DEPARTMENT OF CHEMICAL ENGINEERING
UNIVERSITY OF KARACHI

Ref._____

University Road,
Karachi-75270
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November 25, 2020

Assistant Registrar (Accr),
Zone-II
Pakistan Engineering Council,
Attaturk Avenue (East),
G-5/2
Islamabad.

Subject: Submission of Self Assessment Report (SAR) for Re-accreditation

Dear Sir,

I am directed to send the following documents for re-accreditation visit.

1. 04 hard copies & one soft copy of Self Assessment Report (SAR)
2. Three copies of prospectus of University (Enclosed)
3. Cheque No 00005898 dated 24/11/2020 of Rs.300,000/- (Three lacs) for the reaccreditation visit

With regards,

Yours sincerely,

Dr. Engr. Shagufta Ishteyaque,
Incharge

Self-Assessment Report

Bachelor of Chemical Engineering

2020

University of Karachi, Karachi

QUALIFYING REQUIREMENTS FOR ACCREDITATION

The qualifying requirements are meant to screen out Programs that do not meet the core requirements of the assessment criteria. There are 7 components of the qualifying requirements and each Program is expected to have all the components. For Chemical Engineering program at University of Karachi, the components have been fulfilled and the qualifying requirement for accreditation of Chemical Engineering Program as follows:

S. No	Components of Qualifying Requirement	Status
1	Applicant institution must satisfy the legal status/requirement of the relevant bodies, specifying the particular legal arrangements as a Charter/Degree Awarding Institution (DAI), Constituent or Affiliated institution, or any other type, etc.	University of Karachi is a public-sector university chartered by Government of Sindh and recognized by HEC. University of Karachi was established under as Act of Provincial Assembly of Sindh. Chemical Engineering program is offered by University of Karachi since 2007. It is accredited by Pakistan Engineering Council since its commencement.
2	A minimum of 128 credit hours of which minimum of 65% credit hours must be from core engineering courses offered over a period of four years (8 semesters).	Chemical Engineering program has 137/136 credit hours with 67/68% credit hours from core engineering courses distributed over the period of four years (08 semesters)
3	Final year project (minimum 6 credit hours)	Final year project is a six credit hours course covered in 7^{th} and 8^{th} semesters.
4	Full-time engineering faculty (minimum of 8), and matching student-faculty ratio of 25:1	Dept. of Chemical Engineering has **10 full-time** faculty members with 03 members having PhD degrees. **Student faculty** ratio is **16.4:1**.
5	Progress on / Compliance Report on the last PEC visit observations / EAB decision.	Details are provided in Gap Analysis **Section 1.3.2**
6	Summary of implementation of Outcome Based Assessment (Program Learning Outcomes)	Provided in **Chapter 2, 3** ,**9 and 10** of this report.
7	Duly completed and signed SAR as per prescribed format.	SAR document has been prepared as per PEC format.

The Self-Assessment Report (SAR) is hereby submitted for consideration of PEC EA&QEC/EAB to process for accreditation of the program of Chemical Engineering, University of Karachi Batch 2016.

Signature: _____
(Incharge of the Department)
Date: _____

Signature: _____
(Dean Faculty of Engineering)
Date: _____

Signature: _____
(Vice Chancellor of the Institution)
Date: _____

Signature: _____
(Accreditation Department, PEC)
Date: _____

Acknowledgment

The Department of Chemical Engineering acknowledge to the help and support of Dean Faculty of Engineering Prof. Dr. Nasira Khatoon for review and finalization of SAR 2020.

Special thanks to **Mehran University of Engineering and Technology, Jamshoro, NED University of Engineering and Technology Karachi** and **Dawood University of Engineering and Technology Karachi** for support in providing the Training on different concerns of SAR.

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Chapter 1 Introduction

1.1. University of Karachi

University of Karachi was established through the parliament as a Federal University in 1951. The University act included Faculty of Arts, Business Administration, Education, Engineering, Law, Medicine, Islamic Studies and Science. For the first two years, the University of Karachi remained as an examination University for the affiliated colleges. It started teaching and research activities at two Faculties of Arts and Science. Presently there are 54 Departments and 20 Research Centers and Institutes, under eight faculties.

Realizing the importance of Industrial development of the country, University of Karachi first had started the Department of Applied Chemistry in 1970. To be more industrially oriented a program of bachelor's in Chemical Technology, a four-year course, was launched from the same Department in 1985. However, due to financial constraints the program was discontinued. In 1995 it was restarted as an Evening program. Efforts were made to get the degree holders accredited with Pakistan Engineering Council (PEC). PEC refused to accredit BCT and instead gave set guidelines for Engineering Program. Following those guidelines, the Faculty of Engineering was revived, and the Department of Chemical Engineering was established. PEC accreditation team visited the department and delivered guidelines for further improvements. They again visited in 2011 and accredited the first batch of forty students in 2011. Since then all subsequent batches are accredited.

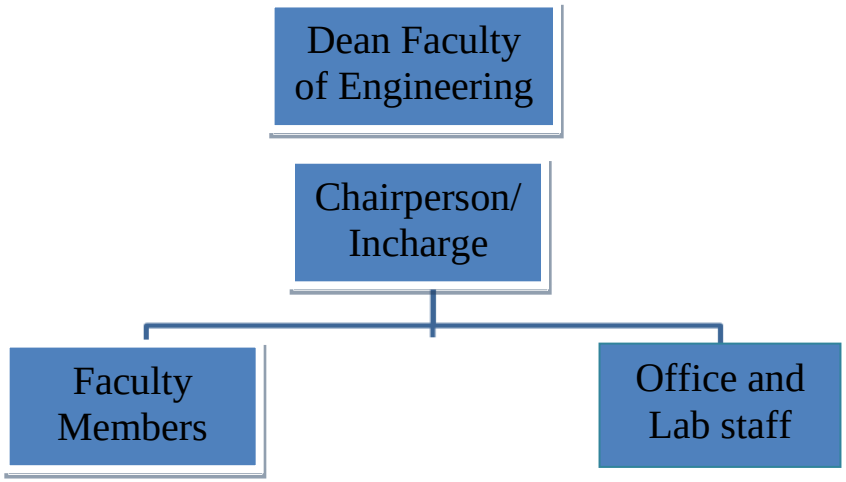

Figure 1-1: Organogram of Department of Chemical Engineering

The Department currently employs highly qualified and experienced faculty members to teach fundamental courses in friendly and affable environment. Students have access to laboratories to learn and apply fundamental Chemical Engineering Principles. The laboratories include Heat Transfer, Mass transfer, Applied Chemistry Lab, Instrumentation and Control, Fluid Mechanics, Chemical Reaction Engineering and Particulate Technology Lab. A Library, computer lab and audio/visual facilities are also available for the students.

1.2. Decision Making at University of Karachi

The decision-making process for academic, administrative and financial matters is very well formalized as shown in Figure 1-2. The decisions are taken at various tiers depending upon the nature of issue. Besides departmental faculty meetings, various bodies play an active role and hold meetings regularly as per the schedule issued by the University. The functions of various bodies are briefly discussed in the following sub-sections.

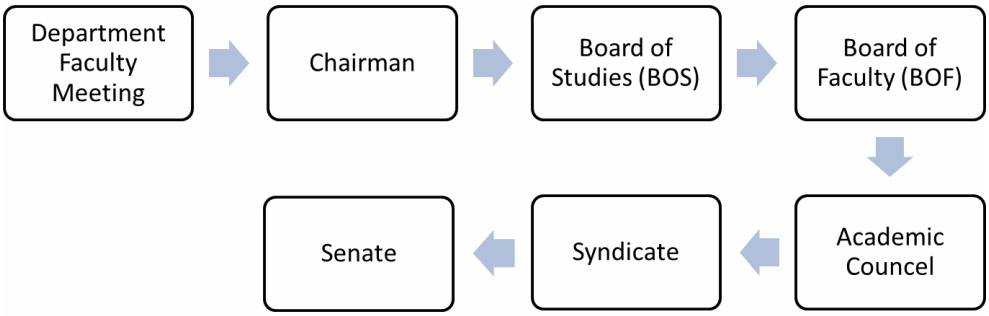

Figure 1-2 Decision Making Process at University of Karachi

1.2.1. Faculty Meeting

The faculty meeting in the department is held on regular basis for various administrative and academic issues. The recommendations from the faculty are sent to the Board of studies.

1.2.2. Board of Studies (BOS)

Each board of studies consisted of the Chairman, All Professors / Associate Professors, one senior Assistant Professor, one lecturer on rotation, three teachers other than university appointed by syndicate and one member appointed by Vice Chancellor. The Chairperson is ex-officio Chairperson of BOS. All academic issues are discussed in the BOS like any changes in syllabus. The approved minutes are formulated.

1.2.3. Board of Faculty (BOF)

Board of Faculty consisted of Chairpersons, all Professors and senior most Associate Professors. The Dean presides over meetings of BOF. Two Associate/Assistant Professors from each department are also nominated by each departmental BOS for three years at one time. Three teachers are also nominated by the Academic Council as members of each BOF for three years at any time. All academic related issues recommended by Boards of Studies in that Faculty are discussed and recommendations submitted in Academic Council.

1.2.4. Academic Council

Vice Chancellor, Pro Vice-Chancellor, all Deans, all Professors, all Chairmen, Principals of affiliated colleges / institutions, two eminent persons nominated by Government of Sindh, Education Secretary of the Provincial Government or Additional Secretary, Chief Librarian and Controller of Examinations are also members of this body. Registrar is the Member/Secretary of Academic Council. All academic matters recommended by respective Boards of Faculties are reviewed and recommendations made to the Syndicate for approval.

1.2.5. Advanced Studies & Research Board (ASRB)

Vice Chancellor, Pro Vice-Chancellor, all Deans, Emeritus Professor, three nominees of each Syndicate and Academic Council are the members of this board. The tenure for the nominated members is three years.
The function of this board is to advise the authorities on all matters connected promotion of advanced study and research, to consider and report to the authorities on the institution of research degree, to propose the regulation for award of research degree, to appoint the supervisor for the research student and to determine the subject of thesis , to recommend the names of paper setters and examiners for research examination after considering the proposals of board do studies in this behalf and others.

1.2.6. Syndicate

The Syndicate is the highest executive body of the University. Vice Chancellor chairs meetings of the Syndicate and Registrar acts as Secretary. Pro Vice-Chancellor, One MPA, one High Court Judge, two members of Senate, Education Secretary or Additional Secretary, Nominee of HEC, one Dean (to be nominated by Chancellor), elected representatives of Professors / Associate Professors / Assistant Professors / Lecturers, three eminent persons nominated by Chancellor, One Principal of an affiliated college, one Alim, and one lady nominated by the Chancellor are members of this body. All University Regulations are approved by this body after considering recommendations as well as executive proposals; only Statutes, Budgets and the Annual Reports have to be reviewed and submitted to the Senate for its approval.

1.2.7. Senate

The University Senate which is the highest legislative body of the University meets at least once every year under the Chairpersonship of the Chancellor; Registrar acts as Secretary. All University Professors, Heads of Departments, Chairpersons, all members of Syndicate, four University teachers other than Professors (to be elected by all University teachers), Principals of affiliated colleges, Chairmen of Boards of Intermediate and Secondary Education Karachi, one elected Registered Graduate, two eminent persons nominated by the Chancellor are Members of this body. It is also the only Statutory Body meeting which is open to the Press.

