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CO-PO Attainment Manual

Terminology (Abbreviations)

OBE: Outcome-Based Education (OBE) is a student-centered teaching and learning system in which course content and evaluation are designed to meet specific objectives and outcomes. It focuses on assessing student performance, i.e. outcomes across levels.

Course Outcomes (CO): Course Outcomes (COs) describe what students should be able to do at the end of a course. The most critical component of a CO is that it must be observable and measurable.

Program Outcomes (PO): Programme outcomes are statements that explain what knowledge, abilities, and attitudes students should have upon completion from an engineering programme. That is, at the conclusion of four years, they should have the following information, abilities, and attitudes. And there are currently 12 POs, which are identified by NBA and apply to all engineering programmes.

Program Educational Objectives (PEO) : These are broad statements that summarise the career and professional successes that the programme prepares graduates to attain in four to five years after graduation.

Program Specific Outcomes (PSO): Program-specific outcomes (PSOs). PSOs characterise a program's main courses.

Few definitions

Mapping Factor (Correlation Level)

It indicates to what extent a certain component (either assessment method to CO or CO to PO or PO to PEO & PSO

- 3-indicates Substantial (high) mapping (high contribution towards attainment)
- 2-indicates Moderate (medium) mapping (medium contribution towards attainment)
- 1-indicates Slight (low) mapping (some contribution towards attainment)

Level of attainment

Here 3 levels of attainment is taken as 1-Low; 2-medium; 3- High

3 levels of attainment can be defined as

- Attainment 3 : 60% Stud scoring >= 70% of max marks allocated to CO
- Attainment 2 : 50% Stud scoring >= 70% of max marks allocated to CO
- Attainment 1 : 40% Stud scoring >= 70% of max marks allocated to CO

Attainment of COs

- Attainment of COs can be measured directly and indirectly
- Direct attainment of COs can be determined from the performances of students in all the relevant assessment instruments.
- Indirect attainment of COs can be determined from the course exit survey.
- The exit survey form should permit receiving feedback from students on all the COs.

Direct CO attainment

- Direct attainment of COs is determined from the performances of students in Continuous Internal Evaluation (CIE) and Semester End Examination (SEE).
- The proportional weightages of CIE: SEE will be as per the academic regulations in force. Proportions of 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.
- Also, we need data about performance of students assessment item – wise.

Direct CO attainment from CIE

- Continuous Internal Evaluation (CIE) is conducted and evaluated by the Department itself thus, institution have access to question-wise marks in all assessment instruments in CIE.
- When questions are tagged with relevant COs, the department has access to performances of students with respect to each CO.
- Hence, computing the direct attainment of COs from CIE is straight forward for Tier 2 institutes.

Direct CO attainment from SEE

- However, Semester End Examination (SEE) is conducted and evaluated by the University for Tier 2 institutes.
- Thus the departments in Tier 2 institutes get only total marks scored in SEE and not question-wise marks!
- As a consequence, departments in Tier 2 institutes have no means of computing the direct attainment of individual COs from SEE!
- SEE performance cannot be ignored!!
- The only possible solution, though not satisfactory, is to treat the average marks in SEE as the common attainment of all COs!!!

CO attainment Computation:

STEP 1: For every subject 6 course outcomes (CO) are defined and mapped to Program outcomes (PO) on a scale of 1 to 3. Highest correlation is 3. For example,

CO'S	PO'S												PSO'S	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
EC2105.1	3	3		1									1	2
EC2105.2	3	3	2	1									1	2
EC2105.3	3	3		1									1	3
EC2105.4	3	3	2	1									1	3
EC2105.5	3	2	2	2									1	2
EC2105.6	2	2	2	1									1	2
	2.83	2.66	2	1.16									1	2

STEP 2:

Maximum marks allotted to each question, mapped to a cognitive level and the corresponding CO. Record the percentage of students achieving a set percentage of max marks allotted to an individual CO.

