



BOARD OF ACCREDITATION FOR
ENGINEERING AND TECHNICAL EDUCATION

OUTCOME BASED EDUCATION (OBE)

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Outline

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- What is Outcome Based Education (OBE)?
- Components of OBE
 - ▣ Mission and Vision of a Program
 - ▣ Program Educational Objective (PEO)
 - ▣ Program Outcome (PO)
 - ▣ Course Outcome (CO)
- Mappings between
 - ▣ PEO and Mission
 - ▣ CO and PO
- How to proceed



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Outcome Based Education (OBE)

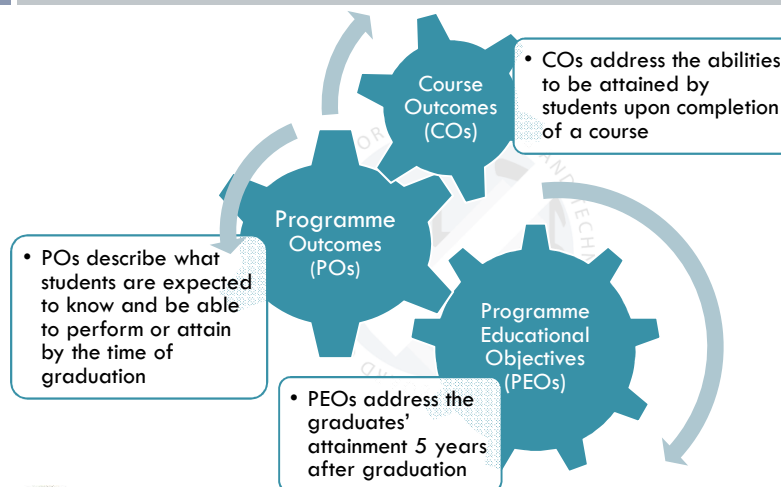
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- A Shift in Focus
- Program structures & curricula are means, not ends.
- From a Resource- or Input-Based or Process-Based Approach to an Outcome-Based Approach
- OBE is an educational process.
- Directed/focused at achieving certain specified outcomes in terms of individual student learning.
- **Outcomes - key things students should understand and be able to do or the qualities they should develop.**



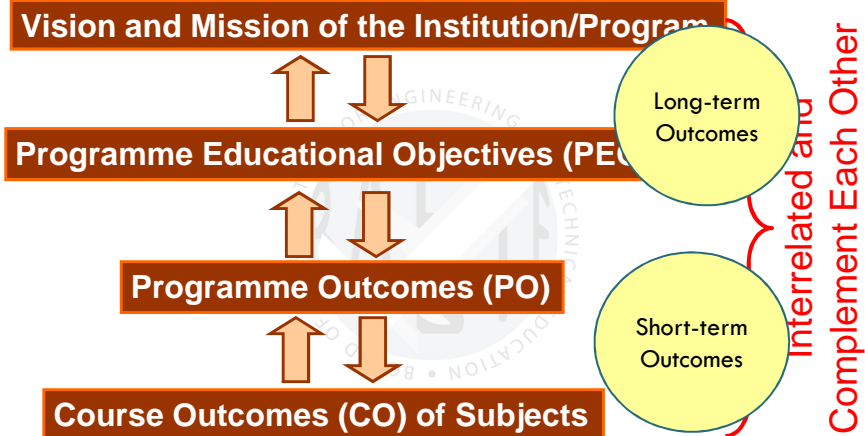
Main components of OBE

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A Model Hierarchy of Outcomes

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Vision and Mission of a Program

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- **Vision** is the futuristic statement that the institution would like to achieve over a long period of time.
Example: Our vision is to be the preeminent department of Civil Engineering through creating recognized professionals, who will provide engineering solutions to infrastructure development and manage disasters in a sustainable manner in line with the national and global context.
- **Mission** is the means by which it proposes to move toward the stated **Vision**.
Example: The mission of the civil engineering department is to educate our students in a student-centered dynamic learning environment, to enhance their skills in line with the program outcomes, to provide advanced facility for conducting forward-looking inter and multi-disciplinary research to meet the challenges of 21st century and to motivate them toward life-long learning process.



Program Educational Objective (PEO)

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Program Educational Objectives (PEO) are long term goals (e.g., 5 years or more after graduation) describing expected achievements of graduates in their career.

