	CO1	To understand the importance of quality in pharmaceutical products
	CO2	To understand the importance of GMP, GLP etc
	CO3	To analyse the factors affecting quality of pharmaceuticals
	CO4	To apply the process involved in manufacturing of pharmaceuticals in different departments.
BP607P	**MEDICINAL CHEMISTRY III-PRACTICAL**	
	CO1	To create medicinally important compounds or intermediates by conventional method.
	CO2	To evaluate the purity of the drug by using different assay methods.
	CO3	To create medicinally important compounds or intermediates by microwave irradiation techniques.
	CO4	To analyze physiochemical properties such as LogP, MR, molecular weight, hydrogen bond acceptors and donors for the class of drugs using drug design software drug likeliness screening.
BP608P	**PHARMACOLOGY III-PRACTICAL**	
	CO1	To understand and execute the methods for determining different biochemical parameters.
	CO2	To understand and apply knowledge about various screening methods of drugs on central nervous system using Ex-pharm software.
	CO3	To understand and apply knowledge about various screening methods of drugs on peripheral nervous system using Ex-pharm software.
	CO4	To analyze and evaluate significance of data by using biostatistical methods in experimental pharmacology.
BP 609P	**HERBAL DRUG TECHNOLOGY-PRACTICAL**	
	CO1	To understand and remember to perform the preliminary phytochemical analysis of crude drugs.
	CO2	To analyze the phytochemicals quantitatively in crude drug extracts, ayurvedic formulations etc.
	CO3	To formulate and standardize herbal preparations for external/internal applications as per regulatory guidelines.
	CO4	To understand and perform monograph analysis of herbal drugs and fixed oils as per pharmacopoeia.
SEVENTH SEMESTER		

BP701T	**INSTRUMENTAL METHODS OF ANALYSIS**	
	CO1	To understand on analytical techniques in the context of qualitative and quantitative analysis of drugs
	CO2	To apply the common methods of pharmaceutical analysis in research, academic and industry
	CO3	To apply the principles of chromatography in qualitative and quantitative analysis of pharmaceuticals in research and industrial perspective
	CO4	To execute the knowledge on spectroscopy in the elucidation of molecular structure and the interpretation of the result.
BP 702 T	**INDUSTRIAL PHARMACY**	
	CO1	To understand the techniques and guidelines in pilot plant and scale up of different pharmaceutical dosage forms
	CO2	To apply the process and guideline on technology development and transfer, their documentation from lab to commercial scale, agencies in India
	CO3	To understand the approval process involved in drug development and regulatory requirements in India and US.
	CO4	To understand industrial safety and accident records
BP 703T	**PHARMACY PRACTICE**	
	CO1	To apply Knowledge on various drug distribution methods, pharmacy stores management and inventory control in a hospital.
	CO2	To understand how to Monitor drug therapy, assess adverse drug reactions and interpret laboratory results
	CO3	To evaluate medication history interview and counsel the patients and Identify drug related problems.
	CO4	To evaluate pharmaceutical care services and to appreciate the concept of rational drug therapy.
BP 704T	**NOVEL DRUG DELIVERY SYSTEMS**	
	CO1	To understand the concepts, terminologies of controlled drug release and apply these in the design of various controlled drug delivery systems
	CO2	To understand the significance of polymers in controlled drug delivery and evaluate their potential in the design of various drug delivery systems
	CO3	Analyze the principles of microencapsulation and can apply the knowledge in manufacture of controlled drug delivery systems
	CO4	Apply the principles of formulation and evaluation of various controlled drug delivery systems and apply this in the manufacture of novel drug delivery systems
	CO5	Understand the principles of nanotechnology and delivery and apply this in the development of targeted drug delivery systems
BP705P	**INSTRUMENTAL METHODS OF ANALYSIS-PRACTICAL**	

	CO1	To acquire knowledge on how to do colorimetry.
	CO2	To understand the concept how to operate HPLC and GC.
	CO3	To understand the working principle of thin layer chromatography and paper chromatography
	CO4	To acquire knowledge on how to determine absorption maxima on UV spectroscopy
BP706PS	**PRACTICE SCHOOL**	
	CO1	To acquire knowledge and advance terminologies based on their choice of school
	CO2	Gain hands on training on the practical aspects of various schools of choice
	CO3	To gain ability to write an effective project report
	CO4	To be able to develop presentation skill
EIGHTH SEMESTER		
BP801T	**BIOSTATISTICS AND RESEARCH METHODOLOGY**	
	CO1	To understand to select a research topic and collecting, analyzing and interpreting the relevant data
	CO2	To apply research designs appropriate to research aims and objectives along with the limitation of particular research methods
	CO3	To understand application of biostatistics in pharmacy along with sampling techniques
	CO4	To demonstrate about various parametric test and how to present and write thesis report
BP802T	**SOCIAL AND PREVENTIVE PHARMACY**	
	CO1	To remember consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
	CO2	To understand a critical way of thinking based on current health-care development.
	CO3	Evaluate alternative ways of solving problems related to health and pharmaceutical issues
	CO4	To evaluate good knowledge about various health programs in our countries
BP804ET	**PHARMACEUTICAL REGULATORY SCIENCE**	
	CO1	To understand the regulatory concepts, new drug discovery and development processes
	CO2	To understand the functioning of different regulatory authorities and agencies in different countries
	CO3	To understand the registration of Indian drug products in overseas market and technical documentation
	CO4	To understand the guidelines, regulation and monitoring of clinical trials
BP805 ET	**PHARMACOVIGILANCE**	

	CO1	To understand History and development of pharmacovigilance, Pharmacovigilance. To apply Program of India (PvPI). National and international scenario of pharmacovigilance in evaluating ADR
	CO2	To apply the methods of Detection, assessment in reporting of adverse drug reactions and to apply communication in pharmacovigilance. To create case narratives of adverse events and their quality.
	CO3	To create methods to generate safety data during pre-clinical, clinical and post approval phases of drugs' life cycle. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation.
	CO4	To understand International standards for classification of diseases and drugs. ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning, CIOMS requirements for ADR reporting. Dictionaries, coding and terminologies used in pharmacovigilance
BP 806 ET	**QUALITY CONTROL AND STANDARDIZATION OF HERBS**	
	CO1	To understand WHO guidelines for quality control of herbal drugs
	CO2	To understand and apply Quality assurance in herbal drug industry
	CO3	To understand the regulatory approval process and their registration in Indian and international markets
	CO4	To understand and appreciate EU and ICH guidelines for quality control of herbal drugs
BP808ET	**CELL AND MOLECULAR BIOLOGY**	
	CO1	Understand about the basics, history, structure and functions, types, reproduction, chemical composition and application of cell
	CO2	To analyze the knowledge regarding DNA, RNA, transcription and translation.
	CO3	Understand about protein (structure, pathways, synthesis etc.)
	CO4	To create the knowledge on genetics, transgenic and genomic analysis Knowledge on receptors and different pathways.
BP809ET	**COSMETIC SCIENCE**	
	CO1	To analyze cosmetic principle to address the needs of cosmetic industry
	CO2	To understand formulation science and analytical techniques required to scientifically design and develop cosmetic products
	CO3	To remember scientific and technical aspects
	CO4	To understand high standards of practice and professional ethics within the cosmetic and toiletries industry
BP810ET	**EXPERIMENTAL PHARMACOLOGY**	
	CO1	To understand the applications of various commonly used laboratory animals.
	CO2	To understand and apply the knowledge of dose selection, calculation and preparation of drug solution/suspensions and selection, grouping of animal species and sex for study
	CO3	To understand and demonstrate the various screening methods used in preclinical research
	CO4	To comprehend and demonstrate the importance of biostatistics and research methodology.

BP 811 ET	**ADVANCED INSTRUMENTATION TECHNIQUES**	
	CO1	To apply the in-depth knowledge on NMR, Mass spectroscopy and Hyphenated technique
	CO2	To apply and study different methods like Thermal method and – X Ray diffraction methods
	CO3	To understand Study on calibration and validation of instruments as per ICH and USFDA
	CO4	To apply and Study on RIA and various extraction technique
BP813PW	**PROJECT WORK**	
	CO1	Ability to develop leadership quality and team work
	CO2	Learn how to collect literature and develop road map for project
	CO3	To design the new research projects
	CO4	Learn to evaluate the obtained experimental data and draw conclusions.

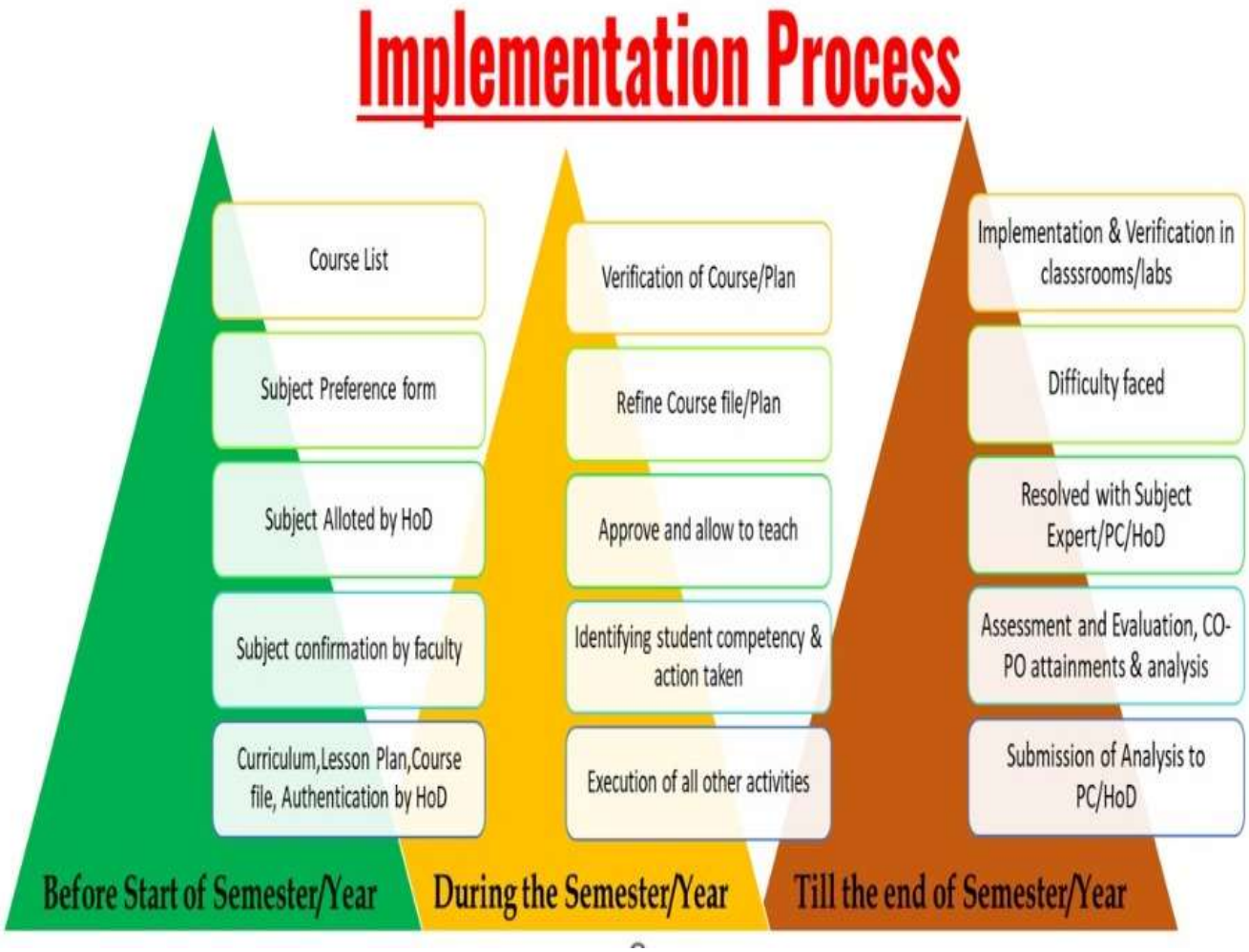
GUIDELINES FOR USING KEYWORDS IN CO-PO MAPPING

1. Develop a Keyword List: Collaboratively establish a core list of keywords associated with your Pharmacy Program Outcomes (POs). Consider:
    - Action Verbs (Bloom's Taxonomy): explain, formulate, dispense, counsel, assess, monitor, evaluate, optimize, manage
    - Technical Terms: pharmacokinetics, pharmacodynamics, dosage forms, drug interactions, compounding, clinical trials
    - Soft Skills: communication, patient counseling, interprofessional collaboration, critical thinking, ethical decision-making
2. Identify Keywords in COs and POs: Carefully examine your Course Outcomes (COs) and Program Outcomes (POs), highlighting core keywords.
3. Establish Correlations: Look for direct matches or semantic similarities between the keywords in COs and POs to indicate correlations. For example:
    - CO: "Dispense medications accurately according to prescription orders..."
    - PO: "...Demonstrate proficiency in the safe and effective preparation and dispensing of medications..."
    - Keyword Match: "dispense," "medications" suggest a strong correlation.
4. Cautions:
    - Nuance: Keywords might not fully represent every aspect of COs and POs. Ensure you understand the deeper context of intended learning outcomes.
    - False Positives: Avoid superficial matches. Ensure keywords align in the depth of knowledge and skill required.

Most of the times, appropriate keyword is sufficient for mapping.

Level	**Keywords Used in writing COs**
No mapping (-)	Key words related with LOT and not related with course or any outcomes
Low (1)	Part of PO is reflected through keywords/action verbs
Medium (2)	Major part of PO is reflected through keywords/action verbs.
High (3)	Exact action verb of PO

OBE FRAMEWORK OF THE INSTITUTION



COMPETENCY MATRIX

To guarantee impactful learning experiences, a staff competency matrix should be implemented that evaluates proficiency in critical areas including content knowledge, assessment creation and evaluation, fostering student engagement, cultivating positive learning environments, maintaining professionalism and collaboration, and effectively integrating communication and technology.

SUBJECT PREFERENCE FORM DEVELOPMENT:

The HOD creates a form capturing faculty preferences for specific subjects, grade levels, and teaching formats.

FORM DISTRIBUTION AND COMPLETION:

The HOD distributes the form to all eligible faculty members with clear instructions and timelines. Faculty members complete the form and submit it to the HOD by the deadline.

DATA REVIEW AND ANALYSIS:

The HOD reviews the submitted forms, considering: Faculty preferences, Competency data (e.g., qualifications, certifications, past performance), Student evaluations (if available), Course requirements and student needs and availability of faculty members.

DRAFT SCHEDULE CREATION:

The HOD creates a draft teaching schedule based on the collected data and analysis. The schedule aims to maximize the alignment of faculty competencies with subject requirements while accommodating preferences as much as possible.

INDIVIDUAL MEETINGS:

The HOD may schedule individual meetings with faculty members to discuss potential assignments, address concerns, and ensure transparency.

FINAL SCHEDULE AND COMMUNICATION:

The HOD finalizes the teaching schedule, considering feedback from individual meetings. The final schedule is communicated to all faculty members, highlighting any changes made and justification (if needed).

CURRICULUM DEVELOPMENT:

Faculty member reviews program learning outcomes, course descriptions, and relevant frameworks.The curriculum aligns with learning outcomes, assessment strategies, and instructional methods.

LESSON PLAN CREATION:

For each unit or topic within the curriculum, faculty member creates detailed lesson plans.

Each lesson plan specifies:

- Learning objectives.
- Instructional activities (e.g., lectures, discussions, group work, assignments).
- Assessment methods (e.g., quizzes, projects, presentations).
- Required resources (e.g., textbooks, articles, technology).
- Estimated time allocation.

COURSE FILE PREPARATION:

Faculty member compiles all relevant materials and documentation into a comprehensive course file.

The course file typically includes:

- Approved curriculum document.
- Detailed lesson plans for all units/topics.
- Syllabi outlining course expectations, grading policies, and academic integrity guidelines.
- Assessment instruments (e.g., rubrics, quizzes, exams).
- Teaching handouts, slides, or other instructional materials.

- References, readings, and supplementary resources.
- Evidence of alignment with learning outcomes and program standards.

Submission and Review: Faculty member submits the completed curriculum, lesson plans, and course file to the Department Chair by the designated deadline.

The Department head reviews the materials for completeness, quality, and adherence to program guidelines. Feedback and suggestions for improvement are provided to the faculty member, if necessary.

Approval and Recordkeeping:

Once approved, the Department Chair signs off on the finalized materials. The Department Chair maintains records of all submitted curriculum, lesson plans, and course files.

Teaching assignments are granted to faculty upon approval by the Head of Department, ensuring alignment with expertise and program needs.

STUDENT COMPETENCIES

Specific competencies of students will be assessed

1. Academic skills: Standardized tests, classroom assessments, portfolios, self-evaluations.
2. Practical skills: Performance-based assessments, simulations, project work, observations.
3. Social-emotional skills: Peer observations, self-evaluations, surveys, interviews, teacher observations.

ASSESSMENT METHODS

Mid-term, End term, class test, surprise test, University theory exam ,Quizzes, Assignment problems, simulation, laboratory experiments, project, field work, report presentation, tutorials, activities, etc.

BASE SCORE FOR STUDENT CATEGORY

- <50% -Slow Learner
- 50% to 65% - Average Learner
- >65%-Advanced Learner

STRATEGIES FOR CATERING TO DIVERSE LEARNING NEEDS: SLOW, AVERAGE, AND ADVANCED LEARNERS

Educators strive to create inclusive learning environments that cater to the individual needs of all students, regardless of their learning pace or abilities.

SLOW LEARNERS:

- Individualized instruction: Tailor lessons to match the student's pace and learning style. Break down complex concepts into smaller, manageable steps.
- Multisensory learning: Engage multiple senses (visual, auditory, kinesthetic) to reinforce understanding. Utilize manipulatives, graphic organizers, and visuals.
- Frequent practice and review: Provide ample opportunities for practice and spaced repetition to solidify concepts. Offer differentiated practice problems with varying difficulty levels.
- Positive reinforcement: Celebrate small wins and progress to boost motivation and confidence. Encourage self-reflection and goal setting.
- Collaboration and peer tutoring: Pair slow learners with average or advanced peers for collaborative learning and peer support
- Remedial classes with timetable & attendance
- Edpuzzle which empower students to take an active role in their learning with interactive video lessons that spark creativity and curiosity.

AVERAGE LEARNERS:

Clear and concise instruction: Present information in a well-organized and easy-to-understand manner. Utilize a variety of instructional methods (lectures, discussions, activities) to keep students engaged.

Differentiated instruction: Offer choices in activities, projects, or assessments to cater to diverse interests and learning styles.

Group work and collaborative learning: Encourage teamwork and collaborative problem-solving to develop critical thinking and communication skills.

Independent learning: Provide opportunities for self-directed learning activities and research projects to foster autonomy and responsibility.

Regular feedback and check-ins: Offer constructive feedback and guidance to help students improve their understanding and performance.

ADVANCED LEARNERS:

Advanced learners are encouraged to enroll in Swayam, NPTEL courses.

Encouraged to participate in E-Cell and IEDC activities

External learning opportunities: Facilitate participation in academic competitions, conferences, or workshops to broaden their knowledge and connect with like-minded peers.

Guidance for competitive Examination

Individual guidance for career building

Journal clubs

Remember, these are just general strategies, and the most effective approach will vary depending on the specific needs of each student and the learning environment. By creating a flexible and differentiated learning environment, educators can empower all students to reach their full potential.

DESIGNING OF QUESTION PAPER

A good and reasonable examination paper must consist of various difficulty levels to accommodate the different capabilities of students. Bloom’s taxonomy framework helps the faculty to set examination papers that are well balanced, testing the different cognitive skills without a tilt towards a tough or easy paper perception.

Designing Question Papers based on Bloom's Taxonomy and Course Outcomes (COs)

Step-by-step procedure for designing question papers aligned with Bloom's Taxonomy and course outcomes (COs):

1. Define Course Outcomes (COs):

Clearly articulate the key knowledge, skills, and abilities your students should acquire by the end of the course.

Ensure COs are measurable and specific, using action verbs like "analyze," "create," or "evaluate."

2. Develop Questions:

For each mapped objective, craft questions that directly assess their specified skills and knowledge.

Use clear and concise language with appropriate vocabulary and difficulty level for the target audience.

Utilize diverse question formats (e.g., multiple choice, open-ended, short answer, problem-solving) to address different learning styles and assessment needs.

3. Ensure Coverage and Distribution:

Allocate questions based on the importance and complexity of each CO.

Aim for balanced representation across all Bloom's levels to test a variety of cognitive skills.

Consider including bonus questions for advanced learners at higher Bloom's levels (optional).

4. Review and Pilot Test:

Peer-review the question paper for clarity, accuracy, and alignment with COs and Bloom's levels.

Conduct a pilot test with a small group of students to gauge difficulty level and identify any potential issues.

Refine the question paper based on feedback and pilot test results.

A suggestive list of skills/ competencies to be demonstrated at each of the Bloom's level and corresponding cues/ verbs for the examination/ test questions are given below:-

S No.	Level	Skill Demonstrated	Question / Verbs for tests
1.	Remember	- Ability to recall information like facts, definitions, etc.	list, define, tell, describe, recite, recall, identify, show, label, tabulate, quote, name, who, when, where, etc.
2.	Understand	- Understanding information - Grasp meaning - Translate knowledge into new context - Interpret facts, compare, contrast - Order, group, infer causes - Predict consequences	describe, explain, paraphrase, restate, associate, contrast, summarize, differentiate, interpret, discuss
3.	Apply	- Use information - Use methods, concepts, laws, theories in new situations - Solve problems using required skills or knowledge - Demonstrating correct usage of a method or procedure	calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model, experiment, show, examine, modify
4.	Analyze	- Break down a complex problem into parts - Identify the relationships and interaction between the different parts of a complex problem - Identify missing, redundant, and contradictory information	classify, outline, break down, categorize, analyze, diagram, illustrate, infer, select
5.	Evaluate	- Compare and discriminate between ideas - Assess value of theories, presentations - Make choices based on reasoned argument - Verify value of evidence - Recognize subjectivity - Use definite criteria for judgments	assess, decide, choose, rank, grade, test, measure, defend, recommend, convince, select, judge, support, conclude, argue, justify, compare, summarize, evaluate
6.	Create	- Use old ideas to create new ones - Combine parts to make (new) whole - Generalize from given facts - Relate knowledge from several areas - Predict, draw conclusions	design, formulate, build, invent, create, compose, generate, derive, modify, develop, integrate

CO-PO ATTAINMENT GUIDELINES

The attainment of POs and COs are evaluated by direct and indirect attainment methods.

Level of attainment

The three levels of attainment is taken as 1- low; 2- medium;3- high and it can be defined as

- Attainment 3 :70% of students score more than 50% marks
- Attainment 2: 60% of students score more than 50% marks
- Attainment 1: 50% of students score more than 50% marks

Direct attainment

The direct attainment is done by evaluating student performance in Continuous Internal Assessment (CIA) which comprises of sessional examinations and academic activities (assignments, seminars, class tests and quizzes) and End semester/ year examinations (EE). The proportional weightages of CIA: EE are 20:80.

Direct attainment of a specific COs is determined from the performances of students to all the assessment items related to that particular CO. Hence, every assessment item needs to be tagged with the relevant CO. Continuous Internal Assessment is conducted and evaluated by college and End Semester Examination is conducted and evaluated by the University. The average marks scored in End semester/year examination will be considered as the common attainment of all COs.

