





CHALAKKODE P.O., KOROM, PAYYANUR, KANNUR-670 307

OUTCOME BASED EDUCATION MANUAL





1 DEFINITIONS

Outcome Based Education (OBE) serves as the foundational framework for a high-quality educational system. It does not prescribe a singular teaching or assessment approach, instead emphasizing that all educational endeavours within OBE should be directed towards accomplishing predetermined objectives. OBE complements traditional methodologies and directs attention towards the resources and support provided by educational institutions. Success in OBE is measured through the demonstration of outcomes, typically expressed as statements indicating students' abilities. Moreover, OBE establishes precise criteria for observable and quantifiable achievements.

KOROM, PAYYANUR, KANNUR-670 307

Why OBE?

The conventional education system emphasizes the inputs provided by teachers and assumes that learning has taken place. In contrast, Outcome Based Education (OBE) directs its attention towards assessing "what the students are capable of doing." It establishes clarity regarding the desired achievements, with predetermined outcomes serving as benchmarks.

OBE transcends typical structured assignments, requiring students to actively participate in the learning process and showcase their skills through more demanding tasks and advanced cognitive abilities.

Furthermore, OBE offers a focal point for assessment and aids employers in comprehending the advantages of the program.

Key Features of OBE

The OBE model assesses the advancement of a graduate across three distinct sets of parameters, which encompass:

- Program Outcomes (PO) - Course Outcomes (CO)





Program outcomes delineate the expected knowledge and abilities that students should possess upon graduation. These outcomes are required to align with the 12 Graduate attributes outlined by the NBA for undergraduate engineering programs.

Course outcomes serve as quantifiable indicators that gauge each student's performance in individual courses undertaken during each semester. Additionally, the NBA mandates the evaluation of a set of Program Specific Outcomes (PSOs), which are outcomes tailored specifically to the subject of study pursued by the graduate. These PSOs measure the technical or subject-specific knowledge acquired by the graduate.



Benefits of OBE

Clarity: Emphasizing outcomes establishes a distinct understanding of the objectives to be achieved by the conclusion of the course.

Flexibility: Armed with a precise understanding of the desired achievements, instructors can tailor their lessons to accommodate the specific requirements of their students.





Comparison: OBE facilitates comparison at various levels including individual, class, cohort, program, and institutional levels.

KOROM, PAYYANUR, KANNUR-670 307

Involvement: Students are tasked with actively engaging in their own learning process. Heightened student involvement fosters a sense of ownership over their learning journey, thereby facilitating greater individual learning outcomes.

Outcome Based Education (OBE) represents a student-centric instructional framework that prioritizes the assessment of student performance based on predetermined outcomes. These outcomes encompass various facets such as knowledge, skills, attitude, and behavior. The primary emphasis lies in evaluating the program's outcomes by articulating the expected attainment levels of knowledge, skills, attitude, and behavior for graduates upon program completion, extending even to their performance after 4 to 5 years post-graduation. Within the OBE model, the requisite knowledge and skill sets for specific engineering degrees are predetermined, with students being assessed across all required parameters (outcomes) throughout the duration of the program.

The criteria integrated within the frameworks typically undergo selection via the customary developmental procedures within the relevant discipline. Assessment methodologies are selected with the aim of ascertaining whether students have met the established criteria. Assessments can manifest in various formats, as long as they effectively gauge whether students possess the necessary knowledge or can execute the requisite tasks.







KOROM, PAYYANUR, KANNUR-670 307

OBE Addresses Key Questions.

- ≻Who are our stakeholders?
- ≻What services do we provide?
- ➤What facilities and policies must be present?
- ≻How do we measure our results?
- ≻How do we use these results for Continuous Quality Improvement (CQI)?
- ≻Are we achieving our objectives and improving?
- ≻Are our stakeholders satisfied?

Stake-holders – who are they?

