



PRAVARA RURAL EDUCATION SOCIETY'S
INSTITUTE OF PHARMACY, LONI

MANUAL
OF
OUTCOME BASED EDUCATION (OBE)





PRAVARA RURAL EDUCATION SOCIETY'S
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ABOUT INSTITUTE

Loknete Dr. Balasaheb Vikhe Patil (Padma Bhushan Awardee) Pravara Rural Education Society Institute of Pharmacy was started in the year 2014 with a humble aim to provide quality education in the Pharmaceutical Sector. It is the fifth pharmacy institution under the Loknete Dr. Balasaheb Vikhe Patil (Padma Bhushan Awardee) Pravara Rural Education Society and believes in providing quality education to the doorsteps of Rural India. Within a short span of 2 years, the college has been approved by DTE & Pharmacy Council of India (under section 12 of the Pharmacy Act, which enables the students to practice the profession of Pharmacy after successful completion of the course).The B pharmacy course started in year 2022 affiliated to Dr. Babasaheb Ambedkar Technological University,lonere. and Pharmacy council of India,New Delhi.



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ABOUT TRUST

Loknete Dr. Balasaheb Vikhe Patil (Padma Bhushan Awardee) Pravara Rural Education Society established in July, 1964 had twin objectives of providing high class education system comparable to the best in any urban area and to give a fillip to the empowerment of women through need based education. Under the vigilant eyes of Padmashri Dr.Vithalrao Vikhe Patil the Pravara Rural Education Society started its rapid growth and began to play a key role to meet the diversified educational needs of people in Maharashtra in Maharashtra. While Pravara Public School and Pravara Kanya Vidya Mandir were getting on their feet, Padmashri set about the task of starting Marathi Medium Schools and covered all the forty villages in and around Pravaranagar. His intuitive vision led him to the firm conviction that if quality education is provided to rural youth, they will play a dominant role in building the Nation. Further, he believed that education of a woman means the education of the whole family. The vision of Honorable Padmashri Dr.Vithalrao Vikhe Patil was carried forward by his son, Late. Padmabhushan Dr. Balasaheb Vikhe Patil, who took Pravara Rural Education Society to great heights with his vision and tremendous leadership. At present, the Loknete Dr. Balasaheb Vikhe Patil (Padma Bhushan Awardee) Pravara Rural Education Society is doing stupendous progress under the dynamic leadership of Honourable Chairman–Namdar Shri. Radhakrishna Vikhe Patil, the illustrious son of Hon'ble Late. Padmabhushan Dr. Balasaheb Vikhe Patil.



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ABBREVIATIONS

OBE	Outcome Based Education	BTL	Bloom's Taxonomy Level
LOT	Lower Order Thinking	HOT	Higher Order Thinking
PEOs	Program Educational Objectives	POs	Program Outcomes
COs	Course Outcomes	PSO	Program Specific Outcome
AE	Annual Examination	CIA	Continuous Internal Assessment



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DEFINITION OF ABBREVIATIONS

Lower order Thinking: The lower-order thinking skills include Remembering, Understanding and Applying.

Higher order Thinking: refer to skills that go beyond memorizing information.

Programme Educational Objects: PEOs are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. Knowledge, Skill and Attitude are the three behavioral elements based on which PEOs are constructed.

Course Outcomes: It is a detailed description of what a student must be able to do at the conclusion of a course.

Programme Outcomes: Program outcomes are statements that describe what students are expected to know and be able to do upon graduating from the program. These relate to the skills, knowledge, analytical ability, attitude and behavior that students acquire through the program.

Programme Specific Outcomes: Program Specific Outcomes are statements that describe what the graduates of a specific engineering program should be able to do.

Annual Examination: Annual examination means the examinations to be held at the end of each academic year separately for theory & practical part by the state board

Continuous Internal Assessment: Continuous Internal assessment is a form of educational examination that evaluates a student's progress throughout a prescribed course.

Bloom's Taxonomy Level: There are six levels of cognitive learning according to the revised version of Bloom's Taxonomy. Each level is conceptually different. The six levels are remembering, understanding, applying, analyzing, evaluating, and creating.

Course Objective: A course objective describes what a faculty member will cover in a course. They are generally less broad than goals and broader than student learning outcomes. Objectives focus on content and skills within the classroom or program.



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ABOUT OBE

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 help the 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 Institute provides to students. It shows the success by making or demonstrating outcomes using statements “able to do” in favor of students. OBE provides clear standards for observable and measurable outcomes.

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.



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India, OBE and Accreditation

From 13th June 2014, India has become the permanent signatory member of the Washington Accord. Implementation of OBE in higher technical education also started in India. The National Assessment and Accreditation Council (NAAC) and National Board of Accreditation (NBA) are the autonomous bodies for promoting global quality standards for technical education in India. NBA has started accrediting only the programs running with OBE from 2013.

The National Board of Accreditation mandates establishing a culture of outcome-based education in institutions that offer Engineering, Pharmacy, Management program. Reports of outcome analysis help to find gaps and carryout continuous improvements in the education system of an Institute, which is very essential.

Features of OBE:

- OBE is an educational process that focuses on what students can do or the qualities they should develop after they are taught.
- OBE involves the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of higher order learning and mastery rather than accumulation of course credits.
- Both structures and curriculum are designed to achieve those capabilities or qualities.
- Discourages traditional education approaches based on direct instruction of facts and standard methods.



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Expectations of students under OBE

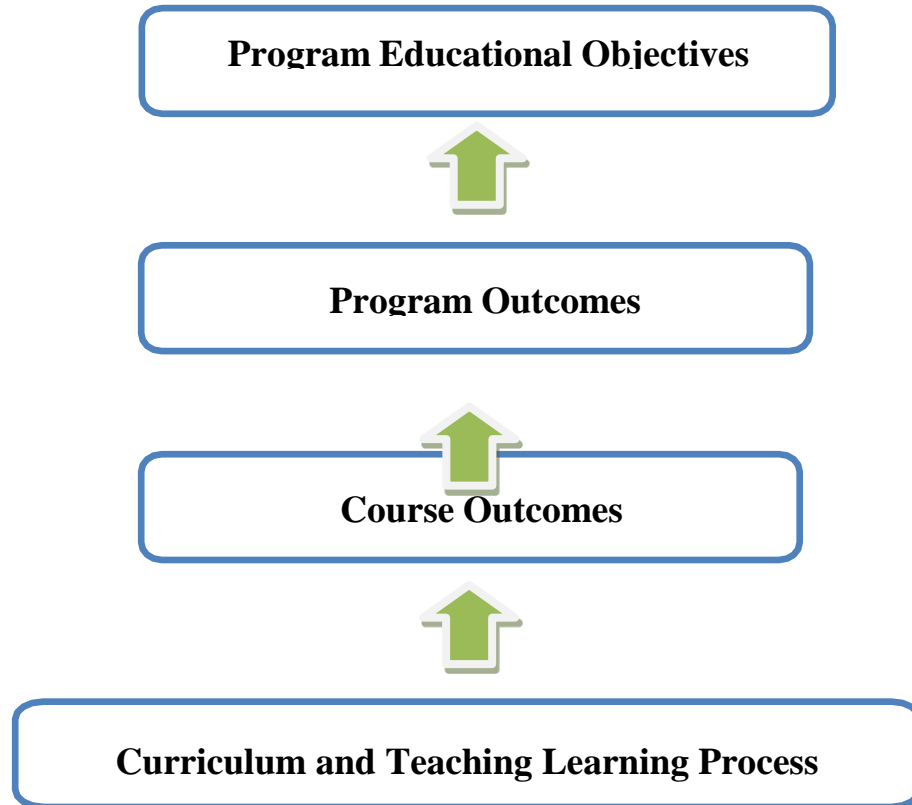
- Students are expected to be able to do more challenging tasks other than memorize and reproduce what was taught.
- Students should be able to: write project proposals, complete projects, analyze case studies, give case presentations, show their abilities to think, question, research, and make decisions based on the findings.
- Be more creative, able to analyze and synthesize information.
- Able to plan and organize tasks, able to work in a team as a community or in entrepreneurial service teams to propose solutions to problems and market their solutions.
- Students should be enriched on three dimensional scales of knowledge, skill and attitude throughout the course.

