

Attainments

Course outcomes (CO) describe what students are able to demonstrate in terms of knowledge and values upon completion of a course. At the end of each course, the PO/PSO assessment is done from the CO attainment of all curriculum components. Each course has defined set of course outcomes and corresponding evaluation criteria. The course outcomes are mapped to the program outcomes which are used to provide the quantitative measurement of how well the program outcomes are achieved. The performance of the students in the examinations during the semester in each course is used to compute the level of attainment of the POs and PSOs through the mapping of questions to COs and COs to POs and PSOs. CO-PO & PSO mapping for all the courses in the program is prepared by the program coordinator in consultation with other faculty members.

CO Attainment

For each CO, methods of measurement are identified to measure progress of the outcome. Assessment methods include direct methods and indirect methods. The process of course outcome assessment is based on mid examination, semester end examination, assignment and quiz. Each question in mid/semester end/assignment/quiz is tagged to the corresponding CO and the overall attainment of that CO is based on average mark set as target for final attainment. The processes & tools are used for the attainment of course outcomes are detailed in the following sections.

Direct assessment methods include:

- Theory Courses – Internal and End Semester exams
- Laboratory courses – Internal and End Semester exams
- Assessment of Projects – Periodical and Specific

Indirect methods include:

- Course end survey
- Programme End survey
- Graduate Exit survey

1. Mid Examinations

This type of performance assessment is carried out during the examination sessions which are held twice a semester. Each and every exam is focused in attaining the relevant course outcomes.

2. Semester End Examination

Semester End Examination is a metric for assessing whether all the COs are attained. Examination is more focused on attainment of course outcomes and program outcomes using a descriptive exam.

3. Rubrics

Rubrics are formulated for the assessment of Laboratory, Mini Project, Major Project, Seminar and Internship courses. The attainment of Course Outcomes of all courses with respect to set attainment levels are recorded.

The expected target level of course outcomes is set in the range of 50% -70% based on the cognitive levels of the students by the course coordinator at the beginning of the semester.

The performance of the students in the examinations during the semester in each course is used to compute the level of direct attainment of the COs. The minimum grade requirement for computation of the attainment levels taken is 'C' from the end semester examination. The questions of each examination are tagged to the course outcomes by the course coordinator.

The attainment of each CO is computed by setting the class average mark as the target. The COs of each course are mapped to POs & PSOs with weightages of 3 (Strong), 2 (Medium) and 1(Weak). The scores of each course are used at the program level to assess the program outcomes.

Attainment of Program Outcomes and Program Specific Outcomes:

All the courses which contribute to the PO are identified and these courses are evaluated through the Course Outcomes using direct assessment tools (Internal and External exam results). The results of the direct assessment of the courses are obtained through micro analysis of the courses and analysed with the set bench mark to calculate the number of students performed to the expected level. Also the PO is assessed using indirect assessment tools (Course End survey and Programme End survey/Graduate Exit survey). After the assessment of the POs using both the direct and indirect assessment tools, the overall results from the assessments of the PO are compared with the expected attainment. If the expected attainment level is reached, the PO is considered satisfied.

Course Outcomes – Assessment Process

- The attainment of course outcomes is assessed with the help of direct and indirect assessment tools.
- Internal examinations is a direct assessment tool.
- This assessment is periodically done covering all course outcomes. This assessment is done in a semester twice covering one or two course outcomes in each examination; however at the end of semester all courses outcomes are tested.
- The questions are framed in accordance with course outcomes and result is analysed. The knowledge and skills, and values of students are assessed through this process.
- Course end survey is considered as indirect assessment tool for assessment of Course Outcomes.
- The analysis is interpreted to find the level of attainment of COs and compared with predefined targets.
- The average of results of CO attainment of all the courses in a semester mapping to a particular PO is compared with pre-defined target of PO.
- Program Outcomes and Program Specific Outcomes are mapped to Course Outcomes. A performance criterion is set for all the COs.

Table 1 Depiction of the assessment methodology that is followed to assess the learning levels of students. Target performance criterion is also given for various assessment tools that are considered

Assessment tool	What to be assessed	Target Performance criterion	Data collection through	Frequency of assessment
Internal Examinations	Through written examination ⇒ Knowledge and skill in application of mathematics, science and engineering	60%	Course Instructor	Every Semester
Lab Examinations	⇒ Through experimentation and design ⇒ Knowledge of Design and analysing skills	80%	Course Instructor	Every Semester
Term paper, mini project and Main project	Upon successful completion, Through demonstration and presentation ⇒ Knowledge of Design ⇒ usage of modern tools ⇒ knowledge of societal issues ⇒ project management techniques	80%	Course Coordinator	Every Semester
Home Assignments	Through specific questions as homework ⇒ problem solving skills ⇒ written communication skills ⇒ Individual or team work	60%	Course Instructor	Every Semester
Quiz	Through specific objective questions ⇒ Knowledge of problem solving approach/ technique	60%	Course Instructor	Every Semester
Semester end Examinations	Through written examination ⇒ Knowledge and skill in application of mathematics, science and engineering	60% For marks & for Grade – Above C	Course Instructor	Every Semester
Course end survey	Through online ⇒ delivery modes ⇒ curriculum and course outcomes ⇒ Content Knowledge ⇒ Skills acquired in the course	70%	Course Instructor & Course coordinator	Each semester