1.3. Adoption of Outcome Based Education (OBE)

In 2018, Chemical Engineering Department took initiative to adopt Outcome-Based Education (OBE) System. The gaps in the existing system were identified for the implementation of the OBE System. The motivation to implement OBE is its characteristic strength in developing comprehensive graduate attributes through different learning areas. The OBE is designed to show student progress based on the 'outcome' of learning skills. In traditional education approach, the performance of students was being gauged through the achieved grades only while the OBE system ensures a comprehensive methodology, where student performance is continuously monitored in all domains of learning. It ensures that students have acquired adequate skills in all domains as outlined by the program.
Steps required for implementation of OBE System were given new impetus, with the provision of Manual of

Accreditation 2014 by Pakistan Engineering Council (PEC). The guidelines provided were used for completing the OBE implementation process.

1.3.1. Industrial Advisory Board

The Industrial Advisory Board was constituted by the University in which eight (08) experts from renowned industries were inducted as members to formulate and approve PEOs. The first meeting of the IAB was held on April 13th, 2019 (see Appendix-A). The members discussed the departmental Mission, PEOs and PLOs which were then subsequently approved.

1.3.2. Gap Analysis

After the reaccreditation visit of PEC in February 2020, it was decided to completely switch over to the OBE based accreditation with effect from first semester of 2019. A gap analysis was essential which was carried out, based upon which proper documentation was prepared and appropriate training of the faculty and staff was conducted. Following gaps were identified therein and appropriate corrective actions were taken or initiated as given in Table 1-1.

Table 1-1 Gap Analysis and actions

Sr. No.	GAP Analysis	Action Taken
1.	Process partially defined (two out of three survey forms have been designed)	Process has been revised. All forms have been designed. (see Annexure N, O, P)
2.	Assessment data gathered from the available survey forms has not been analyzed for needed outcome- based corrections.	Assessment data gathered from the survey forms have been analyzed for respective outcome-based corrections.
3.	PLOS are linked to PEOs but not supportive of all the PEOs	PLOs mapping to PEOs have been revised. See (Table No.3-1)
4.	Mapping is available but all PLOs are not adequately supportive.	CLOs mapping to PLOs have been revised. See Table (3-2)
5.	Teaching and assessment methods are partially supportive	Teaching and assessment methods have updated.
6.	KPIs are not well defined more ever their assessment is not carried out at the appropriate taxonomy level.	KPIs have been revised. See (Table3-3)
7.	CQI process is defined but not institutionalized.	It has been approved by BOS and BOF and forwarded to Academic council (delay is due to COVID-19).
8.	Reasonable exposure in complex engineering problems and activities in most of the courses but not covered in all courses and labs.	University has been closed for seven months. Academic activities still not resumed completely. As situation improves CEPs will be covered in the remaining courses also.
9.	Some labs are deficient in equipment specifically mass transfer and heat transfer lab. Furthermore, process lab requires fume cupboard at priority basis.	Fume Cupboard has been installed. Tender has been raised for purchasing of new equipment.

10.	Satisfactory attainment is there but a lower level expected in terms of taxonomy.	CLO/ PLO attainment level have been revised. Graduating student's survey form have been updated.
11.	2016 and 2017 intakes are in compliance; however, Annual intake of 2018 session is not in compliance with PEC regulations.	Student's intake in 2020 is in compliance with PEC regulation.
12.	Evaluation process is outlined but not followed	Evaluation process has been followed as recommended by PEC.
13.	Limited formal training	Improvement expected after COVID-19 However some trainings have been arranged.
14.	Limited faculty research / publication / sponsored projects.	Faculty research publications have been increased. Several Faculty Members have been submitted projects to different sponsoring Agencies. See (Appendix C)
15.	Even after repeated notices University has not appointed the head/chairman of the department of Chemical Engineering. Moreover, there is no associate professor and professor in the department yet.	Advertisement has been published for the post of associate professor and professor several times. Scrutiny is under process. Delay due to COVID-19.
16.	Some additional lab space has been created by shifting the fluid mechanics lab to new location. Most of the equipment asked to be added in the last report has not yet been added. One tray type distillation column is being procured. Equipment needed are Positive Displacement pumps, Sieve tray columns, Bubble cap tray column, Plate type heat exchanger, Natural Convection Heat Transfer setup, Marcet Boiler, Ion exchange Columns, Samples of Packing used in Packed bed columns. The distillation equipment used are small in size hence, not suitable for engineering studies. (concept of reflux ratio cannot be implemented)	Gradual Improvements is under process
17.	CQI process is defined with limited understanding. Only 1 of the three loops i.e. CLOs' is closed other two loops for PLOs' and PEOs' needs to be institutionalized.	CQI process loop is completed thus closed. Assessment Mechanism for all three Loops have been revised (See Chapter 9)
18.	Only partial actions have been taken.	All the identified weaknesses in the last accreditation visit, have been addressed and resolved accordingly.

19.	One PhD has joined the department and three MS qualified lecturers have been appointed on contract. No senior faculty has been added	Cases for promotion to higher grade are mature and meeting of selection board expected once the pandemic situation improved.
20.	Limited research publications.	Three faculty members enrolled in PhD are in there third year of research. Similarly, four faculty members are on study leave abroad. Publication expected soon.
21.	One floor of the newly constructed building has been added. However, very limited new equipment mentioned in the last visit report has been added.	Tender has already been issued for purchasing of equipment under PC-I
22.	Beside the OBE initiative no new initiative has been taken.	Strengthening of OBE Implementation is first priority.
23.	IAB has been formed but its effectiveness is limited in the whole process.	Its effectiveness has been more elaborated in last IAB meeting minutes. (See Annexure R)
24.	Informal mechanism exists but on the previous patterns. Since OBE has been implemented recently and the survey forms have been designed however, no evidence of data obtained through those forms was available. Data on previous patterns is available which does not fulfill the requirement of OBE.	Formal mechanism has been developed and data has been taken/analyzed on newly developed forms.
25.	Industrial linkages are there however, no evidence of sponsored / joint supervision of design projects was available.	Design projects in collaboration with industries have been assigned to various FYDP groups (See Table 10-1)
26.	Very limited and irregular involvement is observed	Faculty members in collaboration with industries are involved in various Final Year Design Projects. (Which are relevant to the industries).

Chapter 2 Program Educational Objectives (Criterion- 1)

2.1. Introduction

This section deals with the salient features of the Program Educational Objectives (PEOs) prepared in accordance with the Pakistan Engineering Council Manual of Accreditation 2014. The PEOs for the Chemical Engineering Program describe accomplishments that graduates are expected to attain within four to five years after graduation. The PEOs of our undergraduate education program are in alignment with the Vision and the Mission of the University of Karachi.

2.1.1. Vision and Mission of University of Karachi

Vision and Mission statements are developed to serve as foundational guidelines for instituting PEOs. The Vision and Mission of University of Karachi are published on all important forums including the University Website, Departmental notice boards, chairperson / Incharge offices, latest prospectus, conference halls.

2.1.2. Vision

To become a globally recognized center of excellence in higher education.

2.1.3. Mission

To attain international excellence in education and research and to produce highly skilled manpower with a view to foster human values, truthfulness in our society and disseminate contemporary knowledge in all academic disciplines.

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2.1.4. Vision and Mission of Chemical Engineering Department

Vision Statement: To be globally recognized for Chemical Engineering education.

Mission Statement: To provide quality education in Chemical Engineering, empowering leadership in academia and industry.

2.1.5. Department Mission V/S University of Karachi Vision and Mission

From statements it is very much clear that Department's Mission statements are aligned with University Mission.

2.1.7. Program Education Objectives (PEOs)

Program Educational Objectives (PEOs) are the attributes and capabilities that the graduates are expected to exhibit within few years after graduation. The PEOs are direct translation of program mission and are derived involving all stakeholders from academia and industries; which are aligned with University and Department mission. The PEOs stipulate the high-level program objectives and provide a broad framework to design program learning outcomes, curriculum and its provision. The process flow is given in Figure 2-1.

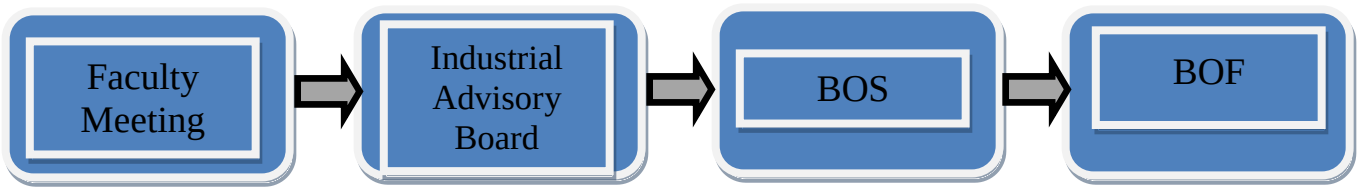


Figure 2-1Process of defining and approving PEOs

The PEOs of the Chemical Engineering program were initially defined by faculty reviewed, updated and approved in Industrial Advisory Board meeting dated April 13th, 2019, wherein the representatives from industry and academia actively participated. The First IAB meeting was chaired by DEAN Engineering. Afterwards PEOs were approved by BOS (Appendix-C). Due to COVID-19 BOF has been delayed and held on _____

The BE (Chemical Engineering Program) will produce graduates, who can:

- **PEO 1: Utilize and apply Chemical Engineering knowledge, scientific techniques and tools to provide solutions to Complex Engineering Problems.**
- **PEO 2: Practice knowledge and skills to improve socio-economic sustainability and global environment.**
- **PEO 3: Play leading role in creating innovative and quality solutions for industrial and societal problems in a professional manner.**

These Program Educational Objectives and mission statements are published on the website of Chemical Engineering Department University of Karachi.
The educational objectives of Chemical Engineering program are in line with the Mission of the University and the Department as after achieving these objectives; the graduates of Chemical Engineering Department have proved themselves to be good chemical professionals and serving the industry.
These objectives are set in order to satisfy the stake holders i.e. industry, academia and government organizations. Our graduates are working in all these areas and are fulfilling their responsibilities with the professional attitude in order to serve the society.
Our graduates are also performing very well in carrying out research in various domains of Chemical Engineering. Many graduates have been acquiring higher education from different renowned universities of the world.

2.1.8. Consistency of PEOs with the Program Mission

University of Karachi has a clear and well-defined planning and assessment framework that is applied by the Department for academic programs. Figure 2-2 summarizes this framework and its components

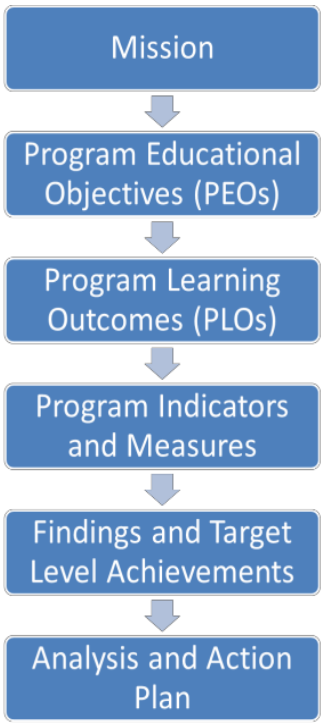


Figure 2-2Program Planning and Assessment Model

The PEOs stipulate the high-level program objectives for BE Chemical Engineering program and provide a broad framework to design Program Learning Outcomes (PLOs), curriculum and its provision. Within the framework, the PEOs are established keeping in view the University Vision and Mission as well as the Departmental Mission. The established PEOs are consistent with the Mission of the Chemical Engineering department. Some key phrases of the PEOs and Chemical Engineering Program Mission are mapped in Table 2-2.

