NBA Awareness Workshop

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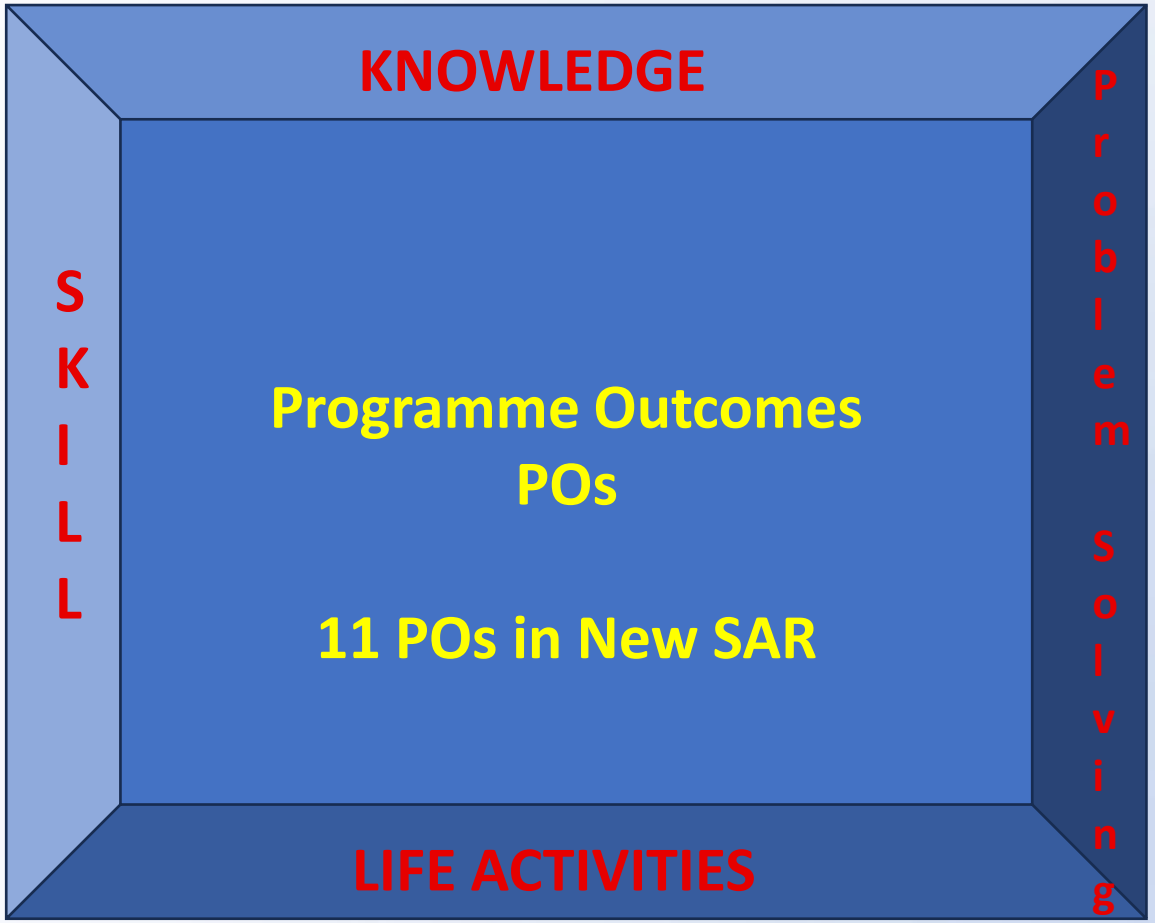
What is Expected from Engineering Activity

Engineering is an activity that is essential to meeting the needs of people, economic development and the provision of services to society. Engineering involves the purposeful application of mathematical and natural sciences and a body of engineering knowledge, technology and techniques. Engineering seeks to produce solutions of which the effects are predicted to the greatest degree possible, in often uncertain contexts. While bringing benefits, engineering activity has potential adverse consequences. Engineering therefore must be carried out responsibly and ethically, use available resources efficiently, be economic, safeguard health and safety, be environmentally sound and sustainable and generally manage risks throughout the entire lifecycle of a system. The United Nations Sustainable Development Goals present targets for 2030. Engineers are key contributors for making progress towards these goals.Typical engineering activity requires several roles including those of the engineering technologist and engineering technician, recognized as professional registration categories in many jurisdictions. These roles are defined by their distinctive competences

Applying Engineering Knowledge: WK1

Cognitive: Bloom's Taxonomy



BLOOM'S HIGHER level

Problem Analysis

Design and Development

Investigation

WK2, WK3, WK4,WK8

Tool Usage
Individual and Collaborative Work
Communication
Project Management and Finance
WK2, WK6

Psychomotor: Dave's Taxonomy

Affective: Bloom's Taxonomy

Attitude, Engineer and the World, Ethics, Values, Culture and Life-long learning WK5,WK7, WK9,

POs and WKs

- PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences. WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline. WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline. WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

POs and WKs

- PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
- PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues

- PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
- PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences. WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline. WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline. WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline. WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area. WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline. WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

POs and WKs

- PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
- PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- PO9: Communication: Communicate effectively and inclusively within the engineering
- PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
- PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues. **WK9:** Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

PO1: Engineering Knowledge: ***Apply knowledge*** of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of ***complex engineering problems.***

Breadth, depth and type of knowledge, both theoretical and practical

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

PO2: Problem Analysis: *Identify, formulate, review* research literature and ***analyze complex engineering problems*** reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

Complexity of analysis

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

PO3: Design/Development of Solutions: *Design creative solutions for complex engineering problems* and *design/develop systems/components/processes* to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

Breadth and uniqueness of engineering problems i.e. the extent to which problems are original and to which solutions have not previously been identified or codified

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re- use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

PO4: Conduct Investigations of Complex Problems: *Conduct investigations of complex engineering problems* using research-based knowledge including **design** of experiments, **modelling**, **analysis & interpretation** of data to provide valid conclusions. (WK8).

Breadth and depth of investigation and experimentation

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues

Programme Outcomes

- **What are the knowledge+Skill+Life Activities and Attitude a graduate is going to inculcate during undergoing the programme and going to practice in the professional career**
- **Generic in nature**
- **Every component is measurable or quantifiable hence, outcomes**
- **In simple language these are the GUNNAs, a graduate is supposed to develop while going through the programme**

What and How of OBE

OBE is a measurable quality improvement framework/system

- What do we want our students to achieve or imbibe?

  Captured in PROGRAM OUTCOMES [POs]. Achievement is judged by assessment and evaluation of attainment of POs

- How do our students achieve it?

  Launched curriculum imparted through Teaching-Learning and assessment and evaluation.

  Qualitative and quatitative rating is done by asseessment and evaluation of Course Outcomes [COs]

- What action is taken to address specialisation of a Programme?

  Defining Programme Specific Outcomes (PSOs)

- How do we close the loop for further improvement (Continuous Quality Improvement (CQI)?

  Make use of the assessment of attainment of COs and POs

OLD Evaluation Criteria NEW

Criteria No.	Criteria	Marks
Program Level Criteria		
1.	Vision, Mission and Program Educational Objectives	50
2.	Program Curriculum and Teaching – Learning Processes	100
3.	Course Outcomes and Program Outcomes	175
4.	Students' Performance	100
5.	Faculty Information and Contributions	200
6.	Facilities and Technical Support	80
7.	Continuous Improvement	75
Institute Level Criteria		
8.	First Year Academics	50
9.	Student Support Systems	50
10.	Governance, Institutional Support and Financial Resources	120

Criterion No.	Criterion Titles	Marks
1	Outcome based Curriculum	120
2	Outcome based Teaching-Learning	120
3	Outcome based Assessment	120
4	Students' Performance	120
5	Faculty Information	100
6	Faculty Contributions	120
7	Facilities and Technical Support	100
8	Continuous Improvement	80
9	Students support and Governance	120

- Points for Attention in NEW SAR

Criterion 1:Outcome based Curriculum: 120

1.1.5. Mapping of PEOs with Mission (10)

(Generate a Mission of the Department–PEOs matrix with [redacted] and [redacted] of the mapping.)

Table No.1.1.5.1: Mapping of PEOs with mission.

PEO Statements	M_1	M_2	....	M_n
PEO1:				
PEO2:				
PEON:				

Note:

- M_1, M_2. . . M_n are distinct elements of mission statement. Enter correlation levels as Low (1), Medium (2) and High (3). If there is no correlation, put "-"

Criterion 1:Outcome based Curriculum: 120

1.2.4. Strategies for Education Reforms (05)

(A brief explanation of the plans to implement and map activities in curriculum design with multidisciplinary and interdisciplinary programs, the establishment of an academic bank of credits system, ABC etc.)

1.3. PO, PSO and their Mapping with Courses (20)

1.3.1. POs and PSOs (05)

(Program Specific Outcomes (PSOs) are defined by the program, with up to 3 PSOs specified.)

List of POs as Defined by NBA in Annexure II.

List of PSOs (up to 3)

(Provide details of the PSOs for the program currently seeking accreditation.)

Criterion 1:Outcome based Curriculum: 120

1.3.2. Mapping between the Courses and POs/PSOs (15)

(Mention the courses relevant to the POs/PSOs.)

Table No.1.3.1: Connection of courses with POs/PSOs.

PO Number	List of Courses
PO1:	
PO2:	
PON:	

Add more rows for PSOs

Criterion 1:Outcome based Curriculum: 120

1.4.1. Course Outcome (Semester Wise) (15)

(Provide Course outcomes (COs) for two core courses per semester from 1-8 semesters as a sample. The maximum number of outcomes for a course is expected to be around 6. COs should reflect on the measurable outcomes towards attaining POs and PSOs).

Table No. 1.4.1.1: Course outcomes.

Semester No:			
Course Title:		**Course Code:**	
Course Outcome No.	**Course Outcome Statement**		

Criterion 2: Outcome based Teaching-Learning: 120

2.5. [redacted] **(10)**

(Type and complexity, POs/PSOs addressed.)

2.6. SWAYAM/NPTEL/MOOC/Self Learning (10)

(Number of students registered, certification and POs/PSOs addressed.)

2.7. Solving [redacted] Problems Incorporating [redacted] (20)

(Provide details of core courses (Project based learning, problem-based learning), mini projects, integrated design projects, capstone projects, hackathon or any other activity-based learning towards [redacted])

2.8. Steps Taken for Enhancing Industry Institute Partnerships (15)

(Provide details of partial delivery of courses, industry supported labs, industry offered short-term programs/training etc.)

Criterion 3: Outcome based Assessment: 120

3.3. Evaluation of Laboratory Work and Workshop (Continuous and SEE) (10)

(Provide details of rubrics used to assess learnings in laboratories and workshops linking with COs and POs/PSOs targeted. Evidence of student a[redacted] to be kept in course files for evaluation.)

