THAPAR INSTITUTE
OF ENGINEERING & TECHNOLOGY
(Deemed to be University)

THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF CHEMICAL ENGINEERING

- **Feedback from Graduating Students**
- **Feedback from Employer**
- **Feedback from Alumni**
- **Analysis of feedbacks received and action taken report**

ANNEXURE-I

SAMPLE FILLED STUDENT SURVEY FORMS

Sample Filled-in Graduating Students Survey 2022-23

The program of BE Chemical Engineering has been designed with certain Student Outcomes/Program Outcomes (the knowledge, skills and attitudes that students develop during the course of study). The students of graduating class are requested to answer the questionnaire given in this form to assess how well they judge they have attained the outcomes set for the program.

	Statement/Name & ROll No	Leeza Gambhir	Arush Aggarwal	Garv Malhotra	Ritwik Tarneja	Sanyam Singh	Mehak Chandel	Pranava Seth	Sankalp Sharma	Isha Jain	Muskan Gupta	HRITU VERSHA
		101901035	101901021	101901051	101901015	101901045	101901023	101951003	101901012	101901026	101901032	101901054
	ase answer the questionnaire (POs) on a scale of 1 to 3 where 1 indicates little achievement or skill, and 3 indicates great deal of achievem											
1	Engineering knowledge: Apply the	3		3		3				3	3	3
2	Problem analysis: Identify, formulate, review	3		3		3				3	3	3
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	3		3		3				3	3	3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	3		3		3				3	3	3
5	Modern tool usage: Create, select, and apply	3		3		3				3	3	3
6	The engineer and society: Apply reasoning	3		3		3				3	3	3
7	Environment and sustainability: Understand	3		3		3				3	3	3
8	Ethics: Apply ethical principles and commit	3		3		3				3	3	3
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	3		3		3				3	3	3
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	3		3		3				3	3	3
11	Project management and finance:	3		3		3				3	3	3
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	3		3		3				3	3	3
	PROGRAM SPECIFIC OUTCOMES (PSOs) on a scale of *1 to 3,* where 1 indicates little achievement or skill, and 3 indicates great deal of achievement											
1	Core competence: Basic knowledge of chemical engineering principles including unit perations, thermodynamics and reaction engineering	3		3		3				3	3	3
2	Application competence: Ability to analyse, design and control chemical processes in an economical and sustainable manner.	3		3		3				3	3	3
	STUDENT OUTCOMES (SOs) on *a scale of 1 to 5,* where 1 indicates little achievement or skill, and 5 indicates great deal of achievement											
1	an ability to identify, formulate, and solve	5		5		5				5	5	5
2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	5		5		5				5	5	5
3	an ability to communicate effectively with a	5		5		5				5	5	5
4	an ability to recognize ethical and	5		5		5				5	5	5
5	an ability to function effectively on a team	5		5		5				5	5	5
6	an ability to develop and conduct	5		5		5				5	5	5
7	an ability to acquire and apply new	5		5		5				5	5	5
	What do you plan to do after graduation at TIET? Pls write Y/N											

(a)	Employment (give details like employer name)	JP Morgan Chase &Co.		Not Yet		Anand Automotive				McDermott	Not yet	Reliance
(b)	Higher education (give the detail, if GATE/GRE etc. qualified)	N		N		N				N	N	N
(c)	Entrepreneur (specify):	N		N		N				N	N	N

Suggestion, If any

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SAMPLE FILLED EMPLOYER SURVEY

Employer Survey 2022-23

Survey form to assess the level of attainment of student outcomes – Employer

Dear Sir

We express our sincere thanks for continually employing our graduate students over the years. We are sure our student are sufficiently equipped not only to take on the real world but also make a better place to live in through responsible and innovative use of technology.

We solicit your feedback on attainment of the student outcomes (the knowledge, skills and attitudes that students develop during the course of study at TIET) of the BE Chemical Engineering program.