For example,

S.No	Roll. No	STUDENT NAME	Test	Descriptive-1						Descriptive-2						CO I	CO II	CO III	CO IV	CO V	CO VI	ASIIGNMENT-1	ASIIGNMENT-2	OBJECTIVE-1	OBJECTIVE-2
				1		2		3		1		2		3											
			Q.No	1.a	1.b	2.a	2.b	3.a	3.b	1.a	1.b	2.a	2.b	3.a	3.b	Max.Marks	Max.Marks	Max.Marks	Max.Marks	Max.Marks	Max.Marks				
			COs	I		II		III		IV		V		VI	VII										
			Max. Marks	5		5		5		5		5		5		5	5	5	5	5	5	5	5	10	10
1	22JE1A0401	AFFRUDDIN SAYYED	30			1		3		2				4.0		0	1	3	2	0	4	5	5	2	3
2	22JE1A0402	ALIYA JABIN SHAIK	30	5		4		5		5		5.0		5.0		5	4	5	5	5	5	5	5	1	3
3	22JE1A0404	ANANTHA VENKATA	30	5		5		4		5				5.		5	5	4	5	0	5	5	5	2	3

		SUDHAKAR REDDY NALABALA											0											
4	22JE1A0405	ANAS BUDE SHAIK	30	2		3		5		5			5.0		2	3	5	5	0	5	5	5	2	2
5	22JE1A0407	BHARATH GORANTLA	30			3		1					5.0		0	3	1	0	0	5	5	5	2	2
6	22JE1A0408	CHOWDESWARA RAO SUNKARA	30	0		3				2			5.0		0	3	0	2	0	5	5	5	2	1
7	22JE1A0409	ELISHA RAJU BURLA	30			4		1		1			5.0		0	4	1	1	0	5	5	5	2	2
8	22JE1A0410	GANESH JITTUGA	30							2			5.0		0	0	0	2	0	5	0	0	2	2

STEP 3:

Evaluation of all COs.

Total Number of Students Answered	43	43	43	43	43	43	43	43	43	43
50% of maximum marks	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	5	5
No. of Students crossed 50% of max. marks	17	20	17	24	10	38	42	42	0	1
% of students crossed 50% of max. marks	40	47	40	56	23	88	98	98	0	2
Attainment Level	1	1	1	2	0	3	3	3	0	0

STEP 4:

Calculate the attainment levels based on internal test and JNTUK University Examinations using the below formula.

For External Exam

60% Stud >= 55% of max marks : ATT 3
50% Stud >= 55% of max marks: ATT 2
40% Stud >= 70% of max marks : ATT 1
else ATT 0

For Internal Exam

60% Stud >= 55% of max marks : ATT 3
50% Stud >= 55% of max marks: ATT 2
40% Stud >= 70% of max marks : ATT 1
else ATT 0

S.No	Roll. No	NAME OF STUDENT	External Grade
1	22JE1A0401	AFFRUDDIN SAYYED	F
2	22JE1A0402	ALIYA JABIN SHAIK	C
3	22JE1A0404	ANANTHA VENKATA SUDHAKAR REDDY NALABALA	B
4	22JE1A0405	ANAS BUDE SHAIK	E
5	22JE1A0407	BHARATH GORANTLA	F
6	22JE1A0408	CHOWDESWARA RAO SUNKARA	F
7	22JE1A0409	ELISHA RAJU BURLA	E
8	22JE1A0410	GANESH JITTUGA	F
9	22JE1A0411	JEEVANA JYOTHI KASA	D
11	22JE1A0413	KOTESWARA RAO DARSI	F
12	22JE1A0414	KOTESWARA RAO PATIBANDLA	E
13	22JE1A0415	LAVANYA PILLUTLA	D
14	22JE1A0416	MAHABOOB BASHA SHAIK	F
15	22JE1A0417	MAHABU SUBHANI SHAIK	F
16	22JE1A0418	MANIKANTA CHAKALAMARRI	F
17	22JE1A0419	MARUTHI PEDDARAVURI	E
18	22JE1A0420	MOJESH RAJU MUPPANA	D
19	22JE1A0421	MUBEEN SHAIK	C
20	22JE1A0423	NAGA RAJU KURICHETI	D
21	22JE1A0424	NANDINI JENAGORLA	E
22	22JE1A0426	NASEEFA BEGUM SHAIK	D
23	22JE1A0427	NEELIMA CHAPALA	F
24	22JE1A0429	PRAVEEN KUMAR ATCHUKATLA	D
25	22JE1A0430	RAJESWARI TURAKA	E
26	22JE1A0431	RUKMINI SWATHI JAVVAJI	B
27	22JE1A0432	SAIDU MODIN GURAJALA	D
28	22JE1A0433	SAIKUMAR REDDY TIRUMALAREDDY	F
29	22JE1A0434	SALMAN SHAIK	E
30	22JE1A0435	SHAHANAZ SYYAD	F
31	22JE1A0436	SOWJANYA PATIBANDLA	F
32	22JE1A0437	SRI HARI ONTIPULI	F
33	22JE1A0438	SUBBARAO YADLAPALLI	F
35	22JE1A0440	VAGDEVI NEELIMA PAIDIMARRI	E
37	22JE1A0442	VENKATA KUMARA SWAMI ANCHULA	C
38	22JE1A0444	SIVA DURGA SATISH CHOUDAM	C
39	22JE1A0445	SAI KISHORE VEPURI	C
40	22JE1A0446	SYAM PRASAD MEDISETTY	F