3.4. Evaluation of Industrial Training/ Internship (Continuous and SEE) (10)

(Provide details of rubrics used to assess learnings in internships/industrial trainings linking POs/PSOs targeted for attainment. Evidence of student [redacted] to be kept in course files for evaluation.)

3.5. Evaluation of Projects (20)

(Provide details of rubrics used to assess learnings in projects linking POs/PSOs targeted for attainment. Evidence of student a[redacted] to be kept in course files for evaluation.)

3.6. Evidence of Addressing S[redacted] (SDG) (10)

(Provide details of student work carried out to meet sustainable development goals such as research work, [redacted] student activities etc. Evidence in the form of a portfolio to be made available during the visit.)

Criterion 3: Outcome based Assessment:120

Table No. 3.8.2: PO and PSO attainment value using [redacted].

Name of the Survey	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
Survey 1											
Survey 2											
Survey 3											
.....											
Indirect Attainment											

Add more columns as needed for PSOs if any.

Note:

- Mention the [redacted] and the [redacted].
- Indirect attainment level of a PO/PSO is determined based on the student exit surveys, employer surveys, etc.

Criterion 4:Students' Performance: 120

Example for Table **No.4B**: A [redacted]

Item (No. of students admitted/exited through multiple entry and exit points) in the respective batch		CAY 2023-24	CAYm1 2022-23	CAYm2 2021-22	CAYm3 2020-21	CAYm4 (LYG) 2019-20	CAYm5 (LYGm1) 2018-19	CAYm6 (LYGm2) 2017-18
N5(Multiple entry) N5=N52+N53+N54	N52= No. of students admitted in 2nd year via multiple entry and exit points in same batch	0(NA)	2	1	2	1	1	2 (a)
	N53= No. of students admitted in 3rd year via multiple entry and exit points in same batch	0(NA)	0(NA)	0	0	0	0	1 (b)
	N54= No. of students admitted in 4th year via multiple entry and exit points in same batch	0(NA)	0(NA)	0(NA)	0	0	0	1 (c)
	N5=N52+N53+N54	0(NA)	2	1	2	1	1	4
N6 (Multiple exit) N6=N61+N62+N63	N61= No. of students exits after 1st year via multiple entry and exit points in same batch	0(NA)	1	1	1	0	1	1 (d)
	N62= No. of students exit after 2nd year via multiple entry and exit points	0(NA)	0(NA)	0	0	0	0	1(e)
	N63= No. of students exit after 3rd year via multiple entry and exit points in same batch	0(NA)	0(NA)	0(NA)	0	0	0	0 (f)
	N6=N61+N62+N63	0(NA)	1	1	1	0	1	2

Criterion 5:Faculty Information: 100

Criterion 5: Faculty Information (100)

Table No. 5A: Faculty details

S.N.	Name of the Faculty	PAN No.	[redacted] ID*(if any)	Highest degree	University	Area of Specialization	Date of Joining in this Institution	Experience in years in current institute	Designation at Time Joining in this Institution	Present Designation	The date on which Designated as Professor/ Associate Professor if any	Nature of Association (Regular/ Contract/ Ad hoc)	If contractual mention Full time or (Part time or hourly based)	Currently Associated (Y/N)	Date of Leaving if any (In case Currently Associated is " No")
1															
:															

Criterion 8: Continuous Improvement: 80

8.2. Academic Audit and Actions Taken thereof during the Period of Assessment (15)

(Academic audit system/process and its implementation in relation to continuous improvement.)

Criterion 9: Students support and Governance: 120

9.3. Feedback Analysis (10)

9.3.1. Feedback on Teaching and Learning Process and Corrective Measures Taken, if any (05)

(Provide details of the feedback collection process on TLP, average percentage of students who participate; Specify the feedback analysis process; Basis of reward/ corrective measures during the assessment period. S[redacted] measures taken. Exhibit the details of a[redacted].)

9.3.2. Feedback on Academic Facilities (05)

(Provide details of the feedback collection process on facilities, its a[redacted]s and c[redacted]s taken during the assessment period.)

Criterion 9: Students support and Governance: 120

9.6. Governance and Transparency (25)

9.6.1. Availability of the Institutional Strategic Plan and its Effective Implementation and Monitoring (10)

(Provide details of the Institute's strategic plan or Institutional Development Plan (IDP), its approval by the competent authority, and its implementation.)

Criterion 9: Students support and Governance:120

9.11. [redacted] and Implementation of Sustainable Development Goals ([redacted]) (10)

(Provide details of initiatives taken towards implementation of SDG specifically on green energy, waste management, preserving water, net zero, quality education, reuse, recycle, less use to renewables, etc. Provide evidences on implementation (projects assigned, R & D activities, entrepreneurial activities, outreach programs etc.)

9.12. Innovative Educational Initiatives and Implementation (05)

(Provide details of initiatives taken towards mobility of students, implementation of academic bank of credits, and s[redacted] including human values, multidisciplinary/interdisciplinary curriculum/programs, initiatives on [redacted], Contribution towards and implementation of teaching in Indian language, etc. Policies on inclusivity and equity and their implementation, [redacted] Action plan and its implementation for slow learners.)

Criterion 9: Students support and Governance:120

9.13. Faculty Performance Appraisal and Development System (FPADS) (10)

(Faculty members of Higher Educational Institutions today have to perform a variety of tasks pertaining to diverse roles. In addition to instruction, faculty members need to innovate and conduct research for their self-renewal, keep abreast of changes in technology, and develop expertise for the effective implementation of curricula. They are also expected to provide services to the industry and community to understand and contribute to solving real-life problems in industry. Another role involves shouldering administrative responsibilities and cooperating with other faculty, heads of departments, and the head of the institute. An [redacted] for faculty is vital for optimizing the contribution of individual faculty to institutional performance.

The assessment is based on a well-defined system for faculty appraisal for all the assessment years and its implementation and effectiveness.)

9.14. Outreach Activities (05)

(Provide details of outreach activities such as community service, Unnat Bharat Abhiyan, [redacted] undertaken by the students and their achievements.)

Quality Link/Mapping

High POs Attainment------Quality

- Extent of COs contributions to POs: COs and PO→CO mapping
- Contribution of curriculum to COs: Curriculum mapping to COs
- Curriculum Strength for quality support: Curriculum to Taxonomy
- Effective implementation of curriculum: T-L-A → constructive alignment
- Assessment and Evaluation standard: Question mapping to COs
- Feedback and improvement mapping
- Quality and relevance of feedback questions to criteria and Audit

OBE Dominant Criteria

Criterion 1	Outcome based Curriculum
Criterion 2	Outcome based Teaching Learning
Criterion 3	Outcome based Assessment
Criterion 6	Faculty Contributions
Criterion 8	Continuous Improvement

POs (Outcome)	PSOs (Outcome)	PEOs (Objective)
• As per New SAR: 11 • Defined by NBA • The Graduates to attain after duration of 4 years • Attainment before getting the degree • Attributes or Gunn a students to imbibe/inculcate during the programme • Defined for Programme i.e. UG/PG/MBA/MCA etc., • Assessed using teaching-learning and assessment records	• 2 to 3 to be defined for each programme • Fill up the gaps to contribute towards POs • Attainment before getting the Degree • Support specialization or beyond syllabus • Defined for a particular programme of a discipline such as UG: Civil or PG: Electrical etc., • Assessed using teaching-learning and assessment records	• 4 to 5 to be listed for each programme • Expected to achieve after 3 to 4 years or beyond after degree • It is like the dream the stakeholders establishing the institute see • POs and PSOs are feeder to PEOs • Assessed using Alumni data and interacting with employers

PEOs

PEO1:

Globally acclaimed Telecommunication entrepreneur for space industries

PEO2:

Renowned Educationist with extraordinary professional accomplishments

PEO3:

Keen Investigator and Contributor to Indian Knowledge System through recognized Research Work

PEO4:

Technical leaders to spearhead the advancement of telecommunications in the country