Please answer the following questions on a scale of 1 to 5 where 1 indicates little achievement or skill, and 5 indicates great deal of achievement.

S.No	Survey questionnaire	Level of attainment (answer on a scale of 1 to 5)				
		1	2	3	4	5
PO: 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.				X	
PO: 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences				X	
PO: 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.				X	
PO: 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.					X
PO: 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.					X
PO: 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.				X	
PO: 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.					X
PO: 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.				X	
PO: 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.					X
PO: 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.					X
PO: 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.					X
PO: 12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.				X	
PSO: 1	**The students of undergraduate program in Chemical Engineering will have: Basic knowledge of mathematics and sciences, for the solution of engineering problems**					X
PSO: 2	**Skill to apply the chemical engineering principles to design, analyze, and control of chemical, physical, and biochemical processes.**					X
PSO: 3	**The ability to conceive and implement sustainable solutions with appropriate consideration for the public health and safety, societal, and environmental considerations.**					X

What courses/topics would you like to see offered as UG course at TIET or for continuing education to your staff.

N/B.

Overall how satisfied are you with BE Chemical Engineering program at TIET and in your opinion how well is the BE Chemical Engineering program meeting its stated educational objectives. Cross-out whichever not applicable.

Excellent/V. good/Good/Avg./Poor

Excellent

Name & Signature	Adriange Madouse
Your Organization Name	Cape Breton University
Suggestion, if any	

Sample Survey filled-in Alumni Survey – Alumni 2022-23

Alumni survey (PO) 2023

Program outcome

Name of Alumni

Deepanshu Kathuria

Year of Passing

2023

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

1	2	3
○	○	◉

PO2: **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

1	2	3
○	○	◉

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 the public health and safety, and the cultural, societal, and environmental considerations

1	2	3
○	○	◉

PO4: **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data, and synthesis of the information to provide valid conclusions.

1	2	3
○	○	◉

PO5: **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

1	2	3
○	○	◉

PO6: **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

1	2	3
○	○	◉

PO7: **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

1	2	3
○	○	◉

PO8: **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

1	2	3
○	○	◉

PO9: **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

1	2	3
○	○	◉

PO10: **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

1	2	3
○	○	◉

PO11: **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

1	2	3
○	○	◉

PO12: **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

1	2	3
○	○	◉

ANNEXURE-II

THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY PATIALA
DEPARTMENT OF CHEMICAL ENGINEERING

ANALYSIS AND REPORT OF SURVEY FROM GRADUATING STUDENTS (2022-23)

Following are the POs attainment analysis and feedback points, according to the graduating students survey.

1. The calculated POs attainment based on the survey were found satisfactory.
2. No suggestion was received from the students.

09/08/2023

Dr. J P Kushwaha

Head

ANALYSIS AND REPORT OF FEEDBACK FROM EMPLOYER (2022-23)

Following are the feedback points, according to the Employer survey 2022-23.

1. IOCL, Panipat suggested to introduce Petroleum Refining and ASPEN simulation courses.
2. HUL, suggested that the courses related to Industry specific software and IT skills, and some case studies of manufacturing should be covered in there UG curriculum.
3. Trident Ltd suggested the inclusion of course based on Microbiology.

Based on the above-mentioned points from employers, we would like to emphasis on the following points.

1. Department UG curriculum is well designed to develop skills to general communication, for real life problems solutions, to work in a team, for creative solutions to challenges, to learn new techniques and integration of technology for work.
2. UG curriculum also covers course such as Petroleum and Petrochemicals (UCH850) in the 8th semester as an elective focus course in Petroleum, which focuses on the petroleum refining, hydrocarbon processing, and derived petrochemicals.
3. Process Modelling and Simulation (UCH802) course of 6th semester of current UG program, covers modelling & simulation techniques of chemical processes with the use of process simulation software such as Aspen Plus/ Aspen Hysys.
4. In first year, computer programming (UTA003) and object oriented programming (UTA018) courses are offered to all the students to hone their IT skills.
5. A number of case studies for manufacturing of various chemicals, fertilizers, paints, soaps and detergents, etc. are taught in the chemical process industry (UCH404) course, which is offered in fourth semester.
6. In fifth semester, generic elective courses are offered in which one course of Biology for Engineers (UBT510) can be opted by the interested students.

