



# **Arya College of Engineering (ACE)**

**(Previously known as Arya Institute of Engineering & Technology - AIET)**

**Approved by AICTE, New Delhi**

**Affiliated to Rajasthan Technical University, Kota**

**SP-40, RIICO Industrial Area, Kukas, Jaipur (Rajasthan) – 302028**

## **ATTAINMENT PROCEDURE**

# Course Identification

## Preparation of Course Outcome

- Bloom's Taxonomy
- RTU Syllabus

- Department Vision, Mission
- PO's / PSO's / PEO's

## Calculations for CO Attainment

### External Assessment (End Semester Exams)

- RTU Theory Exams
- RTU Practical Exams
- Project Assessment
- Practical Training Assessment

### Internal Assessment (Internal Exams)

- Mid Term Exams
- Assignment / Unit Tests
- Internal Lab Assessments
- Internal Project Assessments
- Internal Practical Training/  
Internship Assessment

Set Target % as per  
Difficulty level to achieve

CO Attainment through  
Attainment tools / ERP  
(For End Semester Exam)

CO Attainment through  
Attainment tools / ERP  
(For Internal Exam)

External Examination  
Assessment

- 70% Weightage For Theory Courses
- 40% Weightage For Practical / Lab Courses

Internal Examination  
Assessment

- 30% Weightage For Theory Courses
- 60% Weightage For Practical / Lab Courses

CO Direct Attainment

CO Indirect Assessment through  
End Term Survey from  
Stack Holders

CO Attainment = 90% of Direct  
+ 10% of Indirect

## CO Attainment Level

- Attainment Level 1 : 60% of Student score more than 60% marks (Low)
- Attainment Level 2 : 70% of Student score more than 60% marks (Moderate)
- Attainment Level 3 : 80% of Student score more than 60% marks (Substantial)

CO  
Attainment  
>=  
Target

Yes

No

Revise and Increase CO target  
for the Course / Subject

Plan strategies for improvement  
and recomend action plan to  
Course / subject Coordinator

# Overall PO Attainment Level

**80% Direct**  
(Assessment with Respect to CO's)

Corresponding Cell Value  
(CO/PO Mapping)

**X**

Overall CO  
Attained Value

**3 (Three)**

**20% Indirect**

- End Semester Survey ●
- Program Exit Survey ●
- Alumni Feedback ●
- Employers Feedback ●

## Attainment of Course Outcomes (Program)

### Assessment Process:

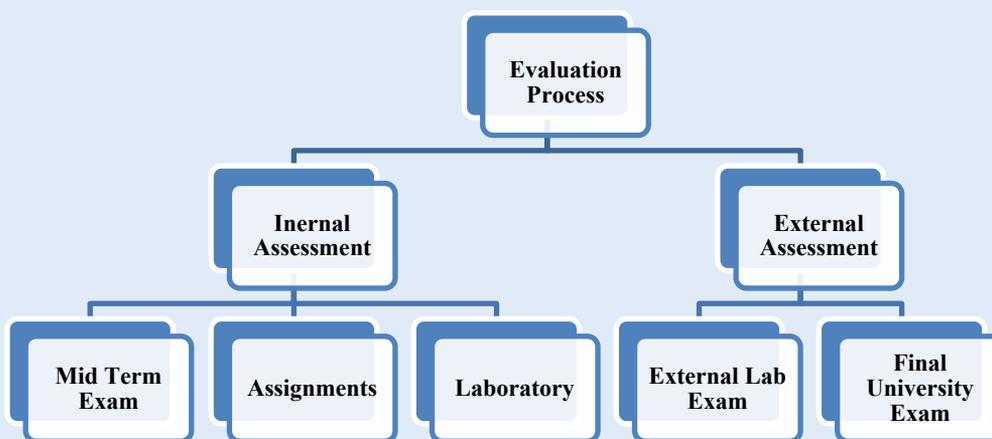
The tools such as tests, assignments, examinations etc. are taken on the questions that relate to specific course outcomes in each course. Presentations and seminars are aimed towards wider scope of the subject including its impact on society and environment as a whole. The questions at the presentations/seminars make the scope even wider and relate with the course outcomes and give the student a feel that things are almost never complete, thus the need for continuous independent life-long learning is emphasized.