The OBE model measures the progress of the graduate in three parameters

1. Program Educational Objectives (PEOs)- Accomplishments after few years of graduation
2. Program Outcomes (POs)- To be achieved at the end of program
3. Course Outcomes (COs) - To be achieved at the end of course



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BLOOM'S TAXONOMY

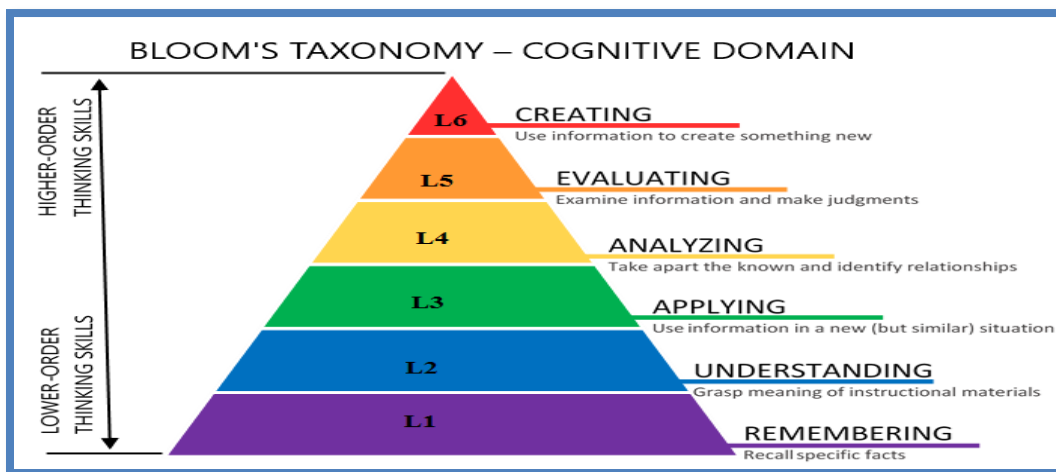


Figure : Bloom Taxonomy



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VISION AND MISSION OF INSTITUTE

VISION

To be an outstanding institute to produce global pharmacist through quality education programs

MISSION

M1 - To create facilities for quality education in pharmaceutical science and research

M2 - To develop collaborations with industries, hospitals and research institutions to meet professional needs

M3 - To reach out public through extension activities to meet social responsibilities, moral ethos and fulfill national obligations.



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**PROGRAM EDUCATIONAL OBJECTIVES (PEOS) AND PROGRAM
OUTCOME**

Program Educational Objectives (PEOs)

PEO1 -To develop professionally competent pharmacist capable of applying knowledge and skills to meet challenges in pharmacy profession

PEO2-To produce pharmacist who work in collaboration with other health professionals to deal with health issues of the society

PEO3 - To impart ethical principles and professional values in student for helping the society .

PEO4 - To inculcate leadership quality with effective oral and written communication skills. -

MAPPING OF PEOS TO MISSION

PEO	M1	M2	M3
PEO1 -To develop professionally competent pharmacist capable of applying knowledge and skills to meet challenges in pharmacy Profession.	3	2	1
PEO2 -To produce pharmacist who working collaboration with Other health professionals to deal with health issues of the society.	1	3	2
PEO3 - To impart ethical principles and professional values in student for helping the society.	1	3	2
PEO4 -To inculcate leadership quality with effective oral and Written communications kills.	1	2	3

1-Mild

2- Moderate

3-High



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PROGRAM OUTCOMES

- 1. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy.
- 2. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- 3. 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 wellbeing.
- 4. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
- 5. Pharmaceutical Ethics:** Honour 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.
- 6. 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.



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7. 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.

8. 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.

9. 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.



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OBE FRAMEWORK OF AN INSTITUTE

OBE focuses on student competency; it concentrates on the outcomes or goals instead of just marks or scores. Therefore, the goals which could be a certain number of skills and knowledge that the learner should have at the end of the course. The assessment methods are defined to measure the achievement of these goals. The teachers take the role of being facilitators and mentors. Constructive feedback from the students also helps in reshaping the additional activities to be given to the students.