Dr. Parminder Singh **Dr. J P Kushwaha** **Head**

THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY, PATIALA
DEPARTMENT OF CHEMICAL ENGINEERING

ANALYSIS AND REPORT OF FEEDBACK FROM ALUMNI SURVEY 2022-2023

Following are the feedback points, according to the Alumni Survey 2022-2023

1. All the POs were achieved satisfactorily
2. No suggestions were given by the Alumni

6/12/2023
S. Barman
(Associate Professor)

6.12.2023
Neetu Singh
(Associate Professor)

6/12/23
J.P,Kushwaha
(Associate Professor)

Process of Program outcome attainment:

The Program Outcomes (PO) or the Program Specific Outcomes (PSO) are achieved through curriculum that offers a number of mandatory courses as well as elective courses. Each course in the curriculum has defined course outcomes that are mapped to the program outcomes and a set of performance criteria that are used to provide quantitative measurement of how well course outcomes are achieved. The process of PO or PSO attainment level is shown by the following flowchart:

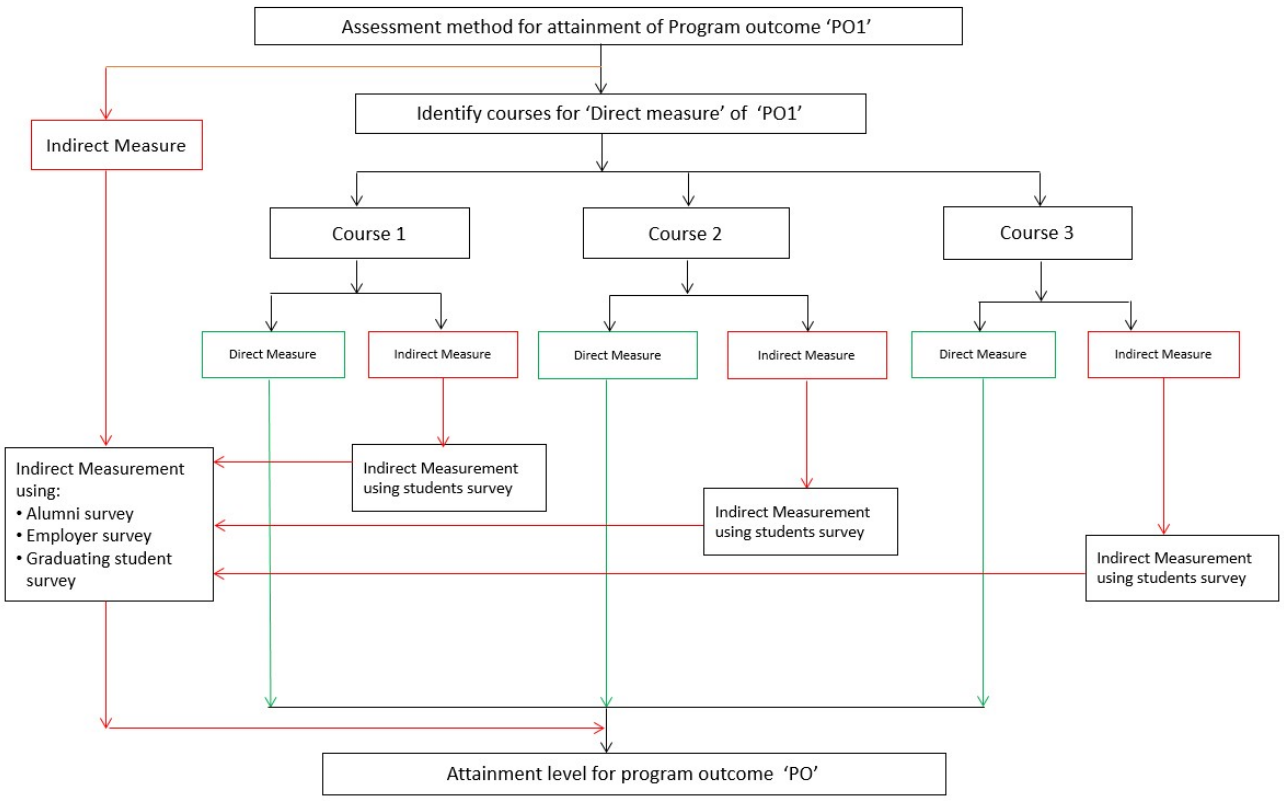

Figure 1 Flowchart showing the process of PO/PSO attainment level

As shown in the flowchart given above, each of the PO or the PSO are assessed using a direct and an indirect method.

This assessment is carried out using the following measurable and quantitative parameters and survey/questionnaire techniques/tools.

A. Assessment Tools used for measurement of Program Outcome attainment:

In the Outcome Based Education (OBE), the course outcome attainment scores measured using direct and indirect assessment tools is eventually used for measuring the attainment of Program Outcomes and Program specific outcomes. Thus, PO and PSO assessment process uses both direct and indirect measures to measure the attainment of each outcome. The examples of such measures are given below:

1. Direct Assessment tools:

After evaluating the attainment of course outcomes using direct assessment tools (as mentioned in Table2. (a)), average direct CO score for each course is computed. Direct assessment score for attainment of PO and PSO is computed by mapping the direct CO scores for all courses with corresponding PO's as defined in the Program articulation matrix. Following direct assessment tools are employed for measuring PO /PSO attainment:

- Mid Semester Examinations [Once during 8th or 9th week of a semester]
- End semester Examination [once during 15th week of the semester]
- Tutorial Assignments [Varies depending on the tutorial engagement]
- Quizzes [Mostly once during semester, Varies and is decided by course coordinator]
- Projects [Mostly once during semester, Varies and is decided by course coordinator]

2. Indirect Assessment tools:

This includes feedbacks from all the stakeholders such as course exit survey, Graduating student survey, alumni feedback, Employer feedback etc.

Table: **Indirect Assessment Tools**

S. No.	Indirect Assessment Tool	Method Description
1	Course Survey [Twice before MST and EST]	Course Survey is completed for every course in each semester to get a formal feedback from students for the courses offered in a semester and provide objective information to the faculty for self-appraisal, self-improvement & development. The course survey is focussed on attainment of course outcomes. Formal student feedback is obtained online and it is mandatory for all students to participate in such surveys. The course survey results are compiled by the individual course instructors for his feedback, and are available in their course files.
2	Graduating student's survey [Once per year for the graduating batch]	A questionnaire survey is used to measure the level of achievement of expected program outcomes/program specific outcomes. It is mandatory for all graduating students to participate in this questionnaire. Each participant is asked to rate his/her perception of achievement of the program outcomes/program specific outcome on a scale of 1 to 5 where 1 signifies a poor outcome and 5 signifies a high level of achievement of objectives. The indirect CO scores measured through this tool are mapped to Likert scale of 1 to3. The assessment results are documented and discussed in the meeting of department