### Tools used in measuring CO:

| Assessment Tool Type    | Assessment Tool Title                             | Tool Description  |
|-------------------------|---|---|
| <b>Assessment Tools</b> | <b>Assignment</b>                                 | The assignment is a qualitative performance assessment tool designed to assess student's knowledge of engineering practices, framework, and problem solving. It also helps to guide written presentation skills and improve the thinking capability of the students.                            |
|                         | <b>Internal Practical Assessment</b>              | This is mainly to assess student's practical knowledge with their designing capabilities.<br>The students are tested for their confidence in terms of design of experimentation and viva voce.  |
|                         | <b>Midterm Exams</b>                              | Midterm examination is conducted twice per semester. Midterm examination is metric for assessing whether the entire COs is attained or not. Examination is more focused on attainment of course outcomes and program outcomes using a descriptive exam.   |
|                         | <b>Final University Exam (Theory + Practical)</b> | External examination is conducted at the end of the semester by the Rajasthan Technical University. This tool examines at all cognitive levels the ability & understanding of the students with respect to the concepts taught and their applicability in solving complex engineering problems. |
|                         | <b>Industrial Internship / Seminar</b>            | The industrial internship offered at the end of the second, fourth & sixth semester and the students presents his work in the form of Seminar to the department which is used to measure the CO.  |
|                         | <b>Project Evaluation</b>                         | The projects are mandatory for Final Year students. The students make their projects under the supervision of respective Guide of department which helps to measure the CO.   |

The weighted distribution of components used to record the attainment of course outcome is given as per following table:

| Select Type                            | Assesment Type      | Assessment Components        | Weightage (%) |
|--|---------------------|------------------------------|---------------|
| Theory                                 | Internal Assesment  | Assignments                  | 10%           |
|  |                     | Mid Semester Examination     | 20%           |
|  | External Assesment  | Final University Examination | 70%           |
| Practical<br>(Lab / Project / Seminar) | Internal Assessment | Internal Lab Examination     | 60%           |
|  | External Assessment | External Laboratory Exam     | 40%           |



**Fig: Process used to obtain attainment level of course outcome**

### **Course Outcome Attainment:**

- Attainment Level 1** : 60% of students score more than 60% marks out of the maximum relevant marks. (Low)
- Attainment Level 2** : 70% of students score more than 60% marks out of the maximum relevant marks. (Moderate)
- Attainment Level 3** : 80% of students score more than 60% marks out of the maximum relevant marks. (Substantial)

### **For Example:**

Attainment through University Examination: Moderate i.e., 2,

Attainment through Internal Assessment: Substantial i.e., 3

We have given 70% weightage to University examination and 30% weightage to internal assessment,

**The attainment calculations are**

$$(70\% \text{ of University Level}) + (30\% \text{ of Internal Level}) = 70\% \text{ of } 2 + 30\% \text{ of } 3 = 1.4 + 0.9 = 2.3$$

## Attainment of Course Outcomes (1<sup>st</sup> Year)

**The Assessment processes used to gather the data upon which the evaluation of Course Outcomes of first year is done**

The Direct assessment tools such as tests, assignments, examinations etc. are taken on the questions that relate to specific course outcomes in each course. Presentations and seminars are aimed towards wider scope of the subject including its impact on society and environment as a whole. The questions at the presentations/seminars make the scope even wider and relate with the course outcomes and give the students a feel that things are almost never complete, thus the need for continuous independent life-long learning is emphasized. They all contribute equally towards indirect attainment of course outcomes.