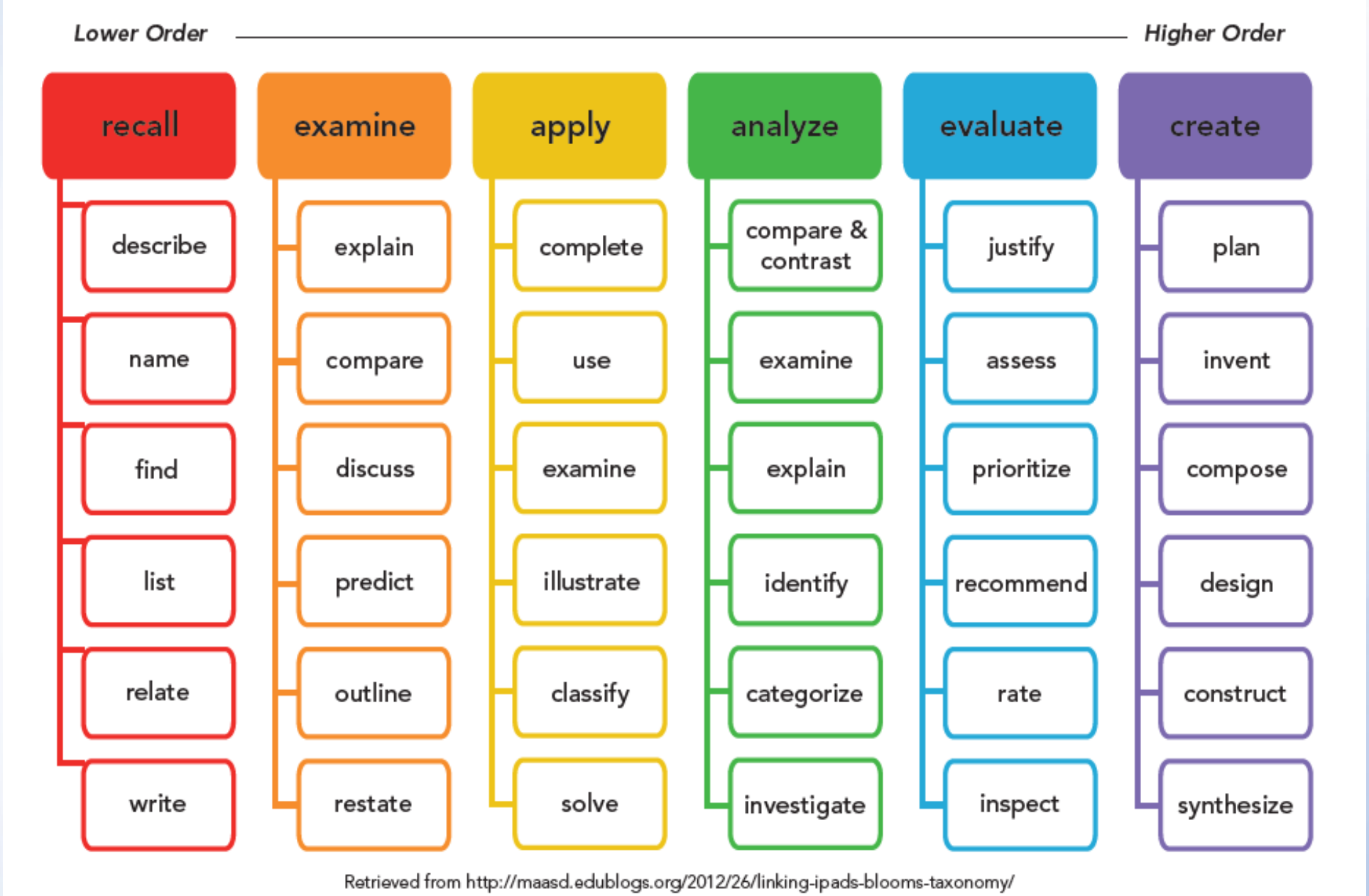
Key Interrelationship

Vision

Mission

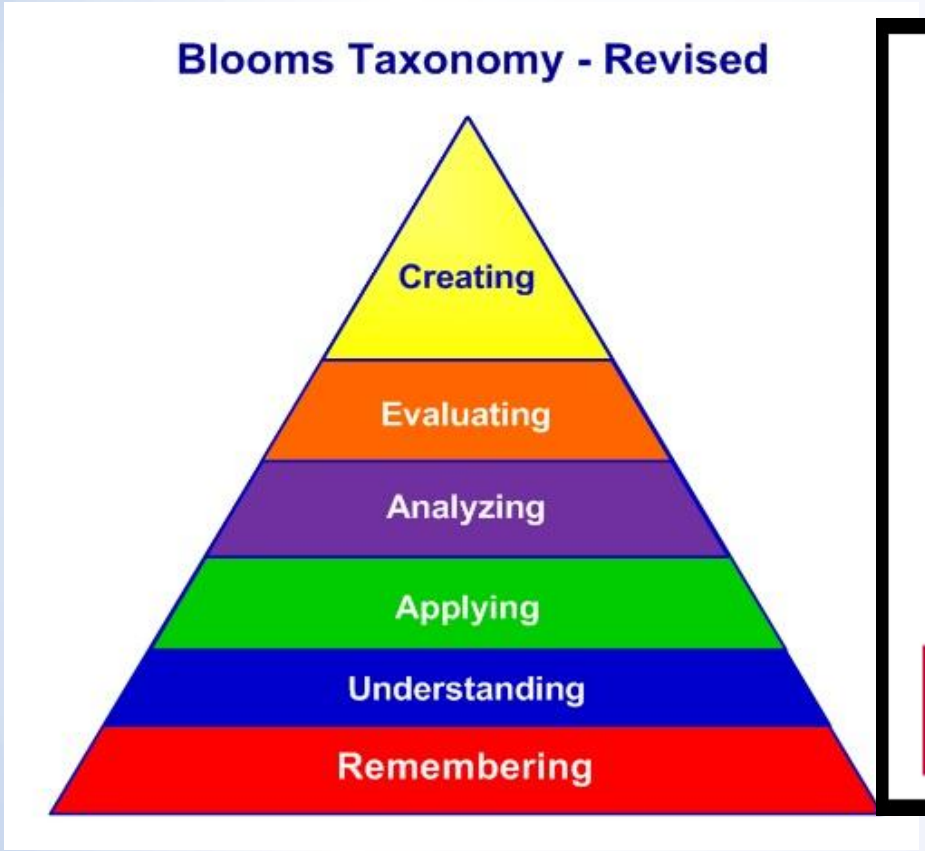
Mapping Matrix with Mission: PEOs and Mission Articulation Matrix

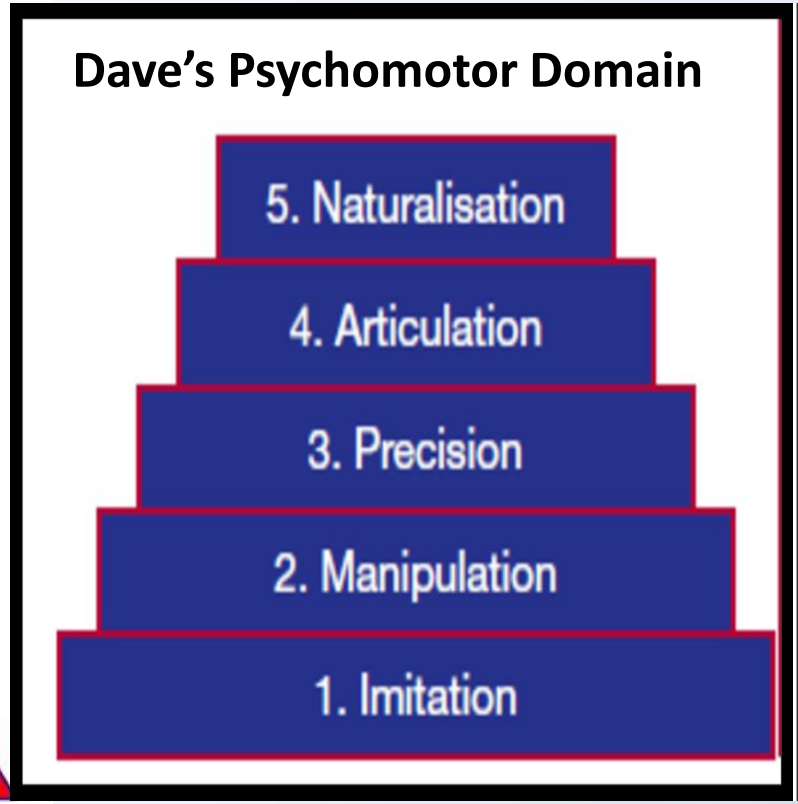
Bloom Verbs

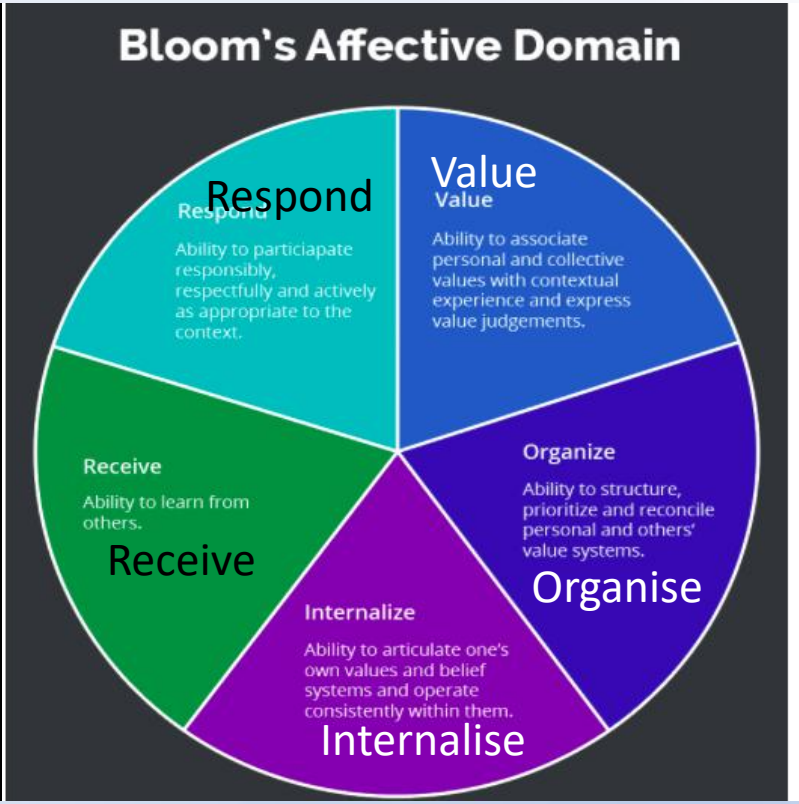


Retrieved from http://maasd.edublogs.org/2012/26/linking-ipads-blooms-taxonomy/

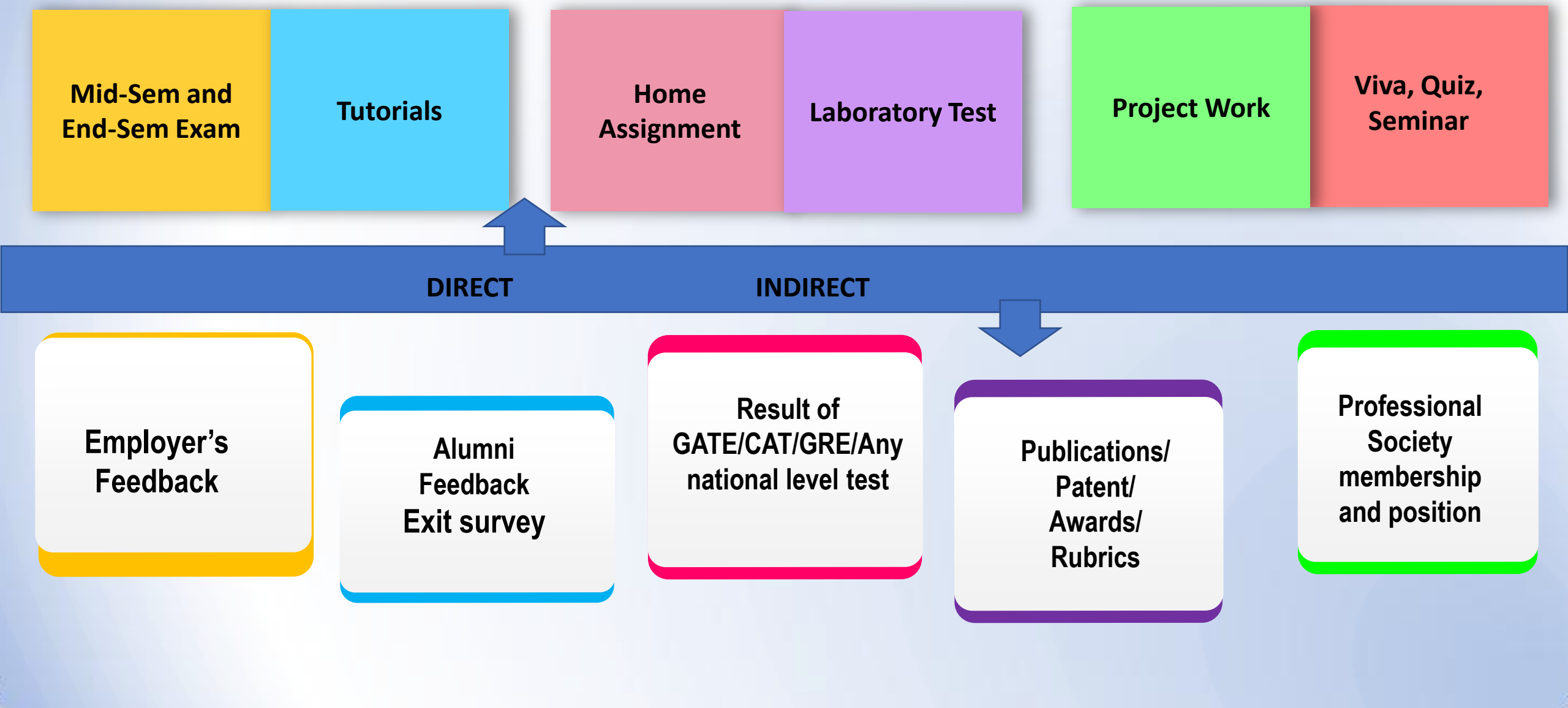
Taxonomy


Blooms Taxonomy - Revised
Creating
Evaluating
Analyzing
Applying
Understanding
Remembering