Direct Course Outcome Attainment = 20% of Continuous Internal Assessment (CIA) +80% of End Semester/year examination attainment.

Indirect attainment

Indirect attainment of COs can be determined from the course end survey.

Attainment of CO = (Level-1 X No of Students Attempted) + (Level-2 X No of Students Attempted) + (Level-3 X No of Students Attempted)/Total No of Students (Level 1: Low; Level 2: Medium; Level 3: High)

Overall Course Outcome Attainment = 90% Direct Course Outcome Attainment + 10% Of Indirect Attainment

PO ATTAINMENT

PO assessment tools are categorized into Direct method and Indirect method. The final PO attainment is calculated by taking 80% of the attainment values from Direct assessment method and 20% of the attainment values from Indirect assessment method.

Direct Method:
Once the overall attainment percentage of each COs is calculated, the PO attainment is calculated by taking the cumulative average of all the course's CO attainment which contributes to the Program Outcomes.

Indirect Method:
This assessment approach is intended to find out about the quality of the learning process by getting feedback from exit surveys.

The obtained values will be compared with the set attainment target fixed for each PO. • If the target is achieved, then the same process will be continued for further batches. • If the target is not achieved, then continuous improvement action will be taken for each PO. Based on the attainment, the improvements to be done are discussed among the staff.

ACTION FOR GAP FULFILMENT

Department will call Departmental meeting to discuss how GAPs can be fulfilled. However these are some suggestions to the departments to fulfil these gaps: -

Remedial Classes for weak students arranged to improve the attainment level.

Beyond syllabus topics added to meet the requirement.

Industry visit/Industrial Expert talk/Senior academic talks can be arranged for the students.

REPORT ON GAP FULFILMENT

Gap analysis will be done in at the end of each semester, gap analysis of odd semester will be done in next even semester, the action for gap fulfilment will be decided & will be implemented in next odd semester. Similarly applicable for even semester also.

NATIONAL COLLEGE OF PHARMACY

INNOVATION AND ENTREPRENEURSHIP DEVELOPMENT CENTRE

INSTITUTION'S INNOVATION COUNCIL

Approved by Pharmacy Council of India, AICTE, DME & Govt. of Kerala
Affiliated to Kerala University of Health Sciences, Accredited by NBA

OBE MANUAL

B PHARM

Prepared by Curriculum Committee and IQAC

National college of Pharmacy

NATIONAL COLLEGE OF PHARMACY

Outcome Based Education (OBE)

Preamble

Outcome Based Education (OBE) is an educational model that forms the base of a quality education system. There is no single specified style of teaching or assessment in OBE. All educational activities carried out in OBE should helpthe students to achieve the set goals. The faculty may adapt the role of instructor, trainer, facilitator, and/or mentor, based on the outcomes targeted.

OBE enhances the traditional methods and focuses on what the Instituteprovides to students. It shows the success by making or demonstrating outcomes using statements "able to do" in favour of students. OBE provides clear standards for observable and measurable outcomes.

The University Grants Commission (UGC) has introduced a Learning Outcomes-based Curriculum Framework for Undergraduate Education in India. The framework is based on the premise that higher education qualifications such as Bachelor's Degree programs are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes, and values) and academic standards expected of graduates of a program of study.

The National Education Policy (NEP) 2023 has also emphasized the importance of outcome-based education in India. A strong focus on outcome-based education is crucial to achieving the goal of elevating the quality of education in India to global standards.

Overall, outcome-based education has been adopted in many technical institutes of higher learning in India. The UGC has introduced a Learning Outcomes- based Curriculum Framework for Undergraduate Education in India, and the NEP 2023 has emphasized the importance of outcome-based education in India .

Benefits of OBE

Clarity
The focus on outcome creates a clear expectation of what needs to be accomplished by the · end of the course.

Flexibility
With a clear sense of what needs to be accomplished, instructors will be able to · structure their lessons around the students' needs.

Comparison
OBE can be compared across the individual, class, batch, program and institute levels.

Involvement
Students are expected to do their own learning. Increased student involvement allows them to feel responsible for their own learning, and they should learn more through this individual learning.

Higher Education Quality

OBE delivers a higher quality of education since it focuses on learning outcomes and guarantees that students master the subject matter. This technique assists students in developing critical thinking abilities, problem-solving skills, and practical skills that are useful in the workplace.

Self-Directed Learning

OBE promotes self-directed learning, in which students are in charge of their own education and growth. In their future employment, students will benefit from having a sense of freedom and autonomy, which is fostered by this method.

Better Career Opportunities

OBE aids students in acquiring the knowledge and skills that employers value. This can increase their employment possibilities and assist them in achieving their career objectives.

BLOOM'S TAXONOMY: A FRAMEWORK FOR LEARNING OBJECTIVES

Bloom's Taxonomy, originally published in 1956, is a hierarchical framework that categorizes educational learning objectives into six levels of cognitive complexity. These levels range from lower-order thinking skills like remembering and understanding to higher-order thinking skills like analyzing, evaluating, and creating. Here's an overview of the six levels:

1. **Remembering:** This level focuses on recalling factual information. Examples include identifying, listing, defining, and describing.

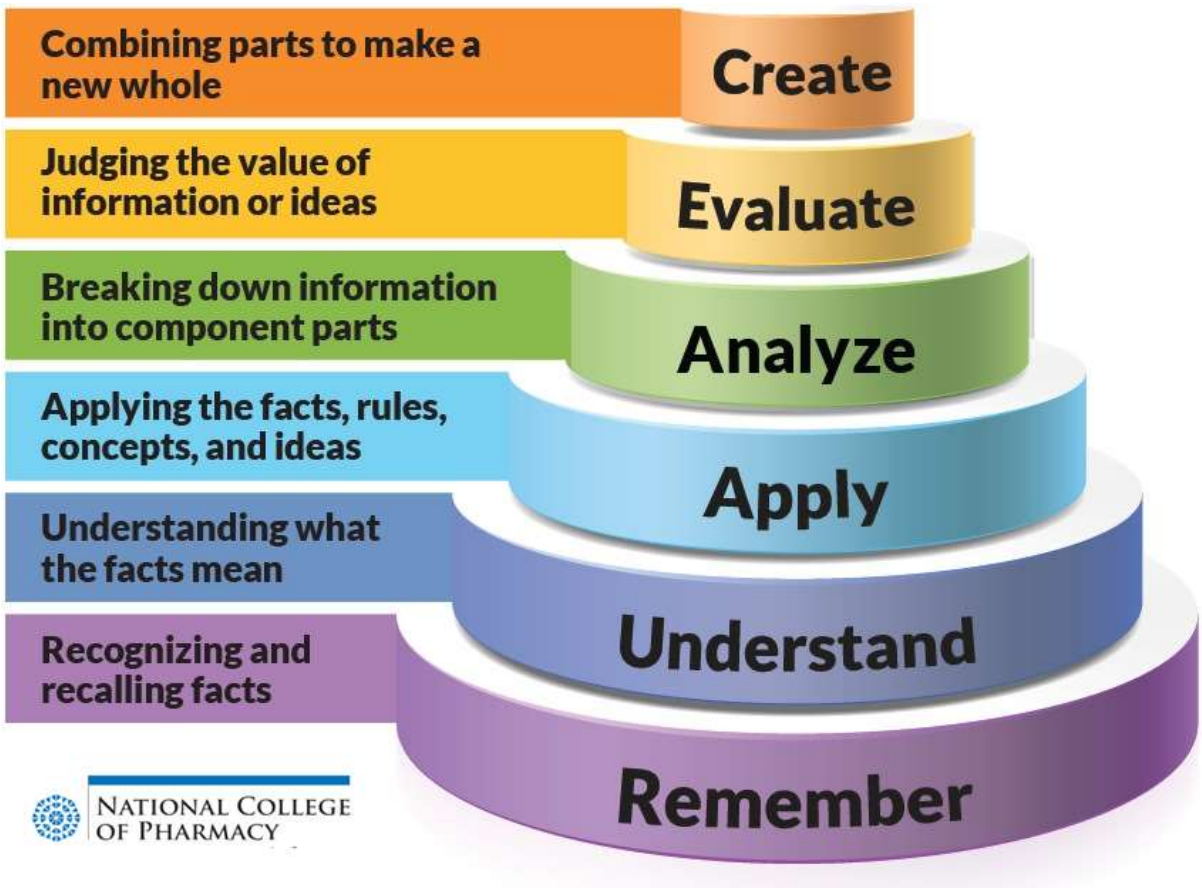
2. **Understanding:** This level requires grasp of the meaning and implications of information. Examples include interpreting, explaining, summarizing, and paraphrasing.

3. **Applying**: This level involves using knowledge and skills in new situations. Examples include demonstrating, calculating, illustrating, and implementing.

4. **Analysing:** This level requires breaking down information into its component parts and seeing how they relate. Examples include comparing, contrasting, differentiating, and classifying.

5. **Evaluating:** This level involves making judgments based on criteria and justifying those judgments. Examples include critiquing, judging, assessing, and recommending.

6. **Creating:** This level requires generating new ideas or products. Examples include designing, developing, composing, and constructing.



REVISED BLOOM'S TAXONOMY:

In 2001, a revised version of Bloom's Taxonomy was published, focusing on action verbs and gerunds rather than nouns. This revision emphasizes deeper and more active learning experiences.

he Revised Bloom's Taxonomy, published in 2001, offers an updated framework for classifying educational learning objectives. It builds upon the original 1956 version by shifting the focus from nouns to action verbs and gerunds, thereby emphasizing active learning and cognitive processes.

Here's a breakdown of the Revised Bloom's Taxonomy and its six levels:

1. Remembering (Knowing & Recalling):

Key words: Recognizing, recalling, retrieving, listing, defining, describing

Focus: Retrieving and recalling factual information.

2. Understanding (Comprehending & Interpreting):

Key words: Interpreting, explaining, summarizing, paraphrasing, classifying, comparing, contrasting

Focus: Grasping the meaning and implications of information, making connections.

3. Applying (Using & Implementing):

Key words: Executing, demonstrating, implementing, calculating, illustrating, solving

Focus: Applying knowledge and skills in new situations, solving problems with known procedures.

4. Analyzing (Breaking Down & Examining):

Key words: Differentiating, organizing, attributing, analyzing, investigating, experimenting

Focus: Breaking down information into parts, examining relationships, drawing connections.

5. Evaluating (Judging & Critiquing):

Key words: Checking, critiquing, judging, assessing, recommending, valuing

Focus: Making judgments based on criteria, evaluating quality and effectiveness.

6. Creating (Generating & Designing):

Key words: Generating, hypothesizing, planning, designing, constructing, composing

Focus: Producing new ideas or products, designing solutions, contributing original work.

Applications of Bloom's Taxonomy:

Bloom's Taxonomy can be used for various educational purposes, including:

Designing learning objectives: Clearly define what students should be able to do at the end of a lesson, unit, or course.

Creating assessments: Align assessments with the desired learning objectives and the appropriate level of Bloom's Taxonomy.

Planning instruction: Design activities and experiences that help students achieve the learning objectives at different levels.

Providing feedback: Offer feedback that helps students move towards mastery of the intended learning objectives.

Overall, Bloom's Taxonomy is a valuable tool for educators who want to encourage deeper learning and critical thinking in their students.

VISION AND MISSION OF INSTITUTION

Process of framing Vision and mission of institution

The Vision, Mission and PEOs are established through continuous interaction with the internal and external stakeholders of the programme. They are discussed and approved by the Program Assessment Committee and Department Advisory Committee.

In establishing the Vision and Mission of the program, the following steps were followed:

Step 1: Vision and Mission of the Institute and the Programme Outcomes defined by NBA are taken as an origin.

Step 2: Suggestions are taken by the Program Assessment Committee from the External and internal stakeholders about statements of Vision and Mission.

Step 3: The collected views are analyzed and reviewed to check the consistency with the vision and mission of the institute and summarized by the Program Assessment Committee.

Step 4: Finally, the programme Vision and Mission are made by the Academic Advisory Committee.

Step 5: After approval, dissemination is carried out through appropriate channels.

VISION OF INSTITUTION

Emerge as a center of eminence by creating responsible and resourceful citizens with commitment to excellence in pharmacy education and allegiance to ethical professional practices.

MISSION OF INSTITUTION

- Providing quality pharmacy education and training that enables pharmacists to facilitate the delivery of ethical, conscientious, cost-effective healthcare services to all.
- Cultivating an environment that is collaborative, interdisciplinary, innovative, and creative in approach.
- Partnering with individuals and institutions across the world who occupy leadership positions and promoting reciprocal exchanges in both academic and cultural spheres.

EDUCATIONAL PROGRAM OUTCOMES:

1. Course Outcome (CO):

Definition: Specific statements describing the knowledge, skills, and attitudes students should be able to demonstrate after completing a particular course.

Focus: Learning outcomes specific to an individual course within a program.

Example: By the end of the "Pharmacology" course, students will be able to identify the mechanisms of action of different drug classes.

2. Program Outcome (PO):

Definition: Statements outlining the broader knowledge, skills, and attributes that graduates of a specific program are expected to possess by the time of graduation.

Focus: Program-level learning outcomes encompassing the entire curriculum.

Example: Graduates will be able to apply their knowledge to develop safe and effective medication regimens for patients.

3. Program Specific Outcome (PSO):

Definition: Statements describing the unique knowledge, skills, and professional attributes that graduates from a particular specialization within a program are expected to attain.

Focus: Outcomes specific to a program specialization, differentiating it from other specializations within the same program.

Example: Graduates will be particularly skilled in providing medication therapy management services in rural communities.

4. Program Educational Objective (PEO):

Definition: Broad statements that describe the long-term career and professional aspirations for graduates of a program several years after graduation.

Focus: Overall vision for the program's contribution to graduates' professional development in the long term.

Example: Our pharmacy graduates will be recognized as leaders in improving medication adherence rates within their communities.

PROCESS OF ESTABLISHING PO, PEO AND PSO

The POs, PEOs and PSOs are established through the following process steps:

Step 1: Vision and Mission of the Institute and B pharm programme along with the Program Outcomes defined by NBA are taken as a basis to interact with various stake holders of the program.

Step 2:

Program Coordinator consults the stakeholders and collects their views.

Step 3: After various meetings, Benchmarking with other colleges and correlating alignment with curriculum contents the Program Coordinator submits the views to Program Assessment Committee

Step 4: Program Assessment Committee reviews and summarizes the collected views and expresses its opinion and forwards the same to Department Advisory Committee who defines the PEO, PO and PSO statements.

Step 5:

Academic Advisory Committee finalizes, formulates and establishes the PEO, PO and PSO statements.

Step 6

After approval dissemination is carried out through appropriate channels.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1. Pharmacy graduates will have high technical and professional expertise in various fields of pharmaceutical sciences to solve complex problems in the area of pharmaceutical Sciences.

2. Pharmacy graduates will have ethical attitude, human values, team spirit, strong communication skills, and attitude of lifelong learning to serve the needs of society.

3. Pharmacy graduates will have an attitude for patient-centered and community-based research to improve patient healthcare outcomes.

PROGRAM OUTCOMES (PO)

1. **Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

2. **Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills, and organizational skills. Develop and implement plans and organize work to meet deadlines.

3. **Problem Analysis:** Utilize the principles of scientific inquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate, and apply information systematically and shall make defensible decisions.

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.

5. **Leadership Skills:** Understand and consider the human reaction to change, motivation issues, leadership and team building when planning changes required for fulfillment 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.

6. **Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. healthcare professionals, promoters of health, educators, managers, employers, employees).

7. **Pharmaceutical Ethics:** Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior 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.

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.

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.

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.

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.

PROGRAM-SPECIFIC OUTCOMES (PSO)

PSO 1: Industry-Focused Excellence

Gain expertise in industry-focused areas paving the way for successful careers in various sectors

PSO2 Interdisciplinary Collaboration and Innovation:

Actively collaborate with healthcare professionals from diverse fields various disciplines to optimize patient care outcomes and contributing innovative solutions to complex healthcare challenges.

GRADUATE ATTRIBUTES

1. **DEEP DISCIPLINE KNOWLEDGE:** Graduates have comprehensive knowledge and understanding of their domain area, the ability to engage with different traditions of thought, and the ability to apply their knowledge in practice, including in multi-disciplinary or multi-professional contexts.
2. **ANALYSE, DESIGN/DEVELOPMENT OF SOLUTIONS TO PROBLEMS:** Graduates are effective problem-solvers, able to apply critical, creative, and evidence-based thinking to conceive innovative responses to future challenges.

3. **PROFESSIONALISM AND LEADERSHIP**: Graduates engage in professional behavior and have the potential to be entrepreneurial and take leadership roles in their chosen occupations or careers and communities.
4. **COMMUNICATION SKILLS AND TEAMWORK:** Graduates convey ideas and information effectively to a range of audiences for a variety of purposes and contribute in a positive and collaborative manner to achieving common goals**.**
5. **ENVIRONMENT AND SUSTAINABILITY:** Understand the impact of professional solutions in societal and environmental contexts and demonstrate knowledge of the need for sustainable development.
6. **RESPONSE TO ETHICS IN LIFE AND SOCIAL ISSUES:** Graduates are responsible and effective global citizens whose personal values and practices are consistent with their roles as responsible members of society.
7. **EFFICIENT PROJECT MANAGEMENT AND FINANCE:** Demonstrate knowledge and understanding of management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
8. **SELF-AWARENESS AND EMOTIONAL INTELLIGENCE:** Graduates are self-aware and reflective; they are flexible and resilient and have the capacity to accept and give constructive feedback; they act with integrity and take responsibility for their actions**.**
9. **MOTIVATION FOR LIFELONG LEARNING**: Recognize the need for and have the preparation and ability to engage in independent and lifelong learning.
10. **DIGITAL CAPABILITIES:** Graduates are well-prepared for living, learning, and working in a digital society

COURSE OUTCOME DESIGN PROCESS

1. Define the Context:

- Understand the course's specific context, including its level, subject matter, and fit into the larger program or student journey.
- Identify institutional regulations or accreditation standards that might influence the outcomes.

2. Identify Learning Objectives:

- Brainstorm the key knowledge, skills, and abilities you want students to gain by the end of the course.
- Consider Bloom's Taxonomy to ensure diverse learning levels.
- Articulate these objectives as clear, concise statements.

3. Translate into Course Outcomes:

- Shift focus from instructor activities to student achievements.
- Use action verbs that describe what students will be able to do (e.g., analyze, design, interpret, solve).
- Ensure outcomes are measurable through assessments and exams.

4. Align with Program Goals and Learning Objectives:

- Ensure course outcomes contribute to the broader program's learning objectives.
- Create a cohesive learning experience and help students see the bigger picture.

5. Consider Different Course Types:

- Adapt the process for different course types, such as foundational subjects versus advanced courses.

6. Draft and Refine:

- Start with a draft and seek feedback from colleagues, students, and stakeholders.
- Iteratively refine and revise outcomes based on feedback.

7. Share and Utilize:

- Communicate course outcomes clearly to students at the beginning of the course.
- Use outcomes to guide teaching, assessment, and feedback strategies.
- Regularly review and update outcomes to ensure they remain relevant and effective.

Sample Action Verbs:

- Analyze
- Design
- Interpret
- Solve
- Create

Lower Order of Thinking(LOT)			Higher Order of Thinking (HOT)		
Remember	**Understand**	**Apply**	**Analyse**	**Evaluate**	**Create**
Define	Explain	Solve	Analyse	Reframe	Design
Describe	Describe	Apply	Compare	Criticize	Create
List	Interpret	Illustrate	Classify	Judge	Plan
State	Summarise	Calculate	Distinguish	Recommend	Formulate
Match	Compare	Sketch	Explain	Grade	Invent
Tabulate	Discuss	Prepare	Differentiate	Measure	Develop
Record	Estimate	Chart	Appraise	Test	Organize
Label	Express	Choose	Conclude	Evaluate	Produce

Note: If Laboratory is given as a separate course (with course code), then there should be separate course outcomes for Laboratory.

CHECKLIST FOR COs

Number of Cos	**2 to 6**
CO essentials	**Action Verb, Subject Content, Level of Achievement, Modes of Performing task (If Applicable)**
Based on BTL	**Understand, Remember, Apply, Analyse, Evaluate, Create**
Number of BTL Considered in one course	**Minimum 2**
Technical Content/ point of curriculum	**All curriculum contents are covered**

COURSE OUTCOMES		
BACHELOR OF PHARMACY		
FIRST SEMESTER		
BP101T	**HUMAN ANATOMY AND PHYSIOLOGY – I**	
	CO1	To understand, analyse and appreciate about the gross morphology, structure and functions of cell, tissues and introduction to scope of anatomy and physiology of human body and principles of cell communication.
	CO2	To understand, analyse and appreciate the anatomy and physiology of skin and sense organs.
	CO3	To understand, analyse and appreciate the structure and working of skeletal system, joints and skeletal muscle in human body.
	CO4	To understand, analyse and appreciate about various body fluids, blood, lymphatic system, peripheral nervous system and cardiovascular system of the human body and its physiology
BP102T	**PHARMACEUTICAL ANALYSIS – I**	
	CO1	To understand the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs
	CO2	To understand principles of volumetric and electrochemical analysis.
	CO3	To analyse various volumetric and electrochemical titrations.
	CO4	To create analytical skills
BP103T	**PHARMACEUTICS - I**	
	CO1	To understand the history of profession of pharmacy and pharmacopeia
	CO2	To analyze and apply the basics of different dosage forms and calculations
	CO3	To understand and remember the various drug incompatibilities
	CO4	To create and evaluate the preparation of different dosage form
BP104T	**PHARMACEUTICAL INORGANIC CHEMISTRY**	
	CO1	To understand about sources of impurities and methods to determine impurities in inorganic chemistry and apply the principles of limit test to limit the impurities in a drug sample.
	CO2	To understand about acids, bases, and buffers in pharmaceutical systems and measurement, calculation and adjustment of tonicity and functions of major physiological ions and electrolytes.
	CO3	Understand and remember the medicinal and pharmaceutical importance of inorganic compounds.
	CO4	Understand the medicinal importance of radioactive compounds
BP105T	**COMMUNICATION SKILLS**	
	CO1	Understand the behavioural needs for a pharmacist to function effectively in the areas of pharmaceutical operation
	CO2	Analyze communication effectively and effectively manage the team as a team player
	CO3	Create interview skills
	CO4	Create Leadership qualities and essentials
BP107P	**HUMAN ANATOMY AND PHYSIOLOGY-PRACTICAL**	
	CO1	To understand and identify the various tissues

	CO2	To understand and analyse various hematological experiments like WBC count, RBC count etc.
	CO3	To understand and analyse experiments like BP monitoring, pulse rate monitoring etc
	CO4	To understand and identify different bones in human body
BP108P	**PHARMACEUTICAL ANALYSIS I –PRACTICAL**	
	CO1	To understand the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs
	CO2	To understand principles of volumetric and electrochemical analysis.
	CO3	To apply various volumetric and electrochemical titrations.
	CO4	To create analytical skills
BP109P	**PHARMACEUTICS I-PRACTICAL**	
	CO1	To analyse and evaluate formulation and dispensing of different pharmaceutical dosage forms
	CO2	To remember calculations of pharmaceutical dosage forms
	CO3	To understand and evaluate prescription and solving errors.
	CO4	To apply iinterpretation of latin terms and metric conversions
BP110P	**PHARMACEUTICAL INORGANIC CHEMISTRY-PRACTICAL**	
	CO1	To evaluate the level of specific impurities in the given inorganic compounds by performing different limit tests.
	CO2	To apply different chemical methods to prepare inorganic compounds.
	CO3	To analyze identification tests as per pharmacopoeia
	CO4	To evaluate purity of an inorganic compound qualitatively by performing test for purity.
BP111P	**COMMUNICATION SKILLS-PRACTICAL**	
	CO1	Understand effective pronunciation of consonant sounds and Vowel sounds
	CO2	To create comprehension listening
	CO3	To apply speech effective communication writing skill
	CO4	Create effective writing, interview handling skills, E-mail etiquette presentation skill
SECOND SEMESTER		
BP201T	**HUMAN ANATOMY AND PHYSIOLOGY – II**	
	CO1	To understand and explain the gross morphology, structure and functions of nervous and endocrine system in human body.
	CO2	To understand about the gross morphology, structure and functions of digestive system and principles of energy and metabolism
	CO3	To understand and analyse about the morphology, structure and working pattern of respiratory and urinary system
	CO4	To understand and analyse the interlinked mechanisms of male and female reproductive system and basic principles of genetics.
BP202T	**PHARMACEUTICAL ORGANIC CHEMISTRY – I**	
	CO1	Remember the basic concept of structure, name and the type of isomerism of the organic compound.