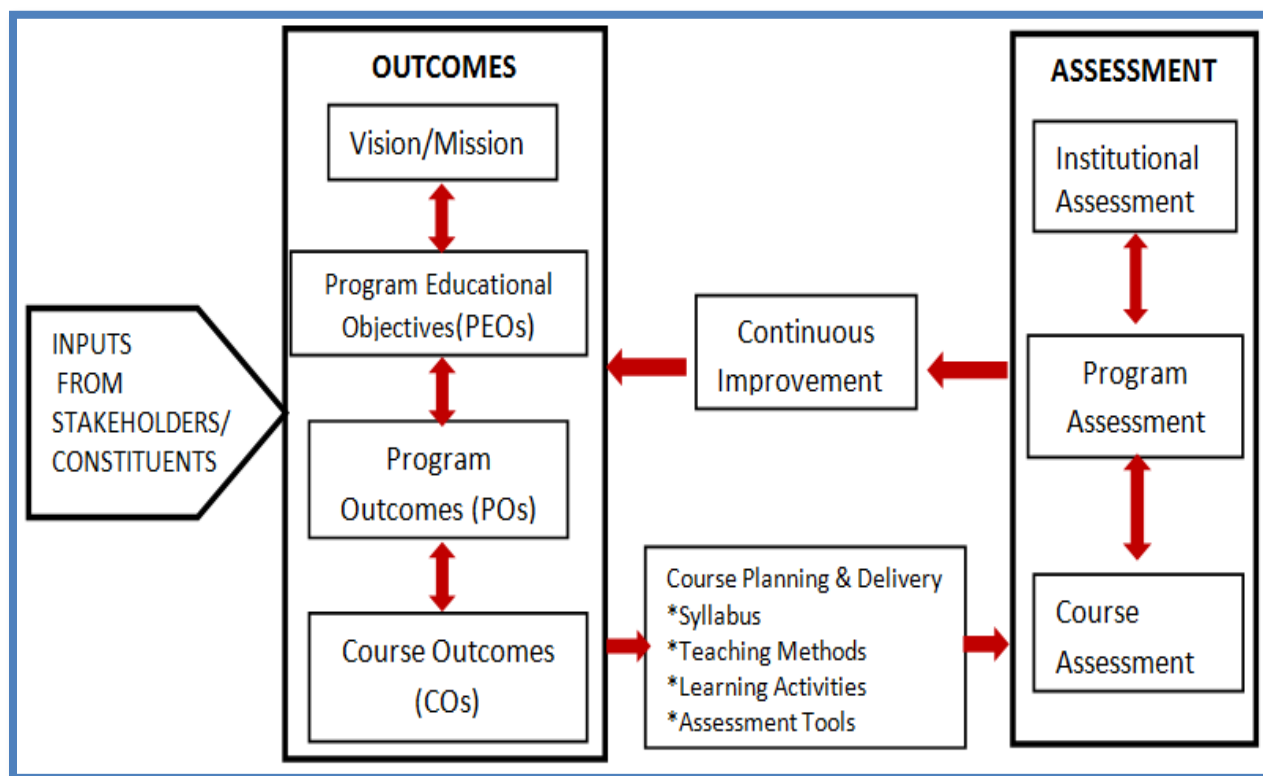


Figure : OBE Framework of Institute

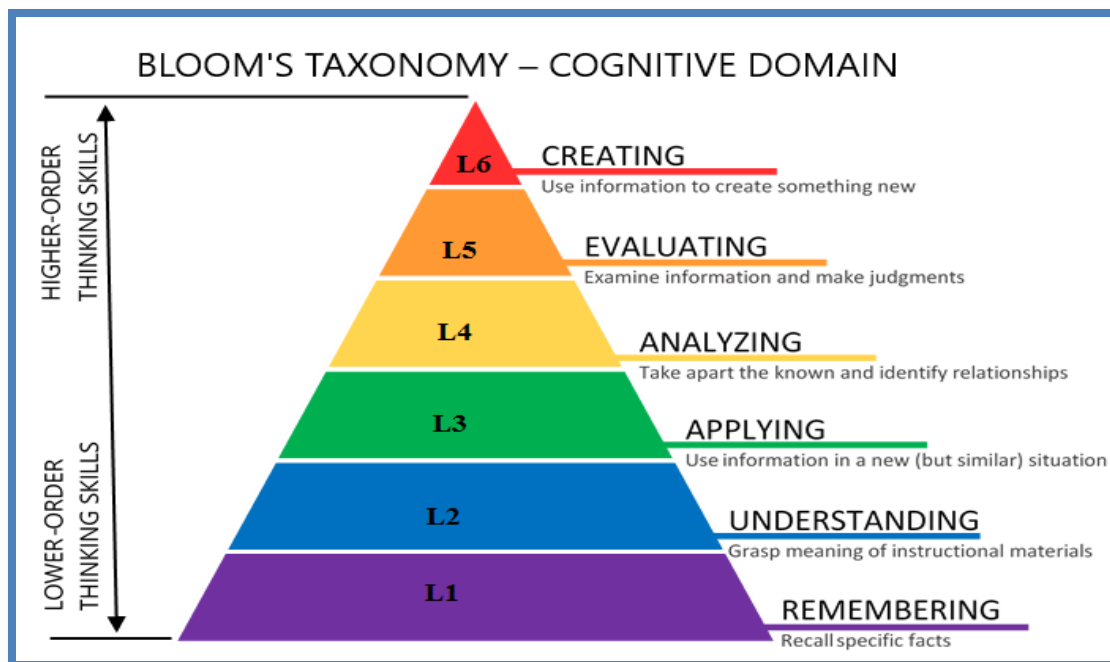


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COURSE OUTCOMES (COs)

Course Outcome is a statements indicating what a student can do after the successful completion of a course. Course outcomes statements are the statements of Knowledge/ Skills/ Attitude that students are expected to know, understand and perform, as a result of learning experiences. Well-written COs facilitate the faculty in measuring the achievement of the CO at the end of the year. It also helps the faculty in designing suitable delivery and assessment methods to achieve the designed COs

The CO statements are defined by considering the course content covered in each course. The keywords used to define COs are based on Bloom's Taxonomy. Each level is conceptually different and six levels are remembering, understanding, applying, analyzing, evaluating, and creating.





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The cognitive process dimensions- Categories					
Lower Order of Thinking (LOT)			Higher Order of Thinking (HOT)		
Remember	Understand	Apply	Analyze	Evaluate	Create
Recognizing (identifying)	Interpreting Illustrating Classifying	Executing Implementing	Differentiating Organizing Attributing	Checking (coordinating, detecting, testing, monitoring)	Planning Generating Producing (constructing
Recalling (retrieving)	Summarizing Inferring (concluding) Comparing Explaining			Critiquing (judging)	



Factual	Conceptual	Procedural	Metacognitive
<ul style="list-style-type: none"> • Knowledge of terminologies • Knowledge of specific details & elements 	<ul style="list-style-type: none"> • Knowledge of classifications and categories • Knowledge of principles & generalizations • Knowledge of theories, models & structures 	<ul style="list-style-type: none"> • Knowledge of subject specific skills and algorithms • Knowledge of subject specific techniques and methods • Knowledge of criteria for determining when to use appropriate procedures 	<ul style="list-style-type: none"> • Strategic Knowledge • Knowledge about cognitive task, including appropriate contextual and conditional Knowledge • Self-Knowledge

Table: Cognitive and Knowledge Category level



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GUIDELINES FOR WRITING COURSE OUTCOME STATEMENTS

Writing an effective course outcome involves three parts:

- 1. Action Verb**
- 2. Subject Content**
- 3. Context**
- 3. Level of achievement as per Bloom Taxonomy level?**

Formula for writing course outcome :

Course Outcome = Action Verb + Subject content + context

1. Action Verb

The action verb describes the intended cognitive process or what the learner is intended to do.

The action verb is typically selected from a Bloom's taxonomy list.

Lower Order of Thinking (LOT)			Higher Order of Thinking (HOT)		
Remember	Understand	Apply	Analyse	Evaluate	Create
Define	Explain	Clarify	Analyse	Reframe	Design
Describe	Describe	Apply	Compare	Criticize	Create
Identify	Interpret	Illustrate	Classify	Judge	Plan
Recognize	Summarize	Calculate	Distinguish	Recommend	Formulate
Recall	Compare	Sketch	Explain	Grade	Invent
Enumerate	Discuss	Prepare	Differentiate	Measure	Develop
observe	Estimate	Perform	Appraise	Test	Organize
Record	Express	Determine	Conclude	Evaluate	Produce



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Reproduce	outline	Identify	Recognize	Compare	Compose
listen	Identify	Use	Use	Score	Combine
Outline	List	Predict	Evaluate	Rank	Modify
list	Classify	Investigate	Illustrate	Debate	Produce
State	Illustrate	Carry	Organize	Justify	Validate
Develop	Relate	Describe	Outline	Choose	adapt
	Demonstrate	Recognize	Test		Compile
	Write	Demonstrate	Seperate		Express
		Interpret			
		Develop			

Table: Action Verb

2. Subject Content

The subject Content describes the knowledge students are expected to acquire. The subject content of the learning outcome is the knowledge, skill, or behavior that the student should have acquired. The statement describes the knowledge and abilities to be demonstrated.

3. Context

The context is the conditions of what delegates the learning

Illustration:

Course outcome:

Explain briefly about properties advantages, disadvantages, preparation, quality control test and packaging of various dosage forms

The above course outcome come belongs to blooms Cognitive level 2 and Knowledge category Procedural level.



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Action verb	Explain
Subject content	Properties advantages, disadvantages, preparation, quality control test and packaging
Context	Various Dosage forms

GUIDELINES/CHECKLIST FOR COS:

Number of Cos	3 to 8 (Depends on content of syllabus.)
CO essentials	Action Verb, Subject Content,
CO optional	Context
Based on BTL	Understand, Remember, Apply, Analyse, Evaluate, Create
Technical Content/ point of curriculum	All curriculum contents are covered



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CO PO MAPPING GUIDELINES

The Correlation between COs and POs is established

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

For a course we map the COs to POs through the CO-PO matrix as shown below. The various correlation levels 1, 2, 3 and - are

- '1' - Slight (Low) mapping (some contribution towards attainment)
- '2' - Moderate (Medium) mapping (medium contribution towards attainment)
- '3' - Substantial (High) mapping (high contribution towards attainment)
- '-' - indicates there is no correlation.

STEP 1: CO – PO Mapping

Mapping of the COs to relevant Program Outcomes (POs) is based on the content of each CO, with appropriate justification.