Table 2-1 Mapping of PEOs with the Program Mission

S.No	PEOs (Keywords)	Mission of the Department		
		Quality Education	Academia and Industry	Leadership
1	Academic, scientific skills, Modern tools and techniques	**X**	X	
2	Socio-economic sustainability and global environment	X	**X**	
3	Leading role	X		**X**

2.2. Processes to Evaluate the Attainment of PEOs

The PEOs for Chemical engineering program are developed in a manner to instill the ability of accomplishments that the graduates are expected to demonstrate within 4 years after graduation. While measuring the attainment of these PEOs, the diversity in choices of graduates in selecting their employment after graduation is kept in mind. The graduates employed in Chemical Engineering may also go for entrepreneurship or other professions later. Program performance indicators are tailored such that deviations in choices are considered. Certain minimum requirements are kept as key performance indicators (KPIs) so that success of program can be established with each review cycle. Benchmarks are also identified that define various measures of success which would be used over next four to five years to quantify the achievements and progress of the program. Figure 2-3 explains PEOs assessment process and review method.

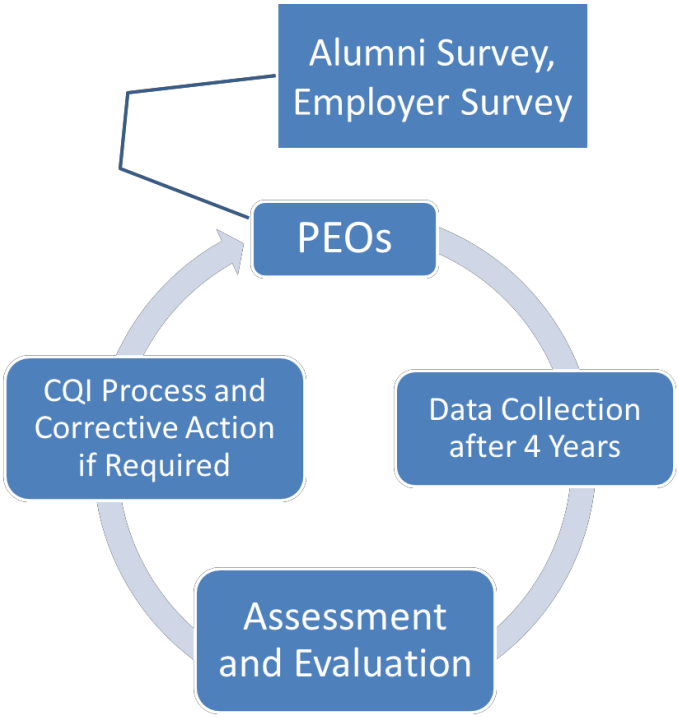


Figure 2-3Flow chart of various processes in establishing and reviewing PEOs

The data is collected from employer and alumni surveys for evaluation of PEOs attainment. The data is collected every year and evaluated at four years after graduation of students. Table 2-3 provides details of measurement tools, KPIs and time of collection of feedback. Based on collected data, CQI process is invoked after four years of graduation of students. The collected data is evaluated as per KPIs and subsequently reviewed for any corrective actions if required. The PEO attainment is assessed /evaluated on the basis of the data gathered by employers and alumni surveys. The surveys are conducted annually to obtain data on performance of graduates in industry. For the purpose of OBE, existing forms were updated to encompass the PEOs. Specimen of both employer and alumni survey forms are provided at Appendix-I.

Table 2-2 PEOs measurement tools, KPIs , collected after 4 years of graduation.

Program Educational Objectives	Measurement Tool	KPI
PEO 1 Utilize and apply Chemical Engineering knowledge, scientific techniques and tools to provide solutions to Complex Engineering Problems.	Alumni Survey	More than 40% of graduates are employed within first year after graduation in relevant Chemical Engineering profession.
	Employer Survey	40% of the employers responded. Average score was 3 or above on a scale of 1-5 regarding competence, knowledge, skills and modern tool compatibility of employed graduates.
PEO 2 Practice knowledge and skills to improve socio-economic sustainability and global environment.	Employer Survey	40% of respondent employers gives an average score 3 or above on a scale of 1-5 regarding economical solution.
		At least 40% of respondent employers gives an average score 3 or above on a scale of 1-5 with adherence to ethical values by graduates.
PEO 3 Play leading role in creating innovative and quality solutions for industrial and societal problems in a professional manner.	Alumni Survey	At least 30% of respondent graduates are pursuing higher education or involved in continual professional development (CPD) activities and related research innovation programs.
	Employer Survey	At least 40% of respondent employers gives an average score 3 or above on a scale of 1-5 regarding provision of creativity and innovative solution to social and industrial issues.

2.3. Improvement Process Using PEO Evaluation Results

Continuous assessment and evaluation are corner stone of the overall OBE improvement process to ascertain whether teaching and learning processes achieve the goals and objectives defined for the program. For Chemical Engineering program, the evaluation of achievement of PEO is carried out through an elaborative process having the following steps:

For PEO evaluation, although data is collected annually from Alumni and Employer's feedback, but it is assessed only after 4 years of graduation.

A thorough analysis of this data is carried out by the program Continual Quality Improvement Committee (CQI) members of the department against the listed KPIs (refer to Table2-3).

The summary of this analysis is presented through CQI Review Report in the departmental faculty meeting and in case of non-achievement of PEOs; scope of corrective actions will be identified. Conclusions will be drawn, and it will be decided whether to review the curriculum to make in line with the PEOs or to review PEOs.

If it is decided that a curriculum review is required, the task of recommending corrective measures is assigned to the departmental Board of Studies (BOS) to be discussed, corrected and approved.
However, if it is decided that the PEOs need to be revised, the case is forwarded to the Industrial Advisory Board (IAB) faculty meeting to review the PEOs respectively and finalize the recommendations on the revisions.
It should also be noted that PEOs review is initiated when the same conclusion is consistently reached after three or more years of data. The PEO evaluation and review process is part of the overall CQI process as described in detail in Chapter 9. Flowchart of CQI process for attainment of PEOs is shown in Figure 2-4.

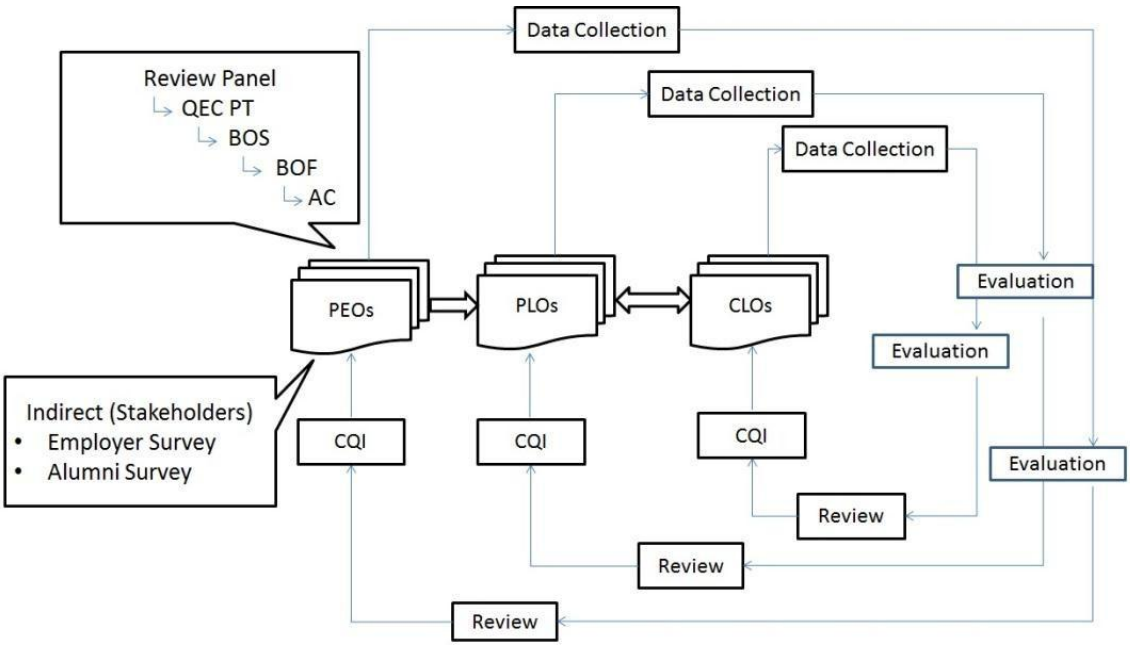


Figure 2-4Flow chart for CQI process for attainment of PEO

Chapter 3 Program Learning Outcomes (Criterion-2)

3.1. Program Learning Outcomes

Pakistan Engineer Council (PEC) has defined graduate attributes for engineers in their Outcome Based Assessment (OBA) Manual, 2014. Those graduate attributes have been adopted as Program learning outcomes (PLOs) of Chemical Engineering program and approved by Board of Studies (BOS). The PLOs are publicized through university website, university notice boards and posters.
Following is the list of Program Learning Outcomes (PLO) which graduates of Chemical Engineering Program will attain during their stay in University of Karachi.

1. **Engineering Knowledge:** An ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

2. **Problem Analysis:** An ability to identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using principles of mathematics, natural sciences and engineering sciences.

3. **Design/Development of Solutions:** An ability to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations

4. **Investigation**: An ability to investigate complex engineering problems in a methodical way including literature survey, design and conduct of experiments, analysis and interpretation of experimental data, and synthesis of information to derive valid conclusions.

5. **Modern Tool Usage:** An ability to 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.

6. **The Engineer and Society:** An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the responsibilities relevant to professional engineering practice and solution to complex engineering problems.

7. **Environment and Sustainability:** An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

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

9. **Individual and Teamwork:** An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.

10. **Communication:** An ability to communicate effectively, orally as well as in writing, 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.

11. **Project Management:** An ability to demonstrate management skills and apply engineering principles to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment.

12. **Lifelong Learning:** Ability to recognize importance of and pursue lifelong learning in the broader context of innovation and technological developments.

The main purpose of defining PLOs is to ensure the achievement of PEOs. The broader defined PEOs were decomposed in more measurable and achievable PLOs that relates to PEOs as depicted in PEC- Annexure B of this report.

3.2. Mapping of PLOs to PEOs

For the achievement of Program Educational Objectives, PLOs must be designed in a way that a relationship can be developed between PLOs and PEOs. The PLOs are the graduate attributes that describe the skills, knowledge, and behaviors the students acquire in their program of study to support the achievement of Program Educational Objectives. Therefore, each PLO is mapped with the Program Educational Objectives to ensure its achievement. PLOs, which can be measured by the time of graduation, are the sources by which the program prepares its graduates to achieve PEOs. The PLOs of Chemical Engineering Program are well-mapped with the PEOs as illustrated in Table3-1.

Table 3-1 PLOs and PEOs Mapping

Sr. No	PLOs	PEO 1	PEO 2	PEO 3
1	Engineering Knowledge	X		
2	Problem Analysis	X		
3	Design/Development of Solutions	X		
4	Investigation	X		
5	Modern Tool Usage	X		
6	The Engineer and Society		X	
7	Environment and Sustainability:		X	
8	Ethics:		X	X
9	Individual and Teamwork:			X
10	Communication:			X
11	Project Management			X
12	Lifelong Learning		X	X

3.3. Encompassment of Graduate Attributes Through PLOs

Program learning outcomes (PLO's) are designed in twelve graduate attributes which are fully encompass and consistent with the guidelines of PEC Manual of Accreditation 2014 for the Chemical Engineering program.