	CO2	Understand to write the reaction, mechanism and orientation
	CO3	Understand reactivity/stability of compounds.
	CO4	Explain the ideas of the identification of organic compound
BP203T	**BIOCHEMISTRY**	
	CO1	To understand the metabolism of nutrient biomolecules in physiological and pathological condition.
	CO2	To understand and remember the role, importance and regulation of enzymes.
	CO3	To understand the concept of bioenergetics and biological oxidation.
	CO4	To understand the genetic organization and functions of genome and synthesis of RNA and proteins.
BP204T	**PATHOPHYSIOLOGY**	
	CO1	To understand the basic principles involved in cell injury and adaptation.
	CO2	To understand the pathogenesis of inflammation and wound healing
	CO3	To understand the pathogenesis, clinical manifestations and complications of common non-communicable diseases
	CO4	To understand the pathogenesis, clinical manifestations and mode of transmission of communicable diseases.
	C05	To understand the etio-pathogenesis and diagnosis of cancer
BP205T	**COMPUTER APPLICATION IN PHARMACY**	
	CO1	To known the various types of application of computer in pharmacy
	CO2	To understand different types of databases
	CO3	To know the application of databases in pharmacy
	CO4	To understand the concept of bioinformatics
BP206T	**ENVIRONMENTAL SCIENCE**	
	CO1	To create the awareness about environmental problems among learners
	CO2	To analyze basic knowledge about the environment audits allied problems
	CO3	Create learnership quality to participate in environment protection and environment improvement.
	CO4	Create skills to help the concerned individuals in identifying and solving environmental problems.
BP207P	**HUMAN ANATOMY AND PHYSIOLOGY II-PRACTICAL**	
	CO1	To understand about the integumentary and special senses, nervous system, endocrine system using specimen, models and diagnosis kit etc
	CO2	To analyse and perform various experiments on visual activity, taste, sensation etc
	CO3	To analyse and perform to record temperature, reflex action, BMI and other neurological examination
	CO4	To analyse the function of olfactory nerve, lung function tests
BP208P	**PHARMACEUTICAL ORGANIC CHEMISTRY I-PRACTICAL**	
	CO1	Remember the basic concept for writing the structure, name and the type of isomerism of the organic compound.
	CO2	Understand how to write the reaction, name the reaction and orientation of reactions. .

	CO3	Understand reactivity/stability of compounds.
	CO4	Explain ideas to identify and confirm the identification of organic compound
BP209P	**BIOCHEMISTRY- PRACTICAL**	
	CO1	To analyze proteins, amino acids and carbohydrates by various qualitative as well as quantitative tests
	CO2	To analyze the biomolecules from different biological samples
	CO3	To understand the action of salivary amylase on starch.
	CO4	To understand the preparation of buffer solution and determination of pH
BP210P	**COMPUTER APPLICATIONS IN PHARMACY-PRACTICAL**	
	CO1	To apply the principles to retrieve the information of a drug and its adverse effects using online tools
	CO2	To create patient record in databases and to generate report
	CO3	To create HTML web page to show personal information
	CO4	To understand drug information storage and retrieval using MS Access
THIRD SEMESTER		
BP301T	**PHARMACEUTICAL ORGANIC CHEMISTRY II-THEORY**	
	CO1	To understand the structure, name and type of isomerism of the organic compounds
	CO2	To understand the preparation, reaction mechanism, and orientation of aromatic organic compounds
	CO3	To understand the chemistry, application and analysis of fats and oils
	CO4	To understand the reactivity/stability of organic compounds
BP302T	**PHYSICAL PHARMACEUTICS – I**	
	CO1	To understand the various principles of solubility of drugs and factors affecting solubility and application of these principles in the development of dosage forms
	CO2	To understand the various physicochemical properties of drugs and states of matters and apply these principles in formulation and quality assurance of dosage forms
	CO3	Create an idea about the principles of micromeritics and its importance in drug action and apply the same in the development of solid dosage forms
	CO4	To apply the principles of complexation in the enhancement of bioavailability and stability of drugs
	CO5	To understand and apply the principles of pH, buffers and isotonicity in the formulation of dosage forms with better safety, stability and effectiveness
BP303T	**PHARMACEUTICAL MICROBIOLOGY – I**	
	CO1	To understand methods of identification, cultivation and preservation of various microorganisms.
	CO2	To understand the importance and implementation of sterilization in pharmaceutical processing and industry.
	CO3	To demonstrate sterility testing of pharmaceutical products.

	CO4	To demonstrate microbiological standardization of pharmaceuticals.
	C05	To understand cell culture technology and its applications in pharmaceutical industries.
BP304T	**PHARMACEUTICAL ENGINEERING**	
	CO1	To understand various unit operations used in pharmaceutical industries
	CO2	To understand the material handling techniques
	CO3	To understand the theories, objectives, advantages and disadvantages of various operations involved in pharmaceutical manufacturing.
	CO4	To understand the various types and preventive methods used for corrosion
BP305P	**PHARMACEUTICAL ORGANIC CHEMISTRY II-PRACTICAL**	
	CO1	To understand the structure, name and the type of isomerism of the organic compound.
	CO2	To understand about how to write the reaction, name the reaction and analyze orientation of reactions.
	CO3	To understand the account for reactivity/stability of compounds.
	CO4	To understand about preparation of organic compounds.
BP306P	**PHYSICAL PHARMACEUTICS I-PRACTICAL**	
	CO1	To understand the knowledge about solubility parameters
	CO2	To understand the partition co efficient of solute in immiscible liquid
	CO3	To understand and identify the various micromeritic parameters
	CO4	To understand the complexation process and its parameters
BP307P	**PHARMACEUTICAL MICROBIOLOGY-PRACTICAL**	
	CO1	To understand the different methods of preparation of culture media and sub culturing.
	CO2	To understand knowledge about aseptic transfer and different methods of isolation of pure culture.
	CO3	To identify the microorganism by using staining, microscopy, various chemical tests and apply this knowledge in microbiology lab and ability to identify bacterial motility by hanging drop method.
	CO4	To understand procedure for standardization of antibiotics
	CO5	To apply the sterility testing procedure in pharmaceutical preparations.
BP308P	**PHARMACEUTICAL ENGINEERING- PRACTICAL**	
	CO1	To understand and perform various unit operations used in pharmaceutical industries
	CO2	To understand and perform the material handling techniques
	CO3	To evaluate various processes involved in pharmaceutical manufacturing processes
	CO4	To evaluate the various preventive methods used for corrosion control in pharmaceutical industries
FOURTH SEMESTER		

BP401T	**PHARMACEUTICAL ORGANIC CHEMISTRY – III**	
	CO1	To understand the stereo chemical aspects of organic compounds and stereo chemical reactions
	CO2	To understand the medicinal uses and other applications of some organic compounds
	CO3	To understand the chemistry of important heterocyclic compounds
	CO4	To understand reactions of synthetic importance
BP402T	**MEDICINAL CHEMISTRY – I**	
	CO1	To understand about medicinal chemistry, history and development of medicinal chemistry, physicochemical properties in relation to biological action (ionization, solubility, partition coefficient, hydrogen bonding, protein binding, chelation, bioisosterism, optical and geometrical isomerism) and drug metabolism, factors affecting drug metabolism including stereo chemical aspects
	CO2	To understand the chemistry of drugs with respect to their biological activity. Know the classification, structures, synthesis and uses of cholinergic, anticholinergic, adrenergic and antiadrenergic agents.
	CO3	To understand the metabolism, adverse effects and therapeutic value of drugs and the classification, structures, synthesis and uses of sedatives and hypnotics, anti convulsants and antipsychotic agents
	CO4	To analyze the importance of SAR of drugs of general anaesthetics, narcotic and non-narcotic drugs
BP403T	**PHYSICAL PHARMACEUTICS II**	
	CO1	To understand the principles of chemical kinetics and apply the same in the stability of drugs
	CO2	To create an idea about assigning expiry date for formulations and different factors affecting stability of drugs
	CO3	To understand various rheological properties of drug molecules and apply those in the designing of dosage forms
	CO4	To understand and apply the use of interfacial properties in formulation research and development.
	CO5	To apply the principles of various dispersion systems in formulation research and development
BP404T	**PHARMACOLOGY – I**	
	CO1	To understand the basics of pharmacology, drug development process and apply the information about drugs absorption, distribution, metabolism and excretion (pharmacokinetics) in therapeutics.
	CO2	To understand the information about the drugs like mechanism of action, physiological and biochemical effects (pharmacodynamics)
	CO3	To understand and apply the knowledge about the pharmacology of peripheral nervous system.
	CO4	To understand and apply the knowledge about the pharmacology of central nervous system.
BP405T	**PHARMACOGNOSY AND PHYTOCHEMISTRY – I**	

	CO1	To understand the fundamentals of pharmacognosy, crude drug and evaluate it with basic concepts in quality control techniques.
	CO2	To understand and apply different techniques in cultivation and production of crude drug and to create new aspects in the production of plants and phytochemicals through plant tissue culture.
	CO3	To understand and remember the role of pharmacognosy in various system of medicine.
	CO4	To understand and analyze primary and secondary metabolite of crude drugs, their uses, chemical nature and general test for evaluation.
BP406P	**MEDICINAL CHEMISTRY I-PRACTICAL**	
	CO1	To create medicinally important compounds or intermediates by conventional method.
	CO2	To evaluate the purity of the drug by using different assay methods.
	CO3	To evaluate partition co-efficient of medicinal compounds
	CO4	To create medicinally important compounds or intermediates by microwave irradiation techniques.
BP407P	**PHYSICAL PHARMACEUTICS II-PRACTICAL**	
	CO1	Apply the principles of chemical kinetics & to use them in assigning expiry date for formulations
	CO2	To evaluate the various interfacial properties and their effect in dosage form design
	CO3	To evaluate the rheological properties of liquids for dosage form design
	CO4	Evaluate the stability of various pharmaceutical dispersion systems
BP408P	**PHARMACOLOGY I-PRACTICAL**	
	CO1	To apply the knowledge about the common laboratory animals, instruments in experimental pharmacology, animal handling, physiological salt solutions, laboratory anesthetics.
	CO2	To demonstrate the various methods of dose calculation and drug administration by various routes in mice/rat.
	CO3	To evaluate the dose response curve of acetylcholine and effect of agonist, antagonist on chick ileum preparation.
	CO4	To understand the various concepts of simulated animal experiment
BP409P	**PHARMACOGNOSY AND PHYTOCHEMISTRY I-PRACTICAL**	
	CO1	To analyze different crude drug by means of qualitative chemical tests.
	CO2	To evaluate a crude drug by means of quantitative microscopy and to understand various leaf constants.
	CO3	To understand and evaluate adulteration in crude drug and to identify new cellular characteristics
	CO4	To evaluate crude drug by physical methods of evaluation
FIFTH SEMESTER		

BP501T	**MEDICINAL CHEMISTRY – II**	
	CO1	To understand the chemistry of drugs with respect to their pharmacological activity
	CO2	To understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
	CO3	To analyze the structural activity relationship of different class of drugs
	CO4	To understand the chemical synthesis of selected drugs
BP502 T	**FORMULATIVE PHARMACY**	
	CO1	To understand the preformulation consideration in pharmaceutical drug formulation
	CO2	To create and evaluate formulations and to perform the evaluation and packaging of solid dosage forms.
	CO3	To analyse, formulate and develop sterile products and perform their evaluation
	CO4	To create and evaluate formulation and to perform the packaging of cosmetics and aerosols
	CO5	To understand about the preparation and evaluation of packaging material.
BP503 T	**PHARMACOLOGY – II**	
	CO1	To understand and apply the knowledge on the classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications of drugs acting on cardiovascular system and renal system.
	CO2	To understand and apply the knowledge about autocoids and related drugs
	CO3	To understand and apply the knowledge about all endocrine and other hormones in our body and their analogues and inhibitors.
	CO4	To apply the knowledge about different bioassay (principles, applications and types) and analyze the drug sample.
BP504 T	**PHARMACOGNOSY AND PHYTOCHEMISTRY – II**	
	CO1	To understand about basic metabolic pathways which are involved in the formation of different secondary metabolites.
	CO2	To understand and analyze the source, phytochemistry, composition, therapeutic and commercial utilization of various medicinally important constituents present in crude drug.
	CO3	To create knowledge about industrial production, estimation and utilization of therapeutically useful phytoconstituents.
	CO4	To understand and apply knowledge about modern extraction techniques, characterization and identification/quality control of herbal drugs through spectroscopy.
BP 505 T	**PHARMACEUTICAL JURISPRUDENCE**	
	CO1	To understand the pharmaceutical legislations and their implications in the development and marketing
	CO2	To understand various Indian pharmaceutical Acts, Laws and schedule
	CO3	To understand the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
	CO4	To understand code of ethics during the pharmaceutical practice
BP 506P	**FORMULATIVE PHARMACY-PRACTICAL**	

	CO1	To evaluate the physicochemical properties of drugs and excipients.
	CO2	Apply the basic knowledge in the formulation and evaluation of various types of tablets and hard gelatin capsules
	CO3	Apply basic knowledge in formulation and evaluation of parenterals.
	CO5	Apply knowledge in the formulation of various liquid and semisolid dosage forms.
	CO4	To evaluate containers used in pharmaceutical formulations.
BP 507P	**PHARMACOLOGY II-PRACTICAL**	
	CO1	To analyze and evaluate various drug actions on isolated tissue.
	CO2	To analyze and evaluate various drug actions on experimental animals.
	CO3	To apply the knowledge about different bioassays and analyze the drug sample.
	CO4	To interpret and analyze diuretic activity of drugs by simulated experiment method.
BP 508P	**PHARMACOGNOSY AND PHYTOCHEMISTRY II-PRACTICAL**	
	CO1	To evaluate macroscopic and microscopic diagnostic characters of crude drug.
	CO2	To understand and analyze the extraction and identification of therapeutically useful phytoconstituents.
	CO3	To understand and analyze separation and purification of phytoconstituents by chromatographic techniques.
	CO4	To understand and perform the chemical analysis and quality control of the unorganized crude drugs as per regulatory guidelines.
SIXTH SEMESTER		
BP601T	**MEDICINAL CHEMISTRY- III**	
	CO1	To understand the importance of drug design and different techniques of drug design such as prodrugs, and Combinatorial Chemistry.
	CO2	To understand the chemistry of drugs with respect to their biological activity. Know the classification, structures, synthesis and uses of antibiotics, antimalarials, antitubercular agents, urinary tract anti-infective agents and anti-viral agents.
	CO3	To understand the metabolism, adverse effects and therapeutic value of drugs and the classification, structures, synthesis and uses of antifungal agents, anti-protozoal agents.
	CO4	To understand the importance of SAR of drugs of anthelmintics and sulphonamides and sulphones.
BP602 T	**PHARMACOLOGY-III**	

	CO1	To understand and apply knowledge about the classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications of drugs acting on respiratory, gastrointestinal system and Drugs on skin
	CO2	To understand and apply the knowledge about chemotherapeutic agents including principles, classification, microbial resistance, chemoprophylaxis
	CO3	To understand and Apply the mechanism of drug action and its relevance in the treatment of different infectious disease and Cancer
	CO4	To understand the knowledge on immune pharmacology and in addition on the basic concepts of gene therapy
BP 603 T	**HERBAL DRUG TECHNOLOGY**	
	CO1	To understand and remember selection of herbs from its sources, good agricultural practices, processing and development of herbal medicinal products. Also to understand about Indian systems of medicines, formulation and standardization of medicines. Understand GMP of Indian systems of medicines.
	CO2	Understand the importance and applications of nutraceuticals in healthcare and its market demand. Analyze herbal drug interactions and its importance in health care.
	CO3	To understand the sources and description of raw materials from herbs used in personal care products. Also learn about the use/application of herbal excipients in formulations and in novel dosage forms.
	CO4	To understand the evaluation and stability testing of herbal drugs as per WHO & ICH guidelines. Also to explain about the patenting aspects of natural products.
BP 604 T	**BIOPHARMACEUTICS AND PHARMACOKINETICS**	
	CO1	Understand and analyze the basic concepts in biopharmaceutics and pharmacokinetics and apply the concept of drug absorption to derive the pharmacokinetic parameters to describe the process of drug absorption. Understand the concept of drug distribution and gain knowledge about volume of drug distribution and plasma protein binding
	CO2	Understand the concept of drug elimination and apply the knowledge to describe parameters like clearance and extraction ratio. Apply the basic knowledge about bioavailability and bio equivalency to design and analyze drug product equivalency studies.
	CO3	Understand the knowledge about the theory of compartmental pharmacokinetics and apply and analyze the plasma or urine data to derive and describe pharmacokinetic parameters
	CO4	Analyze the theory of multicompartment models multiple dosage regimens and concept of nonlinearity and apply it in the multiple dosage regimen.
BP605 T	**PHARMACEUTICAL BIOTECHNOLOGY**	

	CO1	To understand and apply various biotechnology techniques used for production of biologicals in pharmaceutical industry
	CO2	To apply the principles of genetic engineering and innovations by rDNA technology
	CO3	To understand and apply immunology and its all related disciplines
	CO4	To understand knowledge blood products, mutation, microbial genetics, microbial biotransformation and apply them to research and health care
BP606T	**QUALITY ASSURANCE**	
	CO1	To understand the importance of quality in pharmaceutical products
	CO2	To understand the importance of GMP, GLP etc
	CO3	To analyse the factors affecting quality of pharmaceuticals
	CO4	To apply the process involved in manufacturing of pharmaceuticals in different departments.
BP607P	**MEDICINAL CHEMISTRY III-PRACTICAL**	
	CO1	To create medicinally important compounds or intermediates by conventional method.
	CO2	To evaluate the purity of the drug by using different assay methods.
	CO3	To create medicinally important compounds or intermediates by microwave irradiation techniques.
	CO4	To analyze physiochemical properties such as LogP, MR, molecular weight, hydrogen bond acceptors and donors for the class of drugs using drug design software drug likeliness screening.
BP608P	**PHARMACOLOGY III-PRACTICAL**	
	CO1	To understand and execute the methods for determining different biochemical parameters.
	CO2	To understand and apply knowledge about various screening methods of drugs on central nervous system using Ex-pharm software.
	CO3	To understand and apply knowledge about various screening methods of drugs on peripheral nervous system using Ex-pharm software.
	CO4	To analyze and evaluate significance of data by using biostatistical methods in experimental pharmacology.
BP 609P	**HERBAL DRUG TECHNOLOGY-PRACTICAL**	
	CO1	To understand and remember to perform the preliminary phytochemical analysis of crude drugs.
	CO2	To analyze the phytochemicals quantitatively in crude drug extracts, ayurvedic formulations etc.
	CO3	To formulate and standardize herbal preparations for external/internal applications as per regulatory guidelines.
	CO4	To understand and perform monograph analysis of herbal drugs and fixed oils as per pharmacopoeia.
SEVENTH SEMESTER		

BP701T	**INSTRUMENTAL METHODS OF ANALYSIS**	
	CO1	To understand on analytical techniques in the context of qualitative and quantitative analysis of drugs
	CO2	To apply the common methods of pharmaceutical analysis in research, academic and industry
	CO3	To apply the principles of chromatography in qualitative and quantitative analysis of pharmaceuticals in research and industrial perspective
	CO4	To execute the knowledge on spectroscopy in the elucidation of molecular structure and the interpretation of the result.
BP 702 T	**INDUSTRIAL PHARMACY**	
	CO1	To understand the techniques and guidelines in pilot plant and scale up of different pharmaceutical dosage forms
	CO2	To apply the process and guideline on technology development and transfer, their documentation from lab to commercial scale, agencies in India
	CO3	To understand the approval process involved in drug development and regulatory requirements in India and US.
	CO4	To understand industrial safety and accident records
BP 703T	**PHARMACY PRACTICE**	
	CO1	To apply Knowledge on various drug distribution methods, pharmacy stores management and inventory control in a hospital.
	CO2	To understand how to Monitor drug therapy, assess adverse drug reactions and interpret laboratory results
	CO3	To evaluate medication history interview and counsel the patients and Identify drug related problems.
	CO4	To evaluate pharmaceutical care services and to appreciate the concept of rational drug therapy.
BP 704T	**NOVEL DRUG DELIVERY SYSTEMS**	
	CO1	To understand the concepts, terminologies of controlled drug release and apply these in the design of various controlled drug delivery systems
	CO2	To understand the significance of polymers in controlled drug delivery and evaluate their potential in the design of various drug delivery systems
	CO3	Analyze the principles of microencapsulation and can apply the knowledge in manufacture of controlled drug delivery systems
	CO4	Apply the principles of formulation and evaluation of various controlled drug delivery systems and apply this in the manufacture of novel drug delivery systems
	CO5	Understand the principles of nanotechnology and delivery and apply this in the development of targeted drug delivery systems
BP705P	**INSTRUMENTAL METHODS OF ANALYSIS-PRACTICAL**	

	CO1	To acquire knowledge on how to do colorimetry.
	CO2	To understand the concept how to operate HPLC and GC.
	CO3	To understand the working principle of thin layer chromatography and paper chromatography
	CO4	To acquire knowledge on how to determine absorption maxima on UV spectroscopy
BP706PS	**PRACTICE SCHOOL**	
	CO1	To acquire knowledge and advance terminologies based on their choice of school
	CO2	Gain hands on training on the practical aspects of various schools of choice
	CO3	To gain ability to write an effective project report
	CO4	To be able to develop presentation skill
EIGHTH SEMESTER		
BP801T	**BIOSTATISTICS AND RESEARCH METHODOLOGY**	
	CO1	To understand to select a research topic and collecting, analyzing and interpreting the relevant data
	CO2	To apply research designs appropriate to research aims and objectives along with the limitation of particular research methods
	CO3	To understand application of biostatistics in pharmacy along with sampling techniques
	CO4	To demonstrate about various parametric test and how to present and write thesis report
BP802T	**SOCIAL AND PREVENTIVE PHARMACY**	
	CO1	To remember consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
	CO2	To understand a critical way of thinking based on current health-care development.
	CO3	Evaluate alternative ways of solving problems related to health and pharmaceutical issues
	CO4	To evaluate good knowledge about various health programs in our countries
BP804ET	**PHARMACEUTICAL REGULATORY SCIENCE**	
	CO1	To understand the regulatory concepts, new drug discovery and development processes
	CO2	To understand the functioning of different regulatory authorities and agencies in different countries
	CO3	To understand the registration of Indian drug products in overseas market and technical documentation
	CO4	To understand the guidelines, regulation and monitoring of clinical trials
BP805 ET	**PHARMACOVIGILANCE**	

	CO1	To understand History and development of pharmacovigilance, Pharmacovigilance. To apply Program of India (PvPI). National and international scenario of pharmacovigilance in evaluating ADR
	CO2	To apply the methods of Detection, assessment in reporting of adverse drug reactions and to apply communication in pharmacovigilance. To create case narratives of adverse events and their quality.
	CO3	To create methods to generate safety data during pre-clinical, clinical and post approval phases of drugs' life cycle. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation.
	CO4	To understand International standards for classification of diseases and drugs. ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning, CIOMS requirements for ADR reporting. Dictionaries, coding and terminologies used in pharmacovigilance
BP 806 ET	**QUALITY CONTROL AND STANDARDIZATION OF HERBS**	
	CO1	To understand WHO guidelines for quality control of herbal drugs
	CO2	To understand and apply Quality assurance in herbal drug industry
	CO3	To understand the regulatory approval process and their registration in Indian and international markets
	CO4	To understand and appreciate EU and ICH guidelines for quality control of herbal drugs
BP808ET	**CELL AND MOLECULAR BIOLOGY**	
	CO1	Understand about the basics, history, structure and functions, types, reproduction, chemical composition and application of cell
	CO2	To analyze the knowledge regarding DNA, RNA, transcription and translation.
	CO3	Understand about protein (structure, pathways, synthesis etc.)
	CO4	To create the knowledge on genetics, transgenic and genomic analysis Knowledge on receptors and different pathways.
BP809ET	**COSMETIC SCIENCE**	
	CO1	To analyze cosmetic principle to address the needs of cosmetic industry
	CO2	To understand formulation science and analytical techniques required to scientifically design and develop cosmetic products
	CO3	To remember scientific and technical aspects
	CO4	To understand high standards of practice and professional ethics within the cosmetic and toiletries industry
BP810ET	**EXPERIMENTAL PHARMACOLOGY**	
	CO1	To understand the applications of various commonly used laboratory animals.
	CO2	To understand and apply the knowledge of dose selection, calculation and preparation of drug solution/suspensions and selection, grouping of animal species and sex for study
	CO3	To understand and demonstrate the various screening methods used in preclinical research
	CO4	To comprehend and demonstrate the importance of biostatistics and research methodology.