		faculty to make action points for initiating corrective and preventive actions. A sample filled copy of graduating students' survey form is provided in **Annexure-I**
3	Employer survey [Once in a year]	All the students of program to be accredited are required to spend a full six month's semester in the industry completing an industrial project under the joint supervision of industry supervisors and TIET faculty. All the faculty members are required to visit one or two organizations two times during their six month's semester in the industry for evaluation of students placed for their work term in these organizations. This provides an opportunity to take feedback of our graduated students working in these organizations. During the course of interaction with the employer of our students, the employers provide information on their performance against POs &PSOsthrough survey form. This form, like the other forms, has questions related to the POs & PSOs. The rating is again given on a scale of 1 to 5 with 5 representing the best performance. The indirect CO scores measured through this tool are mapped to Likert scale of 1 to 3. A sample copy of filled employer survey form is provided in **Annexure-I**
4	Alumni survey [Once in a Year]	It is believed that the perception of students changes from the time of graduation to some point in their respective careers as they get more mature and have learnt tricks of the trade on the job. At this point of time, they are in a better position to provide more valuable and objective feedback on the learning in their undergraduate program and also how much of the program outcomes (on some scale) have actually been possible. To obtain this information, a survey is conducted for practicing alumni who graduated during the last 2 to 5 years. This survey like the graduating student survey is targeted at the program outcomes & program specific outcomes achieved during the last 2 to 5 years. Again, the respondents are asked to rate each PO and PSO on a scale of 1 to 5. The indirect CO scores measured through this tool are mapped to Likert scale of 1 to3. The findings of the survey are processed and used for effecting improvements in the program to achieve the program educational objectives and program outcomes. A sample copy of filled employer survey form is provided in **Annexure-I.**

B. Processes used for measurement of Program Outcome attainment:

CO Attainment scores for each subject obtained by direct assessment tools is mapped to correlated PO or PSO using the course articulation matrix. Similarly, CO attainment scores achieved through indirect assessment tools are also mapped with the correlated PO or PSO.

$$\text{PO/PSO Attainment (Direct Assessment)} = \left[\frac{\text{PO\_CO Mapping}}{3} \times CO\ Attainment\ (Direct\ Assessment)\right]$$

$$\text{PO/PSO Attainment (Indirect Assessment)} = \left[\frac{\text{PO\_CO Mapping}}{3} \times CO\ Attainment\ (Indirect\ Assessment)\right]$$

Attainment for a program outcome is finally computed by taking weighted average of contributions of participating courses towards that particular PO or PSO.

Finally, program outcomes for entire course is assessed by taking weighted sum of direct and indirect assessment as

Overall PO/PSO = 80% weightage of direct PO Score + 20% weightage of Indirect PO Score

Table 1 below shows the frequency of data collection of each form.

Table 1: Assessment tools, frequency of data collection and weightage

Assessment Tool	When data is collected	Frequency of Data Analysis	Weightage
Course Portfolio	During the semester	Once in a year	**5**
Course Survey	End of the semester	Once in a year	**4**
Graduating Student's Survey	End of the program	Once in a year	**3**
Alumni Survey	After 2-5 year of graduation	Once in a year	
Employer Survey		Once in a year	

On the basis of results of assessment tools, the assessment of level of attainment of each PO or PSO outcome is carried out. The assessment loop for each program outcomes is shown in Figure 2.2

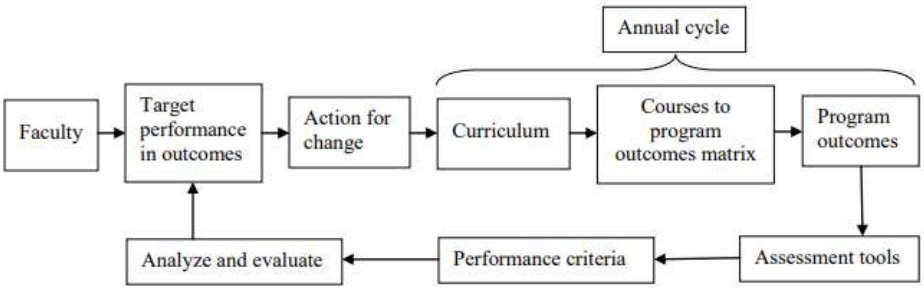

Figure 2 Assessment loop for PO/PSO

Actions taken based on the results of evaluation of each of the COs, POs & PSOs

Based on the CO, PO, and PSO attainment levels, subjects were identified whose CO attainment level was low but weightage towards calculation of a PO/PSO level was high. For such subjects, the concerned faculty prepared an Action Taken Report (ATR), providing details of reasons for the low attainment level and the actions to improve upon the same (please see Table 2).