Dave's Psychomotor Domain
5. Naturalisation
4. Articulation
3. Precision
2. Manipulation
1. Imitation


Bloom's Affective Domain
Respond
Ability to particiapate responsibly, respectfully and actively as appropriate to the context.
Value
Value
Ability to associate personal and collective values with contextual experience and express value judgements.
Organize
Ability to structure, prioritize and reconcile personal and others' value systems.
Organise
Receive
Ability to learn from others.
Receive
Internalize
Ability to articulate one's own values and belief systems and operate consistently within them.
Internalise

Assessment Tools



Assessment of attainment of Outcomes – COs and POs

- OUTCOMES are what our students achieve by T-L-A
- The attainment helps identify doable improvements and act on these.
- CO attainment are to be calculated by the teacher at the end of the course
- Since POs are achieved by COs, PO assessment will use CO assessment as input and be based on CO-PO matrix which captures the contribution of COs to POs
- CO assessment will be based on how students do in the tests/quizzes, internal/end-semester examinations, assignments/home-work and therefore, we need to capture connection between questions in the exam/test and the COs
- These assessments are for an entire class (i.e., aggregate) – as distinct from individual student performance

CO-PO mapping (connecting COs with POs)

The mapping is a matrix with rows as COs and columns as POs

Each cell in the matrix has a value in {--, 1, 2, 3}

The meaning associated with the values are as follows:

-- this CO (row) has contributions to the PO(column)

1 → relevant and small significance

2 → medium or moderate and

3 → strong

These values have to be justified in implementation, that is, T-L-A of the course, in terms of the BLOOM Level of the questions/Problems

CO-PO mapping

COs\POs	PO1	PO2	PO3	PO4	-------
CO1	3	1	2	-----	
CO2	2	2	1	3	
CO3	3	2	3	1	
CO4	1	1	--	--	

PO1 Apply

PO2 Analyze

PO3 Design

PO4 Investigate

PO Attainment – Example

Setting the Target/ Benchmark

- Many methods are available

Method1:

- Same target is identified for all the COs of a course/subject
- Example: the class average mark let say ≥ 70 marks

In this case all the students are kept in one category and all COs are also kept in same level

Example:

Let us consider the case of course title: EM Theory

Here the students are taught Curl, Divergence, Theorems, Maxwell's equations, Boundary conditions, Wave equations, Waveguide etc.,. Each unit of the subject has a different difficulty level and so are the tasks to be performed. Hence, does not give the true outcomes but near value of the expected outcomes

Easy and requires less computation

Method 2:

- Targets are the same for all COs and are set in terms of performance levels of different groups of students
- Classifies Students into different categories, but does not provide any plan for improvement

    15% students below average 60% students at average 25% of students above average

    Let us say average score is 65 to 80 marks

    Appears to be a good system in heterogeneous case

    Computational work is more

    Main aim here to make 15% zero

Method 3:

- Targets are set for each CO separately
- Advantage of finding the difficulty of specific COs
- Set based on average i.e. CO1 80%, CO2 65%, CO3 95%, CO4 98%
- Computation is more and does not give a distribution of performance

Method 4:

- Targets are quantized into certain levels such as Level1, Level 2 and Level 3
- Let set Level 3 as 75% students scoring ≥ 80% mark
- Level 2: 60% students scoring ≥ 80%
- Level 1: 40% Students Scoring ≥ 80%

  - Continuous improvement is to attain Level 3
  - Generally followed method
  - How to fix target whether it is 80 marks or less or more

  For first year 1st Sem: Take average of +2 PCM score or +2 % of Mark

  For rest semesters find the median of formative and summative assessments of at least 3 to 4 batches. Then take average of these medians and ± ø

  Ø is the deviation expected

  - Easy create data sheet and also easy to implement
  - Difficulty in a heterogeneous system to achieve the set level

ECE: 301 COs	Sub: Electromagnetic Theory Statement of COs: At end of the course the student will be able to do:
C301.1	Compute the spatial variations in coordinate system by using various coordinate systems
C301.2	Derive the electric and magnetic force and field intensity for the given charge distributions
C301.3	Apply the knowledge of electro-magnetic to design waveguides
C301.4	Relate the volume charge density and electric flux density in a given boundary value problem
C301.5	Analyze and select a suitable dielectric and magnetic material for cavity resonator application

CO-PO Matrix for a course : In this case EM Theory

Low: 1 Moderate: 2 High: 3

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
C301.1	2		2	3	2	1	2	1	2	3	1	
C301.2	3	1	1	2	2	3	2	3	3	3		
C301.3	2	2		2	1	3	3	2	2	3		
C301.4	1	3	3	1	3	2		2	2	3		3
C301.5	3		1	2	2	2				1		
Avg	11/5= 2.2	6/5= 1.2	7/5= 1.4	10/5= 2	10/5=	11/5= 2.2	7/5= 1.4	8/5= 1.6	9/5= 1.8	13/5= 2.6	1/5= 0.2	3/5= 0.6
Rounded Avg. Attainment	2	1	1	2	2	2	1	2	2	3	0	1

PO Attainment

Avg. Value of PO from Matrix divide by Highest PO level multiply by CO attainment for the course

(Avg.PO/3) X CO attainment

Attainment of PO

COs	CO Attainment	PO1 2	PO2 3	PO3 2	PO4 2	PO5 1	PO6 2	PO7 3	PO8 2	PO9 2	PO 10 1	PO 11 1	PO 12 1
C301.1	2.2	1.47	2,2	1.47		.73							
C301.2	2.8	1.87		1.87	1.87							.93	
C301.3	1.6	1.07	1.6					1.6					.53
C301.4	1.4	.93	1.4	.93		.46							
Attainment		**1.34**	**1.73**	**1.42**	**1.87**	**.59**		**1.6**				**.93**	**.53**

(2.2 x2)/3=1.466=1.47 (2.8 x 2)/3 = 1.866 = 1.87 and so on

PO Attainment - Calculation

Course	COs	Attainment Level Column A	PO1 Ccolumn B	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C3 01	C301.1	1.5	1	1	3	2	2	1	-	1	1	-	-	-	2	2	1
	C301.2	2.1	1	1	3	2	3	1	-	-	1	-	-	-	2	2	1
	C301.3	2.4	1	1	3	3	3	-	-	-	1	2	-	-	3	3	1
	C301.4	2.5	1	1	3	3	3	2	-	-	1	-	-	-	3	3	1
	C301.5	2.4	1	2	3	3	3	-	-	1	1	-	-	1	3	3	1
	C301.6	2.7	1	2	3	3	3	2	-	-	1	2	-	1	3	3	1
C3 02	C302.1	1.8	-	-	-	-	-	-	1	-	2	1	3	-	-	-	-
	C302.2	1.9	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
	C302.3	1.7	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
	C302.4	2.7	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
	C302.5	2.1	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
	C302.6	1.4	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
		Program Outcome Attainmen t	2.27	2.34	2.27	2.33	2.31	2.33	1.93	1.95	2.04	2.40	1.93	2.55	2.33	2.33	2.27

Here only 2 course are taken; for actual calculations all courses to be taken
Calculation: PO1= (column A* Column B)/Sum(column B)
This can be done in excel or spread-sheet tool

PO assessment

Direct 80%	Indirect 20%
• University examination • Internal examination • Tutorials • Class Tests • Direct Assessment Rubrics – Continuous Assessment at laboratory	• Program Exit Survey • Alumni Survey • Employer Survey • External Examiner Feedback • Industrial Visit Evaluation Rubrics • In Plant Training Evaluation Rubrics • Guest Lecture/Workshop/Expert Lecture resource person feedback • Parent Feedback • Students feedback • Co-curricular & Extra Curricular Activities

POs	Exit Survey Question	0	1	2	3	4	5	Total	Weighted Average	% Attainment
PO1	(i)To what level you could apply science, math and engg. Concept to problem solving	0	0	2	3	14	6	25	3.96	76%
	(ii) Your ability to support technical problem solving	0	0	5	4	11	5	25	3.64	
PO2	Ability to analyse ECE problem	0	0	2	5	14	4	25	3.8	76%
PO3	(i)Capability to design ECE components	0	1	4	7	10	3	25	3.4	68%
	(ii) Ability to design ECE system	1	1	1	11	7	4	25	3.36	
PO4	To what Extent you can analyse and interpret data	0	1	1	4	13	6	25	3.88	78%
PO5	Understanding and ability to use modern tools in ECE problem solving	0	0	5	5	11	4	25	3.56	71%

2x2+3x3+14x4+6x5=99/25=3.96 3.96+3.64=7.6=76% 3.8x2=76% and so on

Results of attainment of POs through Semester End Exam (SEE) results,

Sl. no.	Course									marks (%)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1.	Analysis of Structures-II									59%												
2.	Environmental Engineering-I									81%	81%	81%	81%	81%		81%	81%	81%		81%		
3.	Geotechnical Engineering - II									56%												
4.	Highway Engineering									72%	72%	72%	72%	72%		72%		72%		72%		
5.	Hydrology & Water Resources									60%												
6.	Software Applications									75%		75%	75%	75%	75%					75%		75%
7.	Minor Project/Industrial Visit									86%										86%		86%
8.	Design of Steel Structures									56%												
9.	Environmental Engineering-II									70%	70%	70%	70%			70%	70%					
10.	Extensive Survey Project									86%	86%	86%	86%	86%	86%			86%	86%	86%		86%
11.	Pre Stressed Concrete									62%	62%	62%	62%					62%				
12.	Transportation Systems &									68%	68%	68%	68%			68%						

Example Weightages for PO Attainment

PO No.	Method of Assessment	Direct Assessment (CIE)	Direct Assessment (SEE)	Student Exit Survey	Course End Survey	Faculty Survey	PO Attainment, %
	Weightage / PO Description	50%	30%	10%	5%	5%	
PO 1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	38%	22%	7%	4%	4%	76%
PO 2	Identify, formulate, research literature, and analyz e complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	37%	22%	7%	4%	4%	75%
PO 3	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.	32%	23%	7%	3%	3%	68%
PO 4	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.	39%	23%	7%	4%	3%	77%

PO Attainment

- All POs can be adequately addressed through the selection of courses and their COs
- Attainable targets can be selected for each of the CO.
- If assessment is in alignment with COs, the performance of the students indicates the PO attainment.
- These measurements provide the basis for continuous improvement in the quality of learning.