The stake-holders for programs and for professional institutions are:

- > Students
- > Parents
- Industries
- Society
- Alumni
- Faculty & Staff Members
- Members of the Governing Body, Advisory Committees, etc





KOROM, PAYYANUR, KANNUR-670 307

Suggested teaching activities

- ✓ Classroom teaching
- ✓ Seminars
- ✓ Quiz
- ✓ Giving Problems/Assignments
- ✓ Projects
- \checkmark Case studies
- ✓ Group discussions
- ✓ Peer tutoring

Key guidelines for outcome-based learning

- ✓ Visualization of terminologies
- ✓ Cooperative and cohesive learning
- ✓ Inquiry-based instruction
- \checkmark Differentiation
- \checkmark Applying Technology in the classroom
- ✓ Professional development





KOROM, PAYYANUR, KANNUR-670 307

2 VISION AND MISSION

2.1 Vision

A knowledge society promoting human excellence and enlightenment through technical education.

2.2 Mission

To provide technical education of highest quality and standard of excellence for socioeconomic progress embedded in clearly articulated values and driven by commitments.

2.3 Graduate Attributes

Upon completing the program successfully, graduates will embody a comprehensive array of attributes crucial for their professional and personal advancement. These attributes encompass:

1. Mastery of Domain Knowledge: Application of knowledge across diverse fields of arts, science, and management.

2. Proficiency in Problem Analysis: Skill in identifying and analyzing complex problems within various domains.

3. Ability to Design/Develop Solutions: Capability to devise solutions for intricate problems, taking into account public health and safety, as well as cultural, societal, and environmental considerations.

4. Competence in Conducting Investigations: Proficiency in conducting research, designing experiments, and executing them effectively.

5. Application of Society and Ethics: Utilization of contextual knowledge for societal welfare and adherence to professional ethics.





6. Understanding of Environment and Sustainability: Awareness of environmental factors and dedication to sustainable development.

KOROM, PAYYANUR, KANNUR-670 307

7. Mastery of Project Management and Teamwork: Demonstration of project management principles across different domains, enabling effective leadership and teamwork.

8. Effective Communication Skills: Proficiency in communicating effectively for interpersonal interaction and presentations in relevant forums.

9. Cultivation of Innovative Thinking: Encouragement of innovative thinking, identification of business opportunities, and development of entrepreneurial skills for entrepreneurship.

10. Recognition of Lifelong Learning: Acknowledgment of the significance of lifelong learning, along with a commitment to moral values. These attributes collectively equip graduates for success in their careers and lifelong pursuits.





3 PROGRAMME EDUCATIONAL OBJECTIVES

KOROM, PAYYANUR, KANNUR-670 307

3.1 PEO Definition

Programme Educational Objectives (PEOs) delineate the targeted accomplishments and aspirations that an educational program aims for its graduates to attain. These objectives define the desired attributes, competencies, and achievements expected of students upon program completion, serving as a framework to guide curriculum development, assessment methods, and ongoing enhancement initiatives within the educational institution.

3.2 LIST of PEO

A) ELECTRONICS AND COMMUNICATION ENGINEERING

- 1. The graduates of the Programme will have a successful career as Professionals in Industry or as Entrepreneurs, encompassing a broad spectrum of areas related to Electronics and Communication Engineering.
- 2. They will be able to adapt to the changing needs of Industry and Academia through continuous learning and professional upgrading.
- 3. They will exhibit social responsibility in their pursuit for technical excellence.

B) COMPUTER SCIENCE AND ENGINEERING

- 1. Graduates will be successful professionals in Industries of core or interdisciplinary nature or entrepreneurs, demonstrating effective leadership and excellent team work.
- 2. Graduates will expand the horizon of knowledge through higher education or research, leading to self-directed professional development.
- 3. Graduates will demonstrate professional attitude and ethics while providing solutions in societal and environmental contexts.