STEP 2: Identification of Mapping Strength (mapping factor)

Identification of the CO-PO Matrix is based on the attribution or contribution of each Course Outcome (CO) to a particular Program Outcome (PO), considering the number of sessions covered.

The CO –PO mapping is done at four levels with the following guidelines :

- Strength - : Less than 5% Sessions covered
- Strength 1 : 5% to 30 % Sessions covered
- Strength 2 : More than 30% up to 60 % Sessions covered
- Strength 3 : More than 60 % Sessions covered



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Description:

Assume Number of lecture = 75

Example: Let, CO1 related point's explained/engaged 30 lectures

Then Session covered in percentage = $(30/75) \times 100 = 40\% \rightarrow$ medium mapping (2)

Therefore 40 % session covered indicate CO1 has mapping Strength 2 .

Illustration:

The Sample CO – PO Mapping of course Community Pharmacy & Management(TH) is given below

Sample CO –PO Mapping

D Pharm II (ER 2020)

Course Name- Community Pharmacy& Management-TH **Year of Study:** 2022-2023

Mapping of COs to POs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
C202.1	√	-	-	√	-	-	√	-	-
C202.2	√	-	-	√	√	√	-	-	√
C202.3	√	-	-	√	-	√	√	-	√
C202.4	√	√	√	√	-	-	√	-	√
C202.5	√	√	-	√	√	√	-	-	√
C202.6	√	√	√	√	-	√	-	-	-



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Justification

COs	Justification
C202.1	PO1: Knowledge of historical development of community pharmacy profession. PO4: Professional responsibilities of community pharmacist are studied PO7: Professional responsibilities of community pharmacist
C202.2	PO1: Knowledge of prescription PO4: Pharmacist as a drug expert PO5: Legality of prescription. PO6: Documentation of prescription PO9: Updating the legal aspects
C202.3	PO1: Knowledge of benefits and stages of patient counselling PO4: Pharmacist identified as a medication counsel or PO6: Counsel the patient with respect to the chronic diseases PO7: Pharmacist instruct about handling of Patient Package Inserts and Patient Information leaflets PO9: Updating the counselling skills
C202.4	PO1: Knowledge related to OTC medication dispensing and health screening services PO2: Sphygmomanometer, blood glucometer, peak flow meter, incentive spirometer, pulse oximeter are used



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	<p>PO3: Role in OTC medication dispensing</p> <p>PO4: Pharmacist role in OTC medication dispensing and self medication</p> <p>PO7: Relate to monitor health</p> <p>PO9: Identify the need of screening test and satisfy that needs.</p>
C202.5	<p>PO1: Legal requirements to set up community pharmacy and standard operating procedure of Pharmacy management</p> <p>PO2: Pharmacy operation software's are used</p> <p>PO4: Role in community pharmacy management</p> <p>PO5: Legal requirements to set up community pharmacy</p> <p>PO6: Record making</p> <p>PO9: Updating Pharmacy operation software's</p>
C202.6	<p>PO1: Basic knowledge related to communication skills is essential</p> <p>PO2: Emails, Telephone use</p> <p>PO3: Lead in health promotion</p> <p>PO4: Provide health education</p> <p>PO6: Pharmacist effectively communicates with patient & professionals.</p>



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Course Outcome

Number	Course outcome sentence	POs	CL	Number	Course outcome sentence	POs
CO1	Discuss historical development of community pharmacy in international and Indian Scenario & professional responsibilities of community Pharmacist.	PO1,PO4, PO7	2	C	5	1,2
CO2	Explain handling of prescription with respect to dispensing, legality, labeling aspects & errors of prescription.	PO1,P04,P O5,PO6,P O9	2	C	7	3
CO3	Discuss the benefits and stages of patient counseling with respect to the chronic diseases, medication adherence and patient package insert.	PO1,PO4, PO6,PO7, PO9	2	C	12	5,6
CO4	Discuss role of pharmacist in OTC medication dispensing, self medication in various diseases and health screening services.	PO1,PO2, PO3,PO4, PO7,PO9	2	C	20	7,8
CO5	Discuss the legal requirement to set up community pharmacy and standard operating procedure of Pharmacy management.	PO1,PO2, PO4,PO5, PO6,PO9	2	C	25	9
CO6	Classify various communication skills with patient and professional.	PO1,PO2, PO3,PO4, PO6	2	C	6	4
CO1	Discuss historical development of community pharmacy in international and Indian Scenario & professional responsibilities of community Pharmacist.	PO1,PO4, PO7	2	C	5	1,2



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CO-PO Matrix

PO	COs	Total no. of sessions	% SESSIONS	Mapping Strength
PO1	CO1,CO2,CO3,CO4,CO5,CO6,	5+7+12+20+25+6=75	100	3
PO2	CO4,CO5,CO6	20+25+6=51	68	3
PO3	CO4,CO6	20+6=26	34.66	2
PO4	CO1,CO2,CO3,CO4,CO5,CO6	5+7+12+20+25+6=75	100	3
PO5	CO5,CO6	25+6=31	41.33	2
PO6	CO2,CO3,CO5,CO6	7+12+25+6=50	66.66	3
PO7	CO1,CO3,CO4	5+12+20=37	49.33	2
PO9	CO2,CO3,CO4,CO5	7+12+20+25=65	89.66	3

CO PO Mapping Strength

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
C202.1	3	-	-	3	-	-	2	-	-
C202.2	3	-	-	3	2	3	-	-	3
C202.3	3	-	-	3	-	3	2	-	3
C202.4	3	3	2	3	-	-	2	-	3
C202.5	3	3	-	3	2	3	-	-	3
C202.6	3	3	2	3	-	3	-	-	-
Average (C202)	3	3	2	3	2	3	2		3



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ATTAINMENT OF COURSE OUTCOMES

During the course of the program various measurement methods are used to measure the attainment of outcomes. The attainment of Course outcome largely depends on the student's performance output or marks obtained in Cumulative internal Assessment and Annual end theory and practical examination which indicates students learning achievements. Therefore, it is necessary and important to carry out a proper attainment method in order to measure student learning achievement and to predict the student's performance in future. There are different ways to assess student learning. Different types of assessment approaches available and the different frame works to interpret the results are as follows:

Assessment process:

Assessment process is done by direct method and it involves two parts

a. Internal Assessment

b. External Assessment

Course Outcome is evaluated based on the performance of students in internal assessments and in MSBTE board examination of a course. Internal assessment contributes 20% and MSBTE board assessment contributes 80% to the total attainment of a course outcomes