Example: The Department of Civil Engineering forms the foundation for professional and personal development of the graduates that are expected within few years after graduation. The graduates should:

- PEO 1: Excel in their engineering career in the public and, private sectors or academia by applying the knowledge acquired in mathematical, computing and engineering principles and enhancing their skills.
- PEO-2: Engage themselves toward lifelong learning and the pursuit of post graduate or other professional education.
- PEO 3: Analyze and design civil engineering systems after considering safety, sustainability, economical and social impacts of engineering decisions.
- PEO 4: Demonstrate professionalism, ethics, and ability to work in inter and multi-disciplinary team and to adapt to the latest trends and technology.



Mapping between Mission and PEOs

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Missions	PEO-1	PEO-2	PEO-3	PEO-4
Mission-1: To educate our students in a student-centered dynamic learning environment	√	√		
Mission-2: To enhance their skills in line with the program outcomes			√	√
Mission-3: To provide advanced facility for conducting forward-looking inter and multi-disciplinary research to meet the challenges of 21 st century		√	√	
Mission-4: To motivate them toward life-long learning process		√		√



Program Outcome (PO)

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- Program Outcomes (PO) are short term outcomes (at the point of graduation) describing what students are expected to know and be able to perform.
- Washington Accord has specified 12 Graduate Attributes as POs of Engineering programs
- BAETE has adopted those POs
- These POs are generic for any Engineering program.



The POs (1-6)

Characteristics	POs/ILOs/Graduate Attribute Profiles
Engineering Knowledge:	PO1: Knowledge of mathematics, natural science, engineering
Problem Analysis:	PO2: Identify, formulate, research literature and analyse <i>complex</i> engineering problems
Design/ development of solutions:	PO3: Design solutions for <i>complex</i> engineering problems and design systems
Investigation:	PO4: Investigations of <i>complex</i> problems using research-based knowledge and research methods
Modern Tool Usage:	PO5: Create, select and apply appropriate tool
The Engineer and Society	PO6: engineering practice, ethics and the professional responsibility, public safety; economic, social, cultural, environmental and sustainability



The POs (7-12)

Characteristics	POs/ILOs/Graduate Attribute Profiles
Environment and Sustainability:	PO7: Understand and evaluate the sustainability and impact of professional engineering work in societal and environmental contexts.
Ethics:	PO8: Understanding and level of practice
Individual and Team work:	PO9: : Role in and diversity of team, function effectively as an individual, and as a member or leader in a team
Communication:	PO10: Level of communication according to type of activities performed
Project Management and Finance:	PO11: Level of management required for differing types of activity
Lifelong learning:	PO12: Preparation for and depth of continuing learning



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Course Outcome (CO)

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- Course Outcomes (CO) address the abilities to be attained by students upon the completion of a subject
- A subject usually has several COs
- Ideally 3 to 5 COs is considered a good practice
- Bloom's Taxonomy has great influence while writing COs



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Example CO-PO Mapping: Theory Course

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- Computer Graphics course example
 - CO1: **Explain** the working of Input and Output devices for graphics.
 - CO2: **Explain** about graphics primitives and work with coordinate spaces, coordinate conversion, and transformations of graphics objects.
 - CO3: **Demonstrate** 2D & 3D geometrical transformations using modern tools.
 - CO4: **Explain** various 3D projections and current models for surfaces.
 - CO5: **Make use of** the color and transformation techniques for various applications.

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										
CO2	S	M										
CO3		S			M							
CO4		M										
CO5		M			W							



PO1: **Engineering Knowledge** PO5: **Modern Tool Usage** PO2: **Problem Analysis**

Example CO-PO Mapping: Lab Course with Hardware Project

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- Embedded Controller Technology course example
 - CO1: **Illustrate** the architecture of the microcontroller.
 - CO2: **Interpret** the M68HC11 instruction sets.
 - CO3: **Develop a firmware** using assembly language.
 - CO4: **Design a basic hardware** based on 68HC11 microcontroller.
 - CO5: **Work in a team** and **communicate** effectively.

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12
CO 01	X											
CO 02		X										
CO 03			X									
CO 04				X								
CO 05									X	X		



PO3: **Design/development of a solution** PO4: **Investigation**
 PO9: **Individual and Team work** PO10: **Communication**

What changes to be made?

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- **Course Content** - Reviewing course content to suit specified Learning Outcomes, current development, industrial needs, job specifications, professional body requirement (accreditation), etc.
- **Teaching-Learning Methods** – Introducing innovative/flexible teaching methods/delivery tools to develop PEO and PO in students/graduates
- **Assessment & Evaluation Tools** - Introducing variety of assessment and evaluation tools to measure the achievement of PEO and PO.
- **Data & Evidence Collection** - Collecting evidences of process involved and the achievement of the PEO and PO.
- **OBE Management System** – Create an effective OBE management system.



Close the Loop through Continuous Quality Improvement (CQI)

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