OBE MANUAL





C) MECHANICAL ENGINEERING

1. Graduates will be Engineering Professionals, Innovators or Entrepreneurs engaged in Technology Development or implementation of Engineering Systems meeting the Industrial needs.

KOROM, PAYYANUR, KANNUR-670 307

- 2. Graduates will be successful in the pursuit of higher education or research, in Engineering or Management Studies.
- 3. Graduates will be self-disciplined and capable of applying technical concepts and skills for the benefit of society.

D) ELECTRICAL AND ELECTRONICS ENGINEERING

- 1. Graduates will succeed as Professionals in Industry or as Entrepreneurs in Electrical and Electronics Engineering and related disciplines.
- 2. Graduates will be able to adapt to the advances in Technology by continuously acquiring knowledge and skills, with an urge for innovation.
- 3. Graduates will be socially committed individuals, exhibiting professional ethics in addressing technical and engineering challenges.

E) CIVIL ENGINEERING

- 1. Graduates of the Programme will have a successful career as Civil Engineering practitioners, entrepreneurs or professionals, addressing the needs of the industry with a global perspective.
- 2. They will contribute to society as ethical and responsible citizens with proven expertise.
- 3. They will engage in continuous professional development and advance to leadership roles in their chosen career.





PROGRAMME OUTCOMES 4

KOROM, PAYYANUR, KANNUR-670 307

4.1 PO DEFINITION:

Programme Outcomes (PO) within the framework of Outcome Based Education (OBE) represent predefined statements that delineate the anticipated knowledge, skills, and attributes students are expected to acquire upon the culmination of an educational program. These outcomes serve as overarching benchmarks, guiding the assessment of student achievement and evaluating the efficacy of the program. Aligned with industry requisites, professional benchmarks, and institutional objectives, POs ensure graduates are suitably equipped for their forthcoming professional endeavours and scholarly endeavours.

4.2 ENGINEERING GRADUATES WILL BE ABLE TO:

- 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

OBE MANUAL

10





- 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and 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.
- 12. 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.

4.3 Important For Faculty to Know the POS

The Programme Outcomes (POs) play a crucial role as a framework during the development or revision of course outcomes. Familiarity with the POs assists faculty members in crafting suitable delivery methods and assessment strategies.





4 PROGRAMME SPECIFIC OUTCOMES (PSOs)

KOROM, PAYYANUR, KANNUR-670 307

4.1 PSOs Definition:

Programme Specific Outcomes (PSOs) represent defined objectives within an educational curriculum, detailing the specialized knowledge, skills, and competencies students are anticipated to acquire upon concluding the program. These outcomes are customized to align with the program's distinct emphasis or focus, reflecting its unique characteristics and objectives. PSOs serve as a detailed framework for evaluating student attainment and ensuring that graduates possess the specialized expertise requisite for success in their respective fields or industries..

A) ELECTRONICS AND COMMUNICATION ENGINEERING

- 1. Design Electronic Circuits and Systems for Communication, Monitoring and Control Applications.
- 2. Demonstrate the knowledge, in Electronics, Signal Processing, Embedded Systems and Communication Engineering, required for providing technical solutions to real world problems.

B) COMPUTER SCIENCE AND ENGINEERING

- 1. Apply Algorithmic Principles, Programming Skills and Software Engineering Principles to design, develop and evaluate Software Systems of varying complexities.
- 2. Apply knowledge of System Integration to design and implement computer-based systems.
- 3. Solve real world and socially relevant problems with the knowledge in recent and advanced **Computing Technologies**

C) MECHANICAL ENGINEERING

- 1. Apply the concepts of Solid Mechanics in the design of Mechanical Engineering systems.
- 2. Apply knowledge of Thermal and Fluid Sciences to solve Engineering Problems.





- 3. Use Simulation Tools and Computer Integrated Systems in Mechanical Engineering.
- 4. Apply advanced manufacturing processes and modern Industrial Management Techniques in Engineering.