Two-step Process for Bringing Clarity to POs

- POs give useful guidance at the program level for the curriculum design, delivery and assessment of student learning. To connect high-level outcomes (POs) with course content, course outcomes and assessment, there is a necessity to bring further clarity and specificity to the program outcomes . This can be achieved by (i) identifying Knowledge and Skill and (ii) Performance Indicators (PI).

Bringing Clarity to Pos through Competency and PI

(i) Identify knowledge and skill to be attained: For each PO define Knowledge-Skill –different abilities implied by program outcome statement that would generally require different assessment measures. This helps us to create a shared understanding of the knowledge and skill we want students to achieve. They serve as an intermediate step to the creation of measurable indicators.

PO3: 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 public health and safety, and cultural, societal, and environmental considerations.

Knowledge and Applications Level:

1. Demonstrate an ability to define a complex, open-ended problem in engineering terms.
2. Demonstrate an ability to generate a diverse set of alternative design solutions.
3. Demonstrate an ability to select the optimal design scheme for further development.
4. Demonstrate an ability to advance an engineering design to the defined end state.

(ii) Define Performance Indicators: For each of the competencies identified, define performance Indicators (PIs) that are explicit statements of expectations of the student learning.

Example:

For the Level -2

Demonstrate an ability to generate a diverse set of alternative design solutions

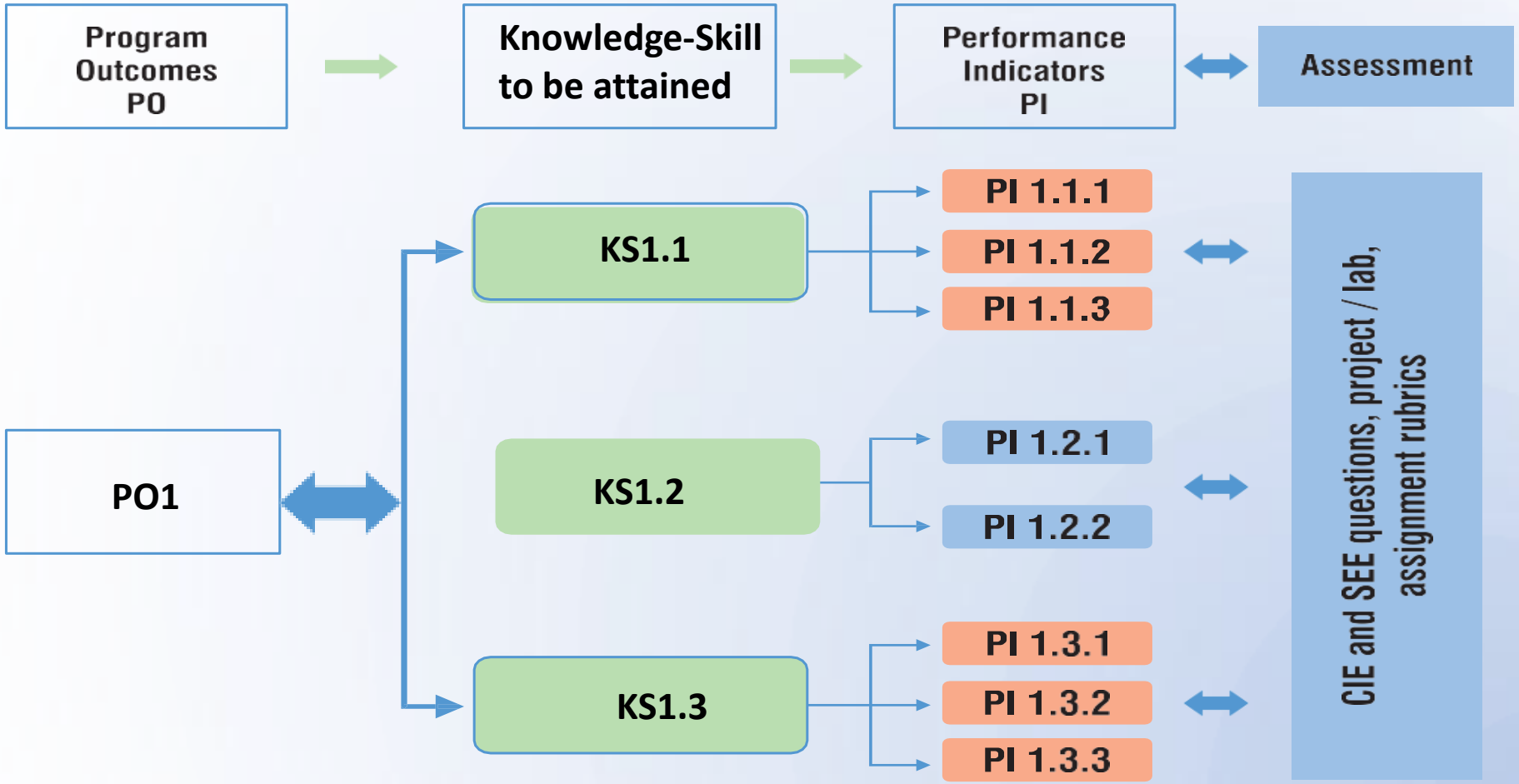
Performance Indicators:

1. Apply formal idea generation tools to develop multiple engineering design solutions
2. Build models, prototypes, algorithms to develop a diverse set of design solutions
3. Identify the functional and non-functional criteria for evaluation of alternate design solutions

.

It should be noted that, when we consider the program outcome, it looks like, it can be achieved only in the Capstone project. But if we consider the knowledge-skill and performance indicators, we start seeing the opportunities of addressing them (and hence PO) in various courses of the program.

POs and Assessment



Design an antenna for mobile phone to radiate in 90 degree with low SAR and with AI support, take a decision on clearance for the company

01 **Engineering Knowledge:** Does it require knowledge math, physical science, engineering fundamental and specialization: **Yes: PO1**

02 **Problem Analysis**: Does it require formulation and survey of research literature: **Yes: PO2**

03 **Design/Development of Solution:** Is it a design problem with consideration for public health: **Yes: PO3**

04 **Conduct investigation:** Does it require research based knowledge and analysis: **Yes: PO4**

05 **Modern Tool Usage:** Is there a need to use ant modern tool **: YES: PO5**

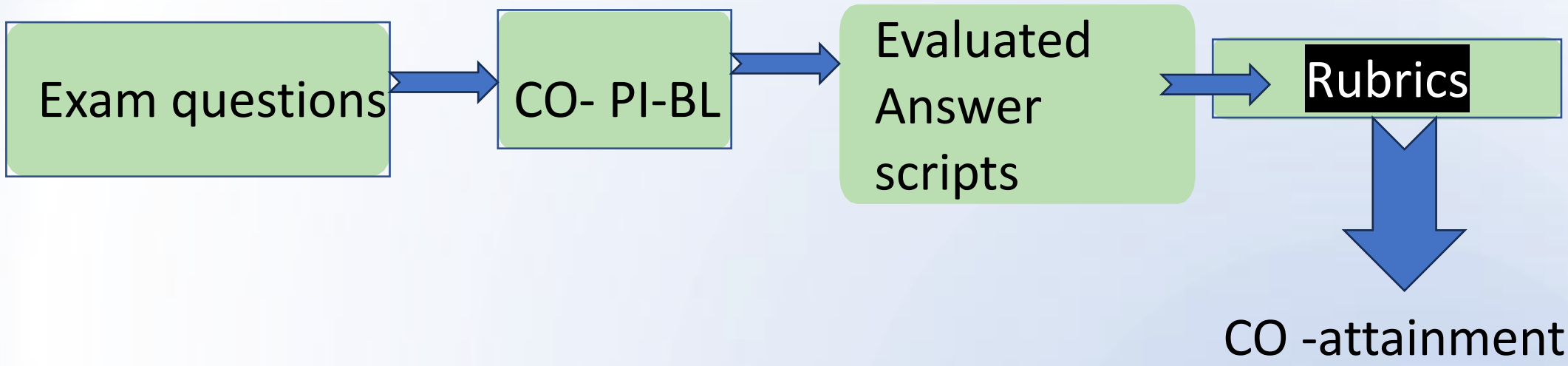
06 **The Engineer and Society:** Does it require professional engineering practice to assess societal health and safety: **Yes PO6**

06 **Environment and sustainability:** Does it relate to sustainability : **NO PO6**

07 **Ethics:** Does it require to apply ethical principle: **Yes PO7**

08-09 **Individual and Team Work: Communication: Yes**
Project Management and Finance: Life Long Learning : NO

Procedure for CO attainment calculation



CO attainment calculation

Reg no	Internal Exams																		University Exams						
	Test 1						Test 2						Project, Assignments, Quiz etc												
	CO1	CO2	CO3	CO4	CO5	Total	CO1	CO2	CO3	CO4	CO5	Total	CO1	CO2	CO3	CO4	CO5	Total	CO1	CO2	CO3	CO4	CO5	Internal	Total
24ECE01	30	40				70			20	30	25	75	17	18	15	9	15	74	9	6	20	13	20	24	92
24ECE02	25	37				62			25	25	25	75	18	14	8	11	9	60	8	7	15	14	19	23	86
24ECE03	10	30				40			14	20	25	59	19	13	11	15	11	69	7	8	20	10	18	21	84
24ECE04	14	20				24			10	17	24	51	20	15	17	14	15	81	6	4	11	5	15	17	58
No. of Students Attended	4	4	4	4	4	4	4	4	4	4	4	4													
Max Mark CO wise	50	50	0	0	0	100	0	0	30	30	40	100	20	20	20	20	20	100	10	10	20	15	20	25	100
Threshold 50%	25	25				50			15	15	20	50	10	10	10	10	10	50	5	5	10	7.5	10	12.5	50
No. of students above threshold	2	3				2			3	4	4	4	4	4	3	3	3	4	4	3	4	3	4	4	4
Level	1	3				1			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
							Target																		
							50% of students above 50% - 1 (LOW)																		
							60% of students above 50% - 2 (MEDIUM)																		
							70% of students above 50% - 3 (HIGH)																		