3.4. Assessment Process of PLOs

Effective implementation of PLOs in the department of Chemical Engineering was carried out by CLO- PLO mapping (see Appendix-J). Direct and indirect assessment of PLOs was carried out by curriculum and through internship feedbacks/Exit Surveys respectively. Evaluation and review are carried out at the time of graduation from the data which is collected at various stages during academic program. A CQI team is designated for the review and analysis for fulfillment of PLOs. Program CQI Team will indicate any corrective actions if required and may progressively be taken up to the higher body as per the hierarchy of various responsible bodies. The flow chart shown in Figure 3.1 outlines the CQI process for PLOs.
The university faculty, students and the industry are the stakeholders in initiation of CQI process for PLOs. Teaching & direct assessment of PLOs is carried out by the faculty and students through Exit Surveys and the industry through the fulfillment of internship Feedback Form. During the review stage of the CQI process, if any revision for improvement is required, the industry and faculty are involved for revision of curriculum through BOS, BOF, and academic council meetings.

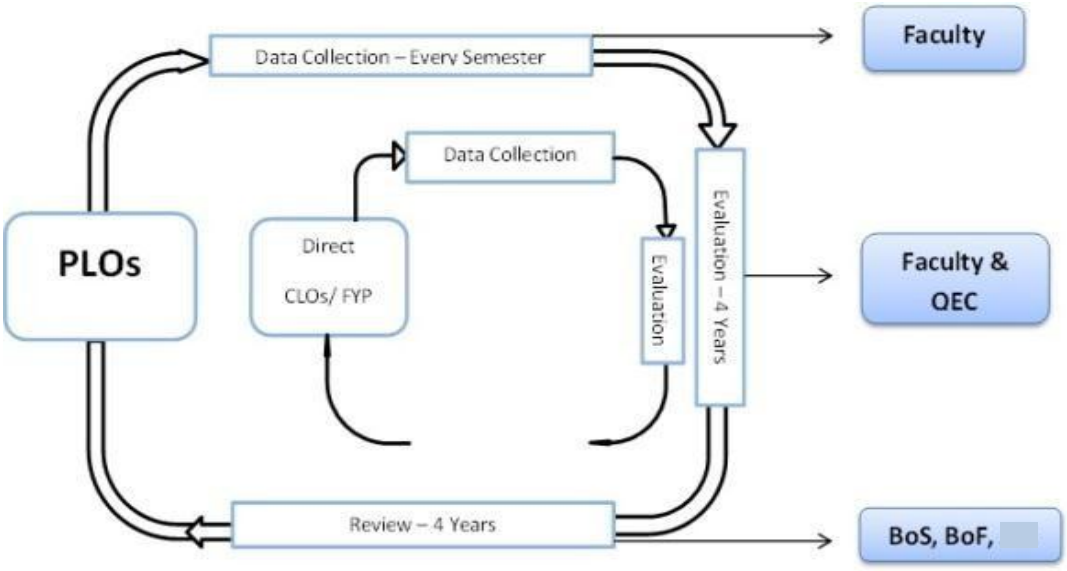


Figure 3-1CQI Process for PLOs

3.5. Mapping of Courses to PLOs

The courses are systematically designed to be mapped to the relevant PLOs, so that all PLOs are covered properly through the courses in the curriculum. The mappings of the courses with the PLOs are shown in Table 3-2. The mapping shows achievement of PLOs directly through CLOs as defined in various courses further given in detail in chapter 4. Therefore, it becomes necessary to audit the achievement of CLOs through CQI process as shown in Figure 3-2. The course outlines are prepared by the faculty, then send to BOS and BOF and finally approved by the Academic Council. Any further changes in courses take place through CQI process. Course objective, definitions of CLOs as per learning domain and taxonomy level, relevant PLOs, mapping of courses to PLOs are given in course profile, see samples in Appendix-J.

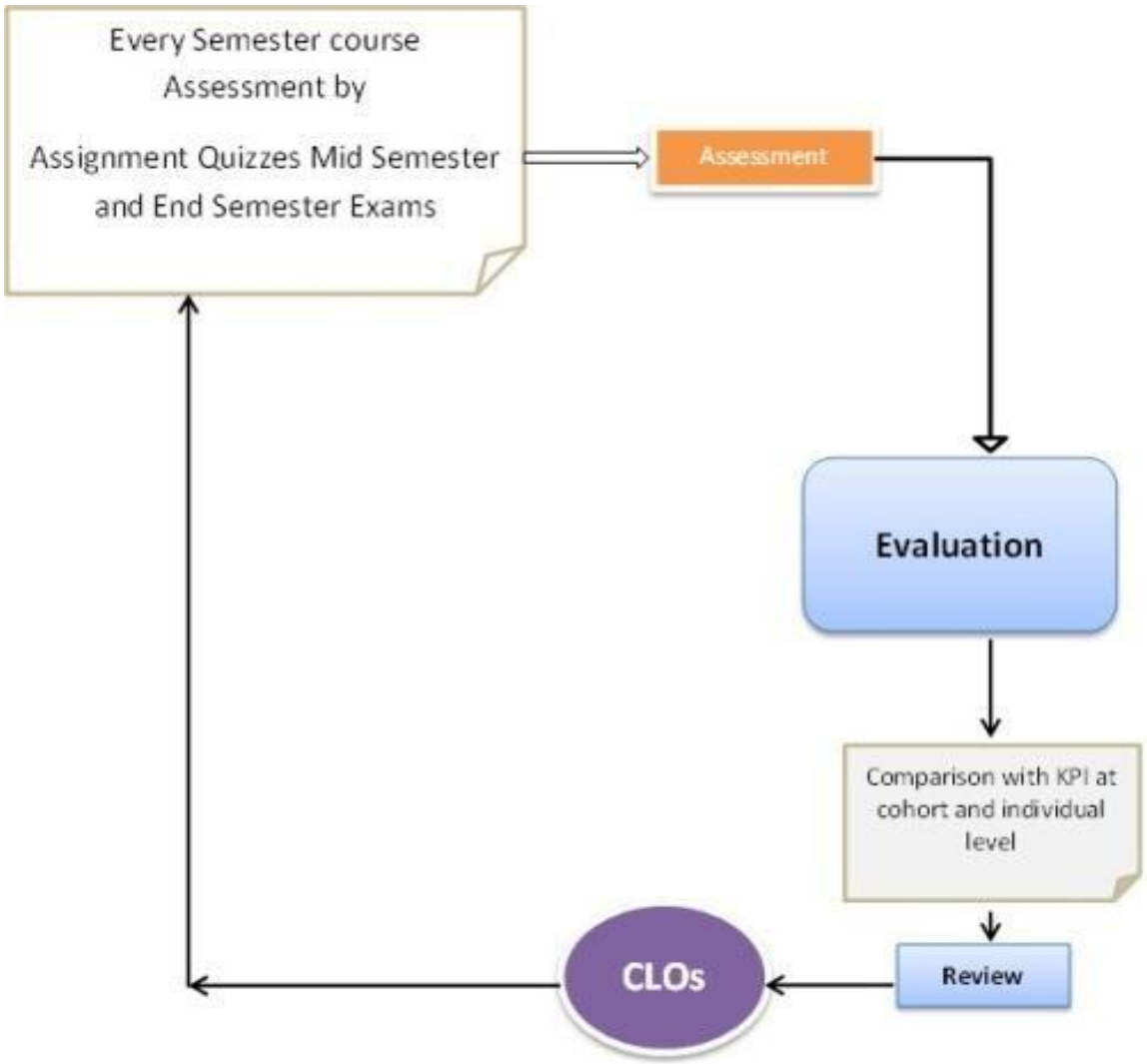


Figure 3-2 CQI Process for CLOs

Table 3-2 Mapping of courses to PLOs

Semester	Course No	Course Title	1	2	3	4	5	6	7	8	9	10	11	12
			Engineering Knowledge	*Problem Analysis*	*Design / Development*	*Investigation*	*Modern Tool Usage*	*The Engineer & Society*	*Environment and Sustainability*	*Ethics*	*Individual and Team Work*	*Communication*	*Project Management*	*Lifelong Learning*
			Level of Emphasis (Low, Medium, High)											
1	300.1	English-I	√							√		√		
	300.1	Islamic Studies / Ethics						√		√				√
	CE-301	Chemical Process Principles-I	√	√	√									
	CE-303	Physics	√		√									
	CE-305	Mathematics-I		√	√									
	CE-307	Engineering Drawing		√										√
2	300.2	Pakistan Studies						√	√					√
	300.2	English-II		√						√		√		√
	CE-300	Applied Chemistry-I	√	√		√				√		√		
	CE-302	Chemical Engineering Thermodynamics-I						√		√				√
	CE-304	Mathematics-II	√	√	√									
	CE-306	Computer & Computation	√		√									
3	CE-401	Applied Chemistry-II		√	√									
	CE-403	Chemical Process Principles-II		√										√
	CE-405	Mathematics-III						√	√					√
	CE-407	Fluid Mechanics		√						√		√		√
	CE-409	Electrical & Electronics Engineering	√											
	CE411	Workshop Practice	√	√		√								
4	CE-400	Chemical Process Technology-I		√	√									
	CE-402	Heat Transfer			√									
	CE-404	Particulate Technology	√	√		√								
	CE-406	Logic & Critical Thinking	√	√										
	CE-408	Mathematics-IV (Numerical Methods & Engineering Statistics)		√	√									
	CE-410	Computer Aided Drawing	√	√	√	√								
5	CE-501.1	Communication Skills	√											
	CE-501	Mass Transfer	√			√		√						
	CE-503	Fuel & Combustion	√						√					√
	CE-505	Engineering Economics	√	√	√	√								
	CE-507	Chemical Engineering Thermodynamics-II	√	√	√									
	CE-509	Computer Programming & Software Application	√	√				√						
6	CE-500	Engineering Materials	√	√	√		√		√					

	CE-502	Chemical Reaction Engineering	√		√									
	CE-504	Simultaneous Heat & Mass Transfer Operations								√	√	√		
	CE-506	Transport Phenomena	√		√				√					
	CE-508	Chemical Process Technology-II	√		√	√	√							
7	CE-601	Instrumentation & Process Control	√	√	√	√								
	CE-603	Chemical Process Design & Simulation	√	√	√									
	CE-605	Project Management	√						√		√		√	
	CE-607	Chemical Engineering Plant Design	√	√					√					
	CE-609	Chemical Engineering Plant Design Project "A"	√	√	√	√	√		√	√	√	√	√	√
		Elective-I	√	√	√	√								
8	CE-600	Chemical Engineering Plant Design Project "B"	√	√	√	√	√		√	√	√	√	√	√
	CE-602	Production & Operations Management	√								√		√	
	CE-604	Maintenances Engineering & Safety	√			√			√					
		Elective-II	√				√	√						
		Elective-III	√				√	√						
	Total		32	25	21	12	06	08	10	09	05	07	04	11

3.6. Process of Data Gathering and Results for Assessment of PLOs

Graduate must attain all PLOs at the time of graduation. For the assessment of PLOs, both direct and indirect methods are used which are shown in Table 3-3. For each assessment method KPIs are also defined for the attainment of PLOs. The data from these assessments is evaluated and corrective actions are prescribed by Departmental QEC Team for discussion and approval in BOS. The description of the methods and KPIs is presented below.