D) ELECTRICAL AND ELECTRONICS ENGINEERING

- 1. To apply the knowledge in Electrical and Electronics Engineering for the design of Power Generation, Transmission, Distribution and Utilization systems.
- 2. To demonstrate the knowledge required to design, develop, test, and implement Electrical & **Electronics** systems

E) CIVIL ENGINEERING

- 1. Provide feasible and sustainable solutions to problems in various Civil Engineering disciplines such as Structural, Environmental, Geotechnical, Transportation and Construction Engineering.
- 2. Apply the principles, methods, software and codes of practices to design various Civil Engineering Systems.





Bloom's Taxonomy is a framework used by educators to categorize learning objectives and outcomes into different cognitive levels. The taxonomy consists of six levels, which are often depicted as a pyramid, with lower-order thinking skills at the bottom and higher-order thinking skills at the top. The levels, in ascending order, are:

- 1. Remembering
- 2. Understanding
- 3. Applying
- 4. Analyzing
- 5. Evaluating
- 6. Creating



TEC





In traditional assessments like Continuous Internal Evaluation (CIE) and Semester End Examinations (SEE), the focus tends to be on the first three levels: remembering, understanding, and applying. This is because these assessments typically involve recall of information, comprehension of concepts, and the ability to apply knowledge to solve problems or answer questions within a limited timeframe.

KOROM, PAYYANUR, KANNUR-670 307

However, assessing higher-order thinking skills such as analysis, evaluation, and creation often requires more extended and complex tasks. These could include activities like:

1. Extended coursework: Assignments that require students to delve deeper into a topic, analyze multiple perspectives, and formulate arguments or solutions.

2. Course projects: Collaborative or individual projects that require students to analyze data, evaluate hypotheses, or create something new.

3. Mini/minor projects: Smaller-scale projects that allow students to apply their learning to realworld problems or scenarios.

4. Internship experiences: Opportunities for students to work in professional settings, where they can apply their knowledge and skills to practical situations and receive feedback from mentors.

5. Final year projects: Culminating projects that often require students to conduct independent research, critically analyze findings, and present their work in a meaningful way.

These types of assessments provide students with opportunities to demonstrate their ability to think critically, evaluate information, and generate new ideas-skills that are essential for success in higher education and beyond.



KOROM, PAYYANUR, KANNUR-670 307



5.1 REVISED BLOOM'S TAXONOMY

SL	LEVEL	DEFIITIONS	VERBS
NO			
1	DEMEMOEDDIG		
	REMEMBERING	Exhibit memory of previously	Define, Find, How, Label, List, Match,
		learned material by recalling facts,	Name, Omit, Recall, Relate, Select, Show,
		terms, basic concepts, and answers.	Spell, Tell, What, When, Where, Which,
			Who, Why.
2	UNDERSTANDING	Demonstrate understanding of facts	Classify, Compare, Contrast, Demonstrate,
		and ideas by organizing, comparing,	Explain, Extend, Illustrate, Infer, Interpret,
		translating, interpreting, giving	Outline, Relate, Rephrase, Show,
		descriptions, and stating main ideas.	Summarize, Translate.
3	APPLYING	Solve problems to new situations by	Apply, Build, Choose, Construct, Develop,
		applying acquired knowledge, facts,	Experiment with, Identify, Interview, Make
		techniques and rules in a different	use of, Model, Organize, Plan, Select,
		way.	Solve, Utilize.
1	ANAL VZING	Examine and break information into	Analyza Assuma Catagoriza Classify
-		parts by identifying motives or	Compare Conclusion Contrast Discover
		causes. Make inferences and find	Dissect Distinguish Divide Examine
		evidence to support generalizations	Function Inference Inspect List Motive
		evidence to support generalizations	Relationships Simplify Survey Take part
			in Test for Theme
5	EVALUATING	Present and defend opinions by	Agree Appraise Assess Award Choose
		making judgments about	Compare. Conclude. Criteria. Criticize.
		information, validity of ideas, or	Decide. Deduct. Defend. Determine.
		quality of work based on a set of	Disprove, Estimate, Evaluate, Explain,
		criteria	Importance, Influence, Interpret, Judge,
			Justify, Mark, Measure, Opinion, Perceive,
			Prioritize, Prove, Rate, Recommend, Rule
			on Select, Support, Value
6	CREATING	Compile information together in a	Agree, Appraise, Assess, Award, Choose,
		different way by combining	Compare, Conclude, Criteria, Criticize,
		elements in a new pattern or	Decide, Deduct, Defend, Determine,
		proposing alternative solutions.	Disprove, Estimate, Evaluate, Explain,
			Importance, Influence, Interpret, Judge,
			Justify, Mark, Measure, Opinion, Perceive,
			Prioritize, Prove, Rate, Recommend, Rule
			on, Select, Support, Value.