BP 811 ET	**ADVANCED INSTRUMENTATION TECHNIQUES**	
	CO1	To apply the in-depth knowledge on NMR, Mass spectroscopy and Hyphenated technique
	CO2	To apply and study different methods like Thermal method and – X Ray diffraction methods
	CO3	To understand Study on calibration and validation of instruments as per ICH and USFDA
	CO4	To apply and Study on RIA and various extraction technique
BP813PW	**PROJECT WORK**	
	CO1	Ability to develop leadership quality and team work
	CO2	Learn how to collect literature and develop road map for project
	CO3	To design the new research projects
	CO4	Learn to evaluate the obtained experimental data and draw conclusions.

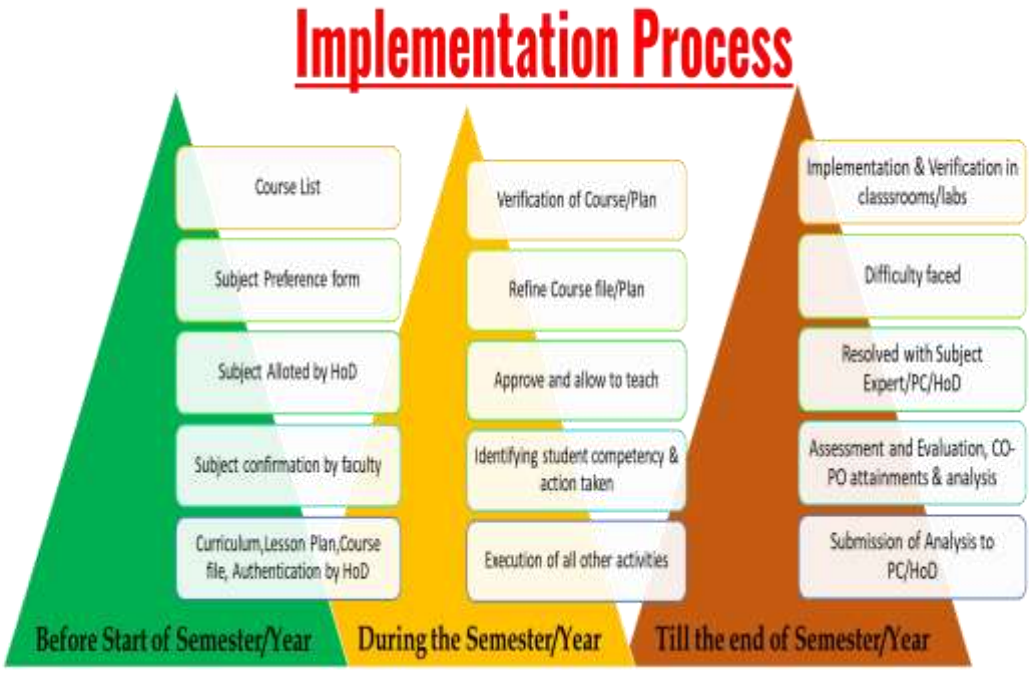
GUIDELINES FOR USING KEYWORDS IN CO-PO MAPPING

1. Develop a Keyword List: Collaboratively establish a core list of keywords associated with your Pharmacy Program Outcomes (POs). Consider:
    - Action Verbs (Bloom's Taxonomy): explain, formulate, dispense, counsel, assess, monitor, evaluate, optimize, manage
    - Technical Terms: pharmacokinetics, pharmacodynamics, dosage forms, drug interactions, compounding, clinical trials
    - Soft Skills: communication, patient counseling, interprofessional collaboration, critical thinking, ethical decision-making
2. Identify Keywords in COs and POs: Carefully examine your Course Outcomes (COs) and Program Outcomes (POs), highlighting core keywords.
3. Establish Correlations: Look for direct matches or semantic similarities between the keywords in COs and POs to indicate correlations. For example:
    - CO: "Dispense medications accurately according to prescription orders..."
    - PO: "...Demonstrate proficiency in the safe and effective preparation and dispensing of medications..."
    - Keyword Match: "dispense," "medications" suggest a strong correlation.
4. Cautions:
    - Nuance: Keywords might not fully represent every aspect of COs and POs. Ensure you understand the deeper context of intended learning outcomes.
    - False Positives: Avoid superficial matches. Ensure keywords align in the depth of knowledge and skill required.

Most of the times, appropriate keyword is sufficient for mapping.

Level	**Keywords Used in writing COs**
No mapping (-)	Key words related with LOT and not related with course or any outcomes
Low (1)	Part of PO is reflected through keywords/action verbs
Medium (2)	Major part of PO is reflected through keywords/action verbs.
High (3)	Exact action verb of PO

OBE FRAMEWORK OF THE INSTITUTION



COMPETENCY MATRIX

To guarantee impactful learning experiences, a staff competency matrix should be implemented that evaluates proficiency in critical areas including content knowledge, assessment creation and evaluation, fostering student engagement, cultivating positive learning environments, maintaining professionalism and collaboration, and effectively integrating communication and technology.

SUBJECT PREFERENCE FORM DEVELOPMENT:

The HOD creates a form capturing faculty preferences for specific subjects, grade levels, and teaching formats.

FORM DISTRIBUTION AND COMPLETION:

The HOD distributes the form to all eligible faculty members with clear instructions and timelines. Faculty members complete the form and submit it to the HOD by the deadline.

DATA REVIEW AND ANALYSIS:

The HOD reviews the submitted forms, considering: Faculty preferences, Competency data (e.g., qualifications, certifications, past performance), Student evaluations (if available), Course requirements and student needs and availability of faculty members.

DRAFT SCHEDULE CREATION:

The HOD creates a draft teaching schedule based on the collected data and analysis. The schedule aims to maximize the alignment of faculty competencies with subject requirements while accommodating preferences as much as possible.

INDIVIDUAL MEETINGS:

The HOD may schedule individual meetings with faculty members to discuss potential assignments, address concerns, and ensure transparency.

FINAL SCHEDULE AND COMMUNICATION:

The HOD finalizes the teaching schedule, considering feedback from individual meetings. The final schedule is communicated to all faculty members, highlighting any changes made and justification (if needed).

CURRICULUM DEVELOPMENT:

Faculty member reviews program learning outcomes, course descriptions, and relevant frameworks.The curriculum aligns with learning outcomes, assessment strategies, and instructional methods.

LESSON PLAN CREATION:

For each unit or topic within the curriculum, faculty member creates detailed lesson plans.

Each lesson plan specifies:

- Learning objectives.
- Instructional activities (e.g., lectures, discussions, group work, assignments).
- Assessment methods (e.g., quizzes, projects, presentations).
- Required resources (e.g., textbooks, articles, technology).
- Estimated time allocation.

COURSE FILE PREPARATION:

Faculty member compiles all relevant materials and documentation into a comprehensive course file.

The course file typically includes:

- Approved curriculum document.
- Detailed lesson plans for all units/topics.
- Syllabi outlining course expectations, grading policies, and academic integrity guidelines.
- Assessment instruments (e.g., rubrics, quizzes, exams).
- Teaching handouts, slides, or other instructional materials.
- References, readings, and supplementary resources.
- Evidence of alignment with learning outcomes and program standards.

Submission and Review: Faculty member submits the completed curriculum, lesson plans, and course file to the Department Chair by the designated deadline.

The Department head reviews the materials for completeness, quality, and adherence to program guidelines. Feedback and suggestions for improvement are provided to the faculty member, if necessary.

Approval and Recordkeeping:

Once approved, the Department Chair signs off on the finalized materials. The Department Chair maintains records of all submitted curriculum, lesson plans, and course files.

Teaching assignments are granted to faculty upon approval by the Head of Department, ensuring alignment with expertise and program needs.

STUDENT COMPETENCIES

Specific competencies of students will be assessed

1. Academic skills: Standardized tests, classroom assessments, portfolios, self-evaluations.
2. Practical skills: Performance-based assessments, simulations, project work, observations.
3. Social-emotional skills: Peer observations, self-evaluations, surveys, interviews, teacher observations.

ASSESSMENT METHODS

Mid-term, End term, class test, surprise test, University theory exam ,Quizzes, Assignment problems, simulation, laboratory experiments, project, field work, report presentation, tutorials, activities, etc.

BASE SCORE FOR STUDENT CATEGORY

- <50% -Slow Learner
- 50% to 65% - Average Learner
- >65%-Advanced Learner

STRATEGIES FOR CATERING TO DIVERSE LEARNING NEEDS: SLOW, AVERAGE, AND ADVANCED LEARNERS

Educators strive to create inclusive learning environments that cater to the individual needs of all students, regardless of their learning pace or abilities.

SLOW LEARNERS:

- Individualized instruction: Tailor lessons to match the student's pace and learning style. Break down complex concepts into smaller, manageable steps.
- Multisensory learning: Engage multiple senses (visual, auditory, kinesthetic) to reinforce understanding. Utilize manipulatives, graphic organizers, and visuals.
- Frequent practice and review: Provide ample opportunities for practice and spaced repetition to solidify concepts. Offer differentiated practice problems with varying difficulty levels.
- Positive reinforcement: Celebrate small wins and progress to boost motivation and confidence. Encourage self-reflection and goal setting.
- Collaboration and peer tutoring: Pair slow learners with average or advanced peers for collaborative learning and peer support
- Remedial classes with timetable & attendance
- Edpuzzle which empower students to take an active role in their learning with interactive video lessons that spark creativity and curiosity.

AVERAGE LEARNERS:

Clear and concise instruction: Present information in a well-organized and easy-to-understand manner. Utilize a variety of instructional methods (lectures, discussions, activities) to keep students engaged.

Differentiated instruction: Offer choices in activities, projects, or assessments to cater to diverse interests and learning styles.

Group work and collaborative learning: Encourage teamwork and collaborative problem-solving to develop critical thinking and communication skills.

Independent learning: Provide opportunities for self-directed learning activities and research projects to foster autonomy and responsibility.

Regular feedback and check-ins: Offer constructive feedback and guidance to help students improve their understanding and performance.

ADVANCED LEARNERS:

Advanced learners are encouraged to enroll in Swayam, NPTEL courses.

Encouraged to participate in E-Cell and IEDC activities

External learning opportunities: Facilitate participation in academic competitions, conferences, or workshops to broaden their knowledge and connect with like-minded peers.

Guidance for competitive Examination

Individual guidance for career building

Journal clubs

Remember, these are just general strategies, and the most effective approach will vary depending on the specific needs of each student and the learning environment. By creating a flexible and differentiated learning environment, educators can empower all students to reach their full potential.

DESIGNING OF QUESTION PAPER

A good and reasonable examination paper must consist of various difficulty levels to accommodate the different capabilities of students. Bloom’s taxonomy framework helps the faculty to set examination papers that are well balanced, testing the different cognitive skills without a tilt towards a tough or easy paper perception.

Designing Question Papers based on Bloom's Taxonomy and Course Outcomes (COs)

Step-by-step procedure for designing question papers aligned with Bloom's Taxonomy and course outcomes (COs):

1. Define Course Outcomes (COs):

Clearly articulate the key knowledge, skills, and abilities your students should acquire by the end of the course.

Ensure COs are measurable and specific, using action verbs like "analyze," "create," or "evaluate."

2. Develop Questions:

For each mapped objective, craft questions that directly assess their specified skills and knowledge.

Use clear and concise language with appropriate vocabulary and difficulty level for the target audience.

Utilize diverse question formats (e.g., multiple choice, open-ended, short answer, problem-solving) to address different learning styles and assessment needs.

3. Ensure Coverage and Distribution:

Allocate questions based on the importance and complexity of each CO.

Aim for balanced representation across all Bloom's levels to test a variety of cognitive skills.

Consider including bonus questions for advanced learners at higher Bloom's levels (optional).

4. Review and Pilot Test:

Peer-review the question paper for clarity, accuracy, and alignment with COs and Bloom's levels.

Conduct a pilot test with a small group of students to gauge difficulty level and identify any potential issues.

Refine the question paper based on feedback and pilot test results.

A suggestive list of skills/ competencies to be demonstrated at each of the Bloom's level and corresponding cues/ verbs for the examination/ test questions are given below:-

S No.	Level	Skill Demonstrated	Question / Verbs for tests
1.	Remember	- Ability to recall information like facts, definitions, etc.	list, define, tell, describe, recite, recall, identify, show, label, tabulate, quote, name, who, when, where, etc.
2.	Understand	- Understanding information - Grasp meaning - Translate knowledge into new context - Interpret facts, compare, contrast - Order, group, infer causes - Predict consequences	describe, explain, paraphrase, restate, associate, contrast, summarize, differentiate, interpret, discuss
3.	Apply	- Use information - Use methods, concepts, laws, theories in new situations - Solve problems using required skills or knowledge - Demonstrating correct usage of a method or procedure	calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model, experiment, show, examine, modify
4.	Analyze	- Break down a complex problem into parts - Identify the relationships and interaction between the different parts of a complex problem - Identify missing, redundant, and contradictory information	classify, outline, break down, categorize, analyze, diagram, illustrate, infer, select
5.	Evaluate	- Compare and discriminate between ideas - Assess value of theories, presentations - Make choices based on reasoned argument - Verify value of evidence - Recognize subjectivity - Use definite criteria for judgments	assess, decide, choose, rank, grade, test, measure, defend, recommend, convince, select, judge, support, conclude, argue, justify, compare, summarize, evaluate
6.	Create	- Use old ideas to create new ones - Combine parts to make (new) whole - Generalize from given facts - Relate knowledge from several areas - Predict, draw conclusions	design, formulate, build, invent, create, compose, generate, derive, modify, develop, integrate

CO-PO ATTAINMENT GUIDELINES

The attainment of POs and COs are evaluated by direct and indirect attainment methods.

Level of attainment

The three levels of attainment is taken as 1- low; 2- medium;3- high and it can be defined as

- Attainment 3 :70% of students score more than 50% marks
- Attainment 2: 60% of students score more than 50% marks
- Attainment 1: 50% of students score more than 50% marks

Direct attainment

The direct attainment is done by evaluating student performance in Continuous Internal Assessment (CIA) which comprises of sessional examinations and academic activities (assignments, seminars, class tests and quizzes) and End semester/ year examinations (EE). The proportional weightages of CIA: EE are 20:80.

Direct attainment of a specific COs is determined from the performances of students to all the assessment items related to that particular CO. Hence, every assessment item needs to be tagged with the relevant CO. Continuous Internal Assessment is conducted and evaluated by college and End Semester Examination is conducted and evaluated by the University. The average marks scored in End semester/year examination will be considered as the common attainment of all COs.

Direct Course Outcome Attainment = 20% of Continuous Internal Assessment (CIA) +80% of End Semester/year examination attainment.

Indirect attainment

Indirect attainment of COs can be determined from the course end survey.

Attainment of CO = (Level-1 X No of Students Attempted) + (Level-2 X No of Students Attempted) + (Level-3 X No of Students Attempted)/Total No of Students (Level 1: Low; Level 2: Medium; Level 3: High)

Overall Course Outcome Attainment = 90% Direct Course Outcome Attainment + 10% Of Indirect Attainment

PO ATTAINMENT

PO assessment tools are categorized into Direct method and Indirect method. The final PO attainment is calculated by taking 80% of the attainment values from Direct assessment method and 20% of the attainment values from Indirect assessment method.

Direct Method:
Once the overall attainment percentage of each COs is calculated, the PO attainment is calculated by taking the cumulative average of all the course's CO attainment which contributes to the Program Outcomes.

Indirect Method:
This assessment approach is intended to find out about the quality of the learning process by getting feedback from exit surveys.

The obtained values will be compared with the set attainment target fixed for each PO. • If the target is achieved, then the same process will be continued for further batches. • If the target is not achieved, then continuous improvement action will be taken for each PO. Based on the attainment, the improvements to be done are discussed among the staff.

ACTION FOR GAP FULFILMENT

Department will call Departmental meeting to discuss how GAPs can be fulfilled. However these are some suggestions to the departments to fulfil these gaps: -

Remedial Classes for weak students arranged to improve the attainment level.

Beyond syllabus topics added to meet the requirement.

Industry visit/Industrial Expert talk/Senior academic talks can be arranged for the students.

REPORT ON GAP FULFILMENT

Gap analysis will be done in at the end of each semester, gap analysis of odd semester will be done in next even semester, the action for gap fulfilment will be decided & will be implemented in next odd semester. Similarly applicable for even semester also.

NATIONAL COLLEGE OF PHARMACY

INNOVATION AND ENTREPRENEURSHIP DEVELOPMENT CENTRE

INSTITUTION'S INNOVATION COUNCIL

Approved by Pharmacy Council of India, AICTE, DME & Govt. of Kerala
Affiliated to Kerala University of Health Sciences, Accredited by NBA

OBE MANUAL

PHARM D PB

Prepared by Curriculum Committee and IQAC

National college of Pharmacy

NATIONAL COLLEGE OF PHARMACY

Outcome Based Education (OBE)

Preamble

Outcome Based Education (OBE) is an educational model that forms the base of a quality education system. There is no single specified style of teaching or assessment in OBE. All educational activities carried out in OBE should helpthe students to achieve the set goals. The faculty may adapt the role of instructor, trainer, facilitator, and/or mentor, based on the outcomes targeted.

OBE enhances the traditional methods and focuses on what the Instituteprovides to students. It shows the success by making or demonstrating outcomes using statements "able to do" in favour of students. OBE provides clear standards for observable and measurable outcomes.

The University Grants Commission (UGC) has introduced a Learning Outcomes-based Curriculum Framework for Undergraduate Education in India. The framework is based on the premise that higher education qualifications such as Bachelor's Degree programs are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes, and values) and academic standards expected of graduates of a program of study.

The National Education Policy (NEP) 2023 has also emphasized the importance of outcome-based education in India. A strong focus on outcome-based education is crucial to achieving the goal of elevating the quality of education in India to global standards.

Overall, outcome-based education has been adopted in many technical institutes of higher learning in India. The UGC has introduced a Learning Outcomes- based Curriculum Framework for Undergraduate Education in India, and the NEP 2023 has emphasized the importance of outcome-based education in India .

Benefits of OBE

Clarity
The focus on outcome creates a clear expectation of what needs to be accomplished by the · end of the course.

Flexibility
With a clear sense of what needs to be accomplished, instructors will be able to · structure their lessons around the students' needs.

Comparison
OBE can be compared across the individual, class, batch, program and institute levels.

Involvement
Students are expected to do their own learning. Increased student involvement allows them to feel responsible for their own learning, and they should learn more through this individual learning.

Higher Education Quality

OBE delivers a higher quality of education since it focuses on learning outcomes and guarantees that students master the subject matter. This technique assists students in developing critical thinking abilities, problem-solving skills, and practical skills that are useful in the workplace.

Self-Directed Learning

OBE promotes self-directed learning, in which students are in charge of their own education and growth. In their future employment, students will benefit from having a sense of freedom and autonomy, which is fostered by this method.

Better Career Opportunities

OBE aids students in acquiring the knowledge and skills that employers value. This can increase their employment possibilities and assist them in achieving their career objectives.

BLOOM'S TAXONOMY: A FRAMEWORK FOR LEARNING OBJECTIVES

Bloom's Taxonomy, originally published in 1956, is a hierarchical framework that categorizes educational learning objectives into six levels of cognitive complexity. These levels range from lower-order thinking skills like remembering and understanding to higher-order thinking skills like analyzing, evaluating, and creating. Here's an overview of the six levels:

1. **Remembering:** This level focuses on recalling factual information. Examples include identifying, listing, defining, and describing.