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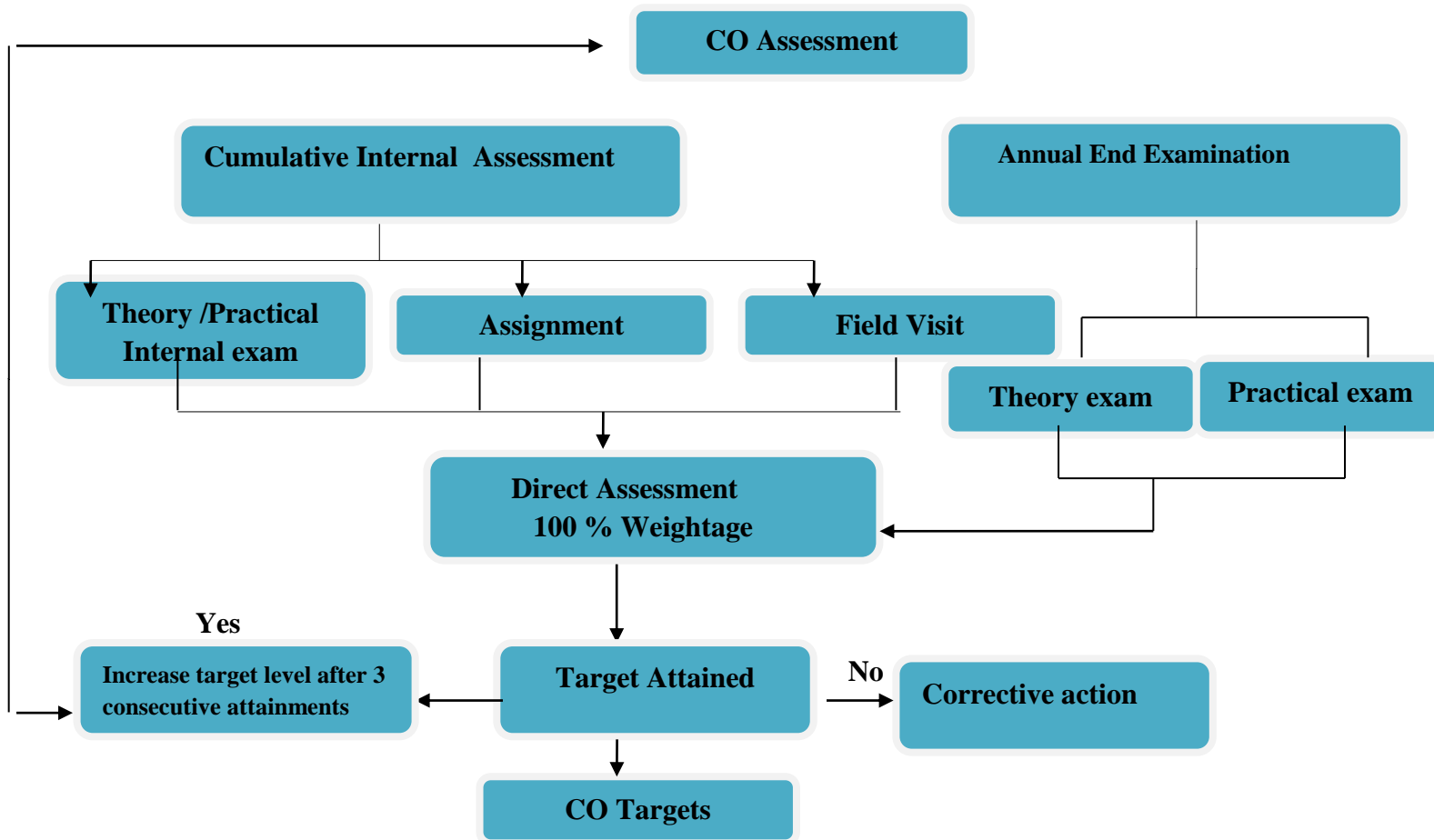


Figure: CO Assessment Process



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Assessment Process and tools used for attainment of Course outcome

Mode of Assessment	Assessment tool	Weightage	Description	Evaluation of Course Outcomes	Frequency of Assessment
Internal Assessment 20%	Theory Internal Sessional Examination	20 %	Three written examinations are conducted and average of best of two sessional examination marks is considered.	The questions in the internal examinations are mapped against COs of respective course. The questions for three internal examinations are framed in such a way to cover all course outcomes	Three times per year
	Internal Practical Sessional Examination	10%	Three practical examinations are conducted and average of best of two sessional examination marks are considered	The questions in the internal practical examinations are mapped against COs of respective course. The questions for three internal practical examinations are framed in such a way to cover all course outcomes	Three times per year
	Continuous Assessment (Applicable for ER 1991)	10%	The continuous assessment is done to analyze students practical knowledge.	It would generally satisfy all course outcomes for a particular course.	As per Course requirement
	Assignments (Applicable for ER 2020)	5 %	Three Assignments are conducted one assignment for each sessional and average of assignment marks are considered.	The topic of Assignments is mapped against COs of respective courses.	Three times per year
	Field Visit (Applicable for ER2020)	5 %	Field visit is conducted as per course requirement.	The topic of field visit is mapped against COs of respective courses.	As per Course requirement
External Assessment 80%	Annual Theory Examination	80 %	Theory Exam conducted by MSBTE board based on entire syllabus .	It would generally satisfy all course outcomes for a particular course.	One Time a year
	Annual Practical Examination	80 %	Practical Exam is conducted by MSBTE board based on entire syllabus	It would generally satisfy all course outcomes for a particular course.	One Time a year

Table: CO Assessment Tools



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a. Internal Assessment:

Sessional Examinations for ER 1991

1. Three theory sessional examinations are conducted of 20 marks .The short and long questions asked in the question papers of sessional exams are mapped with the COs and their attainments are calculated.
2. Three practical sessional exams are conducted for 20 marks and converted into out of 10 marks. Best of two sessional exam averages for 10 marks secured by the students is considered and 10 marks are considered on the basis of continuous assessment and this total 20 marks scored is considered for the calculation of internal assessment.

Sessional Examinations for ER 2020

1. Three theory sessional examinations are conducted of 40 marks and converted into 20 marks. Best of two sessional exam averages for 20 marks secured by the students in the theory sessional are considered for the internal assessment. The objective type, short and long questions are asked in the question papers of sessional exams are mapped with the COs and their attainments are calculated.
2. Three practical sessional exams are conducted for 80 marks and converted into out of 10 marks. Best of two sessional exam averages for 10 marks secured by the students is considered and 10 marks are considered on the basis of field visits and assignments and this total 20 marks scored is considered for the calculation of internal assessment.



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b. External Assessment:

1. MSBTE board annual theory examination consists of objective (only for ER 2020), descriptive type questions conducted by Maharashtra State Board of Technical Education, Mumbai (MSBTE).
2. MSBTE board annual practical examination is conducted on entire syllabus for 80 marks comprises of synopsis, spotting, conduction of experiments and viva-voce as per syllabus of ER-1991 and ER-2020.

CALCULATION OF COURSE OUTCOME ATTAINMENT

The course outcome attainment is calculated considering following:

1. Internal Assessment :

The 20 % weightage is given to Internal Sessional examination to calculate course attainments.

2.External Assessment:

The 80 % weightage is given to MSBTE board examination to calculate course attainment.

Setting target for CO Attainment

The Target of CO Attainment is based on Average marks students scored in previous year MSBTE Board examination



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ATTAINMENT LEVEL

Assessment Methods	Assessment Levels	
Cumulative Internal Assessment 20 % Weightage	Level - I	40 % of students scoring more than 40 % marks out of the maximum marks
	Level- II	50 % of students scoring more than 40 % marks out of the maximum marks
Annual End Examination (MSBTE Board Assessment) 80 % Weightage	Level - III	60 % of students scoring more than 40 % marks out of the maximum marks

To measure Attainment Level of COs one should have following Documents:

1. Curriculum unit-wise mapping of COs
2. Internal sessional Examination Question Paper and its mapping with Cos
3. Answer Papers of all the students for Internal Sessional Examination
4. All Evaluated Assignments and Marks obtained by all the students
5. Annual End Examination Marks obtained by all the students

Steps for Measurement of Attainment of COs are as follows :

STEP I: Decide the target and Level of Attainment

The target is set on basis of the percentage of students getting more than MSBTE Board average marks obtained for previous course exams or assigned by the program committee.



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Step III: Enter Marks of Internal Sessional and Annual End Examination for all Cos

The Student marks are entered in Excel sheet from answer book and added to a particular CO mapped to particular question.