SREE MA







6 TEACHING - LEARNING STRATEGIES

- 1. BLENDED LEARNING
- 2. BRAINSTORMING
- 3. CASE STUDY
- 4. COMPUTER AIDED PRESENTATION
- 5. COMPUTER LABS/LAPTOP INSTRUCTION
- 6. DEMONSTRATION
- 7. DIRECT INSTRUCTION
- 8. DISCOVERY LEARNING
- 9. DISCUSSION
- 10. DRILL AND PRACTICE
- 11. EXAMINATION
- 12. FLIPPED CLASS
- 13. FULLY ONLINE INSTRUCTION
- 14. GROUP ACTIVITIES
- 15. INQUIRY
- 16. LECTURE
- 17. MENTAL MODELING
- 18. MOOC ONLINE
- **19. PROJECT DEVELOPMENT**
- 20. PROJECT PRESENTATION
- 21. QUESTION AND ANSWER
- 22. ROLE PLAY
- 23. SELF-LEARNING
- 24. SEMINAR
- 25. TUTORIAL
- 26. WEB-ENHANCED LEARNING







7 COS AND POS MAPPING

Consolidated Course-PO Mapping

Strength	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Substantial	-	-	-	-	-	-	-	-	-	-	-	-
Moderate	-	-	-	-	-	-	-	-	-	-	-	-
Slight	-	-	-	-	-	-	-	-	-	-	-	-

Consolidated Course-PSO Mapping

Strength	PSO1	PSO2	PSO3
Substantial	-	-	-
Moderate	-	-	-
Slight	-	-	-

Consolidated CO-PO Mapping

Strength	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Substantial	-	-	-	-	-	-	-	-	-	-	-	-
Moderate	-	-	-	-	-	-	-	-	-	-	-	-
Slight	-	-	-	-	-	-	-	-	-	-	-	-

Consolidated CO-PO Mapping (Lab/Projects)

				\mathbf{O}		/						
Strength	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Substantial	-	-	-	-	-	-	-	-	-	-	-	-
Moderate	-	-	-	-	-	-	-	-	-	-	-	-
Slight	-	-	-	-	-	-	-	-	-	-	-	-







Consolidated CO-PSO Mapping

Strength	PSO1	PSO2	PSO3
Substantial	-	-	-
Moderate	-	-	-
Slight	-	-	-

Consolidated PO-Blooms Level-Mapping

Strength	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO	PO9	PO10	PO11	PO12
								8				
Remembering	-	-	-	-	-	-	-	-	-	-	-	-
Understanding												
Applying	-	-	-	-	-	-	-	-	-	-	-	-
Analyzing	-	-	-	-	-	-	-	-	-	-	-	-
Evaluating	-	-	-	-	-	-	-	-	-	-	-	-
Creating	-	-	-	-	-	-	-	-	-	-	-	-