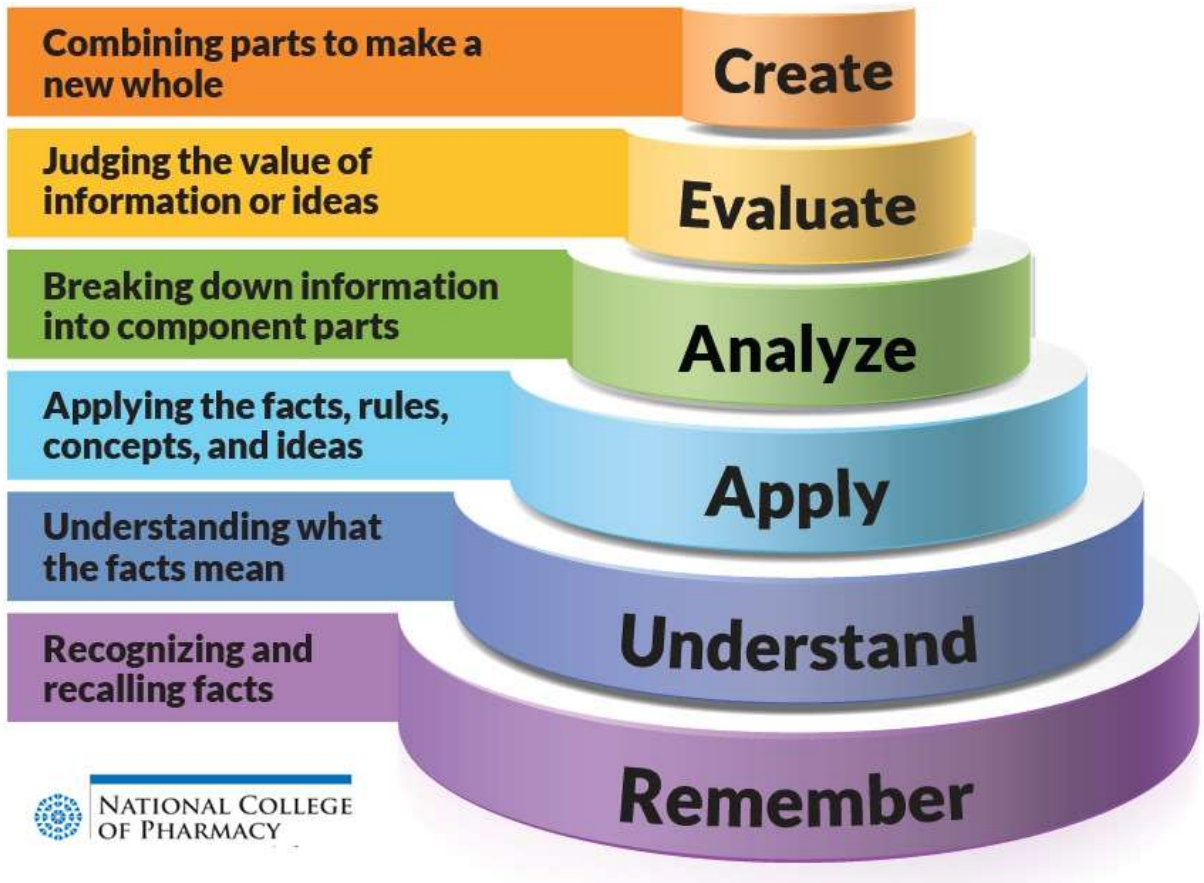
2. **Understanding:** This level requires grasp of the meaning and implications of information. Examples include interpreting, explaining, summarizing, and paraphrasing.

3. **Applying**: This level involves using knowledge and skills in new situations. Examples include demonstrating, calculating, illustrating, and implementing.

4. **Analysing:** This level requires breaking down information into its component parts and seeing how they relate. Examples include comparing, contrasting, differentiating, and classifying.

5. **Evaluating:** This level involves making judgments based on criteria and justifying those judgments. Examples include critiquing, judging, assessing, and recommending.

6. **Creating:** This level requires generating new ideas or products. Examples include designing, developing, composing, and constructing.



REVISED BLOOM'S TAXONOMY:

In 2001, a revised version of Bloom's Taxonomy was published, focusing on action verbs and gerunds rather than nouns. This revision emphasizes deeper and more active learning experiences.

he Revised Bloom's Taxonomy, published in 2001, offers an updated framework for classifying educational learning objectives. It builds upon the original 1956 version by shifting the focus from nouns to action verbs and gerunds, thereby emphasizing active learning and cognitive processes.

Here's a breakdown of the Revised Bloom's Taxonomy and its six levels:

1. Remembering (Knowing & Recalling):

Key words: Recognizing, recalling, retrieving, listing, defining, describing

Focus: Retrieving and recalling factual information.

2. Understanding (Comprehending & Interpreting):

Key words: Interpreting, explaining, summarizing, paraphrasing, classifying, comparing, contrasting

Focus: Grasping the meaning and implications of information, making connections.

3. Applying (Using & Implementing):

Key words: Executing, demonstrating, implementing, calculating, illustrating, solving

Focus: Applying knowledge and skills in new situations, solving problems with known procedures.

4. Analyzing (Breaking Down & Examining):

Key words: Differentiating, organizing, attributing, analyzing, investigating, experimenting

Focus: Breaking down information into parts, examining relationships, drawing connections.

5. Evaluating (Judging & Critiquing):

Key words: Checking, critiquing, judging, assessing, recommending, valuing

Focus: Making judgments based on criteria, evaluating quality and effectiveness.

6. Creating (Generating & Designing):

Key words: Generating, hypothesizing, planning, designing, constructing, composing

Focus: Producing new ideas or products, designing solutions, contributing original work.

Applications of Bloom's Taxonomy:

Bloom's Taxonomy can be used for various educational purposes, including:

Designing learning objectives: Clearly define what students should be able to do at the end of a lesson, unit, or course.

Creating assessments: Align assessments with the desired learning objectives and the appropriate level of Bloom's Taxonomy.

Planning instruction: Design activities and experiences that help students achieve the learning objectives at different levels.

Providing feedback: Offer feedback that helps students move towards mastery of the intended learning objectives.

Overall, Bloom's Taxonomy is a valuable tool for educators who want to encourage deeper learning and critical thinking in their students.

VISION AND MISSION OF INSTITUTION

Process of framing Vision and mission of institution

The Vision, Mission and PEOs are established through continuous interaction with the internal and external stakeholders of the programme. They are discussed and approved by the Program Assessment Committee and Department Advisory Committee.

In establishing the Vision and Mission of the program, the following steps were followed:

Step 1: Vision and Mission of the Institute and the Programme Outcomes defined by NBA are taken as an origin.

Step 2: Suggestions are taken by the Program Assessment Committee from the External and internal stakeholders about statements of Vision and Mission.

Step 3: The collected views are analyzed and reviewed to check the consistency with the vision and mission of the institute and summarized by the Program Assessment Committee.

Step 4: Finally, the programme Vision and Mission are made by the Academic Advisory Committee.

Step 5: After approval, dissemination is carried out through appropriate channels.

VISION OF INSTITUTION

Emerge as a center of eminence by creating responsible and resourceful citizens with commitment to excellence in pharmacy education and allegiance to ethical professional practices.

MISSION OF INSTITUTION

- Providing quality pharmacy education and training that enables pharmacists to facilitate the delivery of ethical, conscientious, cost-effective healthcare services to all.
- Cultivating an environment that is collaborative, interdisciplinary, innovative, and creative in approach.
- Partnering with individuals and institutions across the world who occupy leadership positions and promoting reciprocal exchanges in both academic and cultural spheres.

EDUCATIONAL PROGRAM OUTCOMES:

1. Course Outcome (CO):

Definition: Specific statements describing the knowledge, skills, and attitudes students should be able to demonstrate after completing a particular course.

Focus: Learning outcomes specific to an individual course within a program.

Example: By the end of the "Pharmacology" course, students will be able to identify the mechanisms of action of different drug classes.

2. Program Outcome (PO):

Definition: Statements outlining the broader knowledge, skills, and attributes that graduates of a specific program are expected to possess by the time of graduation.

Focus: Program-level learning outcomes encompassing the entire curriculum.

Example: Graduates will be able to apply their knowledge to develop safe and effective medication regimens for patients.

3. Program Specific Outcome (PSO):

Definition: Statements describing the unique knowledge, skills, and professional attributes that graduates from a particular specialization within a program are expected to attain.

Focus: Outcomes specific to a program specialization, differentiating it from other specializations within the same program.

Example: Graduates will be particularly skilled in providing medication therapy management services in rural communities.

4. Program Educational Objective (PEO):

Definition: Broad statements that describe the long-term career and professional aspirations for graduates of a program several years after graduation.

Focus: Overall vision for the program's contribution to graduates' professional development in the long term.

Example: Our pharmacy graduates will be recognized as leaders in improving medication adherence rates within their communities.

PROCESS OF ESTABLISHING PO, PEO AND PSO

The POs, PEOs and PSOs are established through the following process steps:

Step 1: Vision and Mission of the Institute and B pharm programme along with the Program Outcomes defined by NBA are taken as a basis to interact with various stake holders of the program.

Step 2:

Program Coordinator consults the stakeholders and collects their views.

Step 3: After various meetings, Benchmarking with other colleges and correlating alignment with curriculum contents the Program Coordinator submits the views to Program Assessment Committee

Step 4: Program Assessment Committee reviews and summarizes the collected views and expresses its opinion and forwards the same to Department Advisory Committee who defines the PEO, PO and PSO statements.

Step 5:

Academic Advisory Committee finalizes, formulates and establishes the PEO, PO and PSO statements.

Step 6

After approval dissemination is carried out through appropriate channels.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1.To prepare patient-centered pharmacists with advanced clinical knowledge and skills to optimize medication use, promote patient safety and well-being, and lead healthcare teams in collaborative healthcare settings.

2.To cultivate pharmacy experts with specialized expertise in drug development, pharmaceutical manufacturing, quality control, and regulatory compliance, who will ensure the safety, efficacy, and quality of medicines within the pharmaceutical industry.

PROGRAM OUTCOMES (PO)

1. Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

2. Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills, and organizational skills. Develop and implement plans and organize work to meet deadlines.

3. Problem Analysis: Utilize the principles of scientific inquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate, and apply information systematically and shall make defensible decisions.

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.

5. Leadership Skills: Understand and consider the human reaction to change, motivation issues, leadership and team building when planning changes required for fulfillment 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.

6. Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. healthcare professionals, promoters of health, educators, managers, employers, employees).

7. Pharmaceutical Ethics: Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior 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.

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.

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**.**

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.

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.

PROGRAM-SPECIFIC OUTCOMES

PSO 1: Industry-Focused Excellence

Gain expertise in industry-focused areas like clinical research, pharmacoeconomics, and pharmacovigilance, paving the way for successful careers in these sectors

PSO 2: Clinical Competence and Patient-Centered Care:

Demonstrate clinical competence, applying evidence-based practices to deliver ethical, patient-centered care. Proficiently assess, manage, and optimize drug therapy, ensuring safe and effective outcomes for patients.

PSO 3: Interdisciplinary Collaboration and Innovation:

Actively collaborate with healthcare professionals from diverse fields various disciplines to optimize patient care outcomes and contributing innovative solutions to complex healthcare challenges.

GRADUATE ATTRIBUTES

1. **DEEP DISCIPLINE KNOWLEDGE:** Graduates have comprehensive knowledge and understanding of their domain area, the ability to engage with different traditions of thought, and the ability to apply their knowledge in practice, including in multi-disciplinary or multi-professional contexts.
2. **ANALYSE, DESIGN/DEVELOPMENT OF SOLUTIONS TO PROBLEMS:** Graduates are effective problem-solvers, able to apply critical, creative, and evidence-based thinking to conceive innovative responses to future challenges.
3. **PROFESSIONALISM AND LEADERSHIP**: Graduates engage in professional behavior and have the potential to be entrepreneurial and take leadership roles in their chosen occupations or careers and communities.
4. **COMMUNICATION SKILLS AND TEAMWORK:** Graduates convey ideas and information effectively to a range of audiences for a variety of purposes and contribute in a positive and collaborative manner to achieving common goals**.**
5. **ENVIRONMENT AND SUSTAINABILITY:** Understand the impact of professional solutions in societal and environmental contexts and demonstrate knowledge of the need for sustainable development.
6. **RESPONSE TO ETHICS IN LIFE AND SOCIAL ISSUES:** Graduates are responsible and effective global citizens whose personal values and practices are consistent with their roles as responsible members of society.
7. **EFFICIENT PROJECT MANAGEMENT AND FINANCE:** Demonstrate knowledge and understanding of management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
8. **SELF-AWARENESS AND EMOTIONAL INTELLIGENCE:** Graduates are self-aware and reflective; they are flexible and resilient and have the capacity to accept and give constructive feedback; they act with integrity and take responsibility for their actions**.**
9. **MOTIVATION FOR LIFELONG LEARNING**: Recognize the need for and have the preparation and ability to engage in independent and lifelong learning.
10. **DIGITAL CAPABILITIES:** Graduates are well-prepared for living, learning, and working in a digital society

COURSE OUTCOME DESIGN PROCESS

1. Define the Context:

- Understand the course's specific context, including its level, subject matter, and fit into the larger program or student journey.
- Identify institutional regulations or accreditation standards that might influence the outcomes.

2. Identify Learning Objectives:

- Brainstorm the key knowledge, skills, and abilities you want students to gain by the end of the course.
- Consider Bloom's Taxonomy to ensure diverse learning levels.
- Articulate these objectives as clear, concise statements.

3. Translate into Course Outcomes:

- Shift focus from instructor activities to student achievements.
- Use action verbs that describe what students will be able to do (e.g., analyze, design, interpret, solve).
- Ensure outcomes are measurable through assessments and exams.

4. Align with Program Goals and Learning Objectives:

- Ensure course outcomes contribute to the broader program's learning objectives.
- Create a cohesive learning experience and help students see the bigger picture.

5. Consider Different Course Types:

- Adapt the process for different course types, such as foundational subjects versus advanced courses.

6. Draft and Refine:

- Start with a draft and seek feedback from colleagues, students, and stakeholders.
- Iteratively refine and revise outcomes based on feedback.

7. Share and Utilize:

- Communicate course outcomes clearly to students at the beginning of the course.
- Use outcomes to guide teaching, assessment, and feedback strategies.
- Regularly review and update outcomes to ensure they remain relevant and effective.

Sample Action Verbs:

- Analyze
- Design
- Interpret
- Solve
- Create

Lower Order of Thinking(LOT)			Higher Order of Thinking (HOT)		
Remember	**Understand**	**Apply**	**Analyse**	**Evaluate**	**Create**
Define	Explain	Solve	Analyse	Reframe	Design
Describe	Describe	Apply	Compare	Criticize	Create
List	Interpret	Illustrate	Classify	Judge	Plan
State	Summarise	Calculate	Distinguish	Recommend	Formulate
Match	Compare	Sketch	Explain	Grade	Invent
Tabulate	Discuss	Prepare	Differentiate	Measure	Develop
Record	Estimate	Chart	Appraise	Test	Organize
Label	Express	Choose	Conclude	Evaluate	Produce

Note: If Laboratory is given as a separate course (with course code), then there should be separate course outcomes for Laboratory.

CHECKLIST FOR COs

Number of Cos	**2 to 6**
CO essentials	**Action Verb, Subject Content, Level of Achievement, Modes of Performing task (If Applicable)**
Based on BTL	**Understand, Remember, Apply, Analyse, Evaluate, Create**
Number of BTL Considered in one course	**Minimum 2**
Technical Content/ point of curriculum	**All curriculum contents are covered**

COURSE OUTCOMES

FIRST YEAR

1.1 PHARMACOTHERAPEUTICS I & II

CO1 Understand the pathophysiology, clinical manifestations and management of common diseases associated with different systems of human body including infectious disease.

CO2 To apply the therapeutic guidelines/algorithms in the management of disease

CO3 To understand the role of pharmacist in essential drug concept and to evaluate rational drug use.

CO4 To apply prescribing guidelines for special population such as geriatrics, paediatrics, pregnancy and lactating women.

1.2 PHARMACOTHERAPEUTICS-III

CO1 Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for gastrointestinal system diseases.

CO2 Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for haematological diseases.

CO3 Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for pain and nervous system diseases.

CO4 Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for psychiatric disorders.

CO5 Understand the disease conditions and drug therapy, and ability to apply the drug knowledge on preparation of patient specific pharmacotherapeutic plan for varioustypes of pain.

CO6 To apply the ability to answer the drug queries based on best available evidence,clinical expertise on the preparation and process of EBM and decision making on patient management.

1.3 HOSPITAL PHARMACY

CO1 Create a knowledge on hospital pharmacy, drug committees &policies of hospital

CO2 To understand the various inventory control techniques& drug distribution methods

CO3 To create a knowledge on various hospital pharmacy services such as drug distribution, handling of narcotics and CSSR

CO4 To analyse the professional practice management skills of hospital pharmacists

CO5 Understand role of pharmacist in education & training programs

CO6 To apply the knowledge on manufacturing practices of pharmaceutical formulations in hospital set up and handling radiopharmaceuticals.

1.4 CLINICAL PHARMACY

CO1 To evaluate drug therapy of patient through clinical pharmacist activities and pharmaceutical care.

CO2 To interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states

CO3 To retrieve, analyse, interpret and formulate drug and poison information

CO4 To detect, assess and monitor adverse drug reaction

CO5 To critical evaluate biomedical literature

CO6 To Detect, assess, monitor and prevent medication errors.

1.5 BIOSTATISTICS AND RESEARCH METHODOLOGY

CO1 To apply research designs appropriate to research aims and objectives along with the limitation of particular research methods

CO2 To be able to frame useful research questions. Research designs, data collection, analysis

CO3 To understand how to present research data and write the research report

CO4 To understand how statistical techniques are incorporated in the analysis of medical research data

CO5 To integrate and apply efficiently the different statistical software

CO6 To understand the importance of computers in hospital and community pharmacy

1.6 BIOPHARMACEUTICS AND PHARMACOKINETICS

CO1 Understand and apply the basic concepts in ADME and the mechanisms and factors affecting the processes of drug absorption and drug distribution to derive the pharmacokinetic parameters to describe the processes.

CO2 Understand the concept of drug elimination and apply the knowledge to describe parameters like clearance and extraction ratio and to design dosage regimen in patients with renal impairment.

CO3 Understand about the theory of compartmental pharmacokinetics and analyze the plasma or urine data to derive and describe pharmacokinetic parameters

CO4 Understand about the theory of multicompartment models and multiple dosage regimens to analyze and describe pharmacokinetic parameters

CO5 Understand the basic knowledge about bioavailability and bio equivalency to design and analyze drug product equivalency studies

1.7 CLINICAL TOXICOLOGY

CO1 To understand the basic toxicological knowledge in the general principles involved in the management of poisoning, prevention and treatment, toxicokinetic study of poisoning

CO2 To evaluate the clinical symptoms and management of various drugs poisoning including pesticides, opiates, antidepressants, barbiturates and benzodiazepines, alcohol, paracetamol, NSAIDS, hydrocarbons, caustics and radiation poisoning.

CO3 To analyse the symptoms, toxicological effects and management of various heavy metals including Arsenic, lead, mercury, iron and copper.

CO4 To apply the case with basic first aids, and appropriate antidotes of snake bites, food, plant and envenomations poisoning.

CO5 To understand the pharmacological actions, mechanism of various antidotes in case of substance abuse.

SECOND YEAR

2.1 CLINICAL RESEARCH

CO1 To understand various approaches to drug discovery like pharmacological, toxicological, IND application drug characterisation and dosage forms.

CO2 To remember different phases of clinical trials, post marketing surveillance, abbreviated new drug application and its submission.

CO3 ICH, GCP and CDSCO guidelines and its implementation, ethics in clinical research, IRB/IEC committees and its function.

CO4 To evaluate the roles and responsibilities of biomedical research persons.

CO5 To analyze how to prepare informed consent, documentation of clinical study and safety monitoring.

2.2 PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS

CO1 To understand pharmacoepidemiological models and their applications in health care research

CO2 To compare outcomes of drug use and the risk in pharmacoepidemiology

CO3 To understand the fundamental principles of pharmacoeconomics and its methods.

CO4 To investigate pharmacoeconomics analysis of various pharmaceutical products.

2.3 CLINICAL PHARMACOKINETICS AND PHARMACOTHERAPEUTIC DRUG MONITORING

CO1 To apply the concepts of pharmacokinetics in design of dosage regimens.

CO2 To understand pharmacokinetics of drug interaction.

CO3 To understand about the significance of therapeutic drug monitoring.

CO4 To apply the pharmacokinetic principle of dosage adjustment in renal and hepatic disease.

CO5 To understand different aspects of population pharmacokinetics and pharmacogenetics.

2.4 CLERKSHIP

CO1 To evaluate the data collection, interpretaion, analysis and reporting skills

CO2 To apply communication skill by providing patient counseling, ward round participation and with other health care professionals

CO3 To understand different types of diseases and its pharmacotherapeutic management

CO4 To understand various roles of clinical pharmacist in hospital management

2.5 PROJECT WORK

CO1 To understand the data collection and reporting skills in the area of community, hospital, clinical pharmacy

CO2 To compare the evidence of accurate description of published work of others and of having recorded in the findings in an impartial manner

CO3 To evaluate the presentation, communication, question and answering skills of students

CO4 To understand the objectives, methodology, results, discussions and conclusions, and to apply these results and conclusions to the society by a published work

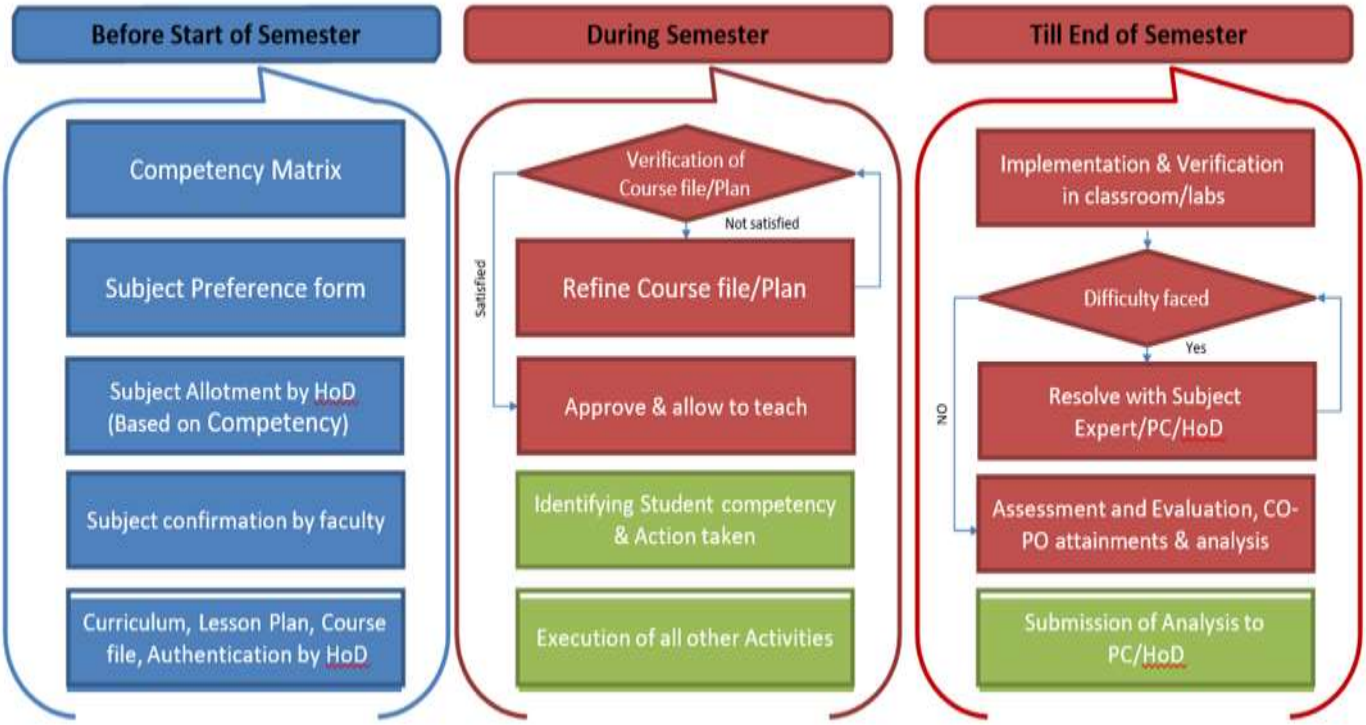
GUIDELINES FOR USING KEYWORDS IN CO-PO MAPPING

1. Develop a Keyword List: Collaboratively establish a core list of keywords associated with your Pharmacy Program Outcomes (POs). Consider:
    - Action Verbs (Bloom's Taxonomy): explain, formulate, dispense, counsel, assess, monitor, evaluate, optimize, manage
    - Technical Terms: pharmacokinetics, pharmacodynamics, dosage forms, drug interactions, compounding, clinical trials
    - Soft Skills: communication, patient counseling, interprofessional collaboration, critical thinking, ethical decision-making
2. Identify Keywords in COs and POs: Carefully examine your Course Outcomes (COs) and Program Outcomes (POs), highlighting core keywords.
3. Establish Correlations: Look for direct matches or semantic similarities between the keywords in COs and POs to indicate correlations. For example:
    - CO: "Dispense medications accurately according to prescription orders..."
    - PO: "...Demonstrate proficiency in the safe and effective preparation and dispensing of medications..."
    - Keyword Match: "dispense," "medications" suggest a strong correlation.
4. Cautions:
    - Nuance: Keywords might not fully represent every aspect of COs and POs. Ensure you understand the deeper context of intended learning outcomes.
    - False Positives: Avoid superficial matches. Ensure keywords align in the depth of knowledge and skill required.