Table 2: POs & PSOs Attainment Levels and Actions for improvement (2022-23)

POs	**Target Level**	**Attainment Level**	**Observations**
PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems			
PO1	**2.10**	**2.91**	For PO1, the target level has been achieved. A total of 22 Chemical Engg Core subjects were considered for calculating the attainment level of PO1. **# Kindly see Annexure-II for the analysis and report.**
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.			
PO2	**2.10**	**2.84**	For PO2, the target level was achieved. A total of 22 subjects were considered for calculating the attainment level of PO2.

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 the public health and safety, and the cultural, societal, and environmental considerations.			
PO3 .	**2.10**	**2.83**	For PO3, the achieved level was good. A total of 22 subjects were considered for calculating the attainment level of PO3.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.			
PO4	**2.10**	**2.97**	For PO4, the target level was achieved. A total of 4 subjects were considered for calculating the attainment level of PO4. In this PO, minimum attainment is achieved in all the courses.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.			
PO5	**2.10**	**2.96**	For PO5, the attainment level was well above the target level. A total of 4 subjects were considered for calculating the attainment level of PO5.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.			
PO6	**2.10**	**2.82**	For PO6, the score was calculated using 4 subjects. The attainment level was better than the set target. In this PO, minimum attainment is achieved in all the courses.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.			

PO7	**2.10**	**2.85**	Total 8 subjects were considered for calculating the attainment level of PO7. In this PO, minimum attainment is achieved in all the courses**.**
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			
PO8	**2.10**	**2.99**	Total 02 subjects were considered for attainment of PO 8., and the PO attainment level was found excellent.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.			
PO9	**2.10**	**2.96**	For PO9, the target level was well achieved. A total of 2 subjects were considered for calculating the attainment level of PO9.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.			
PO10	**2.10**	**2.96**	For PO10, the target level was achieved. A total of 2 subjects were considered for calculating the attainment level of PO10.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.			
PO11	**2.10**	**2.70**	Total 03 courses were mapped to evaluate this PO The attainment level was well above the target level.
PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.			
PO12	**2.10**	**2.97**	For PO12, the target level was achieved. A total of 3 subjects were considered for calculating the attainment level of PO12. The attainment level was excellent in all the courses than the set target.

PSO1. Core competency: Basic knowledge of chemical engineering principles including unit operations, thermodynamics and reaction engineering.			
PSO1	**2.10**	**2.81**	For PSO1, the target level was achieved. A total of 22 subjects were considered for calculating the attainment level of PSO1.
PSO2. Application competency: Ability to analyse, design and control of chemical processes in an economical and sustainable manner.			
PSO2	**2.10**	**2.76**	For PSO2, the target level was very well achieved. A total of 24 courses were considered for calculating the attainment level of PSO2. Overall performance was good and target value was well attained in all courses considered for attainment of PSO2.

 # Kindly see Annexure-II for the analysis and report.

Program Outcomes once mapped to the learning outcomes of a particular course gives us an insight of the level of achievement of students in that particular PO. Given this broaden picture of new understanding, we get an opportunity to improvise through initiatives and also implement certain changes that can be lead us to have better performances. For example, in an outcome measurement related to ability to identify and formulate problems for engineering system was assessed through courses that basically require an understanding of engineering problems and its formulation which may lead to problem solving. Therefore, in order to further strengthen student learning, we implemented a paradigm shift in teaching from **Teacher Centric to Student Centric Learning Approach**. This concept was introduced to the faculty through **Centre for Academic Practices and Student Learning (CAPSL)** training workshop which started in year 2016. All faculty from the department have been completed the basic course of New Direction Program and benefitted through this workshop. Faculty was trained to adopt academic practices such as outcome based learning, creative thinking, introducing assessment methods involving students, and many more. With these approaches, students were more open to creatively formulate problem.