Consolidated PO-Blooms Level-Mapping

Strength	PSO1	PSO2	PSO3
Remembering	-	-	-
Understanding			
Applying	-	-	-
Analyzing	-	-	-
Evaluating	-	-	-
Creating	-	-	-

Dr. LEENA A V PRINCIPAL REE NARAYANA GURU COLLEGE OI ENGINEERING & TECHNOLOGY PAYYANUR, KANNUR







Consolidated CO-Blooms Level-Mapping

Strength	CO1	CO2	CO3	CO4	CO5	CO6
Remembering	-	-	-	-	-	-
Understanding						
Applying	-	-	-	-	-	-
Analyzing	-	-	-	-	-	-
Evaluating	-	-	-	-	-	-
Creating	-	-	-	-	-	-

Consolidated PO-PEO Mapping

Strength	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PE01	-	-	-	-	-	-	-	-	-	-	-	-
PE02												
PE03	-	-	-	-	-	-	-	-	-	-	-	-

Consolidated CO-PEO Mapping

Strength	CO 1	CO2	CO3	CO4	CO5	CO6
PE01 PE02	-	-	-	-	-	-
PE03	-	-	-	-	-	-

Dr. LEENAAV PRINCIPAL REE MARAYANA GURU COLLEGE O ENGINEERING & TECHNOLOGY PRAYYANUR, KANNUR





7 ATTAINMENT OF COURSE OUTCOME

KOROM, PAYYANUR, KANNUR-670 307

7.1 ASSESSMENT AND ATTAINMENT METHODS:

Assessment methods are categorized into two as direct method and indirect method to access COs and POs. CO assessment methods are employed.

7.2 INDIRECT ASSESSMENT METHOD –COURSE END SURVEY ANALYSIS (CESA)

Course End Survey Analysis (CESA) (Indirect method) is a technique to measure the attainment of COs and POs indirectly from the components of course outcomes. The indirect method done through surveys from the stakeholders (Alumni, Parents and Employers) to reflect their views on student's learning after 2 or 3 years of graduation. The institute assesses opinions or thoughts about graduate's knowledge or skills by different stakeholders.

The Attainment of Course Outcome at the end of the every semester is received from the students. For this, a particular template is followed.

The students need to fill the template and give back to the course coordinator.

SUM = Total Score given by all students for CO

Average = SUM / Total No. of Students

Percentage of CO = (SUM/(Total No. of students*4)) *100

7.3 ATTAINMENT OF COURSE OUTCOME – COURSE END ANALYSIS

"Attainment of Course Outcome - Course End Analysis (CEA)" typically refers to the process of evaluating how well students have achieved the intended learning outcomes of a course by the end of the term or semester. This analysis involves assessing whether students have acquired the knowledge, skills, and competencies outlined in the course objectives or outcomes.





The CEA process may include the following steps:

1. Identification of Course Outcomes: This involves clearly defining the intended learning outcomes of the course. These outcomes should be specific, measurable, achievable, relevant, and time-bound (SMART).

KOROM, PAYYANUR, KANNUR-670 307

2. Data Collection: Gathering evidence or data to assess student performance and attainment of course outcomes. This may include exam scores, project assessments, presentations, portfolios, and other forms of student work.

3. Analysis of Student Performance: Examining the collected data to determine how well students have met the course outcomes. This analysis may involve comparing student performance against predetermined criteria or benchmarks.

4. Identification of Strengths and Weaknesses: Identifying areas where students have performed well and areas where improvement is needed. This can help instructors understand which aspects of the course were successful and which may require modification in future iterations.

5. Reflection and Feedback: Reflecting on the assessment results and providing feedback to students. Feedback should be constructive and actionable, helping students understand their strengths and areas for growth.

6. Curriculum Review and Improvement: Using the findings from the CEA process to make informed decisions about curriculum design and instructional strategies. This may involve revising course materials, adjusting teaching methods, or updating learning objectives to better align with student needs and outcomes.