Example

Course: Chemistry

Topic: Salt Preparation

Salt preparation is a process of mixing two or more chemicals through suitable process to make the compound with proper strength, crystallinity and durability as per TATA salt

Students activities

Here students have the choice of selecting different chemicals, select the different processes to produce the salt matching with that of TATA

TEST QUESTION

State the different processes of chemical mixing techniques for salt preparation

PO1: Engineering Knowledge

CO1 : Able to explain chemical mixing techniques for salt preparation

Example

questions	Observation	Decision
1.Does the test question correlate well with the co1 2.Does this CO1 reflects the intended measurement from PO 1	Does not reflect use of math, science and engineering principle and engineering application It is remembrance only Test question also does not match PO1	Correlation between CO-PO is - --------- a. Strong b. Moderate c. Weak Select the correct one

PO1: Engineering Knowledge

CO1 : Able to explain chemical mixing techniques for salt preparation

Subject/Course CHEM-101

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	Remarks
CO 1												
CO 2												
CO 3												
CO n												

3= Strong 2= Moderate 1= Weak

COURSE	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
Subject1	CO1	3	3	-	-	-	-	-	-	-	-	-
	CO2	3	3	-	-	-	-	-	-	-	-	-
Subject2	CO1	3	2	-	3	-	3	3	-	-	-	-
	CO2	3	3	-	-	-	3	3	-	-	3	-
	CO3	-	-	3	-	-	-	3	3	-	3	-
Subject3	CO1	3	3	-	-	-	-	-	-	-	-	-
	CO2	3	3	-	-	-	-	-	-	-	-	-
	CO3	3	3	-	-	-	-	-	-	-	-	-
	CO4	3	3	2	-	-	3	-	-	-	-	-
Subject4	CO1	3	-	-	-	-	-	-	-	-	-	-
	CO2	-	3	3	-	-	-	-	-	-	-	-
	CO3	-	3	3	-	-	-	-	-	-	-	-
	CO4	-	-	-	-	-	-	-	3	3	-	-
Subject5	CO1	3	3	-	-	-	-	-	-	-	-	-
	CO2	3	3	-	-	-	-	-	-	-	-	-
	CO3	3	3	3	-	-	-	-	3	-	-	-
Major Project	CO1	-	-	-	-	-	-	3	-	3	-	-
	CO2	3	3	3	3	-	-	-	3	3	-	-
	CO3	-	-	-	-	3	-	-	-	3	-	-
	CO4	-	-	-	-	-	-	-	-	3	3	2

CO-PO Relationship

Assessment tools

PO/Course Assessment Tool Types	PO/ Course Assessment Tool	1	2	3	4	5	6	7	8	9	10	11	12
Direct Tools	Tests	√	√	√	√								
	Assignments	√	√	√	√		√		√			√	√
	Lab/Seminars/Industrial Training/ Projects (Rubrics)	√	√	√	√	√		√	√	√	√	√	√
Indirect Tools	Course End Survey	√	√	√	√	√	√	√	√	√	√	√	√
	Exit Survey	√	√	√	√	√	√	√	√	√	√	√	√
	Faculty Survey	√	√	√	√	√	√	√	√	√	√	√	√
	Alumni Survey		√			√					√		
	Programme Statistics	√	√					√		√		√	√

CO-attainment for a course

	Program Outcomes	PO1																					
	Max Marks	10	10	10	10				40					5				5					
	Course Outcomes	CO1							TOTAL OBTAINED	TOTAL MARKS ATTEMPTED	PERCENT, %	SCORES OR GRADING BASED ON SCALE OF 3	Target > =70%	CO2				TOTAL OBTAINED	TOTAL MARKS ATTEMPTED	PERCENT, %	SCORES OR GRADING BASED ON SCALE OF 3	Target > =70%
USN	Name	T1-Q1.a	T1-Q1.b	T1-Q2.a	T1-Q2.b									Assignment-1									
1BM13CCT01	ANUSHA S. B.	8	7	8					23	30	77%	3	Y	3				3	5	60.00%	2	
1BM13CCT02	BHAVISH DAS (discontinued after I sem)	5	6	12	8				31	40	78%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT03	DEEPA M NAIK			8	7				15	20	75%	3	Y	5				5	5	100.00%	3	Y
1BM13CCT04	GOLLAPALLI NIRANJAN REDDY			9	7				16	20	80%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT05	JHANSI RAMA PRIYA			9	9				18	20	90%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT06	NIRANJANA N	7	6	9	3				25	40	63%	2		4				4	5	80.00%	3	Y
1BM13CCT07	PAVAN J.			9	9				18	20	90%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT08	PRAMOD B. V.			10	9				19	20	95%	3	Y	3				3	5	60.00%	2	
1BM13CCT09	PRAVEEN GONGACHI	4	7						11	20	55%	2		4				4	5	80.00%	3	Y
1BM13CCT10	RAJESH A.			9	7				16	20	80%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT11	SALMAN PASHA	7	7	6					20	30	67%	2		4				4	5	80.00%	3	Y
1BM13CCT12	SHARATH R.	7	7	8	8				30	40	75%	3	Y	3				3	5	60.00%	2	
1BM13CCT13	SHRINATH			9	8				17	20	85%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT14	SOWMYA H. V.			9	7				16	20	80%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT15	SUNIL KUMAR B. M.		2	7	7				16	30	53%	2		3				3	5	60.00%	2	
1BM13CCT16	VIKAS PRABHAKAR ATTIGERI			9	8				17	20	85%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT17	VIKRAM C GATEGAR			7	8				15	20	75%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT18	VILASKUMAR S. LONIMATH			8	8				16	20	80%	3	Y	5				5	5	100.00%	3	Y
											SUM	50	14							SUM	50	14
										AVG GRADING		2.78						AVG GRADING			2.78	

CO-attainment for a course: Contd.

10	**10**	**10**	**10**				**40**		**PERCENT, %**	**SCORES OR GRADING BASED ON SCALE OF 3**	**Target > =70%**
CO3							**TOTAL OBTAINED**	**TOTAL MARKS ATTEMPTED**			
T1-Q3.a	T1-Q3.b	T2-Q2.a	T2-Q2.b								
8	7						15	20	75.00%	3	Y
		5	12				17	20	85.00%	3	Y
6	8	8	5				27	40	67.50%	2	
	9						9	10	90.00%	3	Y
9	9						18	20	90.00%	3	Y
-	-	-	-				0	40	0.00%	1	
-	-	-	-				0	40	0.00%	1	
8	8						16	20	80.00%	3	Y
8	8						16	20	80.00%	3	Y
6	8						14	20	70.00%	3	Y
		7	7				14	20	70.00%	3	Y
-	-	-	-				0	40	0.00%	1	
8	9	8	7				32	40	80.00%	3	Y
9	9						18	20	90.00%	3	Y
5	6						11	20	55.00%	2	
9	8	8	8				33	40	82.50%	3	Y
7	8	8					23	30	76.67%	3	Y
8	9						17	20	85.00%	3	Y
									SUM	46	13
								AVG GRADING		2.56	

CO-attainment for a course: Contd.

COURSE OUTCOMES	GRADING AVG ON SCALE OF 3	DISTRIBUTION %		
		3	2	1
CO1	**2.78**	14 / 18 = 77.77%	4 / 18 = 22.22%	0 / 18 = 0%
CO2	**2.78**	14 / 18 = 77.77%	4 / 18 = 22.22%	0 / 18 = 0%
CO3	**2.56**	13 / 18 = 72.22%	2 / 18 = 11.11%	3 / 18 = 16.66%
CO4	**2.56**	10 / 18 = 55.55%	8 / 18 = 44.44%	0 / 18 = 0%

TARGET is > = More than 75% of Students Must Achieve 70% Marks.

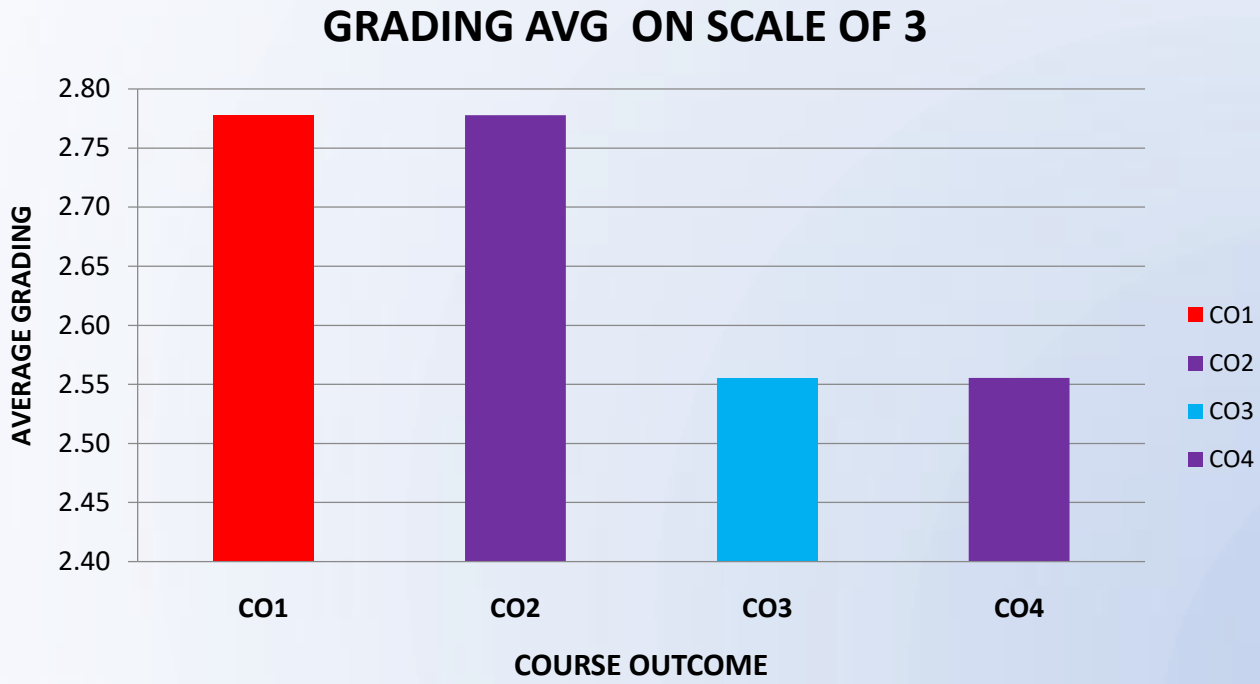
PO AND CO SCALE	**3**	**Strongly Related**
	2	**Moderate**
	1	**Low**

NUMBER OF STUDENTS SCORING > =70%

COURSE OUTCOMES	% OF STUDENTS ACHIEVED CO	CO RESULT
CO1	77.78%	Y
CO2	77.78%	Y
CO3	72.22%	N
CO4	55.56%	N

CO-attainment for a course: Contd.