Step IV : Calculation of Course outcome attainment

From marks entered in excel sheet of Internal sessional exam and Annual end examination CO attainment is calculated as per Attainment level se

Diploma in Pharmacy Academic Year: 2020-21												
Course: Biochemistry & Clinical Pathology Course Code: 000												
Course Outcomes (COs)												
CO1: Discuss chemistry, classification, biochemical role, Qualitative tests & disease associated with protein metabolism.												
CO2: Discuss chemistry, classification, biochemical role, Qualitative tests & disease associated with carbohydrate.												
CO3: Discuss chemistry, classification, biochemical role, Qualitative tests & disease associated with lipid metabolism.												
CO4: Discuss chemistry, biochemical roles of vitamins, coenzymes, Minerals & water.												
CO5: Outline concept of enzymatic action & factors affecting it.												
CO6: Discuss clinical pathology of blood & urine.												
Course Outcomes (CO)	Continuous Internal Evaluation				Assessment Tools		CO attainment average					
	Sess-1	Sess-2	Sess-3	Annual Exam	CO attainment	average	sessional exam	annual exam				
CO1	✓	✓	✓	✓	(3+3+3+3+3+3)/8=3	3						
CO2	✓	✓	✓	✓	(3+3+3+2+3+3+3+3)/12=2.91	3						
CO3	✓	✓	✓	✓	(2+2+1+2+2+3+3+3+3)/11=2.64	3						
CO4	✓	✓	✓	✓	(3+3+3+3+3+2+2+2+2+2+2+2)/12=2.67	3						
CO5	✓	✓	✓	✓	(3+2+2+2+2)/9=2	2						
CO6	✓	✓	✓	✓	(3+3+3+3)/9=2	2						
Average of all CO attainment												
Levels for Internal examinations												
Level-1 1. If 40% of students score more than 40% of marks												
Level-2 2. If 50% of students score more than 40% of marks												
Level-3 3. If 60% of students score more than 40% of marks												
Levels for Annual examination												
Level-1 1. If 40% of students score more than 40% of marks												
Level-2 2. If 50% of students score more than 40% of marks												
Level-3 3. If 60% of students score more than 40% of marks												
Attainment level status												
100% attainment of Internal Exam 1, 100% Attainment of Annual Exam												

Subject:	Biochemistry & Clinical Pathology													
Course Name and Code	BCP (809) (PH-1-S)													
Name of the teacher	Ms Pabli Jyoti Narayan													
Academic Year	2020-21													
Sessional 1														
Roll No.	Name of Student	1	2	3	4	5	6	7	8	9	10	11	12	13
	Course Outcome	1	1	2	1	2	2	2	1	1	1	2	2	2
1	Aher Aishwarya Parashram	1	1	1	0	1	1	1	1	0	1	0	1	1
2	Aher Omkar Sanjay	1	0	1	1	0	1	1	1	0	1	0	0	1
3	Aher Vaishnavi Dadasaheb	1	0	0	1	0	1	1	1	0	1	0	0	1
4	Andure Dipak Manohar	1	1	1	1	1	1	1	1	1	0	1	1	1
5	Aure Pratik Ashok	1	1	0	1	1	0	0	0	0	1	1	1	1
TOTAL		67	67	67	67	67	67	67	67	67	67	67	67	67
N		2	2	2	2	2	2	2	2	2	2	2	2	2
Attempt		65	65	65	65	65	65	65	65	65	65	65	65	65
Total Marks		62	58	52	55	47	49	43	46	41	43			
Average		0.95	0.89	0.80	0.85	0.72	0.75	0.66	0.71	0.63	0.66			
Students scoring more than 40% of maximum marks for each bit		62	58	52	55	47	49	43	46	41	43			
Attainments %		95.38	89.23	80.00	84.62	72.31	75.38	66.15	70.77	63.08	66.15			
Attainment on point 3 scale		3	3	3	3	3	3	3	3	3	3			

Figure : Sample CO Attainment calculation Excel Sheet



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Step V : Calculation of overall CO attainment

Internal attainment of each COs of **particular course** is the average of attainments obtained using various internal assessment tools. University exam covers the entire syllabus of a course and hence it is useful to measure the attainment of all COs related to a course. The total attainment is the sum of 20% of Internal exam attainment and 80% of External exam attainment.

$$\text{Total Attainment} = 20\% \text{ Internal Attainment} + 80\% \text{ University Attainment}$$

ATTAINMENT OF PROGRAM OUTCOMES

PO ASSESSMENT PROCESS

The program outcomes assessment is based on the course outcomes attainment, the final PO attainment is assessed by direct and indirect method. The assessment tools for direct and indirect methods used for evaluating the attainment of POs are mentioned below –

$$\text{POattainment} = (0.8 \times \text{Direct Attainment}) + 0.2 \times (\text{Indirect Attainment})$$

A. Direct methods

1. Internal Assessment.
2. External Assessment



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B. Indirect methods

1. Graduate Exit Survey:

At the end of the program , Graduate exit survey is conducted to summarize the feedback of students and the questionnaire of feedback are mapped with the program outcomes .

2. Alumni Survey:

Alumni survey is conducted during Alumni meet organized at the institute once in a year, the feedback of Alumni are mapped with the program .

The tools, process and frequency of assessment adopted for evaluating the attainment of the POs for every course the target level for an assessment year is set on the basis of the target achieved in the previous year. For any course, achieving the maximum attainment level of 3 during the assessment year, the attainment level for the subsequent year shall be redefined by increasing the target marks.