Table 3-3 KPI for PLO attainment

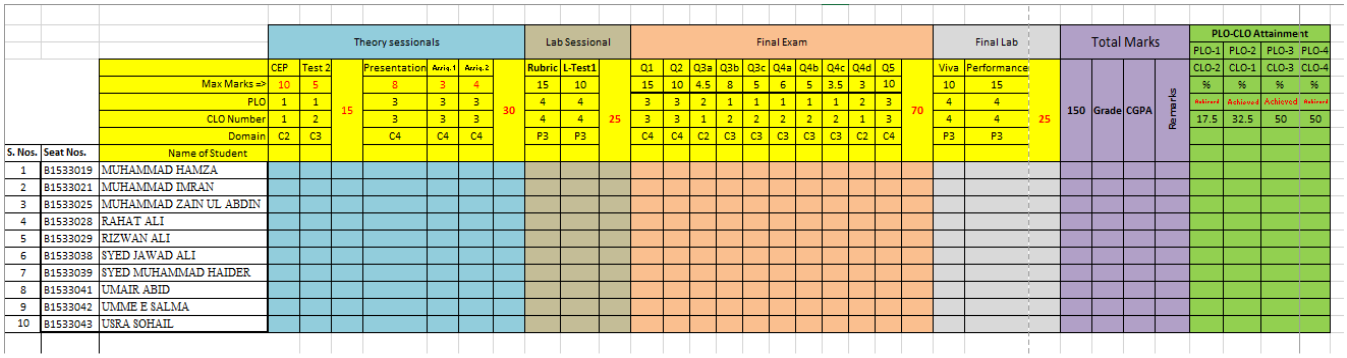
Assessment	Measurement Tools	Method	KPIs	When Measured
PLOs 1 to 12	Exams/FYDP	Direct	CQI invokes when cohort failure of more than 50%will be appear in any PLO attainment.	By the time of graduation
			Individual – Each student should attain minimum 50% in all CLO-PLOs.	
	Internship Feedback	Indirect	Minimum 40% of students attain score 3 and above on the scale of 1-5 for mapped PLOs	Annual in summer

3.6.1 Direct Assessment

The direct assessment of the PLOs is achieved through the assessment of CLOs of coursework (examinations and rubrics) and Final Year Projects (FYP).

3.6.2 Course work (CLOs)

Each faculty member prepares the CLO-PLO attainment-based result by using a defined spreadsheet which has been used for the further attainment of CLOs and PLOs. In the left section of spreadsheet, Student's information, marks of each assessment method, mapping of CLOs to assessment tool and taxonomy domain is shown while in the right of the sheet PLO-CLO mapping along with contribution in marks and percentage attainment is depicted in Figure 3-3



			Theory sessionals							Lab Sessional			Final Exam											Final Lab			Total Marks				PLO-CLO Attainment			
																															PLO-1	PLO-2	PLO-3	PLO-4
			CEP	Test 2		Presentation	Assig.1	Assig.2		Rubric	L-Test1		Q1	Q2	Q3a	Q3b	Q3c	Q4a	Q4b	Q4c	Q4d	Q5		Viva	Performance						CLO-2	CLO-1	CLO-3	CLO-4
		Max Marks =>	10	5		8	3	4		15	10		15	10	4.5	8	5	6	5	3.5	3	10		10	15						%	%	%	%
		PLO	1	1		3	3	3		4	4		3	3	2	1	1	1	1	1	2	3		4	4						Achieved	Achieved	Achieved	Achieved
		CLO Number	1	2	15	3	3	3	30	4	4	25	3	3	1	2	2	2	2	2	1	3	70	4	4	25	150	Grade	CGPA	Remarks	17.5	32.5	50	50
		Domain	C2	C3		C4	C4	C4		P3	P3		C4	C4	C2	C3	C3	C3	C3	C3	C2	C4		P3	P3									
S. Nos.	Seat Nos.	Name of Student																																
1	B1533019	MUHAMMAD HAMZA																																
2	B1533021	MUHAMMAD IMRAN																																
3	B1533025	MUHAMMAD ZAIN UL ABDIN																																
4	B1533028	RAHAT ALI																																
5	B1533029	RIZWAN ALI																																
6	B1533038	SYED JAWAD ALI																																
7	B1533039	SYED MUHAMMAD HAIDER																																
8	B1533041	UMAIR ABID																																
9	B1533042	UMME E SALMA																																
10	B1533043	USRA SOHAIL																																

Figure 3-3 Section of spreadsheet showing data entry for exam results for a course

The CLOs marks are calculated as weighted average. As per KPI decided by the department is 50%. For example, if a student is fails to attain 50% marks in any individual CLO it will automatically highlighted with red. For cohort attainment if 50% and more students will fail in any CLO-PLO or in complete course, CQI will invoke.

At the end of semester after recording the attainment from spreadsheet of all courses are provided to Department Assessment Team (DAT). The result of attainment of CLOs is used by QEC Team for CQI purposes. Record of all courses is kept by the Head of Department in both hard and soft form. The CLO attainment data is then further used for the calculation of PLO attainment for each semester which is combined to be used for CQI process for PLOs at the end of program for every individual.

Along with this direct assessment of PLOs, attainment from FYP and indirect assessment through internship surveys and Exit Surveys are summarized and used for the final calculation of attainment of PLOs. An individual student must obtain at least 03 times attainment for qualifying a PLO.

3.6.3 Summary of Results

The results are collected and a brief summary of the results for each semester is recorded in a format. PLOs passing percentage is set same as CLO passing i.e. 50% whereas, for every failing CLO as well as for the PLO which is attained at low level. (i.e. less than 50% achieved), relevant CQI process is initiated describe in chapter #09.

3.6.4 Final Year Design Project (FYDP)

The direct assessment of PLOs is also achieved through FYDP evaluation with the help of prescribed rubrics, as shown below, at different assessment stages during the project. Chemical Engineering Department has a complete policy on methodology for conduct of FYDP, its assessments and evaluation which is provided below. When the projects are assigned to the students, students, a copy of policy containing a detailed formatting guide and assessment rubrics for various assessment stages of the project over final academic year is provided. Results for 1st, mid and final evaluation are marked through a result sheet form and rubric description shown on the next page.

Table 3-4 Final Year Design Project Assessment Rubrics For Final Evaluations

Rubric Description	Poor	Fair	Good	Very Good	Excellent
R1 Subject Knowledge / Problem Statement	Student has no knowledge of both problem and solution. Cannot answer basic questions	Student very less knowledge of both problem and solution. Cannot answer questions	Student is uncomfortable with information. Can answer basic questions only	Student has competent knowledge and is at ease with information. Can answer questions but without rationalization and explanation.	Student has presented full knowledge of both problem and solution. Answers to questions are with rationalization and explanation
R2 Organization and Content of Presentation	Student has no clue about the content of his presentation.	Information is arranged in confused and unstructured way. Key points are not covered. The contents are hard to understand.	Information articulated clearly but it is difficult to follow the presentation. All key points are covered but no use of charts, graphs, figures etc., to explain salient points.	Information articulated clearly and the flow is reasonable All key points are covered but limited use of charts, graphs, figures etc., to explain salient points.	Information articulated clearly and is organized in a structured way. All key points are covered. Enhances presentation and keeps interest by effective use of charts, graphs, figures etc., to explain salient points.
R3 Material and Energy Balance, Sizing Calculations & HAZOP Study	Student has no clue about the Calculations and their results.	Calculation results shown in confused and unstructured way. Key points are not covered. The contents are hard to understand	Calculation results shown clearly but it is difficult to follow the presentation. All key points are not covered	Calculation results shown clearly and the flow is reasonable. All key points are covered.	Calculation results shown clearly and the flow is reasonable. All key points are covered but with good use of charts, graphs, figures etc., to explain salient points.
R4 Costing & Optimization	Student has no clue about the Calculations and their results.	Calculation results shown in confused and unstructured way. Key points are not covered. The contents are hard to understand	Calculation results shown clearly but it is difficult to follow the presentation. All key points are not covered	Calculation results shown clearly and the flow is reasonable. All key points are covered	Calculation results shown clearly and the flow is reasonable. All key points are covered but with good use of charts, graphs, figures etc., to explain salient points.
R5 Project Overview,	Student has no clue about the Process	Process Description and Technology	Process Description and Technology	Process Description and Technology	Process Description and Technology

Process / Research Technology Selection, Comparative Study	description and Technology Selection criteria	Selection criteria shown in confused and incomprehensive way. Key points are not covered. The contents are hard to understand	Selection criteria shown clearly but it is difficult to follow the presentation. All key points are not covered	Selection criteria shown clearly and the flow of presentation is reasonable. All key points are covered	Selection criteria shown clearly and the flow is reasonable. All key points are covered with good explanation of other alternatives
R6 Block Flow Diagram (BFD), Process Flow Diagram (PFD), & Process Instrumentation Diagram (P&ID)	Student has no clue about the Process Diagrams	BFD, PFD & P&ID made with errors and without following Engineering rules and practices	BFD & PFD are made with complete detail following Engineering rules and practices but P&ID made with errors and without following above rules.	BFD, PFD & P&ID are made with complete detail following Engineering rules and practices but P&ID before and after HAZOP are not made	BFD, PFD & P&ID are made with complete detail following Engineering rules and practices and P&ID before and after HAZOP are made
R7 Process Simulation, Work breakdown structure (WBS), GANNT Chart & Hydraulic sizing Software	Student has no clue about the Software (Modern Tool) Usage	Software (Modern Tool) used with errors and without following Engineering rules and practices.	Software (Modern Tool) used following Engineering rules and practices. Results shown in confused and non-comprehensive way.	Software (Modern Tool) used following Engineering rules and practices. Results shown in clear and comprehensive way.	Software (Modern Tool) used following Engineering rules and practices. Results shown in clear and comprehensive way. Extra Effort is done for optimization and refinement
R8 Delivery & Presentation Skills	Presentation was not clear at all. Language was not appropriate	Presenter occasionally spoke clearly. Holds little to no eye contact.	Presenter spoke clearly. Language was generally clear but mostly reading from notes.	Presenter spoke very clearly. Language was generally clear and delivery was fluent. Consistent use of direct eye contact with audience.	Presenter spoke clearly and at a good pace to ensure audience comprehension. Language was used effectively and delivery was fluent and expressive.
R9 Work Division / Work Conclusion	Work division among group members/ Work Conclusion is not shown	Work Division among group members/ Work Conclusion is not appropriate.	Work division/ Work Conclusion is shown but more clarity is needed	Work division/ Work Conclusion is shown.	Clear work division among group members/ Proper Work Conclusion is shown
R10 Language and Grammar	A lot of spelling and grammatical mistakes in the presentations	Frequent spellings and grammatical errors that slows the reading flow.	Occasional spellings and grammatical errors.	Occasional spellings and grammatical errors that have only minor impact on presentation.	Almost no spelling or grammatical mistake. .