COURSE OUTCOMES	GRADING AVG ON SCALE OF 3	DISTRIBUTION %		
		3	2	1
CO1	2.78	77.78%	22.22%	0.00%
CO2	2.78	77.78%	22.22%	0.00%
CO3	2.56	72.22%	11.11%	16.67%
CO4	2.56	55.56%	44.44%	0.00%



CO Attainment

- The assessments should be in alignment with the COs
- Question paper should be so set to assess all COs
- The average marks obtained in assessments against items for each CO will indicate the CO attainment.
- Instructors can set targets for each CO of his/her course.
- Attainment gaps can therefore be identified.
- Instructor can plan to reduce the attainment gaps or enhance attainment targets.

CO-PO mapping (How to Present)

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) : blank: no correlation

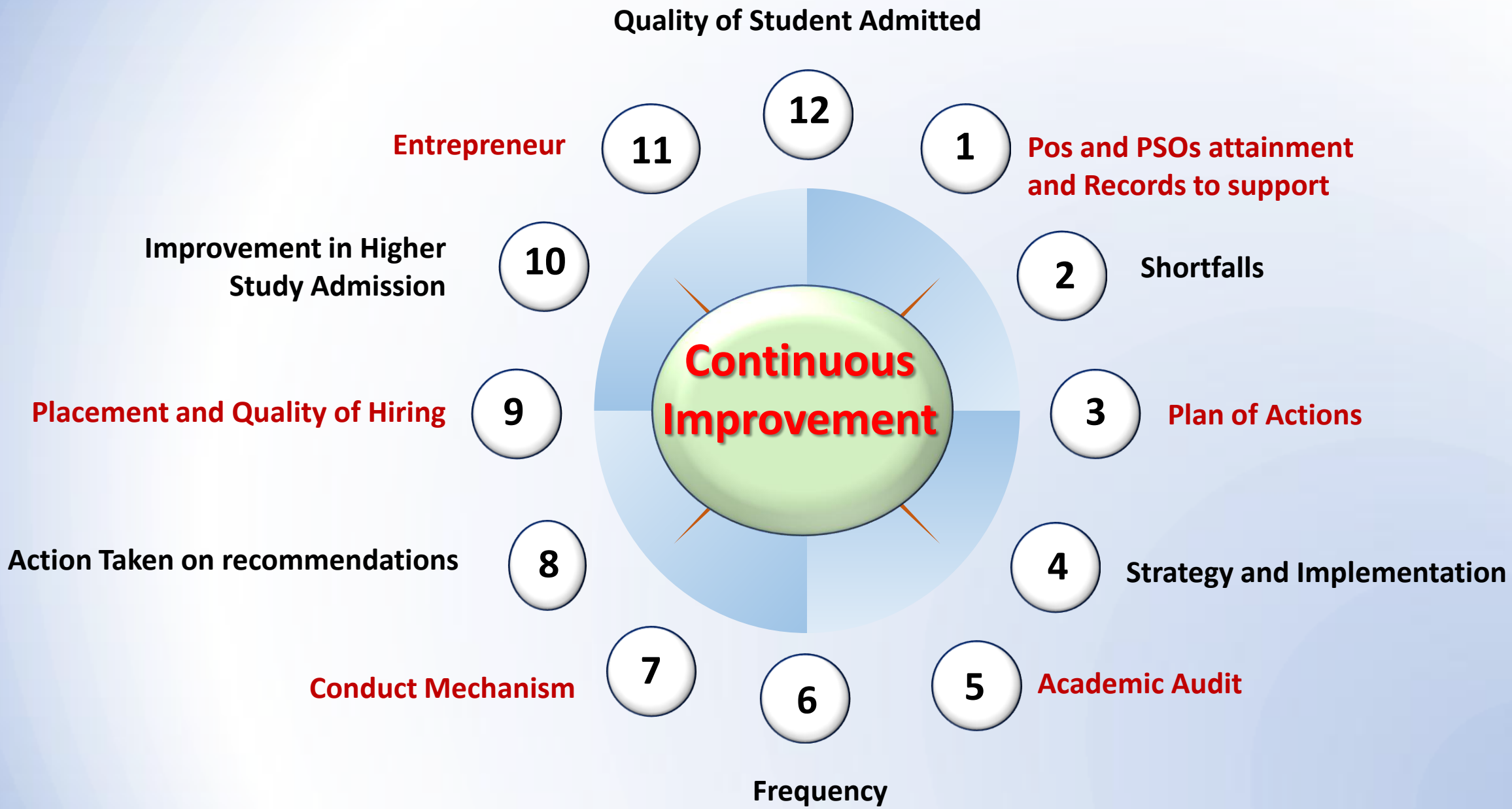
						PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
SEM		**SUB CODE**	Course	**COURSE OUTCOMES**	**COURSE OUTCOMES Statement**												
III	**C203**	**BEXX201**	**Course name**	**C203.1**	.	3	3	2	2	-	-	3	3	2	2	1	-
				C203.2		-	-	-	-	-	-	3	3	3	2	1	-
				C203.3		-	-	-	-	-	-	3	2	2	2	1	-
				C203.4		-	-	-	-	-	-	3	2	2	2	1	-
				C203.5		-	-	-	-	-	-	2	2	2	2	1	-
				C203.6		-	-	-	-	-	-	2	2	2	2	1	-

Model Question Paper

Course: EM Theory (ECE 503)

Maximum Marks :100; Duration: 03 hours

Q.No	Questions	Marks	CO	BL
1(a)	Explain the steps involved in finding curl of a vector.	08	CO1	L2
1(b)	Apply stoke theorem to solve the given problem	12	CO2	L3
2(a)	State Maxwell's equations.	08	CO2	L1
2b	Design a cylinrical waveguide with the given parameters and analyse the performance using PML boundary condition	12	CO3	L4
3a	Compare rectangular coordinate system with that of cylindical	08	CO3	L2


Quality of Student Admitted
12
1
Pos and PSOs attainment and Records to support
2
Shortfalls
3
Plan of Actions
4
Strategy and Implementation
5
Academic Audit
6
Frequency
7
Conduct Mechanism
8
Action Taken on recommendations
9
Placement and Quality of Hiring
10
Improvement in Higher Study Admission
11
Entrepreneur
Continuous Improvement

Outcome assessment for improvement

From an SAR of civil Engineering program (accreditation completed)

PO1: Engineering knowledge: Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

Target: 2.5 Set by Department; Calculated attainment: 2.3

The overall attainment of PO1 is near but below the target value;

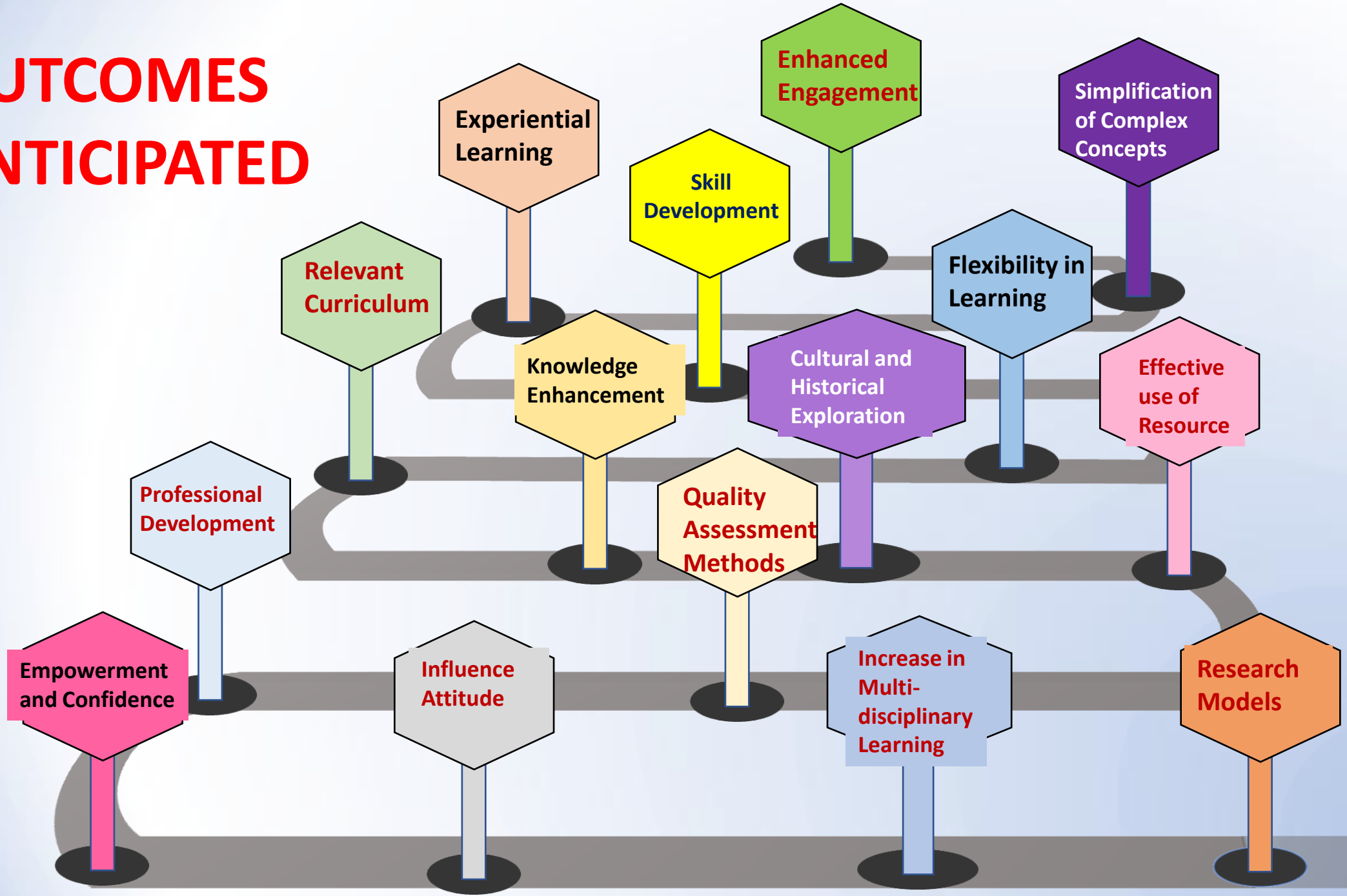
The foundation course Mechanics of Materials (CVC202) has CO attainment below the target. Mathematical courses - Statistics and Integral Transforms (MAC209) and Numerical Methods and Partial Differential Equations (MAC213) have attainment below the target value. These are impacting the PO attainment.