Most of the times, appropriate keyword is sufficient for mapping.

Level	**Keywords Used in writing COs**
No mapping (-)	Key words related with LOT and not related with course or any outcomes
Low (1)	Part of PO is reflected through keywords/action verbs
Medium (2)	Major part of PO is reflected through keywords/action verbs.
High (3)	Exact action verb of PO

OBE FRAMEWORK OF THE INSTITUTION



COMPETENCY MATRIX

To guarantee impactful learning experiences, a staff competency matrix should be implemented that evaluates proficiency in critical areas including content knowledge, assessment creation and evaluation, fostering student engagement, cultivating positive learning environments, maintaining professionalism and collaboration, and effectively integrating communication and technology.

SUBJECT PREFERENCE FORM DEVELOPMENT:

The HOD creates a form capturing faculty preferences for specific subjects, grade levels, and teaching formats.

FORM DISTRIBUTION AND COMPLETION:

The HOD distributes the form to all eligible faculty members with clear instructions and timelines. Faculty members complete the form and submit it to the HOD by the deadline.

DATA REVIEW AND ANALYSIS:

The HOD reviews the submitted forms, considering: Faculty preferences, Competency data (e.g., qualifications, certifications, past performance), Student evaluations (if available), Course requirements and student needs and availability of faculty members.

DRAFT SCHEDULE CREATION:

The HOD creates a draft teaching schedule based on the collected data and analysis. The schedule aims to maximize the alignment of faculty competencies with subject requirements while accommodating preferences as much as possible.

INDIVIDUAL MEETINGS:

The HOD may schedule individual meetings with faculty members to discuss potential assignments, address concerns, and ensure transparency.

FINAL SCHEDULE AND COMMUNICATION:

The HOD finalizes the teaching schedule, considering feedback from individual meetings. The final schedule is communicated to all faculty members, highlighting any changes made and justification (if needed).

CURRICULUM DEVELOPMENT:

Faculty member reviews program learning outcomes, course descriptions, and relevant frameworks.The curriculum aligns with learning outcomes, assessment strategies, and instructional methods.

LESSON PLAN CREATION:

For each unit or topic within the curriculum, faculty member creates detailed lesson plans.

Each lesson plan specifies:

- Learning objectives.
- Instructional activities (e.g., lectures, discussions, group work, assignments).
- Assessment methods (e.g., quizzes, projects, presentations).
- Required resources (e.g., textbooks, articles, technology).
- Estimated time allocation.

COURSE FILE PREPARATION:

Faculty member compiles all relevant materials and documentation into a comprehensive course file.

The course file typically includes:

- Approved curriculum document.
- Detailed lesson plans for all units/topics.
- Syllabi outlining course expectations, grading policies, and academic integrity guidelines.
- Assessment instruments (e.g., rubrics, quizzes, exams).
- Teaching handouts, slides, or other instructional materials.
- References, readings, and supplementary resources.
- Evidence of alignment with learning outcomes and program standards.

Submission and Review: Faculty member submits the completed curriculum, lesson plans, and course file to the Department Chair by the designated deadline.

The Department head reviews the materials for completeness, quality, and adherence to program guidelines. Feedback and suggestions for improvement are provided to the faculty member, if necessary.

Approval and Recordkeeping:

Once approved, the Department Chair signs off on the finalized materials. The Department Chair maintains records of all submitted curriculum, lesson plans, and course files.

Teaching assignments are granted to faculty upon approval by the Head of Department, ensuring alignment with expertise and program needs.

STUDENT COMPETENCIES

Specific competencies of students will be assessed

1. Academic skills: Standardized tests, classroom assessments, portfolios, self-evaluations.
2. Practical skills: Performance-based assessments, simulations, project work, observations.
3. Social-emotional skills: Peer observations, self-evaluations, surveys, interviews, teacher observations.

ASSESSMENT METHODS

Mid-term, End term, class test, surprise test, University theory exam ,Quizzes, Assignment problems, simulation, laboratory experiments, project, field work, report presentation, tutorials, activities, etc.

BASE SCORE FOR STUDENT CATEGORY

- <50% -Slow Learner
- 50% to 65% - Average Learner
- >65%-Advanced Learner

STRATEGIES FOR CATERING TO DIVERSE LEARNING NEEDS: SLOW, AVERAGE, AND ADVANCED LEARNERS

Educators strive to create inclusive learning environments that cater to the individual needs of all students, regardless of their learning pace or abilities.

SLOW LEARNERS:

- Individualized instruction: Tailor lessons to match the student's pace and learning style. Break down complex concepts into smaller, manageable steps.
- Multisensory learning: Engage multiple senses (visual, auditory, kinesthetic) to reinforce understanding. Utilize manipulatives, graphic organizers, and visuals.
- Frequent practice and review: Provide ample opportunities for practice and spaced repetition to solidify concepts. Offer differentiated practice problems with varying difficulty levels.
- Positive reinforcement: Celebrate small wins and progress to boost motivation and confidence. Encourage self-reflection and goal setting.
- Collaboration and peer tutoring: Pair slow learners with average or advanced peers for collaborative learning and peer support
- Remedial classes with timetable & attendance
- Edpuzzle which empower students to take an active role in their learning with interactive video lessons that spark creativity and curiosity.

AVERAGE LEARNERS:

Clear and concise instruction: Present information in a well-organized and easy-to-understand manner. Utilize a variety of instructional methods (lectures, discussions, activities) to keep students engaged.

Differentiated instruction: Offer choices in activities, projects, or assessments to cater to diverse interests and learning styles.

Group work and collaborative learning: Encourage teamwork and collaborative problem-solving to develop critical thinking and communication skills.

Independent learning: Provide opportunities for self-directed learning activities and research projects to foster autonomy and responsibility.

Regular feedback and check-ins: Offer constructive feedback and guidance to help students improve their understanding and performance.

ADVANCED LEARNERS:

Advanced learners are encouraged to enroll in Swayam, NPTEL courses.

Encouraged to participate in E-Cell and IEDC activities

External learning opportunities: Facilitate participation in academic competitions, conferences, or workshops to broaden their knowledge and connect with like-minded peers.

Guidance for competitive Examination

Individual guidance for career building

Journal clubs

Remember, these are just general strategies, and the most effective approach will vary depending on the specific needs of each student and the learning environment. By creating a flexible and differentiated learning environment, educators can empower all students to reach their full potential.

DESIGNING OF QUESTION PAPER

A good and reasonable examination paper must consist of various difficulty levels to accommodate the different capabilities of students. Bloom’s taxonomy framework helps the faculty to set examination papers that are well balanced, testing the different cognitive skills without a tilt towards a tough or easy paper perception.

Designing Question Papers based on Bloom's Taxonomy and Course Outcomes (COs)

Step-by-step procedure for designing question papers aligned with Bloom's Taxonomy and course outcomes (COs):

1. Define Course Outcomes (COs):

Clearly articulate the key knowledge, skills, and abilities your students should acquire by the end of the course.

Ensure COs are measurable and specific, using action verbs like "analyze," "create," or "evaluate."

2. Develop Questions:

For each mapped objective, craft questions that directly assess their specified skills and knowledge.

Use clear and concise language with appropriate vocabulary and difficulty level for the target audience.

Utilize diverse question formats (e.g., multiple choice, open-ended, short answer, problem-solving) to address different learning styles and assessment needs.

3. Ensure Coverage and Distribution:

Allocate questions based on the importance and complexity of each CO.

Aim for balanced representation across all Bloom's levels to test a variety of cognitive skills.

Consider including bonus questions for advanced learners at higher Bloom's levels (optional).

4. Review and Pilot Test:

Peer-review the question paper for clarity, accuracy, and alignment with COs and Bloom's levels.

Conduct a pilot test with a small group of students to gauge difficulty level and identify any potential issues.

Refine the question paper based on feedback and pilot test results.

A suggestive list of skills/ competencies to be demonstrated at each of the Bloom's level and corresponding cues/ verbs for the examination/ test questions are given below:-

S No.	Level	Skill Demonstrated	Question / Verbs for tests
1.	Remember	- Ability to recall information like facts, definitions, etc.	list, define, tell, describe, recite, recall, identify, show, label, tabulate, quote, name, who, when, where, etc.
2.	Understand	- Understanding information - Grasp meaning - Translate knowledge into new context - Interpret facts, compare, contrast - Order, group, infer causes - Predict consequences	describe, explain, paraphrase, restate, associate, contrast, summarize, differentiate, interpret, discuss
3.	Apply	- Use information - Use methods, concepts, laws, theories in new situations - Solve problems using required skills or knowledge - Demonstrating correct usage of a method or procedure	calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model, experiment, show, examine, modify
4.	Analyze	- Break down a complex problem into parts - Identify the relationships and interaction between the different parts of a complex problem - Identify missing, redundant, and contradictory information	classify, outline, break down, categorize, analyze, diagram, illustrate, infer, select
5.	Evaluate	- Compare and discriminate between ideas - Assess value of theories, presentations - Make choices based on reasoned argument - Verify value of evidence - Recognize subjectivity - Use definite criteria for judgments	assess, decide, choose, rank, grade, test, measure, defend, recommend, convince, select, judge, support, conclude, argue, justify, compare, summarize, evaluate
6.	Create	- Use old ideas to create new ones - Combine parts to make (new) whole - Generalize from given facts - Relate knowledge from several areas - Predict, draw conclusions	design, formulate, build, invent, create, compose, generate, derive, modify, develop, integrate

CO-PO ATTAINMENT GUIDELINES

The attainment of POs and COs are evaluated by direct and indirect attainment methods.

Level of attainment

The three levels of attainment is taken as 1- low; 2- medium;3- high and it can be defined as

- Attainment 3 :70% of students score more than 50% marks
- Attainment 2: 60% of students score more than 50% marks
- Attainment 1: 50% of students score more than 50% marks

Direct attainment

The direct attainment is done by evaluating student performance in Continuous Internal Assessment (CIA) which comprises of sessional examinations and academic activities (assignments, seminars, class tests and quizzes) and End semester/ year examinations (EE). The proportional weightages of CIA: EE are 20:80.

Direct attainment of a specific COs is determined from the performances of students to all the assessment items related to that particular CO. Hence, every assessment item needs to be tagged with the relevant CO. Continuous Internal Assessment is conducted and evaluated by college and End Semester Examination is conducted and evaluated by the University. The average marks scored in End semester/year examination will be considered as the common attainment of all COs.

Direct Course Outcome Attainment = 20% of Continuous Internal Assessment (CIA) +80% of End Semester/year examination attainment.

Indirect attainment

Indirect attainment of COs can be determined from the course end survey.

Attainment of CO = (Level-1 X No of Students Attempted) + (Level-2 X No of Students Attempted) + (Level-3 X No of Students Attempted)/Total No of Students (Level 1: Low; Level 2: Medium; Level 3: High)

Overall Course Outcome Attainment = 90% Direct Course Outcome Attainment + 10% Of Indirect Attainment

PO ATTAINMENT

PO assessment tools are categorized into Direct method and Indirect method. The final PO attainment is calculated by taking 80% of the attainment values from Direct assessment method and 20% of the attainment values from Indirect assessment method.

Direct Method:
Once the overall attainment percentage of each COs is calculated, the PO attainment is calculated by taking the cumulative average of all the course's CO attainment which contributes to the Program Outcomes.

Indirect Method:
This assessment approach is intended to find out about the quality of the learning process by getting feedback from exit surveys.

The obtained values will be compared with the set attainment target fixed for each PO. • If the target is achieved, then the same process will be continued for further batches. • If the target is not achieved, then continuous improvement action will be taken for each PO. Based on the attainment, the improvements to be done are discussed among the staff.

ACTION FOR GAP FULFILMENT

Department will call Departmental meeting to discuss how GAPs can be fulfilled. However these are some suggestions to the departments to fulfil these gaps: -

Remedial Classes for weak students arranged to improve the attainment level.

Beyond syllabus topics added to meet the requirement.

Industry visit/Industrial Expert talk/Senior academic talks can be arranged for the students.

REPORT ON GAP FULFILMENT

Gap analysis will be done in at the end of each semester, gap analysis of odd semester will be done in next even semester, the action for gap fulfilment will be decided & will be implemented in next odd semester. Similarly applicable for even semester also.

NATIONAL COLLEGE OF PHARMACY

INNOVATION AND ENTREPRENEURSHIP DEVELOPMENT CENTRE

INSTITUTION'S INNOVATION COUNCIL

Approved by Pharmacy Council of India, AICTE, DME & Govt. of Kerala
Affiliated to Kerala University of Health Sciences, Accredited by NBA

OBE MANUAL

M PHARM

Prepared by Curriculum Committee and IQAC

National college of Pharmacy

NATIONAL COLLEGE OF PHARMACY

Outcome Based Education (OBE)

Preamble

Outcome Based Education (OBE) is an educational model that forms the base of a quality education system. There is no single specified style of teaching or assessment in OBE. All educational activities carried out in OBE should helpthe students to achieve the set goals. The faculty may adapt the role of instructor, trainer, facilitator, and/or mentor, based on the outcomes targeted.

OBE enhances the traditional methods and focuses on what the Instituteprovides to students. It shows the success by making or demonstrating outcomes using statements "able to do" in favour of students. OBE provides clear standards for observable and measurable outcomes.

The University Grants Commission (UGC) has introduced a Learning Outcomes-based Curriculum Framework for Undergraduate Education in India. The framework is based on the premise that higher education qualifications such as Bachelor's Degree programs are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes, and values) and academic standards expected of graduates of a program of study.

The National Education Policy (NEP) 2023 has also emphasized the importance of outcome-based education in India. A strong focus on outcome-based education is crucial to achieving the goal of elevating the quality of education in India to global standards.

Overall, outcome-based education has been adopted in many technical institutes of higher learning in India. The UGC has introduced a Learning Outcomes- based Curriculum Framework for Undergraduate Education in India, and the NEP 2023 has emphasized the importance of outcome-based education in India .

Benefits of OBE

Clarity
The focus on outcome creates a clear expectation of what needs to be accomplished by the · end of the course.

Flexibility
With a clear sense of what needs to be accomplished, instructors will be able to · structure their lessons around the students' needs.

Comparison
OBE can be compared across the individual, class, batch, program and institute levels.

Involvement
Students are expected to do their own learning. Increased student involvement allows them to feel responsible for their own learning, and they should learn more through this individual learning.

Higher Education Quality

OBE delivers a higher quality of education since it focuses on learning outcomes and guarantees that students master the subject matter. This technique assists students in developing critical thinking abilities, problem-solving skills, and practical skills that are useful in the workplace.

Self-Directed Learning

OBE promotes self-directed learning, in which students are in charge of their own education and growth. In their future employment, students will benefit from having a sense of freedom and autonomy, which is fostered by this method.

Better Career Opportunities

OBE aids students in acquiring the knowledge and skills that employers value. This can increase their employment possibilities and assist them in achieving their career objectives.

BLOOM'S TAXONOMY: A FRAMEWORK FOR LEARNING OBJECTIVES

Bloom's Taxonomy, originally published in 1956, is a hierarchical framework that categorizes educational learning objectives into six levels of cognitive complexity. These levels range from lower-order thinking skills like remembering and understanding to higher-order thinking skills like analyzing, evaluating, and creating. Here's an overview of the six levels:

1. **Remembering:** This level focuses on recalling factual information. Examples include identifying, listing, defining, and describing.

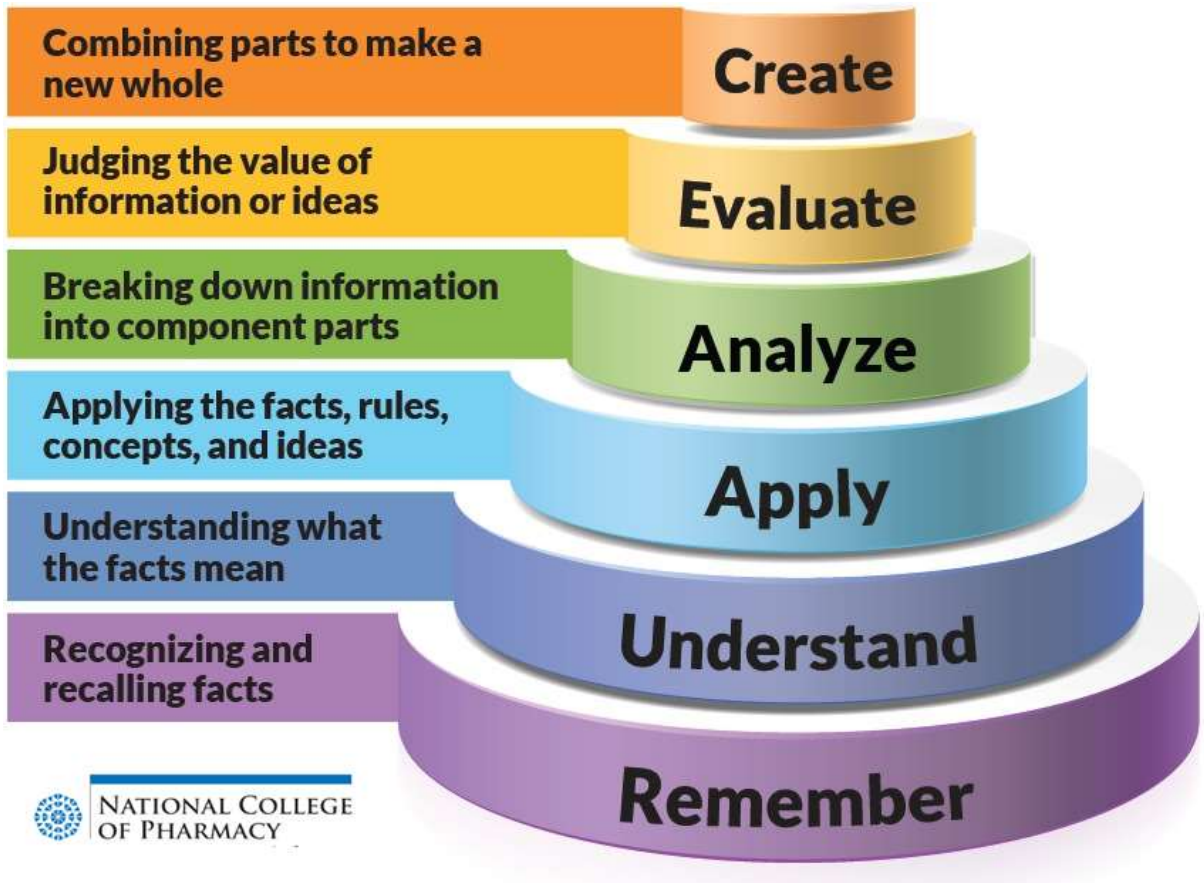
2. **Understanding:** This level requires grasp of the meaning and implications of information. Examples include interpreting, explaining, summarizing, and paraphrasing.

3. **Applying**: This level involves using knowledge and skills in new situations. Examples include demonstrating, calculating, illustrating, and implementing.

4. **Analysing:** This level requires breaking down information into its component parts and seeing how they relate. Examples include comparing, contrasting, differentiating, and classifying.

5. **Evaluating:** This level involves making judgments based on criteria and justifying those judgments. Examples include critiquing, judging, assessing, and recommending.

6. **Creating:** This level requires generating new ideas or products. Examples include designing, developing, composing, and constructing.



REVISED BLOOM'S TAXONOMY:

In 2001, a revised version of Bloom's Taxonomy was published, focusing on action verbs and gerunds rather than nouns. This revision emphasizes deeper and more active learning experiences.

he Revised Bloom's Taxonomy, published in 2001, offers an updated framework for classifying educational learning objectives. It builds upon the original 1956 version by shifting the focus from nouns to action verbs and gerunds, thereby emphasizing active learning and cognitive processes.

Here's a breakdown of the Revised Bloom's Taxonomy and its six levels:

1. Remembering (Knowing & Recalling):

Key words: Recognizing, recalling, retrieving, listing, defining, describing

Focus: Retrieving and recalling factual information.

2. Understanding (Comprehending & Interpreting):

Key words: Interpreting, explaining, summarizing, paraphrasing, classifying, comparing, contrasting

Focus: Grasping the meaning and implications of information, making connections.

3. Applying (Using & Implementing):

Key words: Executing, demonstrating, implementing, calculating, illustrating, solving

Focus: Applying knowledge and skills in new situations, solving problems with known procedures.

4. Analyzing (Breaking Down & Examining):

Key words: Differentiating, organizing, attributing, analyzing, investigating, experimenting

Focus: Breaking down information into parts, examining relationships, drawing connections.

5. Evaluating (Judging & Critiquing):

Key words: Checking, critiquing, judging, assessing, recommending, valuing

Focus: Making judgments based on criteria, evaluating quality and effectiveness.

6. Creating (Generating & Designing):

Key words: Generating, hypothesizing, planning, designing, constructing, composing

Focus: Producing new ideas or products, designing solutions, contributing original work.

Applications of Bloom's Taxonomy:

Bloom's Taxonomy can be used for various educational purposes, including:

Designing learning objectives: Clearly define what students should be able to do at the end of a lesson, unit, or course.

Creating assessments: Align assessments with the desired learning objectives and the appropriate level of Bloom's Taxonomy.

Planning instruction: Design activities and experiences that help students achieve the learning objectives at different levels.

Providing feedback: Offer feedback that helps students move towards mastery of the intended learning objectives.

Overall, Bloom's Taxonomy is a valuable tool for educators who want to encourage deeper learning and critical thinking in their students.

VISION AND MISSION OF INSTITUTION

Process of framing Vision and mission of institution

The Vision, Mission and PEOs are established through continuous interaction with the internal and external stakeholders of the programme. They are discussed and approved by the Program Assessment Committee and Department Advisory Committee.

In establishing the Vision and Mission of the program, the following steps were followed:

Step 1: Vision and Mission of the Institute and the Programme Outcomes defined by NBA are taken as an origin.

Step 2: Suggestions are taken by the Program Assessment Committee from the External and internal stakeholders about statements of Vision and Mission.