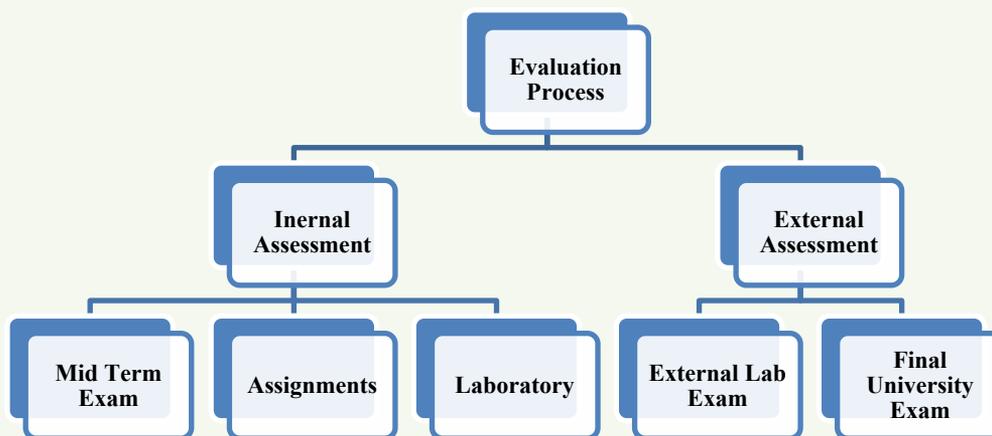
**Tools used in measuring CO:**

| <b>Assessment Tool Type</b> | <b>Assessment Tool Title</b>                      | <b>Tool Description</b>   |
|-----------------------------|---|---|
| <b>Assessment Tools</b>     | <b>Assignment</b>                                 | The assignment is a qualitative performance assessment tool designed to assess student's knowledge of engineering practices, framework, and problem solving. It also helps to guide written presentation skills and improve the thinking capability of the students.                            |
|                             | <b>Internal Practical Assessment</b>              | This is mainly to assess student's practical knowledge with their designing capabilities.<br>The students are tested for their confidence in terms of design of experimentation and viva voce.  |
|                             | <b>Midterm Exams</b>                              | Midterm examination is conducted twice per semester. Midterm examination is metric for assessing whether the entire COs is attained or not. Examination is more focused on attainment of course outcomes and program outcomes using a descriptive exam.   |
|                             | <b>Final University Exam (Theory + Practical)</b> | External examination is conducted at the end of the semester by the Rajasthan Technical University. This tool examines at all cognitive levels the ability & understanding of the students with respect to the concepts taught and their applicability in solving complex engineering problems. |

The individual COs of the courses are mapped with correlation level and are being evaluated by prescribed assessment tools. The attainment of individual CO is calculated by assigning separate weightage to the continuous assessment tests, end term examinations, assignments, or quizzes. The attainment of COs is compared with the target level. The CO is said to be attained if its attainment value is greater than or equal to target attainment level.

The weighted distributions of components to Record the attainment of Course Outcomes are given in the following table:

| Select Type | Assesment Type      | Assessment Components           | Weightage (%) |
|-------------|---------------------|---------------------------------|---------------|
| Theory      | Internal Assesment  | Assignments                     | 10%           |
|             |                     | Mid Semester Examination        | 20%           |
|             | External Assesment  | Final University Examination    | 70%           |
| Practical   | Internal Assessment | Internal Laboratory Examination | 60%           |
|             | External Assessment | External Laboratory Exam        | 40%           |



**Fig: Processes are used to obtain attainment level of course outcome**

**Course Outcome Attainment:**

- Attainment Level 1** : 60% of students score more than 60% marks out of the maximum relevant marks. (Low)
- Attainment Level 2** : 70% of students score more than 60% marks out of the maximum relevant marks. (Moderate)
- Attainment Level 3** : 80% of students score more than 60% marks out of the maximum relevant marks. (Substantial)

**For Example:**

- Attainment through University Examination: Moderate i.e., 2, Attainment through Internal Assessment: Substantial i.e., 3
- We have given 80% weightage to University examination and 20% weightage to Internal assessment, the attainment calculations are :

