

Detail Procedure of CO/PO attainment:

The Program outcomes (PO's) are defined by NBA, New Delhi which are mandatory. Apart from the PO's every department has liberty to define its own Program Specific Outcomes (PSO's). The mandatory PO's are as follows

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, 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 modelling to complex engineering activities with an understanding of the limitations.
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.

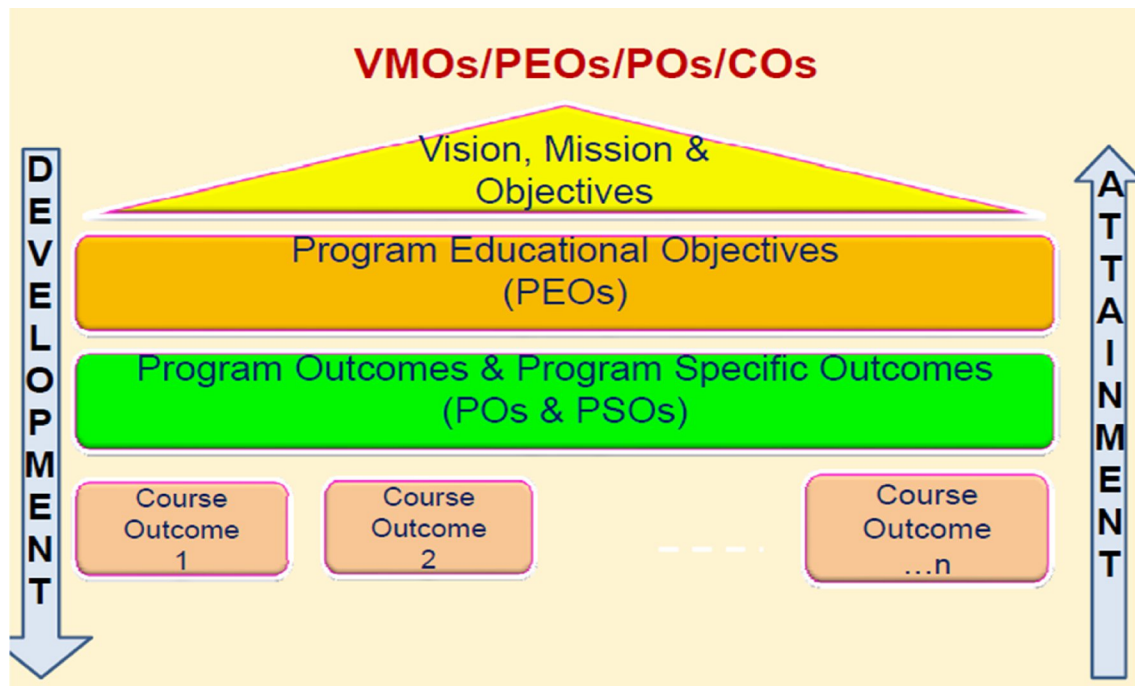
Program Specific Outcomes

(Program has to specify 2 – 4 PSOs)

The following procedure is applied to PO calculations

1. Definition and Validation of Course Outcomes and their mapping to Program Outcomes
2. List all the Course Outcomes (COs) and Program Outcomes (POs)
3. List Assessment tools employed for evaluation of level of attainment for COs (and Evidence for this)
4. Establish Attainment Levels for the Pos

The following figure shows when and how development and calculations of CO's and PO's can be done.



Once Co's are validated, then next task is to map Co's with Po's along with proper emphasis. It is the discretion of that Course incharge to give proper weightage in CO-PO matrix. Consider the following figure for CO-PO matrix and its emphasis.

CO-PO Matrix

CO	Programme Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	X			X							X			X
2		X					X						X	
3	X				X			X				X		
4			X		X		X						X	

CO-PO Emphasis Table

CO	Programme Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	3			3							1			2
2		2					2						3	
3	2				2			3				2		
4			3		3		1						1	

The CO Calculations are done as per the equations already given in the description using equations. For every student CO attainment is calculated and is given in the following figure as follows

Roll No.	Name of Student	CO1		CO2		CO3		CO4	
		%ge	M/N	%ge	M/N	%ge	M/N	%ge	M/N
1	/ Khot Aparna Ajit	7.45	M	6.62	M	11.04	M	9.93	M
2	/ Patil Sonal S	9.44	M	8.4	M	13.92	M	12.6	M
3	/ Mestri Ruksar A	6.96	M	6.6	M	10.92	M	9.9	M
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67	Kharate Abhijeet	4.33	N	5.38	N	9.12	N	8.07	N
68	Patil Avinash A.	4.19	N	5.18	N	8.76	N	7.77	N
69	Patil Shailandra	5.93	M	7.22	M	12.12	M	10.83	M
70	Shinde Rahul B	5.78	M	6.68	M	10.92	N	10.02	M
	Average	5.44		6.11		10.22		9.17	

Where 'M' stands for CO met by particular student and 'N' stands for CO has not met. Finally according to the emphasis table PO's are calculated for sample course. Consider the following figure.

Programme outcomes calculation due to single course contribution

CO	Programme Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2
1	55.76		38.76	58.14							19.38			38.76
2		44.57					44.57		22.29				66.86	
3	40.51				36.95			55.43				36.95		55.43
4					59.15		19.72						19.72	
Avg.	48.14	44.57	38.76	58.14	48.05		32.15	55.43	22.29		19.38	36.95	43.29	47.10

Finally PO calculation is done for all courses through direct attainment and indirect attainment and put before departmental committees for further improvements.