Step 3: The collected views are analyzed and reviewed to check the consistency with the vision and mission of the institute and summarized by the Program Assessment Committee.

Step 4: Finally, the programme Vision and Mission are made by the Academic Advisory Committee.

Step 5: After approval, dissemination is carried out through appropriate channels.

VISION OF INSTITUTION

Emerge as a center of eminence by creating responsible and resourceful citizens with commitment to excellence in pharmacy education and allegiance to ethical professional practices.

MISSION OF INSTITUTION

- Providing quality pharmacy education and training that enables pharmacists to facilitate the delivery of ethical, conscientious, cost-effective healthcare services to all.
- Cultivating an environment that is collaborative, interdisciplinary, innovative, and creative in approach.
- Partnering with individuals and institutions across the world who occupy leadership positions and promoting reciprocal exchanges in both academic and cultural spheres.

EDUCATIONAL PROGRAM OUTCOMES:

1. Course Outcome (CO):

Definition: Specific statements describing the knowledge, skills, and attitudes students should be able to demonstrate after completing a particular course.

Focus: Learning outcomes specific to an individual course within a program.

Example: By the end of the "Pharmacology" course, students will be able to identify the mechanisms of action of different drug classes.

2. Program Outcome (PO):

Definition: Statements outlining the broader knowledge, skills, and attributes that graduates of a specific program are expected to possess by the time of graduation.

Focus: Program-level learning outcomes encompassing the entire curriculum.

Example: Graduates will be able to apply their knowledge to develop safe and effective medication regimens for patients.

3. Program Specific Outcome (PSO):

Definition: Statements describing the unique knowledge, skills, and professional attributes that graduates from a particular specialization within a program are expected to attain.

Focus: Outcomes specific to a program specialization, differentiating it from other specializations within the same program.

Example: Graduates will be particularly skilled in providing medication therapy management services in rural communities.

4. Program Educational Objective (PEO):

Definition: Broad statements that describe the long-term career and professional aspirations for graduates of a program several years after graduation.

Focus: Overall vision for the program's contribution to graduates' professional development in the long term.

Example: Our pharmacy graduates will be recognized as leaders in improving medication adherence rates within their communities.

PROCESS OF ESTABLISHING PO, PEO AND PSO

The POs, PEOs and PSOs are established through the following process steps:

Step 1: Vision and Mission of the Institute and B pharm programme along with the Program Outcomes defined by NBA are taken as a basis to interact with various stake holders of the program.

Step 2:

Program Coordinator consults the stakeholders and collects their views.

Step 3: After various meetings, Benchmarking with other colleges and correlating alignment with curriculum contents the Program Coordinator submits the views to Program Assessment Committee

Step 4: Program Assessment Committee reviews and summarizes the collected views and expresses its opinion and forwards the same to Department Advisory Committee who defines the PEO, PO and PSO statements.

Step 5:

Academic Advisory Committee finalizes, formulates and establishes the PEO, PO and PSO statements.

Step 6

After approval dissemination is carried out through appropriate channels.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1.To prepare patient-centered pharmacists with advanced clinical knowledge and skills to optimize medication use, promote patient safety and well-being, and lead healthcare teams in collaborative healthcare settings.

2.To cultivate pharmacy experts with specialized expertise in drug development, pharmaceutical manufacturing, quality control, and regulatory compliance, who will ensure the safety, efficacy, and quality of medicines within the pharmaceutical industry.

PROGRAM OUTCOMES

1.**Pharmacy Knowledge:** Drawing on the principles of pharmaceutical chemistry, pharmaceutical analysis, pharmaceutics, and pharmacy practice, to establish clear guidelines and regulations for the entire drug lifecycle, encompassing discovery, development, delivery of care, and responsible use.

2.**Pharma Data Skills**: The capacity to create, carry out, analyze, and interpret data for the right pharmaceutical system or procedure.

3.**Sustainable drug development:** The capacity to design, synthesize, or isolate a drug and drug formulation system, component, or drug use process to satisfy desired needs within actual constraints, including economic, environmental, social, political, ethical, health and safety, and manufacturability and sustainability.

4.**Multidisciplinary Teamwork:** The capacity to work in multidisciplinary groups across various organizational levels in academia, business, research, and healthcare.

5. **Problem-Solving:** The capacity to recognize, define, and address professional issues in pharmaceutical concerns.

6.**Ethics:** Knowledge of professional pharmacy values and ethical responsibility in carrying out professional tasks from societal, governmental, and international viewpoints.

7.**Communication** : The capacity to successfully communicate verbally and in writing to be recognized in social and professional circles.

8. **Socioeconomic Impact** : The capacity to comprehend how pharmacy practice affects society, the economy, the environment, and the environment in general.

9.**Lifelong learning**: Understanding the value of, and capacity for, lifelong learning in line with the most recent developments in the professional sector in order to better serve the community.

10. **Research and Development**: Knowledge of current concerns relating to pharmaceutical product use in society and research, development, and manufacturing technologies. The capacity to use the methods, abilities, and contemporary equipment required for professional practice research and development

PROGRAM SPECIFIC OUTCOMES

M PHARM PHARMACY PRACTICE

PSO 1: Industry-Focused Excellence: Gain expertise in industry-focused areas like clinical research, pharmacoeconomics, and pharmacovigilance, paving the way for successful careers in these sectors

PSO 2: Clinical Competence and Patient-Centered Care: Demonstrate clinical competence, applying evidence-based practices to deliver ethical, patient-centered care. Proficiently assess, manage, and optimize drug therapy, ensuring safe and effective outcomes for patients.

PSO 3: Interdisciplinary Collaboration and Innovation: Actively collaborate with healthcare professionals from diverse fields various disciplines to optimize patient care outcomes and contributing innovative solutions to complex healthcare challenges.

M PHARM PHARMACEUTICAL CHEMISTRY

PSO1: Drug Discovery Proficiency: Demonstrate proficiency in applying foundational knowledge of pharmacy and pharmaceutical chemistry to actively contribute to the drug discovery and development process.

PSO2: Research Development and Regulatory Compliance: Actively possess the skills to identify, formulate, and analyze research problems, culminating in substantiated conclusions that adhere to regulatory requirements within the drug discovery field.

PSO3: Computational and Analytical Proficiency: Proficiency in utilizing computational tools and analytical techniques to conceptualize and investigate issues pertaining to rational drug design, organic synthesis, process chemistry, and natural products chemistry.

M PHARM PHARMACEUTICAL ANALYSIS

PSO1: Industry-Focused Excellence : Gain industry-focused excellence by mastering analytical techniques and regulatory procedures for pharmaceuticals, food, cosmetics, and herbal products, demonstrating expertise in advanced methods like spectroscopy and chromatography.

PSO2: Bioanalytical Techniques & Quality Assurance :- Actively possess core knowledge of bioanalytical techniques, regulatory procedures, and a deep understanding of the responsibilities associated with Quality Control and Quality Assurance departments.

PSO3: Research-Development & Innovation :- Develop, integrate, and apply their knowledge to critically evaluate scientific literature and conduct research projects related to product development, analytical method development, and validation.

M PHARM PHARMACEUTICS

PSO 1: Industry-Focused Excellence: Gain expertise in pharmaceutical industry dynamics like research, regulations, market trends, and technological advancements and apply this knowledge to pave the way for successful careers in these sectors.

PSO 2: Expertise in novel drug development: Demonstrate expertise and will innovate in developing novel drug delivery systems, addressing current challenges and improving therapeutic outcomes for patients.

PSO 3: Interdisciplinary Collaboration and Innovation: Actively collaborate with professionals from diverse disciplines, contributing pharmaceutical knowledge and skills to address complex healthcare challenges to enhance patient care and public health outcomes.

GRADUATE ATTRIBUTES

1. **DEEP DISCIPLINE KNOWLEDGE:** Graduates have comprehensive knowledge and understanding of their domain area, the ability to engage with different traditions of thought, and the ability to apply their knowledge in practice, including in multi-disciplinary or multi-professional contexts.
2. **ANALYSE, DESIGN/DEVELOPMENT OF SOLUTIONS TO PROBLEMS:** Graduates are effective problem-solvers, able to apply critical, creative, and evidence-based thinking to conceive innovative responses to future challenges.
3. **PROFESSIONALISM AND LEADERSHIP**: Graduates engage in professional behavior and have the potential to be entrepreneurial and take leadership roles in their chosen occupations or careers and communities.
4. **COMMUNICATION SKILLS AND TEAMWORK:** Graduates convey ideas and information effectively to a range of audiences for a variety of purposes and contribute in a positive and collaborative manner to achieving common goals**.**
5. **ENVIRONMENT AND SUSTAINABILITY:** Understand the impact of professional solutions in societal and environmental contexts and demonstrate knowledge of the need for sustainable development.
6. **RESPONSE TO ETHICS IN LIFE AND SOCIAL ISSUES:** Graduates are responsible and effective global citizens whose personal values and practices are consistent with their roles as responsible members of society.
7. **EFFICIENT PROJECT MANAGEMENT AND FINANCE:** Demonstrate knowledge and understanding of management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

8. **SELF-AWARENESS AND EMOTIONAL INTELLIGENCE:** Graduates are self-aware and reflective; they are flexible and resilient and have the capacity to accept and give constructive feedback; they act with integrity and take responsibility for their actions**.**
9. **MOTIVATION FOR LIFELONG LEARNING**: Recognize the need for and have the preparation and ability to engage in independent and lifelong learning.
10. **DIGITAL CAPABILITIES:** Graduates are well-prepared for living, learning, and working in a digital society

COURSE OUTCOME DESIGN PROCESS

1. Define the Context:

- Understand the course's specific context, including its level, subject matter, and fit into the larger program or student journey.
- Identify institutional regulations or accreditation standards that might influence the outcomes.

2. Identify Learning Objectives:

- Brainstorm the key knowledge, skills, and abilities you want students to gain by the end of the course.
- Consider Bloom's Taxonomy to ensure diverse learning levels.
- Articulate these objectives as clear, concise statements.

3. Translate into Course Outcomes:

- Shift focus from instructor activities to student achievements.
- Use action verbs that describe what students will be able to do (e.g., analyze, design, interpret, solve).
- Ensure outcomes are measurable through assessments and exams.

4. Align with Program Goals and Learning Objectives:

- Ensure course outcomes contribute to the broader program's learning objectives.
- Create a cohesive learning experience and help students see the bigger picture.

5. Consider Different Course Types:

- Adapt the process for different course types, such as foundational subjects versus advanced courses.

6. Draft and Refine:

- Start with a draft and seek feedback from colleagues, students, and stakeholders.
- Iteratively refine and revise outcomes based on feedback.

7. Share and Utilize:

- Communicate course outcomes clearly to students at the beginning of the course.
- Use outcomes to guide teaching, assessment, and feedback strategies.
- Regularly review and update outcomes to ensure they remain relevant and effective.

Sample Action Verbs:

- Analyze
- Design
- Interpret
- Solve
- Create

Lower Order of Thinking(LOT)			Higher Order of Thinking (HOT)		
Remember	**Understand**	**Apply**	**Analyse**	**Evaluate**	**Create**
Define	Explain	Solve	Analyse	Reframe	Design
Describe	Describe	Apply	Compare	Criticize	Create
List	Interpret	Illustrate	Classify	Judge	Plan
State	Summarise	Calculate	Distinguish	Recommend	Formulate
Match	Compare	Sketch	Explain	Grade	Invent
Tabulate	Discuss	Prepare	Differentiate	Measure	Develop
Record	Estimate	Chart	Appraise	Test	Organize
Label	Express	Choose	Conclude	Evaluate	Produce

Note: If Laboratory is given as a separate course (with course code), then there should be separate course outcomes for Laboratory.

CHECKLIST FOR COs

Number of Cos	**2 to 6**
CO essentials	**Action Verb, Subject Content, Level of Achievement, Modes of Performing task (If Applicable)**
Based on BTL	**Understand, Remember, Apply, Analyse, Evaluate, Create**
Number of BTL Considered in one course	**Minimum 2**
Technical Content/ point of curriculum	**All curriculum contents are covered**

COURSE OUTCOMES

M. PHARM - PHARMACEUTICS		
FIRST SEMESTER		
MPT 101T	**MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES**	
	CO1	To understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments. Skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals. To expand the theoretical knowledge on various instrumental techniques available for analysis of organic substances
	CO2	To develop basic practical skills using instrumentation techniques
	CO3	To develop the skills in selecting suitable techniques for analysis of drugs and pharmaceuticals
	CO4	To execute the theoretical knowledge on various instrumental techniques available for analysis of organic substances
MPH 102T	**DRUG DELIVERY SYSTEM**	
	CO1	Understand the principles and fundamentals in development on novel drug delivery systems.
	CO2	Apply the various approaches for development of novel drug delivery systems.
	CO3	Analyze the criteria for selection of drugs and polymers for the development of drug delivery system.
	CO4	Understand the formulation and evaluation of novel drug delivery systems.
MPH 103T	**MODERN PHARMACEUTICS**	
	CO1	Understand the elements of preformulation studies.
	CO2	Understand the optimization techniques in pharmaceutical formulation and processing.
	CO3	Understand and implement the pharmaceutical validation, policies of current good manufacturing practices and concept of total quality management.
	CO4	Understand the physics of tablet compression, dissolution parameters and pharmacokinetic parameter and linearity concept of significance.

MPH 104T	**REGULATORY AFFAIRS**	
	CO1	Understand the concepts of innovator and generic drugs, drug development process, regulatory guidances and guidelines for filing and approval process and documentation in pharmaceutical industry.
	CO2	Apply the principles of preparation of dossiers and their submission to regulatory agencies in different countries.
	CO3	Understand about the post approval regulatory requirements for actives and drug products and submission of global documents in CTD/ eCTD formats.
	CO4	Identify the clinical trials requirements for approvals for conducting clinical trials, pharmacovigilance and process of monitoring in clinical trials.
MPH 105P	**PHARMACEUTICS PRACTICAL- I**	
	CO1	Analysis of pharmacopoeial compounds and their formulations by UV Visible spectrophotometer/ HPLC/ Gas Chromatography
	CO2	Evaluation of sustained-release formulation
	CO3	Apply the principles of formulation and evaluation of transdermal patches
	CO4	Apply the knowledge in Pre-formulation studies of tablets, effect of compressional force and to plot Heckle plot, Higuchi and Peppa's factors
SECOND SEMESTER		
MPH 201T	**MOLECULAR PHARMACEUTICS (NANOTECH AND TARGETED DDS)**	
	CO1	Understand the basic concepts of targeting and Targeted Drug Delivery Systems.
	CO2	Understand the preparation and evaluation of Micro Capsules / Micro Spheres/ Niosomes, Aquasomes.
	CO3	Understand the preparation and evaluation of Pulmonary Drug Delivery Systems.
	CO4	Understand the preparation and evaluation of Veterinary Drug Delivery Systems.
MPH 202T	**ADVANCED BIOPHARMACEUTICS AND PHARMACOKINETICS**	
	CO1	Understand the basic concepts in biopharmaceutics and pharmacokinetics.
	CO2	Understand the use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination.

	CO3	Evaluate biopharmaceutic studies involving drug product equivalency.
	CO4	Understand the design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameterss and potential clinical pharmacokinetic problems and application of basics of pharmacokinetics.
MPH 203T	**COMPUTER AIDED DRUG DELIVERY SYSTEM**	
	CO1	Understand history of computers in pharmaceutical research and development, to understand the computational modeling of drug disposition.
	CO2	To demonstrate the importance of documentation and to know the importance of computers in preclinical development and optimization techniques in pharmaceutical formulation.
	CO3	Demonstrate the importance of computers in market analysis, clinical development.
	CO4	Understand the concept of Artificial Intelligence (AI) and Robotics, Computational Fluid Dynamics (CFD).
MPH204T	**COSMETICS AND COSMECEUTICALS**	
	CO1	Understand the key ingredients used in cosmetics and cosmeceuticals and building blocks for various formulations.
	CO2	Understand current technologies in the market.
	CO3	Apply the various aspects of cosmetic science for the design of cosmetic products
	CO4	Apply scientific knowledge to ensure desired safety, stability, and efficacy in cosmetics and cosmeceuticals
MPH205P	**PHARMACEUTICS PRACTICAL- II**	
	CO1	Apply the principles of UV Visible spectrophotometry and HPLC in the analysis of pharmacopoeial compounds and their formulations
	CO2	Apply the basic knowledge in the formulation of sustained release tablets and transdermal patches
	CO3	Evaluate release characteristics of sustained-release matrix tablets and transdermal patches
	CO4	Apply the knowledge of pre-formulation studies of tablets, effect of compressional force and to plot Heckle plot, Higuchi and peppa's factors in formulation design.

THIRD SEMESTER		
MRM 301T	**RESEARCH METHODOLOGY AND BIOSTATISTICS**	
	CO1	To understand the overall process of designing a research study from its inception to its report
	CO2	Students will be familiar with conducting a literature review for a scholarly educational study.
	CO3	To understand how statistical techniques are incorporated in the analysis of medical research data and its presentation
	CO4	To understand the basic principles of medical research and ethical issues.
	CO5	To understand CPCSEA guidelines.
	CO6	To understand and apply skills/tools for research report writing, how to publish in journals and to conduct poster, seminar and conference presentation.
M PHARM- PHARMACEUTICAL CHEMISTRY		
FIRST SEMESTER		
MPT 101T	**MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES**	
	CO1	To understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments Skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals. To expand the theoretical knowledge on· various instrumental techniques available for analysis of organic substances
	CO2	To develop basic practical skills using instrumentation techniques
	CO3	To develop the Skills in selecting suitable techniques for analysis of drugs and pharmaceuticals
	CO4	To execute the theoretical knowledge on various instrumental techniques available for analysis of organic substances
MPC 102T	**ADVANCED ORGANIC CHEMISTRY - I**	
	CO1	Understand the principles and applications of retrosynthesis
	CO2	Understand and apply the mechanism and applications of named reactions
	CO3	Understand the various catalysts used in organic reactions
	CO4	Understand and apply the chemistry of heterocyclic compounds

MPC 103T	**ADVANCED MEDICINAL CHEMISTRY**	
	CO1	Remember and understand different stages of drug
	CO2	Apply and analyse the role of medicinal chemistry in drug research
	CO3	Apply and evaluate different techniques for drug discovery
	CO4	Evaluate and create various strategies for design and development of drug like molecules
MPC 104T	**CHEMISTRY OF NATURAL PRODUCTS**	
	CO1	Understand and apply different types of natural compounds and their chemistry and the importance of natural compounds as lead molecules for new drugs
	CO2	Remember and understand general methods of structural elucidation of compounds
	CO3	Understand the concept of rDNA technology tool for new drug discovery
	CO4	Analyse and evaluate isolation, purification and characterization of simple chemical original constituents from natural source
MPC 105P	**PHARMACEUTICAL CHEMISTRY PRACTICAL-I**	
	CO1	Analyse and evaluate interpretation of the NMR, Mass and IR spectra of various organic compounds.
	CO2	Apply the theoretical and practical skills of the hyphenated instruments.
	CO3	To Analyse and evaluate organic compounds.
	CO4	To execute the reactions of synthetic importance
SECOND SEMESTER		
MPC 201T	**ADVANCED SPECTRAL ANALYSIS**	
	CO1	Analyse the interpretation of NMR, Mass and IR spectra of various organic compounds.
	CO2	To apply theoretical and practical skills of the hyphenated instruments.
	CO3	To analyse and evaluate organic compounds.
	CO4	To understand thermal methods of analysis.
MPC 202T	**ADVANCED ORGANIC CHEMISTRY – II**	
	CO1	Remember and understand the principles and applications of green chemistry.
	CO2	Understand and apply the concept of peptide chemistry.

	CO3	Remember and understand the various catalysts used in organic reactions.
	CO4	Remember and understand the concept of stereochemistry and asymmetric synthesis.
MPC 203T	**COMPUTER AIDED DRUG DESIGN**	
	CO1	Understand the role of CADD in drug discovery.
	CO2	Apply and analyse different CADD techniques and their applications.
	CO3	Evaluate and create various strategies to design and develop new drug like molecules.
	CO4	Evaluate and create new drug like molecules using molecular modeling software.
	CO5	Understand and apply the in-silico virtual screening protocols.
MPC 204T	**PHARMACEUTICAL PROCESS CHEMISTRY**	
	CO1	Understand the strategies of scale up process of API's and intermediates.
	CO2	Understand and apply the various unit operations and various reactions in process chemistry.
	CO3	Understand industrial safety measures
	CO4	Understand reaction progress kinetic analysis
MPC 205P	**PHARMACEUTICAL CHEMISTRY PRACTICAL-II**	
	CO1	Create organic compounds by adapting different approaches involving reduction/hydrogenation/ nitration
	CO2	Understand regulatory requirements in API
	CO3	Apply and analyse interpretation of organic compounds by FT-IR/ NMR/MS
	CO4	Execute the preparation of organic compounds
THIRD SEMESTER		
MRM 301T	**RESEARCH METHEDOLOGY AND BIOSTATISTICS**	
	CO1	To understand the overall process of designing a research study from its inception to its report
	CO2	Students will be familiar with conducting a literature review for a scholarly educational study.
	CO3	To understand how statistical techniques are incorporated in the analysis of medical research data and its presentation

	CO4	To understand the basic principles of medical research and ethical issues.
	CO5	To understand CPCSEA guidelines.
	CO6	To understand and apply skills/tools for research report writing, how to publish in journals and to conduct poster, seminar and conference presentation.
M. PHARM- PHARMACEUTICAL ANALYSIS		
FIRST SEMESTER		
MPT 101T	**MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES**	
	CO1	To understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments Skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals. To expand the theoretical knowledge on· various instrumental techniques available for analysis of organic substances
	CO2	To develop basic practical skills using instrumentation techniques
	CO3	To develop the Skills in selecting suitable techniques for analysis of drugs and pharmaceuticals
	CO4	To execute the theoretical knowledge on various instrumental techniques available for analysis of organic substances
MPA 102T	**ADVANCED PHARMACEUTICAL ANALYSIS**	
	CO1	To execute the knowledge in hyphenated instruments
	CO2	To apply the Knowledge of interpretation of the NMR, Mass and IR spectra
	CO3	To operate the analytical instruments
	CO4	To interpret and to identifiy the organic compounds
MPA 103T	**PHARMACEUTICAL VALIDATION**	
	CO1	To understand concepts of calibration, qualification and validation
	CO2	To examine the various manufacturing and laboratory equipment and validation of utility systems
	CO3	To understand the different concepts, processes and documentation of process validation and ICH guidelines regarding analytical method development. To study about USFDA guidelines regarding process validation
	CO4	To understand the concept of cleaning validation and computerized system validation