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PO ATTAINMENT PROCESS

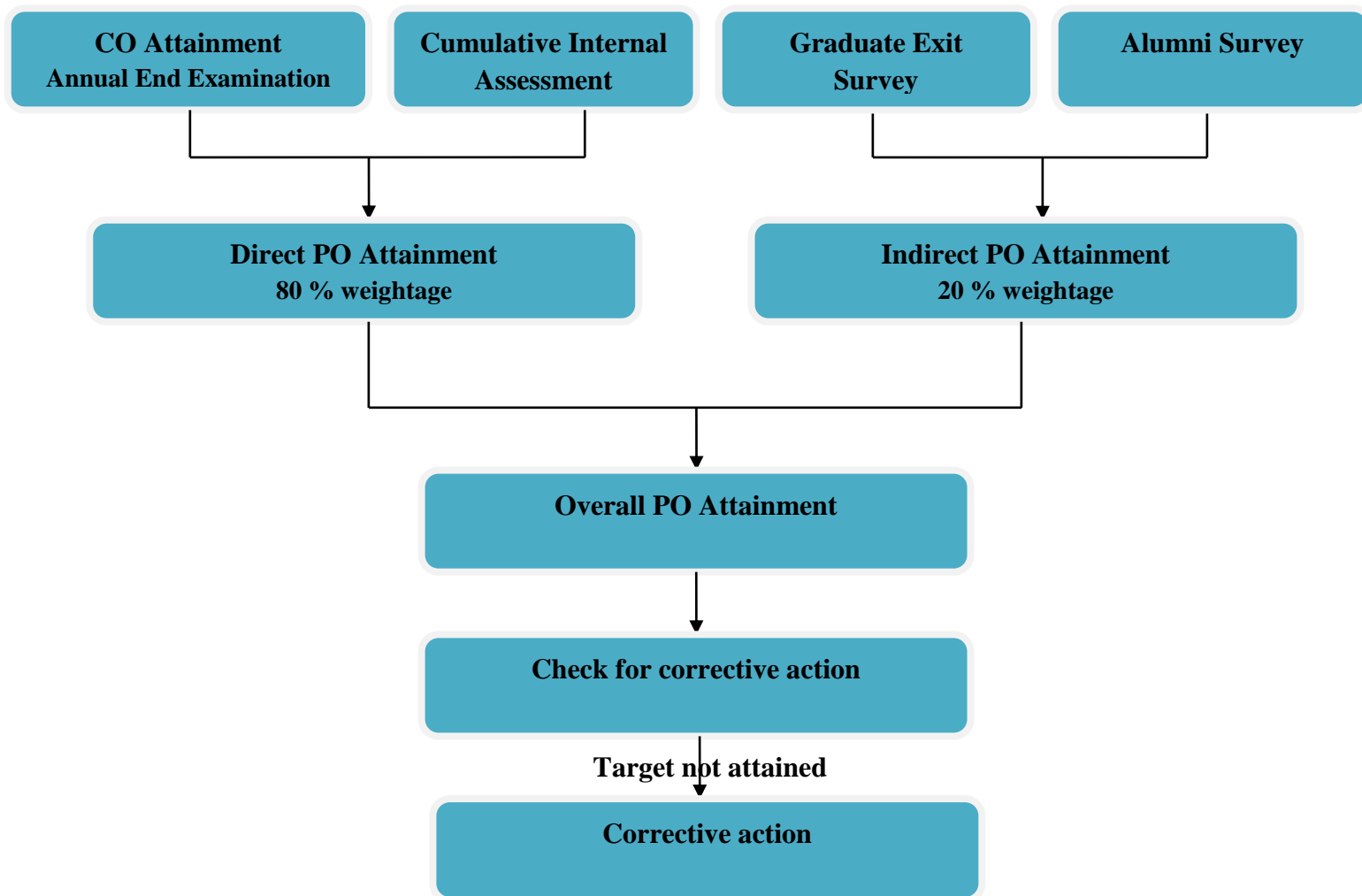


Figure: PO Attainment Process



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Evaluation process	Final attainment
Cumulative Internal Assessment	80 %
Annual End Examination	Direct Attainment
Graduate Exit Survey	20 %
Alumni Survey	Indirect Attainment

PO Evaluation

The process used to measure the attainment of POs through direct and indirect attainment is as follows,

A. Direct Methods

STEPS for Measurement of PO Attainment by direct method is as follows :

- 1. Course outcomes for all courses are drafted.**
- 2. Each course outcome is mapped to POs.**

The Correlation between COs and POs are established and various correlation levels 1, 2, 3 and – are established based on number of COs contribution (Session covered) to particular PO.



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Sample CO-PO mapping of Community Pharmacy and Management (TH)(C202)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
C202.1	3	-	-	3	-	-	2	-	-
C202.2	3	-	-	3	2	3	-	-	3
C202.3	3	-	-	3	-	3	2	-	3
C202.4	3	3	2	3	-	-	2	-	3
C202.5	3	3	-	3	2	3	-	-	3
C202.6	3	3	2	3	-	3	-	-	-
C202	3	3	2	3	2	3	2	-	3

3. Attainment of COs are measured by using external, internal assessments and calculation of PO attainment.

The attainment of each course outcome is determined using internal as well as external (MSBTE exam) assessment. The each PO attainment of corresponding to a particular course is determined from the attainment values obtained for each course outcome related to that PO and the CO-PO mapping values

Direct PO attainments are calculated using result of CO attainment by using formula:

$$\text{PO Attainment at course level} = \frac{\text{Actual course weight age X Course attainment of course}}{\text{Maximum weight age}}$$



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Illustration:

Let's Assume Course attainment value is 2.11 of course Community pharmacy and management and CO-PO mapping strength is as per table listed above .

SO

$$\text{PO Attainment at course level} = \frac{\text{Actual course weight age X Course attainment of course}}{\text{Maximum weight age}}$$

Sample calculation:

$$\begin{aligned} \text{C202.1 - PO1 mapping attainment} &= 3 \times 2.11 / 3 = 2.11 \\ \text{202.1 - PO4 mapping attainment} &= 3 \times 2.11 / 3 = 2.11 \\ \text{C202.2- PO7 mapping attainment} &= 2 \times 2.11 / 3 = 0.737 \\ \text{C202.4- PO3 mapping attainment} &= 2 \times 2.11 / 3 = 0.737 \end{aligned}$$

Target for PO Attainment

$$\text{Target for PO Attainment} = \text{Direct Attainment (80\%)} + \text{Indirect Attainment of POs (20\%)}$$

$$\text{Direct Attainment} = \text{CO - PO weight age X 0.8}$$

$$\text{Indirect Attainment} = \text{Maximum weight age of Pos through Survey X 0.2}$$

Analysis of PO Attainment

$$\% \text{ PO Attainment} = \text{Actual PO Attained} / \text{Target} * 100$$



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Direct PO attainment of Community Pharmacy and Management (TH) (C202)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
C202.1	3 x2.11/3	-	-	3 x2.11/3	-	-	2 x3/3	-	-
C202.2	3 x2.11/3	-	-	3 x2.11/3	2 x3/3	3 x2.11/3	-	-	2.11
C202.3	3 x2.11/3	-	-	3 x2.11/3	-	3 x2.11/3	2 x3/3	-	2.11
C202.4	3 x2.11/3	3 x 2.11/3	2 x3/3	3 x2.11/3	-	3 x2.11/3	2 x3/3	-	2.11
C202.5	3 x2.11/3	3 x2.11/3	-	3 x2.11/3	2 x3/3	3 x2.11/3	-	-	2.11
C202.6	3 x2.11/3	3 x2.11/3	2 x3/3	3 x2.11/3	-	3 x2.11/3	-	-	-
C202	2.11	2.11	0.737	2.11	0.736	2.11	0.737	-	2.11

Average of direct attainments of PO obtained for all Courses:

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	AVG
C101	x ₁	x ₁	x ₁	x ₁	x ₁	x ₁	x ₁	x ₁	x ₁	X ₁
C201	x ₂	x ₂	x ₂	x ₂	x ₂	x ₂	x ₂	x ₂	x ₂	X ₂
AVG	y	y	y	y	y	y	y	y	y	Y

Direct Attainment (Y) = Average of direct attainments of 'y' obtained for all Courses.



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Direct Attainment value of all courses for Batch 2019-21 are as follows:

Subject	Course code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
Pharmaceutics (TH)	C101	0.58	0.58	-	0.58	0.58	-	-	0.58	0.58
Pharmaceutical Chemistry (TH)	C102	0.56	0.19	-	0.56	0.19	-	-	-	0.56
Pharmacognosy (TH)	C103	0.57	0.57	-	0.57	0.19	-	0.38	-	-
Human Anatomy and Physiology (TH)	C104	0.56	0.19	-	0.56	-	-	-	-	-
Social Pharmacy(TH)	C105	2.02	2.02	2.02	2.02	0.67	1.35	2.02	0.67	2.02
Pharmaceutics (PR)	C106	2.97	2.97	-	2.97	0.99	2.97	0.99	1.98	0.99
Pharmaceutical Chemistry (PR)	C107	2.78	1.85	-	2.78	0.93	2.78	-	0.93	1.85
Pharmacognosy (PR)	C108	2.96	1.97	-	2.96	-	2.96	-	-	-
Human Anatomy and Physiology (PR)	C109	2.94	1.96	-	2.94	-	2.94	-	-	1.96
Social Pharmacy (PR)	C110	2.85	1.90	0.95	2.85	-	2.85	2.85	1.90	0.95
Pharmacology (TH)	C201	2.86	-	-	2.86	-	-	2.86	-	1.91
Community Pharmacy and Management (TH)	C202	2.93	2.93	1.95	2.93	1.95	2.93	1.95	-	2.93