Table 3-5 Final year Project Assessment Rubrics Form For Final Evaluation

Department of Chemical Engineering

Project Topic: _____

Student Seat no. / Name: _____

Rubric No	PLO	Rubric Description	Poor (1-2)	Fair (3-4)	Good (5-6)	Very Good (7-8)	Excellent (9-10)	Remarks
1	PLO-1: Engineering Knowledge PL0-12: Lifelong Learning	Subject Knowledge/ Problem Statement						
2	PLO-11: Project Management.	Organization and Content of Presentation						
3	PLO-2: Problem Analysis PLO-7: Environment and Sustainability	Material and Energy Balance, Sizing Calculations & HAZOP Study						
4	PLO-2: Problem Analysis	Costing & Optimization						
5	PLO-3: Design/ Development of Solution PLO-4: Investigation	Project Overview, Process/ Research Technology Selection, Comparative Study						
6	PLO-3: Design/ Development of Solution	Block Flow Diagram(BFD), Process Flow Diagram(PFD), & Process Instrumentation Diagram (P&ID)						
7	PLO-5: Modern Tool Usage	Process Simulation, Work breakdown structure (WBS), GANNT Chart & Hydraulic sizing Software						
8	PLO-8: Ethics PLO-10: Communication	Delivery & Presentation Skills						
9	PLO-9: Individual &Teamwork	Work Division/ Work Summary / Conclusion						
10	PLO-10: Communication	Language and Grammar						

Name & Signature of Evaluator: _____

☐ Internal Supervisor: _____

☐ External Supervisor: _____

Remarks: _____

Name & Signature of Evaluator: _____

☐ Internal Supervisor: _____

☐ External Supervisor: _____

_____

Incharge of Department:
Dr.Shagufta Ishteyaque

Department of Chemical Engineering

Final Evaluation

Title of Project:_____

		Group No. 01			
		(1)	**(2)**	**(3)**	**(4)**
Student's Name					
Roll No.					
Final Evaluation Rubric	**100**				
Mid Evaluation Marks	**50**				
Report Writing	**50**				
TOTAL	**200**				

☐ Internal Supervisor: _____

☐ External Supervisor: _____

_____

Incharge of Department:
Dr.Shagufta Ishteyaque

3.6.5 Indirect Assessment

The indirect assessment is accomplished through the external sources/means through Internship feedback, for which feedback forms are designed in line with Program Learning Outcomes (Appendix-I).
The student's feedback about each course and relevant teacher is also obtained through online portal at the end of each semester and submitted to the QEC Team for further processing and evaluation.

3.7. Application of Assessment Results for Improvement of Program

Program CQI Team evaluates results of each course along with faculty and Chairperson and initiates the CQI process. If a weakness is identified through CQI, the corrective action process is invoked by QEC Team. The process for corrective action identifies the nature of problem that may be improved through review process. If the weakness is related to achievement of CLOs and/or PLOs through coursework, the revision of curriculum or other corrective actions are recommended. The possible corrective actions may be, the revision of curriculum, redefining of CLOs, revision of CLOs to PLOs mapping, the assessment methods, instruction methodology, or mentoring/training of faculty, for this purpose corrective action form is attached in Appendix-H. The Exit Survey is also conducted by the Department and is gathered from graduating students at the time of graduation in which their self-assessment is required assessing their own skills as compare to the intended program outcomes.

Chapter 4 Curriculum and Learning Process (Criterion-3)

4.1. Program Structure and Course Contents

The basic requirement for running a Degree Program is the design and implementation of the curriculum. The curriculum has been designed to fulfill the Program Learning Outcomes and Course Learning Outcomes in the light of Mission of the Program of Chemical Engineering. The program aims at engineering skills development as required under Outcome-based Education system. The B.E. Chemical Engineering is a four-year degree program comprising of eight semesters. The total number of courses offered is 46 (inclusive of Design Project) with total 137 credit hours. For a revised curriculum which has been implemented since January 2019 total courses offered are 49 (Design Project) with total 136 credit hours

The curriculum of this program is clearly structured and is composed on the courses in following discipline:

1	Basic Sciences courses	32.8
2	Humanities courses	
3	Management sciences courses	
4	Interdisciplinary courses	
5	Chemical Engineering courses	67.2

4.1.1. Curriculum Design

The non-engineering courses has around 30% weight age while the remaining is for engineering courses. The Engineering domain includes Engineering fundamentals, breadth and depth, and elective courses. A comprehensive Final Year Project is also part of the curriculum. The contents of breadth and depth courses are selected to provide students with the knowledge of overall as well as specialized areas of Engineering. Several courses include complex engineering and open-ended problems that allow the students to apply their knowledge and critical thinking and gain an in depth understanding of theory. The Non-Engineering domain contains courses o communication, ethical and moral responsibilities, mathematics, physics, pure and applied chemistry and management sciences. The combination of Engineering and Non-Engineering courses is in accordance with the National guidelines provided by the HEC / PEC.

Table 4-1Summary of Curriculum Design (For 3rd, 4th year)

Summary HEC-Framework (Required)					Summary UoK-DCE-Framework (Current / Existing)				
Domain	Knowledge Area	Total Courses	Total Credits	% Overall	Domain	Knowledge Area	Total Courses	Total Credits	% Overall
Non-Engineering	Humanities	7	14	30	Non-Engineering	Humanities	7	16	32.8%
	Management Sciences	1	3			Management Sciences	2	5	
	Natural Sciences	7	23			Natural Sciences	7	24	
	Sub Total	15	40			Sub Total	16	45	
Engineering	Computing	3	9	70	Engineering	Computing	4	9	67.1%
	Engineering Foundation	8	29			Engineering Foundation	9	32	
	Major Based Core (Breadth)	8	28			Major Based Core (Breadth)	7	26	
	Major Based Core (Depth)	3	9			Major Based Core (Depth)	5	15	
	Inter-Disciplinary Engineering Breadth (Electives)	7	12			Inter-Disciplinary Engineering Breadth	3	4	
	Senior Design Project	2	6			Senior Design Project	2	6	
	Industrial Training	0	0			Industrial Training	0	0	
	Sub Total	31	93			Sub Total	30	92	
Grand Total		46	133	100	Grand Total		46	137	100

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Table 4-2 Summary of Curriculum Design (Revised - Implemented Since 2019)

Summary HEC-Framework					**Summary UoK-DCE-Framework**				
(Required)					**(Revised- implemented since 2019)**				
Domain	Knowledge Area	Total Courses	Total Credits	% Overall	Domain	Knowledge Area	Total Courses	Total Credits	% Overall
Non-Engineering	Humanities	7	14	30	Non-Engineering	Humanities	7	13	31.62%
	Management Sciences	1	3			Management Sciences	3	5	
	Natural Sciences	7	23			Natural Sciences	8	25	
	Sub Total	15	40			Sub Total	18	43	
Engineering	Computing	3	9	70	Engineering	Computing	4	8	68.38%
	Engineering Foundation	8	29			Engineering Foundation	9	31	
	Major Based Core (Breadth)	8	28			Major Based Core(Breadth)	8	25	
	Major Based Core (Depth)	3	9			Major Based Core(Depth)	6	17	
	Inter-Disciplinary Engineering Breadth (Electives)	7	12			Inter-Disciplinary Engineering Breadth (Electives)	4	6	
	Senior Design Project	2	6			Senior Design Project	2	6	
	Industrial Training	0	0			Industrial Training	0	0	
	Sub Total	31	93			Sub Total	33	93	
Grand Total		46	133	100	Grand Total		51	136	100

`

Table 4-3 Breakup of courses (Existing Curriculum)

Knowledge Area	Subject Area	S. NO	Name of Course	Theory	Laboratory	Cr. Hrs	Total Courses	Total Credits	% Area	% Overall
Non-Engineering Domain										
Humanities	English	1	English-I	3	0	3	3	16	35.56 %	32.85 %
		2	English-II	2	0	2				
		3	Communication Skills	2	0	2				
	Social Science	4	Pakistan Studies	2	0	2	3			
		5	Logic & Critical Thinking	2	0	2				
		6	Engineering Economics	2	0	2				
	Cultures	7	Islamic Studies / Ethics	3	0	3	1			
Management Sciences		8	Project Management	2	0	2	2	5	11.11 %	
		9	Production & Operations Management	3	0	3				
Natural Sciences	Physics	10	Physics	3	1	4	1	4	8.89%	
	Mathematics	11	Mathematics-I (Calculus and Analytical Geometry)	3	0	3	4	12	26.67 %	
		12	Mathematics-II (Applied Mathematics)	3	0	3				
		13	Mathematics-III (Chemical Engineering Mathematics)	3	0	3				
		14	Mathematics-IV (Numerical Methods & Engineering Statistics)	3	0	3				
	Chemistry	15	Applied Chemistry-I (Physical & Analytical Chemistry)	3	1	4	2	8	17.78 %	
		16	Applied Chemistry-II (Inorganic & Organic Chemistry)	3	1	4				
Engineering Domain										
Computing	Fundamentals & Programming	17	Computer & Computation	1	1	2	3	9	9.78%	67.15 %
		18	Computer Aided Drawing	0	1	1				
		19	Computer Programming & Software Application	2	1	3				
	Computer Application in Chemi	20	Chemical Process Design & Simulation	2	1	3	1			

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	cal Engineering Design								
Engineering Foundation	Engineering Foundation	21	Chemical Process Principles-I	3	0	3	9	32	34.78 %
		22	Chemical Process Principles-II	3	0	3			
		23	Chemical Engineering Thermodynamics-I	3	1	4			
		24	Chemical Engineering Thermodynamics-II	3	0	3			
		25	Fluid Mechanics	3	1	4			
		26	Heat Transfer	3	1	4			
		27	Chemical Process Technology-I	3	0	3			
		28	Particulate Technology	3	1	4			
		29	Mass Transfer	3	1	4			
Major Based Core	Major Based Core (Breadth)	30	Chemical Process Technology-II	3	1	4	7	26	28.26 %
		31	Chemical Reaction Engineering	3	1	4			
		32	Fuel & Combustion	3	1	4			
		33	Simultaneous Heat & Mass Transfer	3	1	4			
		34	Instrumentation & Process Control	3	1	4			
		35	Chemical Engineering Plant Design	3	0	3			
		36	Engineering Materials	3	0	3			
	Major Based Core (Depth)	37	Maintenances Engineering & Safety	3	0	3	5	15	16.30 %
		38	Transport Phenomena	3	0	3			
		39	Elective-I	3	0	3			
		40	Elective-II	3	0	3			
		41	Elective-III	3	0	3			
Inter-disciplinary Engineering Breadth		42	Engineering Drawing	0	1	1	3	4	4.35%
		43	Workshop Practice	0	1	1			
		44	Electrical & Electronics Engineering	2	0	2			
Chemical Engineering Project		45	Chemical Engineering Plant Design Project “A”	0	3	3	2	6	6.52%
		46	Chemical Engineering Plant Design Project “B”	0	3	3			

`

Table 4-4 Breakup of courses **(Revised – Implemented since 2019)**

Course Framework University of Karachi - Chemical Engineering (Revised – Implemented since 2019)									
Non-Engineering Domain									
Knowledge Area	**Subject Area**	**Name of Course**	**Theory**	**Lab**	**Cr.Hrs**	**Total Courses**	**Total Credits**	**% Area**	**% Overall**
Humanities	English	Functional English	3	0	3	3	6	14%	32%
		Communication Skills	0	1	1				
		Technical Report Writing & Presentation Skills	1	1	2				
	Social Science	Pakistan Studies	1	0	1	3	5	12%	
		Logic & Critical Thinking	2	0	2				
		Chemical Engineering Economics	2	0	2				
	Cultures	Islamic Studies / Ethics	2	0	2	1	2	5%	
Management Sciences		Process Safety Management	2	0	2	3	5	12%	
		Industrial Management	2	0	2				
		Entrepreneurship	1	0	1				
Natural Sciences	Physics	Physics	2	1	3	1	3	7%	
	Mathematics	Mathematics-I (Calculus and Analytical Geometry)	3	0	3	5	14	33%	
		Mathematics-II (Applied Mathematics)	3	0	3				
		Mathematics-III (Chemical Engineering Mathematics)	3	0	3				
		Probability & Statistics	2	0	2				
		Numerical Methods & Software Application	2	1	3				
	Chemistry	Applied Chemistry-I	3	1	4	2	8	19%	