STEP 5:

CO attainment level for the that course is,

Course attainment @Internals = 0.70 * Avg IAT attainment + 0.30 * AQSM

CO Direct Attainment				
CO's	**COURSE OUTCOME**	**CO AttainmentLevel (Mid)**	**CO AttainmentLevel (External)**	**Direct CO AttainmentLevel**
EC2105.1	Able to Identify random variables and Define and manipulate distribution and density functions.	1	3	2.4
EC2105.2	Able to Compute various operations like expectations, variances, etc. from probability density functions and probability distribution functions.	1	3	2.4
EC2105.3	Able to Characterize probability density and distribution function for multiple random variables	1	3	2.4
EC2105.4	Able to perform operations on Multiple random variables	1.4	3	2.52
EC2105.5	Explain the concept of random process, differentiate between stochastic and ergodic processes	0.6	3	2.28
EC2105.6	Illustrate the concept of random processes and determine covariance and spectral density of stationary random processes, Analyze the LTI systems with random inputs.	1.8	3	2.64

STEP 6:

Program outcomes attained through the attainment of COs. For a given course, all COs are mapped to certain POs, as shown in STEP 1. The overall CO attainment value as computed in STEP 6 and the CO-PO mapping values given in the STEP 1 used to compute the attainment of POs.

CO-PO attainment:

PO attainment can be computed for a batch using the below formula.

PO/PSO attainment = (CO attainment * CO-PO Mapping)/Max correlation strength

	PO'S												**PSO'S**	
CO'S	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
EC2105.1	3	3		1									1	2
EC2105.2	3	3	2	1									1	2
EC2105.3	3	3		1									1	3
EC2105.4	3	3	2	1									1	3
EC2105.5	3	2	2	2									1	2
EC2105.6	2	2	2	1									1	2
	2.83	2.66	2	1.16									1	2