On the other hand, where student is assessed for his/her ability to solve complex engineering problems, role of problem solving through tutorials becomes very important. While student centric approach did help in 2018-2019 but a marginal fall was visible in 2019-2020. One of the main reasons for this can be attributed to a shift to an **Online Mode of Teaching because of COVID pandemic**. To strengthen the online teaching-learning **Thapar Learning Management System (TIET-LMS)** was developed and effective July 2020, all academic activities are conducted through it, and reviewing tutorials has also now become seamless. It is anticipated that with the coming up of TIET-LMS, we foresee a positive improvement in this regard in the future.

We strongly believe that a static curriculum cannot bring in changes in the understanding and applying engineering design to produce solutions in the context of global, cultural, social, environmental and economic factors. Keeping this in view, our scheme and syllabi are updated from time to time. A Board of Studies (BOS) meeting is held on a regular basis wherein an expert opinion is sought from Industry and Academic experts in the field of chemical engineering. Based on their suggestions, curriculum is modified and updated to match with the latest market trends. The scheme is then sent to the Senate for approval. One of the recent and major changes that we have incorporated in our Curriculum includes:

Three focus areas (elective Focus) have been offered to B.E. Chemical Engineering students admitted in 2019 onwards after student clears semester VI (3rd year) of the program. Student has to choose elective Focus out of the following four choices:

- Energy
- Materials
- Petroleum

The students are given their choices based on after 2nd year CGPA. The choice of elective courses and the project work will be related to the elective Focus chosen. Thus a student will graduate with a B.E. Chemical Engineering degree along with an elective Focus certificate in the chosen area in Energy/Materials/Petroleum. The additional elective Focus certificate will give an edge to the student in placements and career growth, and also better opportunities for pursuing higher studies in the area.

Over the past three years, particularly, we are laying **more stress on writing and presentation skills**. Casual, unprofessional writing is no more accepted in project report, capstone, or laboratory reports etc. This is keeping in view the need to communicate effectively with range of audiences through writing, with peers and with people in professional organizations. Now Students have to undertake several proof reading before the final report is accepted for evaluation purposes. Several templates of project writing have been prepared by the faculty and are circulated to students much before the submission time. Students are encouraged to read research papers and asked to bring in a small write up, which becomes useful in undertaking a Capstone Project. Students who go for project semester are exclusively judged for their writing and communications skills by their Industrial Mentor, which in itself is a motivation for students to work harder even when outside the campus. The **Centre for Training & Development (CTD) on campus** has been established to build upon the communication skills through lecture series, workshops and several other activities. We do see several benefits emanating from this Centre and we expect a positive change in the PO scores over the next few years.

We have managed to continuously improve in our outcomes related to experimentation, analysing and interpreting data for making informed engineering judgments. **Experiential Learning Centre (ELC)** activities have been introduced recently and at very early stage in the curriculum. Several activities have been accomplished successfully as ELC activities in the last 2 years such as:

- Hydro-distillation of biomass (rose pellets, raw turmeric, mint, etc.) to obtain essential oil.
- Production of edible oil from oil seeds (solvent extraction).
- Production of liquid soap/detergent
- Thermodynamics experiment to design experimental set-ups to study the P-V-T behaviour of air for: Isobaric process, Isothermal process, Adiabatic Process
- Packed bed reactor design.
- Dissection of centrifugal pump.
- VLE data generation for acetone-water binary mixture.
- Design and fabrication of double pipe /plate heat exchangers

Head
Chemical Engineering Department