Improvement

This diagnosis indicates insufficient connectivity between the theoretical concepts and their mathematical applications.

- Action 1: Contextual learning pedagogy is used in Mechanics of Materials (15ECVF202) to associate classroom teaching to real-world experiences and improve the grasp of fundamental concepts.
- Action 2: Mathematical courses in the third semester, i.e., Statistics and Integral Transforms (15EMAB202), and in the fourth semester, i.e., Numerical Methods and Partial Differential Equations (15EMAB207) introduced contextual problems of civil engineering.

OUTCOMES ANTICIPATED



Let Us now Define OBE

A process of designing ,revising and restructuring of curriculum and its implementation through innovative T-L and use continuous assessment and evaluation that reflects the achievement of higher order learning and skill rather than accumulation of credits through rote learning thus, making our students capable of solving complex problems using modern tool with values and ethics while keeping sustainability, society, culture and environment in mind.

Learning Principles

- Focused (No ambiguity)
- Expanded Opportunity
- Knowledge, Skill and Attitude Integration
- High Expectation

Outputs	Outcomes
•*Activities we do to achieve* outcomes •Conduct FDP on NBA to train faculty members •If the patient having high fever give paracetamol	•Results of the activities to be demonstrated •All the departments/Programmes of the institute got accredited •Has the patient fever comedown

Revisiting Key Features for Attention

Curriculum Design

- Extent of gaps identification
- Balancing Cognitive, Psychomotor and Affective needs
- Internship or Industry component
- Stake-holders involvement
- Credits through MOOCs
- Mapping with COs and POs

T-L: Implementation

- Innovative pedagogy
- Modern Tools
- Industry Experts
- Involvement in Communities
- Industry Labs
- Beyond Syllabus activities
- Complex Problem exercises
- Peers learning
- Diverse Tasks

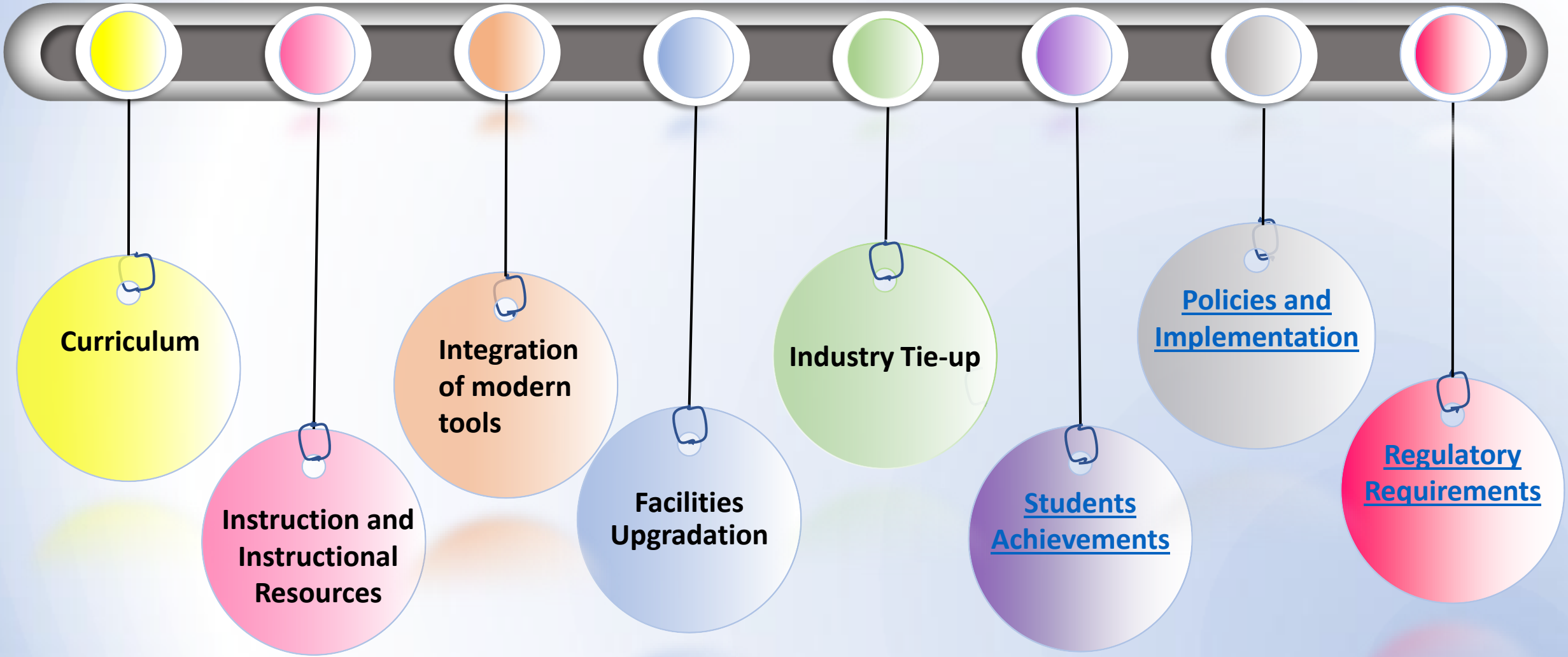
Assessment and Evaluation

- Diverse modes of continuous assessment
- Quality of questions or tasks
- Mapping to COs
- Sources of questions and moderation
- Rubrics
- Distribution Slope of the challenges
- Group assessment

Study Undertaken

- Efficacy Study
- Effectiveness Study
- Impact Study
- Feedback Analysis
- Corrective Actions
- Audit both academic and infrastructure
- Involvement of third party

Review Activities



Rubrics

- To grade assessment having more than one correct answer in efficient and equitable way
- Transparency in grading, as well as increase consistency in scoring
- Understand the purpose of an assignment
- Provide peer feedback, or to engage in self-assessment

Elements of Rubrics

- criteria for assessing
- Quality Levels
- Scoring strategy

Criteria

- Criteria define the distinct elements or competent performance of the tasks central to the assignment.
- Generally, 4 to 6 criteria assess the breadth of knowledge or skill that are most essential to an assignment.
- Effectively selecting the most important criteria is the first step to designing analytic rubrics

Quality Levels

- Selecting the number of quality levels is a critical decision
- Research has shown that as the number of quality levels increases, consistency across graders or reviewers decreases
- The labeling of quality levels requires careful reflection. In learning contexts, instructors typically distinguish levels of Knowledge-skill, mastery, or expertise

Scoring Strategy

- 1) Setting weights for each criterion, and single scores for each quality level. This approach speeds grading and minimizes discretion that might be a source of bias
- 2)Weighting criteria and providing a range of scores for each quality level. This approach supports instructors interested in making more fine-grained distinctions.
- 3)Focusing on the overall combination of quality levels across criteria to assign a grade. This is a simplified grading structure that focuses on the overall grade and holistic judgment of the instructor or grader. For larger course enrollments, this strategy increases the risk of inconsistent or biased grading.

Creating Rubrics

- **Determine the purpose of the assignment**
- **Clearly establish criteria**
- **Determine the scoring method**
- **Develop the descriptors of the criteria**
- **Be sensitive to language used**
- **Explore results with hypothetical scoring combinations**

Rubrics Tools

- Gradescope is a tool that enables efficient and transparent grading. It prompts instructors to grade by question rather than by student.
- The Canvas Rubrics Tool can help you grade more quickly by providing an easy way to select the appropriate feedback, or grade by the same criteria for each student.
- Canvas automatically calculates the total score for you in Speed-grader.

Analytic Rubrics

	Needs Improvement (1)	Developing (2)	Sufficient (3)	Above Average (4)
Clarity (Thesis supported by relevant information and ideas.)	The purpose of the student work is not well-defined. Central ideas are not focused to support the thesis. Thoughts appear disconnected.	The central purpose of the student work is identified. Ideas are generally focused in a way that supports the thesis.	The central purpose of the student work is clear and ideas are almost always focused in a way that supports the thesis. Relevant details illustrate the author's ideas.	The central purpose of the student work is clear and supporting ideas always are always well-focused. Details are relevant, enrich the work.
Organization (Sequencing of elements/ideas)	Information and ideas are poorly sequenced (the author jumps	Information and ideas are presented in an order that the	Information and ideas are presented in a logical sequence	Information and ideas are presented in a logical sequence

Developmental Rubrics

Domain	Initial Level of Development (1)	Intermediate Level of Development (2)	Mature Level of Development (3)
Cognitive	Assumes knowledge is certain and categorizes knowledge claims as right or wrong; is naive about different cultural practices and values; resists challenges to one's own beliefs and views differing cultural perspectives as wrong	Evolving awareness and acceptance of uncertainty and multiple perspectives; ability to shift from accepting authority's knowledge claims to personal processes for adopting knowledge claims	Ability to consciously shift perspectives and behaviors into an alternative cultural worldview and to use multiple cultural frames

Holistic Rubrics

Criterion	Excellent	Good	Adequate	Poor
Site Visits Notes	Every site visit includes good and thoughtful notes about that site	Every site has notes, but one or two days are not good/thoughtful notes OR one day of notes is missing	Every site has notes, but three of four days are not good/ thoughtful notes OR two days of notes are missing	Not every day has good/ thoughtful notes OR more than two days of notes are missing
Class Question	Not every day has good/ thoughtful notes OR more than two days of notes are missing	Is missing answers to no more than 8 questions across the site visits	Is missing answers to no more than 12 questions across the site visits	Is missing answers to more than half of the questions across the site visits
Reflection on Site Visits	Provided thoughtful reflection on	Provided thoughtful reflection on at least 4 of the site visits OR provided	Provided thoughtful reflection on at least 3 of the site visits	at least 3 of the site visits OR provided

Checklist

Criterion	Yes	No
All Sites have Notes		
Sites Notes are Thorough		
Site Notes are Thoughtful		
Answers all Site Questions for All Sites		
Provided Reflection on each of the 6 Site Visits		
Reflection on Site Visits was Thoughtful		

Research Paper

Criteria	Excellent (3 points)	Good (2 points)	Poor (1 point)
Number of sources	Ten to twelve	Five to nine	One to four
Historical accuracy	No apparent inaccuracies	Few inaccuracies	Lots of historical inaccuracies
Organization	Can easily tell from which sources information was drawn	Can tell with difficulty from where information came	Cannot tell from which source information came
Bibliography	All relevant bibliographic information is included	Bibliography contains most relevant information	Bibliography contains very little information

Appreciate your Attention and Time.

Thank You