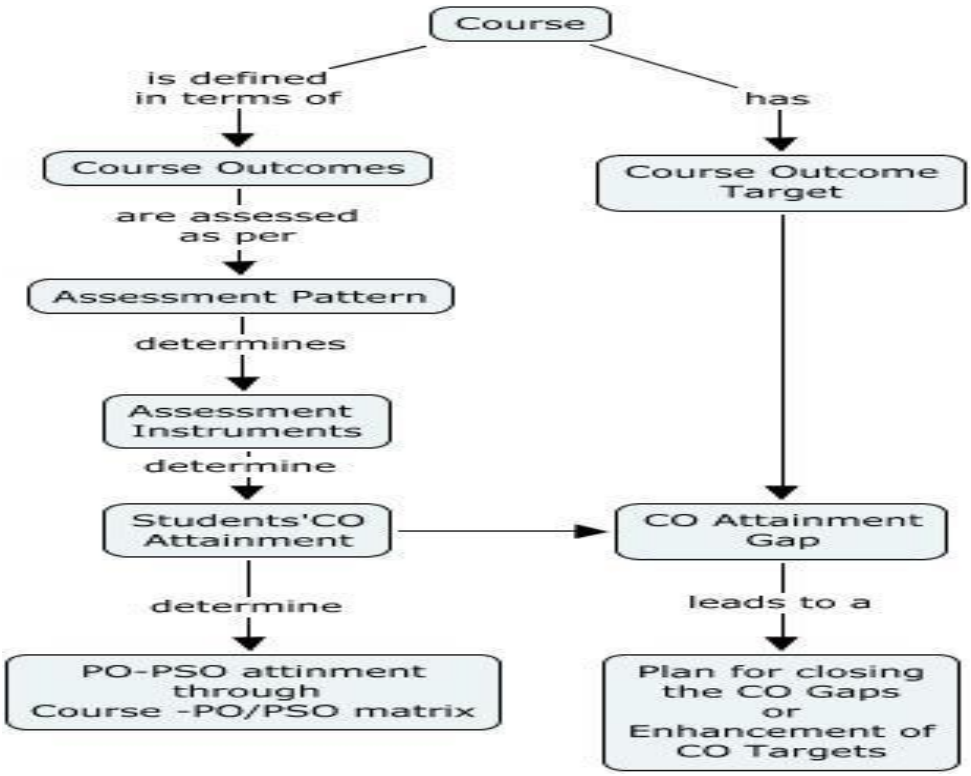
i.e. CO1 attainment final =2.83 and CO1-PO1 mapping is 3, so the attainment w.r.t CO1 and

PO1 is = (2.83 * 3)/3 = 2.83

CO1-PO2 mapping is 3 hence CO1-PO2 = (2.66*3)/3 = 2.66

Same process is repeated for all the POs.

CO attainment and Gap Analysis



PO/PSO	TARGET	ATTAINEMNT	DIFFERENCE %	REMARKS
PO1	2.83	2.29	19.08127208	
PO2	2.66	2.16	18.79699248	
PO3	2	1.64	18	
PO4	1.16	0.94	18.96551724	
PO5	0	0	0	
PO6	0	0	0	
PO7	0	0	0	
PO8	0	0	0	
PO9	0	0	0	
PO10	0	0	0	
PO11	0	0	0	
PO12	0	0	0	
PSO1	1	0.81	19	
PSO2	2	1.9	5	

STEP 7:

PO attainment for a batch can be calculated using the formula below. Indirect attainment is calculated using student exit surveys, employer surveys, co-curricular and extracurricular activities, and assigned to POs. A questionnaire was created for this purpose, and the average response of the outgoing students for each PO was computed.

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Final PO attainment for a particular batch = 0.8 * Direct Attainment + 0.2 * Indirect attainment

Subject Code	SUBJECT NAME	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CSE1101	M-I	0.79	0.61	0.26	0.3									0.52	0.26
CSE1102	COMMUNICATIVE ENGLISH	2.46	2.46	1.65	0.83			0.69						0.82	1.64
CSE1103	APPLIED PHYSICS	0.73	0.56	0.24	0.36									0.48	0.24
CSE1104	PPSC	2.62		2.03			2.03	1.89					1.16	1.74	0.87
CSE1201	M-II	1.99	1.54	0.66	0.99									1.32	0.66
CSE1202	APPLIED CHEMISTRY	2.63	1.75	0.85										1.75	0.87
CSE1203	CO	1.45	1.25	2.07										1.3	0.65
CSE1204	PYTHON PROGRAMMING	0.7		0.52	0.48	0.24								0.48	0.45
CSE1205	DATA STRUCTUREs	0.2	0.41	0.46	0.61	0.4	0.24	0.73						0.53	0.43
CSE2101	OOPs THROUGH C++	0.63	0.53	0.48	0.29		0.23							0.61	0.24
CSE2102	M-III	1.95	1.52	0.65	0.97									1.3	0.65
CSE2103	OPERATING SYSTEM	0.37	0.44	0.62										0.42	0.52