MPA 104T	**FOOD ANALYSIS**	
	CO1	To understand various analytical techniques in the determination of food constituents.
	CO2	To execute the analytical techniques in the determination of food additives.
	CO3	To understand the analytical techniques in the determination of finished food products
	CO4	To select the various analytical techniques in the determination of pesticides in food
MPA 105P	**PHARMACEUTICAL ANALYSIS PRACTICAL-I**	
	CO1	To interpret the pharmacopeial compounds and their formulation by UV/HPLC
	CO2	To analyse the different constituents, additives and preservatives in food products
	CO3	To Analyse and perform assay of compounds by titration and instrumental techniques
	CO4	To understand the calibration of analytical instruments and glass wares
SECOND SEMESTER		
MPA 201T	**ADVANCED INSTRUMENTAL ANALYSIS**	
	CO1	To understand and to interpret pattern for the organic substances
	CO2	To understand the theoretical aspects of the HPLC and GC techniques
	CO3	To analyse the practical aspects and troubleshooting techniques for HPLC and GC techniques
	CO4	To apply the knowledge and skills in advanced instrumentation techniques for drug analysis
MPA 202T	**MODERN BIO-ANALYTICAL TECHNIQUES**	
	CO1	To understand and study on extraction of drugs and metabolites from biological matrices. Study on bioanalytical method validation.
	CO2	To evaluate the bioavailability, their dissolution study, biopharmaceutics classification and permeability
	CO3	To understand and to study on pharmacokinetics and knowledge in cell culture
	CO4	To understand on metabolite identification including RLM, HLM. In vitro and In vivo studies including bioavailability and bioequivalence studies

MPA 203T	**QUALITY CONTROL AND QUALITY ASSURANCE**	
	CO1	To understand the cGMP aspects in a pharmaceutical industry
	CO2	To execute the importance of documentation in Pharmaceutical industries
	CO3	To understand the scope of quality certifications applicable to Pharmaceutical industries
	CO4	To understand the responsibilities of QA & QC departments
MPA 204T	**HERBAL AND COSMETIC ANALYSIS**	
	CO1	To understand the determination of herbal remedies
	CO2	To understand various analytical techniques in the determination of herbal products
	CO3	To understand various herbal regulations
	CO4	To understand the herbal monographs
MPA 205P	**PHARMACEUTICAL ANALYSIS PRACTICAL-II**	
	CO1	To Analysis of pharmacopoeial compounds and their formulation by UV/HPLC
	CO2	To analyse different constituents, additives and preservatives in food products
	CO3	To understand highly sensitive analytical procedures using sophisticated instruments and interpret the data scientifically.
	CO4	To execute and perform calibration of analytical instruments and glass wares
THIRD SEMESTER		
MRM 301T	**RESEARCH METHODOLOGY AND BIOSTATISTICS**	
	CO1	To understand the overall process of designing a research study from its inception to its report
	CO2	Students will be familiar with conducting a literature review for a scholarly educational study.
	CO3	To understand how statistical techniques are incorporated in the analysis of medical research data and its presentation
	CO4	To understand the basic principles of medical research and ethical issues.
	C05	To understand CPCSEA guidelines.
	C06	To understand and apply skills/tools for research report writing, how to publish in journals and to conduct poster, seminar and conference

		presentation.
M.PHARM- PHARMACY PRACTICE		
FIRST SEMESTER		
MPP 101T	**CLINICAL PHARMACY PRACTICE**	
	CO1	Understand the elements of pharmaceutical care and provide comprehensive patient care services.
	CO2	Interpret the laboratory results to aid the clinical diagnosis of various disorders.
	CO3	Provide integrated, critically analysed medicine and poison information to enable health care professionals in the efficient patient management.
MPP 102T	**PHARMACOTHERAPEUTICS-I**	
	CO1	To describe and explain the rationale for drug therapy and summarize the therapeutic approach for management of various disease conditions including reference to the latest available evidence.
	CO2	To discuss the clinical controversies in drug therapy and evidence-based medicine.
	CO3	Prepare individualized therapeutic plans based on diagnosis.
	CO4	Identify the patient specific parameters relevant in initiating drug therapy, monitoring therapy (including alternatives, time course of clinical and laboratory indices of therapeutic response and adverse effect/s).
MPP 103T	**HOSPITAL AND COMMUNITY PHARMACY**	
	CO1	To understand the organizational structure of hospital pharmacy.
	CO2	To know about drug policy and drug committees.
	CO3	Know about drug procurement and drug distribution practices including radiopharmaceuticals.
	CO4	To understand the community pharmacy management and its value-added services.
MPP 104T	**CLINICAL RESEARCH**	
	CO1	To know the new drug development process.
	CO2	Understanding of the regulatory and ethical requirements.
	CO3	Appreciate and conduct the clinical trials activities
	CO4	To know safety monitoring and reporting in clinical trials and to manage the trial coordination process

MPP105 P	**PHARMACY PRACTICE PRACTICAL-I**	
	CO1	Understand the elements of pharmaceutical care and provide comprehensive patient care services.
	CO2	Understand and perform various activities of a clinical pharmacist.
	CO3	Identify the patient specific parameters relevant in initiating drug therapy and monitoring therapy.
	CO4	Understand concepts of clinical research and to design study protocol & informed consent form.
SECOND SEMESTER		
MPP 201T	**PRINCIPLES OF QUALITY USE OF MEDICINES**	
	CO1	To understand the principles of quality use of medicines and to know the benefits and risks associated with use of medicines
	CO2	To understand regulatory aspects of quality use of medicines
	CO3	To identify and resolve medication related problems
	CO4	To practice evidence-based medicines by promoting quality use of medicines
MPP 202T	**PHARMACOTHERAPEUTICS II**	
	CO1	To summarize the therapeutic approach for management of various disease conditions including reference to the latest available evidence
	CO2	To discuss the clinical controversies in drug therapy and evidence-based medicine
	CO3	To prepare individualized therapeutic plans based on diagnosis
	CO4	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 effect/s)
MPP 203T	**CLINICAL PHARMACOKINETICS AND THERAPEUTIC DRUG MONITORING**	
	CO1	Design the drug dosage regimen for individual patient.
	CO2	To interpret and correlate plasma drug concentration with therapeutic outcomes.
	CO3	Recommend dosage adjustment for renal and hepatic failure patients.
	CO4	To understand the genetic polymorphism of individuals on pharmacokinetics and pharmacodynamics of drugs.

MPP 204T	**PHARMACOEPIDEMIOLOGY & PHARMACOECONOMICS**	
	CO1	Understand the various epidemiological methods and their applications.
	CO2	Understand the pharmacoeconomic decision analysis methods and its applications.
	CO3	To analyze current Pharmacoeconomic methods and issues with applications of Pharmacoeconomics to various pharmacy settings.
MPP 205P	**PHARMACY PRACTICE PRACTICAL – II**	
	CO1	To understand and perform various activities of clinical pharmacist.
	CO2	To understand the elements of pharmaceutical care and provide comprehensive patient care services.
	CO3	To interpret and calculate various pharmacokinetic parameters.
	CO4	To understand and apply the concept of pharmacoeconomics in to practice.
THIRD SEMESTER		
MRM 301T	**RESEARCH METHODOLOGY AND BIOSTATISTICS**	
	CO1	To understand the overall process of designing a research study from its inception to its report
	CO2	Students will be familiar with conducting a literature review for a scholarly educational study.
	CO3	To understand how statistical techniques are incorporated in the analysis of medical research data and its presentation
	CO4	To understand the basic principles of medical research and ethical issues.
	CO5	To understand CPCSEA guidelines.
	CO6	To understand and apply skills/tools for research report writing, how to publish in journals and to conduct poster, seminar and conference presentation.

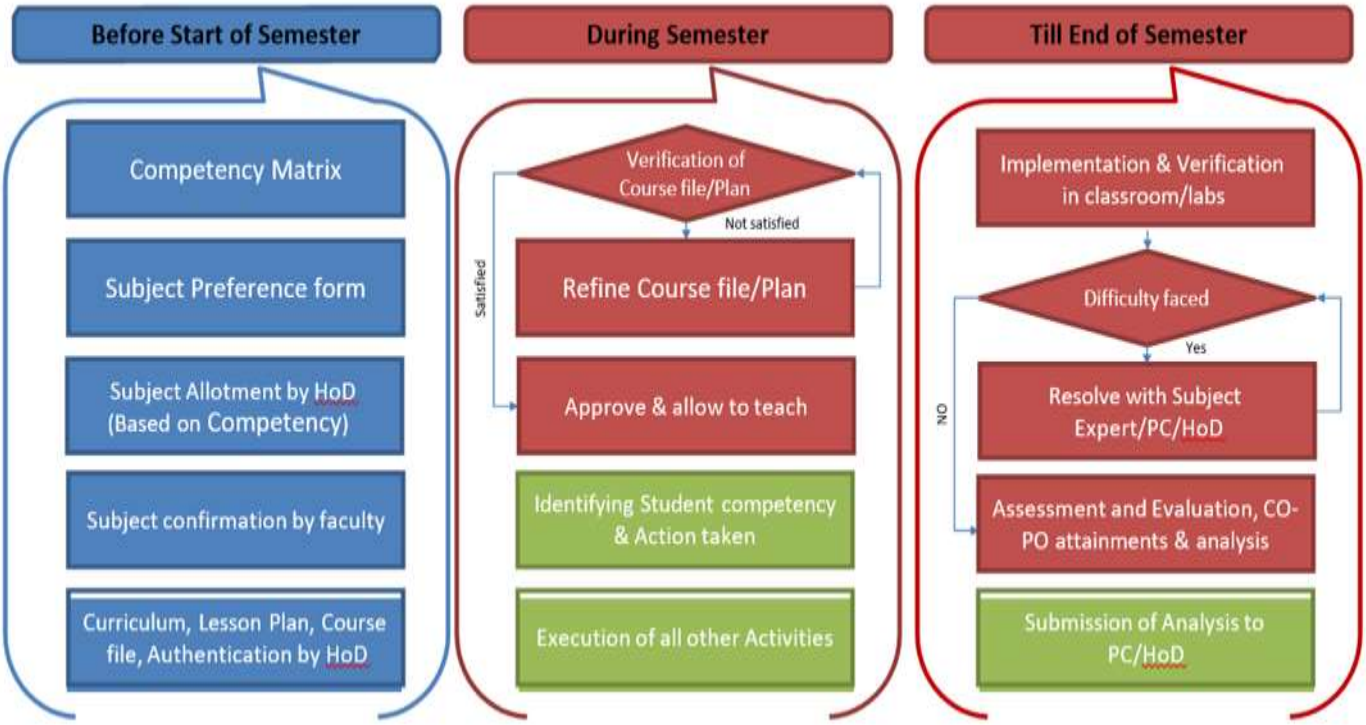
GUIDELINES FOR USING KEYWORDS IN CO-PO MAPPING

1. Develop a Keyword List: Collaboratively establish a core list of keywords associated with your Pharmacy Program Outcomes (POs). Consider:
    - Action Verbs (Bloom's Taxonomy): explain, formulate, dispense, counsel, assess, monitor, evaluate, optimize, manage
    - Technical Terms: pharmacokinetics, pharmacodynamics, dosage forms, drug interactions, compounding, clinical trials
    - Soft Skills: communication, patient counseling, interprofessional collaboration, critical thinking, ethical decision-making
2. Identify Keywords in COs and POs: Carefully examine your Course Outcomes (COs) and Program Outcomes (POs), highlighting core keywords.
3. Establish Correlations: Look for direct matches or semantic similarities between the keywords in COs and POs to indicate correlations. For example:
    - CO: "Dispense medications accurately according to prescription orders..."
    - PO: "...Demonstrate proficiency in the safe and effective preparation and dispensing of medications..."
    - Keyword Match: "dispense," "medications" suggest a strong correlation.
4. Cautions:
    - Nuance: Keywords might not fully represent every aspect of COs and POs. Ensure you understand the deeper context of intended learning outcomes.
    - False Positives: Avoid superficial matches. Ensure keywords align in the depth of knowledge and skill required.

Most of the times, appropriate keyword is sufficient for mapping.

Level	**Keywords Used in writing Cos**
No mapping (-)	Key words related with LOT and not related with course or any outcomes
Low (1)	Part of PO is reflected through keywords/action verbs
Medium (2)	Major part of PO is reflected through keywords/action verbs.
High (3)	Exact action verb of PO

OBE FRAMEWORK OF THE INSTITUTION



COMPETENCY MATRIX

To guarantee impactful learning experiences, a staff competency matrix should be implemented that evaluates proficiency in critical areas including content knowledge, assessment creation and evaluation, fostering student engagement, cultivating positive learning environments, maintaining professionalism and collaboration, and effectively integrating communication and technology.

SUBJECT PREFERENCE FORM DEVELOPMENT:

The HOD creates a form capturing faculty preferences for specific subjects, grade levels, and teaching formats.

FORM DISTRIBUTION AND COMPLETION:

The HOD distributes the form to all eligible faculty members with clear instructions and timelines. Faculty members complete the form and submit it to the HOD by the deadline.

DATA REVIEW AND ANALYSIS:

The HOD reviews the submitted forms, considering: Faculty preferences, Competency data (e.g., qualifications, certifications, past performance), Student evaluations (if available), Course requirements and student needs and availability of faculty members.

DRAFT SCHEDULE CREATION:

The HOD creates a draft teaching schedule based on the collected data and analysis. The schedule aims to maximize the alignment of faculty competencies with subject requirements while accommodating preferences as much as possible.

INDIVIDUAL MEETINGS:

The HOD may schedule individual meetings with faculty members to discuss potential assignments, address concerns, and ensure transparency.

FINAL SCHEDULE AND COMMUNICATION:

The HOD finalizes the teaching schedule, considering feedback from individual meetings. The final schedule is communicated to all faculty members, highlighting any changes made and justification (if needed).

CURRICULUM DEVELOPMENT:

Faculty member reviews program learning outcomes, course descriptions, and relevant frameworks.The curriculum aligns with learning outcomes, assessment strategies, and instructional methods.

LESSON PLAN CREATION:

For each unit or topic within the curriculum, faculty member creates detailed lesson plans.

Each lesson plan specifies:

- Learning objectives.
- Instructional activities (e.g., lectures, discussions, group work, assignments).
- Assessment methods (e.g., quizzes, projects, presentations).
- Required resources (e.g., textbooks, articles, technology).
- Estimated time allocation.

COURSE FILE PREPARATION:

Faculty member compiles all relevant materials and documentation into a comprehensive course file.

The course file typically includes:

- Approved curriculum document.
- Detailed lesson plans for all units/topics.
- Syllabi outlining course expectations, grading policies, and academic integrity guidelines.
- Assessment instruments (e.g., rubrics, quizzes, exams).
- Teaching handouts, slides, or other instructional materials.
- References, readings, and supplementary resources.
- Evidence of alignment with learning outcomes and program standards.

Submission and Review: Faculty member submits the completed curriculum, lesson plans, and course file to the Department Chair by the designated deadline.

The Department head reviews the materials for completeness, quality, and adherence to program guidelines. Feedback and suggestions for improvement are provided to the faculty member, if necessary.

Approval and Recordkeeping:

Once approved, the Department Chair signs off on the finalized materials. The Department Chair maintains records of all submitted curriculum, lesson plans, and course files.

Teaching assignments are granted to faculty upon approval by the Head of Department, ensuring alignment with expertise and program needs.

STUDENT COMPETENCIES

Specific competencies of students will be assessed

1. Academic skills: Standardized tests, classroom assessments, portfolios, self-evaluations.
2. Practical skills: Performance-based assessments, simulations, project work, observations.
3. Social-emotional skills: Peer observations, self-evaluations, surveys, interviews, teacher observations.

ASSESSMENT METHODS

Mid-term, End term, class test, surprise test, University theory exam ,Quizzes, Assignment problems, simulation, laboratory experiments, project, field work, report presentation, tutorials, activities, etc.

BASE SCORE FOR STUDENT CATEGORY

- <50% -Slow Learner
- 50% to 65% - Average Learner
- >65%-Advanced Learner

STRATEGIES FOR CATERING TO DIVERSE LEARNING NEEDS: SLOW, AVERAGE, AND ADVANCED LEARNERS

Educators strive to create inclusive learning environments that cater to the individual needs of all students, regardless of their learning pace or abilities.

SLOW LEARNERS:

- Individualized instruction: Tailor lessons to match the student's pace and learning style. Break down complex concepts into smaller, manageable steps.
- Multisensory learning: Engage multiple senses (visual, auditory, kinesthetic) to reinforce understanding. Utilize manipulatives, graphic organizers, and visuals.
- Frequent practice and review: Provide ample opportunities for practice and spaced repetition to solidify concepts. Offer differentiated practice problems with varying difficulty levels.
- Positive reinforcement: Celebrate small wins and progress to boost motivation and confidence. Encourage self-reflection and goal setting.
- Collaboration and peer tutoring: Pair slow learners with average or advanced peers for collaborative learning and peer support
- Remedial classes with timetable & attendance
- Edpuzzle which empower students to take an active role in their learning with interactive video lessons that spark creativity and curiosity.

AVERAGE LEARNERS:

Clear and concise instruction: Present information in a well-organized and easy-to-understand manner. Utilize a variety of instructional methods (lectures, discussions, activities) to keep students engaged.

Differentiated instruction: Offer choices in activities, projects, or assessments to cater to diverse interests and learning styles.

Group work and collaborative learning: Encourage teamwork and collaborative problem-solving to develop critical thinking and communication skills.

Independent learning: Provide opportunities for self-directed learning activities and research projects to foster autonomy and responsibility.

Regular feedback and check-ins: Offer constructive feedback and guidance to help students improve their understanding and performance.

ADVANCED LEARNERS:

Advanced learners are encouraged to enroll in Swayam, NPTEL courses.

Encouraged to participate in E-Cell and IEDC activities

External learning opportunities: Facilitate participation in academic competitions, conferences, or workshops to broaden their knowledge and connect with like-minded peers.

Guidance for competitive Examination

Individual guidance for career building

Journal clubs

Remember, these are just general strategies, and the most effective approach will vary depending on the specific needs of each student and the learning environment. By creating a flexible and differentiated learning environment, educators can empower all students to reach their full potential.

DESIGNING OF QUESTION PAPER

A good and reasonable examination paper must consist of various difficulty levels to accommodate the different capabilities of students. Bloom’s taxonomy framework helps the faculty to set examination papers that are well balanced, testing the different cognitive skills without a tilt towards a tough or easy paper perception.

Designing Question Papers based on Bloom's Taxonomy and Course Outcomes (COs)

Step-by-step procedure for designing question papers aligned with Bloom's Taxonomy and course outcomes (COs):

1. Define Course Outcomes (COs):

Clearly articulate the key knowledge, skills, and abilities your students should acquire by the end of the course.

Ensure COs are measurable and specific, using action verbs like "analyze," "create," or "evaluate."

2. Develop Questions:

For each mapped objective, craft questions that directly assess their specified skills and knowledge.

Use clear and concise language with appropriate vocabulary and difficulty level for the target audience.

Utilize diverse question formats (e.g., multiple choice, open-ended, short answer, problem-solving) to address different learning styles and assessment needs.

3. Ensure Coverage and Distribution:

Allocate questions based on the importance and complexity of each CO.

Aim for balanced representation across all Bloom's levels to test a variety of cognitive skills.

Consider including bonus questions for advanced learners at higher Bloom's levels (optional).

4. Review and Pilot Test:

Peer-review the question paper for clarity, accuracy, and alignment with COs and Bloom's levels.

Conduct a pilot test with a small group of students to gauge difficulty level and identify any potential issues.

Refine the question paper based on feedback and pilot test results.

A suggestive list of skills/ competencies to be demonstrated at each of the Bloom's level and corresponding cues/ verbs for the examination/ test questions are given below:-

S No.	Level	Skill Demonstrated	Question / Verbs for tests
1.	Remember	- Ability to recall information like facts, definitions, etc.	list, define, tell, describe, recite, recall, identify, show, label, tabulate, quote, name, who, when, where, etc.
2.	Understand	- Understanding information - Grasp meaning - Translate knowledge into new context - Interpret facts, compare, contrast - Order, group, infer causes - Predict consequences	describe, explain, paraphrase, restate, associate, contrast, summarize, differentiate, interpret, discuss
3.	Apply	- Use information - Use methods, concepts, laws, theories in new situations - Solve problems using required skills or knowledge - Demonstrating correct usage of a method or procedure	calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model, experiment, show, examine, modify
4.	Analyze	- Break down a complex problem into parts - Identify the relationships and interaction between the different parts of a complex problem - Identify missing, redundant, and contradictory information	classify, outline, break down, categorize, analyze, diagram, illustrate, infer, select
5.	Evaluate	- Compare and discriminate between ideas - Assess value of theories, presentations - Make choices based on reasoned argument - Verify value of evidence - Recognize subjectivity - Use definite criteria for judgments	assess, decide, choose, rank, grade, test, measure, defend, recommend, convince, select, judge, support, conclude, argue, justify, compare, summarize, evaluate
6.	Create	- Use old ideas to create new ones - Combine parts to make (new) whole - Generalize from given facts - Relate knowledge from several areas - Predict, draw conclusions	design, formulate, build, invent, create, compose, generate, derive, modify, develop, integrate

CO-PO ATTAINMENT GUIDELINES

The attainment of POs and COs are evaluated by direct and indirect attainment methods.

Level of attainment

The three levels of attainment is taken as 1- low; 2- medium;3- high and it can be defined as

- Attainment 3 :70% of students score more than 50% marks
- Attainment 2: 60% of students score more than 50% marks
- Attainment 1: 50% of students score more than 50% marks

Direct attainment

The direct attainment is done by evaluating student performance in Continuous Internal Assessment (CIA) which comprises of sessional examinations and academic activities (assignments, seminars, class tests and quizzes) and End semester/ year examinations (EE). The proportional weightages of CIA: EE are 20:80.

Direct attainment of a specific COs is determined from the performances of students to all the assessment items related to that particular CO. Hence, every assessment item needs to be tagged with the relevant CO. Continuous Internal Assessment is conducted and evaluated by college and End Semester Examination is conducted and evaluated by the University. The average marks scored in End semester/year examination will be considered as the common attainment of all COs.

Direct Course Outcome Attainment = 20% of Continuous Internal Assessment (CIA) +80% of End Semester/year examination attainment.

Indirect attainment

Indirect attainment of COs can be determined from the course end survey.

Attainment of CO = (Level-1 X No of Students Attempted) + (Level-2 X No of Students Attempted) + (Level-3 X No of Students Attempted)/Total No of Students (Level 1: Low; Level 2: Medium; Level 3: High)

Overall Course Outcome Attainment = 90% Direct Course Outcome Attainment + 10% Of Indirect Attainment

PO ATTAINMENT

PO assessment tools are categorized into Direct method and Indirect method. The final PO attainment is calculated by taking 80% of the attainment values from Direct assessment method and 20% of the attainment values from Indirect assessment method.

Direct Method:
Once the overall attainment percentage of each COs is calculated, the PO attainment is calculated by taking the cumulative average of all the course's CO attainment which contributes to the Program Outcomes.

Indirect Method:
This assessment approach is intended to find out about the quality of the learning process by getting feedback from exit surveys.

The obtained values will be compared with the set attainment target fixed for each PO. • If the target is achieved, then the same process will be continued for further batches. • If the target is not achieved, then continuous improvement action will be taken for each PO. Based on the attainment, the improvements to be done are discussed among the staff.

ACTION FOR GAP FULFILMENT

Department will call Departmental meeting to discuss how GAPs can be fulfilled. However these are some suggestions to the departments to fulfil these gaps: -

Remedial Classes for weak students arranged to improve the attainment level.

Beyond syllabus topics added to meet the requirement.

Industry visit/Industrial Expert talk/Senior academic talks can be arranged for the students.

REPORT ON GAP FULFILMENT

Gap analysis will be done in at the end of each semester, gap analysis of odd semester will be done in next even semester, the action for gap fulfilment will be decided & will be implemented in next odd semester. Similarly applicable for even semester also.