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		(Physical & Analytical Chemistry)							
		Applied Chemistry-II (Inorganic & Organic Chemistry)	3	1	4				
					Total	18	43	100%	
Engineering Domain									
Computing	Fundamentals & Programming	Computer Application	0	1	1	3	8	9%	68%
		Software and Systems Development	2	1	3				
		Computer Aided Drawing	0	1	1				
	Computer Application in Chemical Engineering Design	Chemical Process Design & Simulation	2	1	3	1			
Engineering Foundation	Engineering Foundation	Chemical Process Principles-I	3	0	3	9	31	33%	
		Chemical Process Principles-II	2	1	3				
		Chemical Engineering Thermodynamics-I	3	1	4				
		Chemical Engineering Thermodynamics-II	2	0	2				
		Fluid Mechanics-I	3	1	4				
		Heat Transfer	3	1	4				
		Chemical Process Technology	3	1	4				
		Particulate Technology	3	1	4				
		Mass Transfer	3	0	3				
Major Based Core	Major Based Core (Breadth)	Fluid Mechanics-II	2	0	2	8	25	27%	
		Chemical Reaction Engineering	3	1	4				
		Fuels & Energy	3	1	4				
		Simultaneous Heat & Mass	3	1	4				

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		Transfer							
		Instrumentation & Process Control	3	1	4				
		Engineering Materials	2	0	2				
		Separation Processes	1	1	2				
		Chemical Engineering Plant Design	3	0	3				
	Major Based Core (Depth)	Maintenances & Utility Engineering	2	0	2	6	17	18%	
		Transport Phenomena	3	0	3				
		Petroleum Refinery Engineering	3	1	4				
		Process Analysis and Optimization	2	0	2				
		Elective-I	3	0	3				
		Elective-II	3	0	3				
Inter-disciplinary Engineering Breadth		Engineering Drawing	0	1	1	4	6	6%	
		Workshop Practice	0	1	1				
		Electrical & Electronics Engineering	2	0	2				
		Engineering Mechanics	2	0	2				
Chemical Engineering Project		Chemical Engineering Plant Design Project "A"	0	3	3	2	6	6%	
		Chemical Engineering Plant Design Project "B"	0	3	3				
				Total	136	33	93	100%	100%
Industrial Trainings		Internship							

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4.1.2. Semester Wise Distribution of Courses

For the previous batches B16 and B17, course distribution is given in table 4-5 and for B18 batch and onwards is given in table 4-6 respectively.

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Table 4-5 Semester Wise Distribution for Chemical Engineering Courses (Th + Pr) – BATCHES16 & 17

Course No	Course Title	Lec	Lab	CR	Course No	Course Title	Lec	Lab	CR
	(Semester-I)					**(Semester-II)**			
300.1	English-I	3	0	3	300.2	Pakistan Studies	2	0	2
300.1	Islamic Studies / Ethics	3	0	3	300.2	English-II	2	0	2
CE-301	Chemical Process Principles-I	3	0	3	CE-300	Applied Chemistry-I	3	1	4
CE-303	Physics	3	1	4	CE-302	Chemical Engineering Thermodynamics-I	3	1	4
CE-305	Mathematics-I	3	0	3	CE-304	Mathematics-II	3	0	3
CE-307	Engineering Drawing	0	1	1	CE-306	Computer & Computation	1	1	2
		15	2	17			14	3	17
Second Year									
	(Semester-III)					**(Semester-IV)**			
CE-401	Applied Chemistry-II	3	1	4	CE-400	Chemical Process Technology-I	3	0	3
CE-403	Chemical Process Principles-II	3	0	3	CE-402	Heat Transfer	3	1	4
CE-405	Mathematics-III	3	0	3	CE-404	Particulate Technology	3	1	4
CE-407	Fluid Mechanics	3	1	4	CE-406	Logic & Critical Thinking	2	0	2
CE-409	Electrical & Electronics Engineering	2	0	2	CE-408	Mathematics-IV (Numerical Methods & Engineering Statistics)	3	0	3
CE411	Workshop Practice	0	1	1	CE-410	Computer Aided Drawing	0	1	1
		14	3	17			14	3	17
Third Year									
Course No	**Course Title**	**Lec**	**Lab**	**CR**	**Course No**	**Course Title**	**Lec**	**Lab**	**CR**
	(Semester-V)					**(Semester-VI)**			
CE-501.1	Communication Skills	2	0	2	CE-500	Engineering Materials	3	0	3
CE-501	Mass Transfer	3	1	4	CE-502	Chemical Reaction Engineering	3	1	4
CE-503	Fuel & Combustion	3	1	4	CE-504	Simultaneous Heat & Mass Transfer Operations	3	1	4
CE-505	Engineering Economics	2	0	2	CE-506	Transport Phenomena	3	0	3
CE-507	Chemical Engineering Thermodynamics-II	3	0	3	CE-508	Chemical Process Technology-II	3	1	4
CE-509	Computer Programming & Software Application	2	1	3					
		15	3	18			15	3	18
Fourth Year									
	(Semester-VII)					**(Semester-VIII)**			
CE-601	Instrumentation & Process Control	3	1	4	CE-600	Chemical Engineering Plant Design Project “B”	0	3	3
CE-603	Chemical Process Design & Simulation	2	1	3	CE-602	Production & Operations Management	3	0	3
CE-605	Project Management	2	0	2	CE-604	Maintenances Engineering & Safety	3	0	3
CE-607	Chemical Engineering Plant Design	3	0	3		Elective-II	3	0	3
CE-609	Chemical Engineering Plant Design Project “A”	0	3	3		Elective-III	3	0	3
	Elective-I	3	0	3					
		13	5	18			12	3	15

Total Credit Hours : 137

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Table 4-6Semester Wise Distribution for Chemical Engineering Courses (Th + Pr) – BATCH18 & onwards

First Year									
Course No	**Course Title**	**Lec**	**Lab**	**CR**	**Course No**	**Course Title**	**Lec**	**Lab**	**CR**
	(Semester-I)					**(Semester-II)**			
300.1	Functional English	3	0	3	300.1	Islamic Studies / Ethics	2	0	2
300.2	Pakistan Studies	1	0	1	CE-300	Applied Chemistry-II (Inorganic & Organic Chemistry)	3	1	4
CE-301	Applied Chemistry-I (Physical & Analytical Chemistry)	3	1	4	CE-302	Workshop Practice	0	1	1
CE-303	Physics	2	1	3	CE-304	Chemical Process Principles-I	3	0	3
CE-305	Mathematics-I (Calculus and Analytical Geometry)	3	0	3	CE-306	Mathematics-II (Applied Mathematics)	3	0	3
CE-307	Engineering Drawing	0	1	1	CE-308	Computer Application	0	1	1
CE-309	Logic & Critical Thinking	2	0	2	CE-310	Electrical & Electronics Engineering	2	0	2
	Total	14	3	17		Total	13	3	16
Second Year									
	(Semester-III)					**(Semester-IV)**			
CE-401	Chemical Engineering Thermodynamics-I	3	1	4	CE-400	Chemical Engineering Thermodynamics-II	2	0	2
CE-403	Engineering Materials	2	0	2	CE-402	Heat Transfer	3	1	4
CE-405	Mathematics-III (Chemical Engineering Mathematics)	3	0	3	CE-404	Particulate Technology	3	1	4
CE-407	Fluid Mechanics-I	3	1	4	CE-406	Chemical Process Principles-II	2	1	3
CE-409	Software and Systems Development	2	1	3	CE-408	Mass Transfer	3	0	3
CE-411	Engineering Mechanics	2	0	2	CE-410	Computer Aided Drawing	0	1	1
CE-413	Communication Skills	0	1	1					
	Total	15	4	19		Total	13	4	17
Third Year									
Course No	**Course Title**	**Lec**	**Lab**	**CR**	**Course No**	**Course Title**	**Lec**	**Lab**	**CR**
	(Semester-V)					**(Semester-VI)**			
CE-501	Fluid Mechanics-II	2	0	2	CE-500	Process Safety Management	2	0	2
CE-503	Technical Report Writing & Presentation Skills	1	1	2	CE-502	Chemical Reaction Engineering	3	1	4
CE-505	Fuels & Energy	3	1	4	CE-504	Numerical Methods & Software Application	2	1	3
CE-507	Probability & Statistics	2	0	2	CE-506	Chemical Process Technology	3	1	4
CE-509	Simultaneous Heat & Mass Transfer	3	1	4	CE-508	Separation Processes	1	1	2
CE-511	Instrumentation & Process Control	3	1	4	CE-510	Entrepreneurship	1	0	1
	Total	14	4	18		Total	12	4	16
Fourth Year									
	(Semester-VII)					**(Semester-VIII)**			
CE-601	Transport Phenomena	3	0	3	CE-600	Chemical Engineering Plant Design Project "B"	0	3	3
CE-603	Chemical Process Design & Simulation	2	1	3	CE-602	Industrial Management	2	0	2
CE-605	Chemical Engineering Economics	2	0	2	CE-604	Maintenances & Utility Engineering	2	0	2
CE-607	Chemical Engineering Plant Design	3	0	3		Elective-I	3	0	3
CE-609	Petroleum Refinery Engineering	3	1	4		Elective-II	3	0	3
CE-611	Chemical Engineering Plant Design Project "A"	0	3	3	CE-606	Process Analysis and Optimization	2	0	2
	Total	13	5	18		Total	12	3	15

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Electives: The following Electives would be offered depending upon teacher's availability. A candidate has to select any three Electives.

1. **CE-610 Computational Fluid Dynamics**
2. **CE-611 Mineral Processing**
3. **CE-612 Biochemical Separations**
4. **CE-613 Novel Seperation Process**
5. **CE-614 Energetic Material**
6. **CE-615 Polymer Engineering**
7. **CE-616 Chemical Wet Processing of textile**
8. **CE-618 Biochemical Engineering**
9. **CE-619 Gas Engineering**
10. **CE-620 Petrochemicals**
11. **CE-621 Risk Management & Safety**
12. **CE-622 Environmental Engineering**
13. **CE-623 Renewable Energy Resources**
14. **CE-624 Industrial Energy Systems**

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4.1.3. Laboratory Contents

The lab in-charge strictly follows the course plans distributed at the start of the semester. It makes sure that the experiments conducted in the course exactly follow the approved course experiments which are finalized by the Chairperson. The details of the laboratories including staff, related course work, type of workstations, nature of experiments, etc. are provided in PEC-Annexure G. Total numbers of engineering and computing courses are 30/33 out of which number of lab courses are 25/26. The sample of experiments of conducted in some laboratories is shown in Table4-7

Table 4-7Sample of Experiments conducted in the Chemical Engineering Department

FIRST YEAR	
Applied Chemistry-1 (CE-300)	
01	To determine the Total Acidity in the given sample of water in terms of $CaCO_3$ in parts per million(ppm)
02	Standardization of strong acid with anhydrous $NaCO_3$
03	Standardization of NaOH against standard acid
04	Potentiometric location of end point between strong acid and base
05	Conductometric location of end point between strong acid and base
06	Determination of vitamin C in tablet
07	Determination of Acetic acid in vinegar
08	Determination of Ni in given sample
09	Study of spectrum of $K_2Cr_2O_7$ and $KMnO_4$ and find out wavelength at which maximum absorption occurs using UV/VIS spectrometer
10	To determine concentration of unknown sample of $K_2Cr_2O_7$ and $KMnO_4$ by simultaneous method with the help of spectrometer
11	To determine concentration of unknown sample $KMnO_4$ by calibration curve with the help of spectrometer
SECOND YEAR	
Heat Transfer (CE-402)	
1	To calculate and compare the heat losses in different insulation.
2	To determine dirt factor and pressure drop of shell and tube heat exchanger

3	To determine dirt factor and pressure drop of double pipe heat exchanger (co-current)
4	To determine dirt factor and pressure drop of double pipe heat exchanger (counter-current)
5	To determine loading factor of cooling tower
6	An experimental investigation of film wise and drop wise condensation
7	To determine thermal conductivity of gases
8	To determine thermal conductivity of liquids
9	To calculate number of turns helical coil heat exchanger (with agitation)
10	To calculate number of turns helical coil heat exchanger (without agitation)
11	To determine heat transfer rate of different bricks using electrical furnace (with air gap)
12	To determine heat transfer rate of different bricks using electrical furnace (without air gap)
THIRD YEAR	
Chemical Reaction Engineering (CE-502)	
1	To study single stage CSTR and find the fraction of tracer passed before residence time
2	To study the double stage CSTR and find the fraction of tracer passed before residence time.
3	To study triple stage CSTR and find the fraction of tracer passed before residence time.
4	To study gas-solid non catalytic reaction using shrinking core.
5	To study the F-Curve for a single stage CSTR and find the fraction of tracer that left the CSTR prior to space time.
6	Determine the order of the reaction, by "Integration Method"
7	To determine the order of the reaction by "Differential Method"
8	To find the reaction rate constant in a Continuous Stirred Tank Reactor
9	To determine the effect of inadequate mixing on the reaction rate
10	Dynamic behavior of continuous stirred tank reactor.
11	To study the performance of a Plug Flow Reactor PFR and the effects of flow rate on efficiency.