CSE2104	SE	0.49	0.48	0.67	0.36	0.61								0.57	0.56
CSE2105	MFCS	2.62	1.09											1.31	1.31
CSE2201	P&S	2.68	2.23	0.89	0.89			0.59						1.78	0.89
CSE2202	DBMS	2.49	2.2	2.68		2.38								1.46	2.68
CSE2203	FLAT	2.33	2.62	1.74										2.62	1.74
CSE2204	JAVA	0.61	0.48	0.48	0.56	0.53								0.49	0.49
CSE2205	MEFA	1.64	1.32	1.32	0.99	1.32	1.32	1.64	1.32	1.81	0.99	2.63	1	1.31	1.31
CSE3101	CN	0.89	1.88	1.74	2.24	2.62	0.8	1.96		2.62	2.94	2.94		2.19	1.47
CSE3102	DAA	2.66	2.66	2.84	2.34	2.59								2.79	2.79
CSE3103	DWDM	0.49	1.07	0.98	1.21	1.46	0.42	1.12		1.46	1.68	1.68		2.79	2.68
EC3104	DLD	0.73	0.65	0.4	0.36	0	0	0	0	0	0	0	0	0.48	0.24
CSE3105	SPM	2.15		2.18	0.87						2.51	1.85		0.91	0.91
CSE3201	MACHINE LEARNING	0.55	0.44	0.68	0.45	0.6	0.59							0.45	0.68
CSE3202	CD	2.15	2.08	2.02	2.62	0.86								2.18	1.73

CSE3203	CNS	2.2	2.27	2.43	2									1.97	0.98
CSE3204	OOAD	0.97	2.15	2.53	1.77	2.56	1	1		1.5	1.64	1.47	1.5	1.64	1.29
CSE3205	MPMC	1.69	1.09	1.09								1.54	1.85		1.85
CSE4101	CNS	2.51	2.17	1.93	1.85	1.82								1.9	1.93
CSE4102	UML		1.49	2.79		2.4								1.57	2.1
CSE4103	MACHINE LEARNING	2.5	2	3	1.37	2.25								2.75	3
CSE4104	EMBEDDED SYSTEMS	2.83	2.33	1.5	0	0	0	0	0.47	0	0	0	0	0.95	1.89
CSE4105	MOBILE COMPUTING	2.32	2.01	1.78	1.11		0.89							2.23	0.89
CSE4106	CYBER_SECURITY_&FORENSICS	2.51	2.17	1.93	1.2		0.96							2.41	0.96
CSE4201	MOB	2.58	2.12	2.43	1.21	1.82	2.28	2.13	2.43	1.51	1.67	1.52	1.98	0.00	1.82
CSE4202	ENTERPRENEURSHIP	1.78	1.78	2.23	1.93	2.22								2.79	2
CSE4203	DEVOPS	1.78	1.78	2.14	1.93	1.77								1.81	2.32

In-Direct Survey

Questionnaire for the Assessment

CO No	Statement	Exellent (3)	Moderate (2)	Average (1)	Poor (0)	Attaiment %	Attainment
EC4102.1	Able to learn the basic concepts of applications, frequencies	31	12	0	0	90.6	3
EC4102.2	Able to learn satellite sub systems used for tracking and	29	14	0	0	89.1	3
EC4102.3	Derive the expression for G/T ratio and C/N Ratio of the	27	15	1	0	88.0	3
EC4102.4	Able to analyse the satellite link with specified G/T and C/N	20	22	1	0	82.5	3
EC4102.5	Know various types of multiple access techniques and	21	22	0	0	82.9	3
EC4102.6	Define the concepts of GPS and its architecture, Know	26	17	0	0	86.8	3

Continuous Improvement in PO&PSO Attainment

Every Faculty needs to compute two main attainment values as mentioned below. Based on that if target is not attained hen appropriate actions should be taken.

- Course attainment
- Course w.r.t PO attainment

Department HOD needs to compute batch wise PO and PSO attainment and needs to analyze the gaps and take necessary actions.