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Biochemistry and Clinical Pathology (TH)	C203	2.11	-	-	2.11	-	-	-	-	-	-
Pharmacotherapeutics (TH)	C204	2.86	-	-	2.86	0.95	-	-	-	-	0.95
Hospital and Clinical Pharmacy (TH)	C205	2.15	2.15	2.15	2.15	2.15	1.43	2.15	0.72	2.15	
Pharmacy Law and Ethics(TH)	C206	2.95	0.98	2.95	2.95	2.95	-	2.95	0.98	2.95	
Pharmacology (PR)	C207	2.89	2.89	-	2.89	0.96	2.89	2.89	-	0.96	
Community Pharmacy and Management(PR)	C208	2.98	1.99	0.99	2.98	0.99	2.98	2.98	-	2.98	
Biochemistry and Clinical Pathology (PR)	C209	2.84	2.84	-	2.84	-	2.84	-	-	2.84	
Pharmacotherapeutics (PR)	C210	2.88	-	-	2.88	-	2.88	2.88	-	2.88	
Hospital and Clinical Pharmacy(PR)	C211	3.00	3.00	1.00	3.00	-	3.00	-	-	3.00	
	Avg	2.34	1.82	1.86	2.34	1.52	2.54	2.17	1.11	2.05	1.97

PO Attainment (Direct Method) = 1.97



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B. Indirect methods

Indirect POs attainment is calculated by using Graduate exit survey and Alumni Survey.

A) Graduate Exit Survey

Graduate exit survey is conducted of students who graduated out of Institute for that year to summarize the feedback of students and the questionnaire of feedback is mapped with the program outcomes.

Questionnaire Format:

The questionnaire consists of 10 questions which is relevant for assessing each PO. Each question is having 3 options namely Excellent, Very Good, Good, which is given ratings 3, 2, 1 respectively.

Sr. No.	Question	Rating		
		1	2	3
1	D Pharm program enabled me to acquire knowledge of drugs and their formulation uses and adverse effect.			
2	D Pharm program enabled me to acquire knowledge of prescription handling and Patient counselling skill.			
3	D Pharm program encourage me to follow ethical consideration in pharmacy practice			
4	D Pharm program encourage me to use modern tools and techniques for pharmacy practice			
5	D pharm program enhance my social responsibility as a pharmacist in			



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	dealing with community health and environmental issue			
6	D pharm program help me to develop leadership skills through various student developmental activities			
7	D pharm program help me to develop communication skills through various student developmental activities			
8	D pharm program help me to develop team spirit through various student developmental activities			
9	D Pharm program encourage me to develop zeal as a life long learner			
10	D Pharm program help me to get knowledge of world(Human,culture,society and science)			

Mapping of PO with Questionnaires' (Graduate Exit survey)

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
Question Co-relation with PO	1	4	6	8	3	7	5	10	9



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2. Alumni Survey:

Alumni survey is conducted during Alumni meet organized at the institute once in a year, the feedback of Alumni are mapped with the program .

Questionnaire Format:

The questionnaire consists of 9 questions which is relevant for assessing each PO. Each question is having 3 options namely Excellent, Very Good, Good, which is given rating 3,2,1 respectively.

Sr.No.	Question	Rating		
		1	2	3
1	Extent of curriculum meeting the industry and community needs.			
2	Your ability to apply knowledge of drug and dosage form to meet desired need of society			
3	Your ability to engage and to resolve contemporary issues acquired lifelong learning.			
4	Your ability to use techniques, skill, and model tools necessary for pharmacy practices.			
5	Benefit from communication skills, presentation skills, and leadership qualities acquired from student development activity.			
6	Competence to function on multidisciplinary teams in your job			
7	Responsibility level acquired as pharmacist to address social health, safety and environmental issues.			
8	How useful was training provide by institute in professional life			
9	Apply ethical principles in fulfilling professional ethics and responsibility of pharmacy education.			



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Mapping of PO with Questionnaires (Alumni Exit survey)

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
Question Co- relation with PO	1	7	9	2	6	3	8	4	5

2. The feedback of students and the questionnaire of feedback obtained from Graduate exit survey and Alumni Survey are mapped with the program outcomes and attainments is calculated by using following formula

$$\text{PO Attainment} = \frac{\text{No of Respondent at level A} \times \text{A}}{\text{Total number of Respondent}}$$

Where A = Response level 1, 2, 3

Illustration:

If 33 graduates or alumni participates in Graduate exit and alumni survey and gives rating in scale of 3,2,1 to a questionnaire asked in survey. Then number respondent who given rating 3,2,1 to a questionnaire are mapped with the program outcomes then number of respondent at level 3,2 and 1 are counted.



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Graduate Exit Survey									
Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
No. of Student at level 3	30	32	32	30	31	30	29	31	33
No. of Student at level 2	2	1	1	2	2	2	3	2	0
No. of Student at level 1	1	0	0	1	0	1	1	0	0

On basis of number of respondent participated and rating given put in below formula and we PO attainment

$$\text{PO Attainment} = \frac{\text{No of Respondent at level A} \times \text{A}}{\text{Total number of Respondent}}$$

Sample calculation:

No. of Student at level 3- PO1 mapping attainment	=	30 X 3 / 33	= 2.73
No. of Student at level 2 - PO2 mapping attainment		1 X 2 / 33	= 0.06
No. of Student at level 1 - PO4 mapping attainment		1 X 1 / 33	= 0.03

On doing calculation as above for all ratings mapped with the program outcomes for graduate exit survey and Alumni survey we get :



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Graduate Exit Survey

Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
3	2.73	2.91	2.91	2.55	2.82	2.73	2.64	2.82	3.00	
2	0.12	0.06	0.06	0.12	0.12	0.12	0.18	0.12	-	
1	0.03	-	-	0.03	-	0.03	0.03	-	-	
Average	0.96	1.48	1.48	0.90	1.47	0.96	0.95	1.47	3.00	1.39

Indirect PO attainment by Graduate survey: 1.39

Alumni Exit Survey

Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
3	2.93	2.86	2.86	2.93	2.86	2.86	2.86	2.86	2.86	
2	0.05	0.09	0.09	0.05	0.09	0.05	-	0.09	-	
1	-	-	0.02	-	0.02	0.02	0.02	-	-	
Average	1.49	1.48	0.99	1.49	0.99	0.98	1.44	1.48	2.86	1.47

Indirect PO attainment by Alumni survey: 1.47



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Overall PO Attainment

The final PO attainment can be computed for a specific batch of students using following equation:

$$\text{Overall attainment} = (0.8 \times \text{DirectAttainment}) + 0.2 \times$$

Illustration:

The PO attainment (direct method) is 1.97 and PO attainment obtained by Indirect method by Graduate survey and alumni survey are 1.39 and 1.47 respectively

So

$$\begin{aligned}\text{Over all PO Attainment} &= (0.8 \times \text{DirectAttainment}) + (0.2 \times \text{IndirectAttainment}) \\ &= (0.8 \times 1.97) + 0.2 \times (1.39 + 1.47/2) \\ &= 1.576 + 0.286 = 1.862\end{aligned}$$

Over All PO Attainment = 1.862



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CONTINUOUS IMPROVEMENT (FACULTY LEVEL)

Outcome	Action to be taken by faculty
High attainment of all CO-PO	Set new higher targets or attainment levels for next Academic Year (A.Y.).
Moderate attainment of all CO-PO	Record observations, Continue action plan of last A.Y. with plan for improvements.
Low attainment of all CO- PO	Record observations, assess the target set, revise/improve action plan of last A.Y. to achieve the attainment with plan for improvements.
CO-PO not attained, poor performance	Record observations, Critical assessment of target with Program Assessment Committee (PAC), Revise action plan of last A.Y. at faculty/department level.