Assessment of Course outcomes for theory courses

All the theory courses under the program are grouped under the twelve defined Program Outcomes and three Program Specific Outcomes defined for the program.

The course outcomes of a course should satisfy at least any one or more of the defined program outcomes.

Course outcomes or Learning outcomes describe what students are able to demonstrate in terms of knowledge, skills, and values upon completion of a course.

In Correlation of CO-PO-PSO Tables, '3' indicates strong correlation, '2' indicates moderate correlation, '1' indicates low correlation and '-' shows no correlation with the respective PO and PSO.

FROM THE INTERNAL EXAMINATIONS CONDUCTED: (Assignment tests, Sessional tests and Quiz/Home assignments)

Another mapping table is constructed to link the questions in examinations with relevant course outcomes.

Evaluation of the question is done and the learning levels of students like knowledge, evaluate, apply, solve and design are judged in the form of marks. Question wise student performance is tabulated.

In general, percentage of students who scored more than 60% marks in each question is taken for calculating CO attainment.

CO attainment is measured on 3 point scale as follows:

% of CO attainment	$\geq 70\%$	$\geq 60\% \ \&\lt 70\%$	$\geq 50\% \ \&\lt 60\%$	$\lt 50\%$
CO attainment level	3	2	1	0

For external examination, percentage of students who scored more than 'C' grade [$\geq 55\%$] is considered for evaluation of CO attainment.

Assessment of Course outcomes of Lab courses:

All the Laboratory courses under the program are grouped under the defined Program Outcomes. The course outcomes of a practical course should satisfy at least any one or more of the defined program outcomes. Course outcomes or Learning outcomes describe what students are able to demonstrate in terms of knowledge, skills, and values upon completion of a course. Course outcomes are written for the practical courses also as theory courses.

Learning levels of students are measured with the capabilities exhibited in terms of knowledge, application and design, which are judged and reflected in the form of marks. Percentage of students who scored more than 80% marks in each criterion measured, is taken for calculating CO attainment.

Evaluation of course outcomes attainment (Direct assessment)

20% weightage is given to Internal assessment and 80% weightage is given to Semester end examination to get the attainment of CO from Direct assessment tool.

The attainment level of each student can be studied and it can also be checked if the entire COs are attained or are met with the set performance goal.

The value obtained for CO attainment is multiplied by 1 for strong, 0.8 for medium and 0.6 for low correlation with the PO.

General TARGET LEVEL FOR A CO IS “2”

Satisfactory attainment of the course outcomes should ensure the attainment of the program outcomes and position the graduates to attain the specific outcomes as well. Fig. 1 gives the overview of the assessment process of Program Outcomes & Program Specific Outcomes through assessment of Course Outcomes.