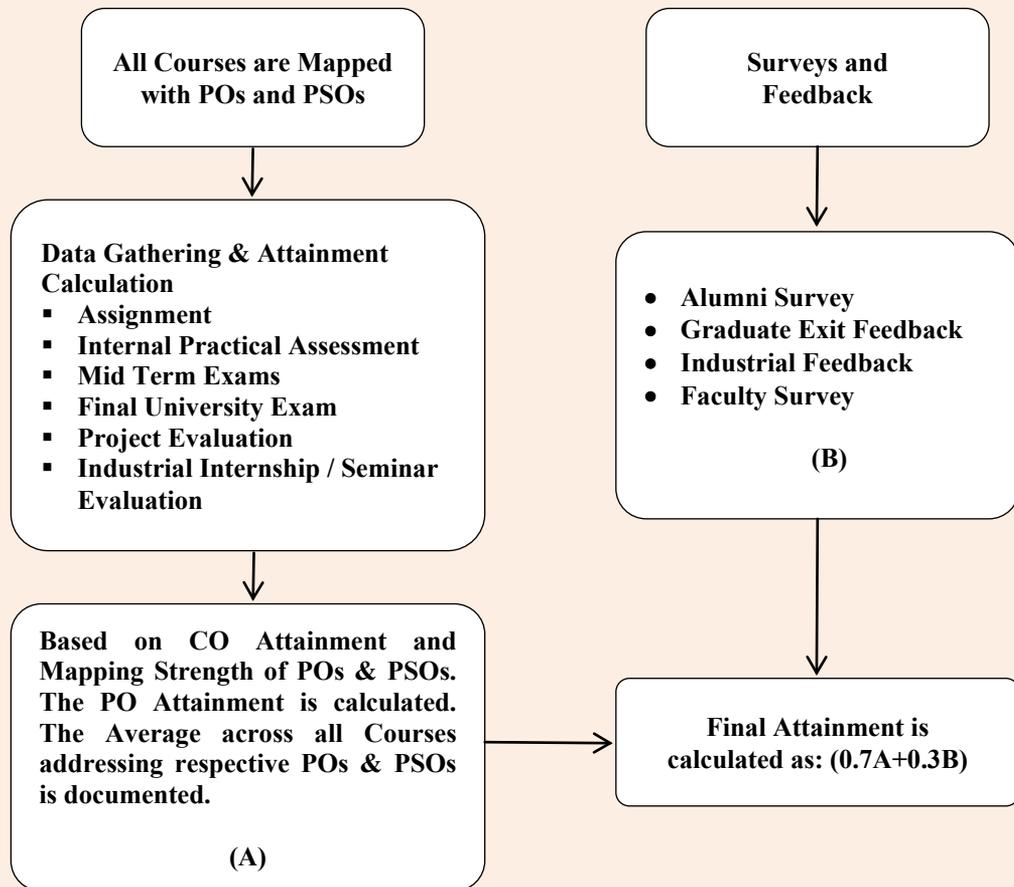
**(70% of University level) + (30% of Internal level) = 70% of 2 + 30% of 3 = 1.4 + 0.9 = 2.3**

## Attainment Level of POs and PSOs

The assessment process includes both the direct and indirect measurement. The list of assessment tools for both direct and indirect methods is given below:

### Assessment Tools used in measuring POs and PSOs :

| Assessment Tool Type             | Assessment Tool Title                             | Tool Description   |
|----------------------------------|---|--|
| <b>Direct Assessment Tools</b>   | <b>Assignment</b>                                 | The assignment is a qualitative performance assessment tool designed to assess student's knowledge of engineering practices, framework, and problem solving. It also helps to guide written presentation skills and improve the thinking capability of the students.   |
|                                  | <b>Internal Practical Assessment</b>              | This is mainly to assess student's practical knowledge with their designing capabilities<br>The students are tested for their confidence in terms of design of experimentation and viva voce.  |
|                                  | <b>Midterm Exams</b>                              | Midterm examination is conducted twice per semester. Midterm examination is metric for assessing whether the entire POs with respect to COs are attained or not. Examination is more focused on attainment of course outcomes and program outcomes using a descriptive exam.   |
|                                  | <b>Final University Exam (Theory + Practical)</b> | External examination is conducted at the end of the semester by the Rajasthan Technical University. This tool examines at all cognitive levels the ability & understanding of the students with respect to the concepts taught and their applicability in solving complex engineering problems.  |
|                                  | <b>Project Evaluation</b>                         | The projects are mandatory for Final Year students. The students make their projects under the supervision of respective Guide of department which helps to measure the CO.  |
|                                  | <b>Industrial Internship / Seminar</b>            | The industrial internship offered at the end of the fourth semester & sixth semester is used to measure the PO.  |
| <b>Indirect Assessment Tools</b> | <b>Alumni Survey</b>                              | Alumni, particularly who has graduated within the 3-4 years of current academic year, feedback is taken with reference to the achievement of POs.  |
|                                  | <b>Graduate Exit Survey</b>                       | In the last semester i.e., 8th semester, feedback is taken by the student of last year. Achievement of POs and graduate attributes (GA) are taken as criteria in the feedback.   |
|                                  | <b>Industrial Feedback</b>                        | Students who have undergone vocational/summer training and internship in the industries as well as who got the jobs in the industries. Feedback is taken from the industries for the performance of students. Verbal feedback is taken from industry persons when our faculty meets them at any conference or when they come to our institute for giving lectures or training. |
|                                  | <b>Faculty Survey</b>                             | Feedback is taken from faculties regarding attainment of PO's for an academic year. The Feedback is taken on questions which directly or indirectly related to PO's specified by NBA.  |



**Figure: Measuring Attainment of PO and PSO**