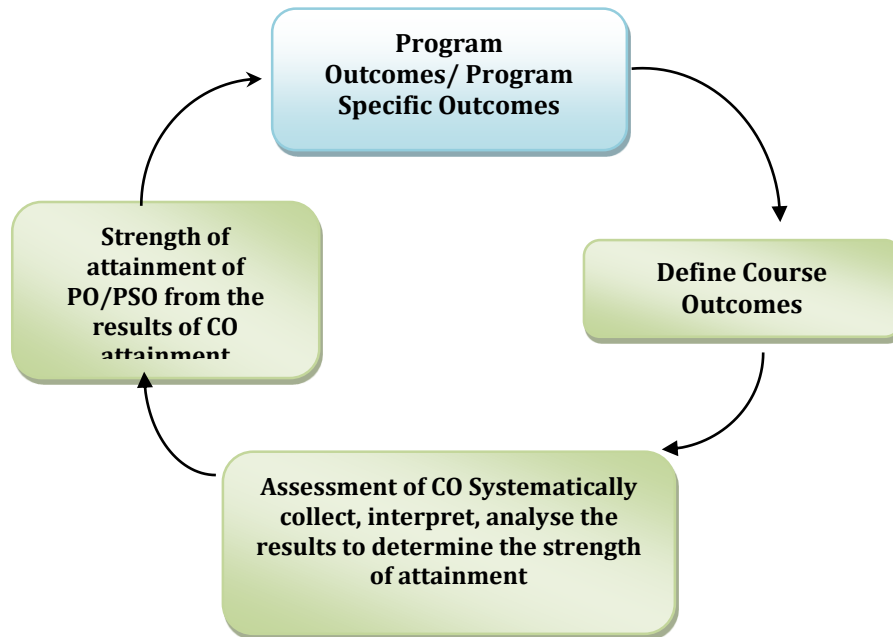
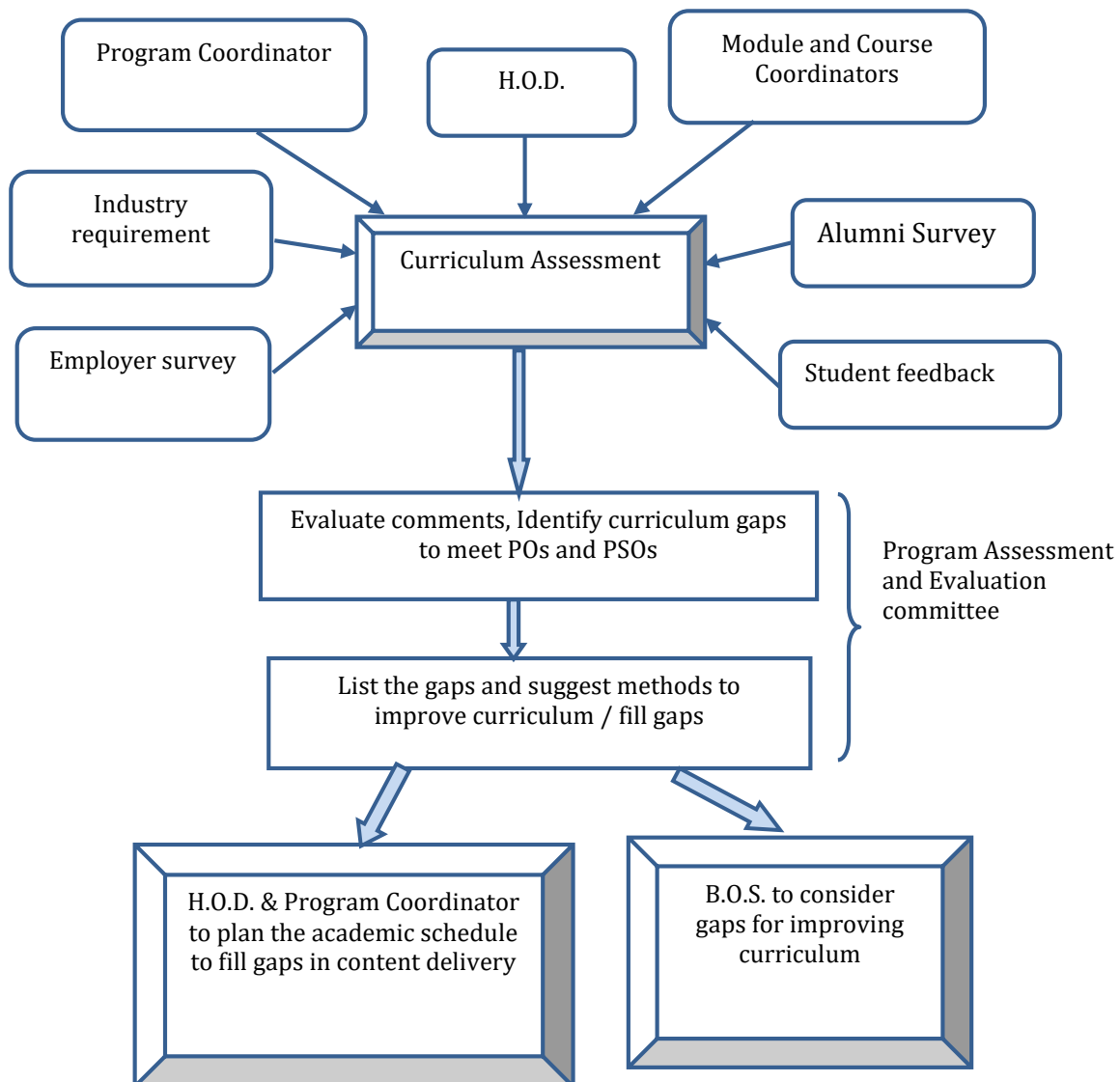


Fig. 1 PO/PSO Assessment process through Course Outcomes

Fig. 2 Process used to identify curricular gaps and improve attainment of POs, PSOs and PEOs



For each course, the level of attainment of each CO is compared with the predefined targets, and if not attained, the course coordinator takes necessary steps for the improvement to reach the target. If the performance criterion is not reached, then faculty suggests for the improvement to attain the same.