FINAL YEAR	
Instrumentation and Process Control (CE-601)	
1	To study the effect of PI action on automatic feedback temperature control loop
1	To study the effect of PID action on automatic feedback temperature control loop
2	To study and observe the effect of PI action on level control loop
3	To study and observe the effect of PID action on level control loop
4	To calibrate a K type thermocouple.
5	To calibrate a J type thermocouple.
6	To study and observe the effect of PI action on feedback control loop of pressure
7	To study and observe the effect of PID action on feedback control loop of pressure
8	To study the effect of proportional action of feedback flow control loop
9	To calibrate pressure gauge using standard pressure calibration unit
10	To study and observe the effect of PID action on flow control loop
11	To study the effect of PID action on feedback PH control loop by varing its integral time derivative time
Chemical Process Design and Simulation (CE-603)	
1	Starting with HYSYS, Building the Simulation, Accessing HYSYS, Defining the Simulation Basis, Installing a Stream, Defining Necessary Stream, Saving, Preview the Result using Workbook, Changing the Fluid Package etc
2	Simulation of Unit Pump and its problem
3	Simulation of Unit Compressor and its problem
4	Simulation of Unit Expander and its problem
5	Simulation of Unit Heat Exchanger and its problem
6	Simulation of Unit Flash Separator and its problem
7	Simulation of Conversion Reactor and its problem
8	Simulation of Unit Equilibrium Reactor and its problem
9	Simulation of Unit CSTR and its problem
10	Simulation of Unit Absorber and its problem
11	Simulation of Unit Separation Column its problem

12	Example 1: Process Involving Reaction and Separation
13	Example 2: Modification of Process for the Improvement
14	Example 3: Process Involving Recycle
15	Example 4: Ethylene Oxide Process

4.1.4. Contribution of Courses towards PLOs

Each course is covered by sufficient numbers of CLO. Every course is linked with PLO through CLO and PLO mapping which is indicated in course profile. The Blooms taxonomy domains for all the CLOs are also defined in terms of affective, cognitive and psychomotor domain with respective learning level. CLOs of a particular course may fall in one or more than one domain. In case, multiple CLOs are contributing to the same PLO, the highest learning level or more dominant level of a course is considered to be the overall learning level of a course. Mapping of courses with PLOs is given in PEC Annexure-D.

4.2. Program Delivery and Assessment Methods

Academic calendar is prepared and circulated by the Deans at the start of the academic year and is forwarded to all concerned and also published on the University website. At the start of the semester, concerned faculty prepares the teaching / lesson plans, which are forwarded to the Chairperson of the department. A course-file is maintained during the semester for each course. Updating of the course-file is the responsibility of the concerned faculty member.

4.2.1. Teaching Methods

Teaching method is considered as most integral part of the teaching / lesson plan. At the start of semester, faculty members select an appropriate teaching method according to the learning level and desired outcomes. The teaching methods include presentations, lectures, videos, assignments, complex engineering problems and open-ended problems. The method may vary depending on nature of the subject and CLOs. The samples of the course profile for few courses are attached as Appendix-J.

4.2.2. Assessment Methods

The Chemical Engineering department assessment strategy is based on the following main objectives, which are in line with the internal best practices: Student assessment reflects learning outcomes and academic standards.

1. Student assessment should be aligned with the course learning outcomes. The student assessment should be "fit for purpose" in being appropriate for the articulated academic standards.

2. Assessment should be consistent and fair.

3. A variety of formative and summative assessment methods should be used.

4. Appropriate and prompt feedback should be being provided to students on their assessment results.

5. Grade and assessment moderation policies and procedure should be in place.

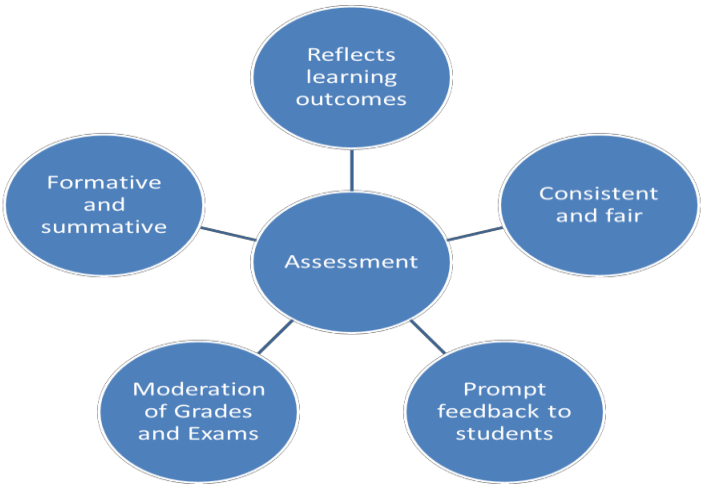


Figure 4-1 Objectives of Assessment Strategy

In the Chemical Engineering Department, faculty members use a variety of assessment methods. These can be summative and/or formative. Summative assessment methods are used to evaluate students‟ performance and achievement in all courses. Formative assessment is given to the students mostly combined with summative assessment by giving them scheduled and incremental feedback during different phases of courses" projects, writing feedback in tests answers sheets, distribute or publish tests and quizzes key solutions, and giving students common and specific verbal feedback during lab sessions. Pure formative assessment is given to the students in form of not graded homework assignments.

Summative assessments include a mixture of techniques which are midterm exams, tests, assignments, projects, term papers, case studies, quizzes, etc. Exams include a variety of question types including essay, short-answer, multiple choices, and other types of questions. Midterm and final exams should not rely solely on multiple choice or true and false questions.

Formative assessment is used to inform the students of their progress in learning and how it can be improved. In order to achieve this, formative assessment should be the basis for prompt and objective feedback to the students. Students have access to their exam and assessment results after it has been marked.

Assessment techniques including exams, assignments, homework, projects, etc. assess the extent to which the students are meeting the Course Learning Outcomes (CLOs) that have been published. The principle of constructive alignment is used where assessment methods are integrated and aligned with the CLOs and teaching/learning methods. Assessment methods are designed to achieve the CLOs. The course profile includes an assessment table that specifies the course assessment methods along with their frequency, weight, and relation with CLOs. Each course instructor develops a matrix showing the mapping between the CLOs and PLO. As the CLOs are mapped to the PLOs, the assessments in turn contribute to satisfying the PLOs. In addition, Faculty members ensure balanced and comprehensive assessment of CLOs during the semester. All CLOs are assessed. The type, number of assessment items and their weight should be in lined with the CLOs, importance of the topics, and the time of the teaching/learning activities.

Selection of assessment methods is carried out by the concerned faculty members. The faculty members may choose from various assessment methods available including problem solving, presentations, projects, reports, surveys, examinations, etc.

4.3. Complex Engineering Problems / Open Ended Problems:

In addition to final year project, students are also given number of complex engineering problems and open-ended assignments in different courses to develop analytical, logical, reasoning and research skills of the students. Such

problems may be assigned to individual students or group of students. Open ended complex engineering problems also provide a chance to exercise the learned concepts in a close to field environment where scenarios are not predefined. The department decides that complex engineering will be assigned in third and final year while open ended lab will be assigned to first and second year, examples are shown listed in Appendix K and L respectively.

4.4. Internship Program

An internship of 4-6 weeks duration, in relevant industries, is compulsory for all students of Chemical Engineering Program. Internships from various industries are offered during Summer break through Department Industrial Liaison office as well as self-arrangement. Following industries has offered number of internships for students.

- Tri-Pack Films Limited
- Gatron Industries Limited
- Novatex Limited
- Byco Petroleum Pakistan Limited
- General Tyre and Rubber Company Pakistan Limited
- Pakistan Council of Scientific and Industrial Research (PCSIR)
- Tri-Pack Films Limited
- Pakistan Refinery Limited
- Artistic Milliners
- Archroma
- Hantex
- Luckey Cement etc

4.5. Final Year Projects (FYDP)

For the comprehensive evaluation of knowledge and skills achieved while studying the Chemical Engineering Program, a Complex Engineering Problem is assigned as the Final Year Project (FYP). The progress of FYP is monitored in various steps throughout the project duration.

The FYP is offered during first Semester of Final Year. Each group is required to prepare a progress report and deliver presentations at different steps to the Project Evaluation Committee. At the end of the project, students are required to submit four hardbound copies of the FYP report. A standardized template has been prepared for the FYP report.

Assessment of the FYP is carried out by the Project Evaluation Committee. FYP evaluation methodology is given in the previous Chapter. The students are graded by a Project Evaluation Committee consisting of three to five members, the Chairperson being the Convener. Mapping of FYP to direct assessment of PLOs is given in table 4-5.

Table 4-8Mapping of FYP to direct assessment of PLOs

Program Learning Outcomes	Design Project
Engineering Knowledge	**X**
Problem Analysis	**X**
Design/Development of Solutions	**X**
Investigation	**X**
Modern Tool Usage	**X**
The Engineer and Society	
Environment and Sustainability:	**X**
Ethics:	**X**
Individual and Team Work:	**X**
Communication:	**X**
Project Management	**X**
Lifelong Learning	**X**

Chapter 5 Students (Criterion-4)

5.1 Student Admission

Admissions are based strictly on merit. To qualify for the University admission, candidates are also required to pass the entrance test by securing at least 50% marks. Candidates having qualified the entrance test and being on merit are then called for interview where they are allocated admission in the field of their choice based on the availability of seats. The process of admission is discussed below:

5.1.1 Admission Process

Applicants must have passed HSC (Pre-Engineering)/Equivalent Examination, with at least 60% aggregate marks for all admission categories.

5.1.2 Admission Criteria

University of Karachi is a public sector University. All seats are allocated as per the Admission Policy as approved by the Syndicate of the University. The admissions are offered to Chemical Engineering program on the basis of overall merit and available seats.

5.1.3 Annual Intake

Maximum number of intake students in Chemical Engineering program is 40-50. This pertains to theory class of one section.

Table 5-1Student Admissions and Enrolments

S.No.	Intake Batch	Total Students Admitted as per admission Committee	Present Strength of students as per semester Examination Cell	No. of Section(s)
1.	2017	45	44	1
2.	2018	45	36	1
3.	2019	50	44	1
4.	2020	24	22	1
	Total	164	146	

5.1.4 Policies and Processes for Credit Transfer/Exemption

The department follows the University policies related to credit transfer/ exemption which are explicitly mentioned in the prospectus of the university under section 6.6. Following are the excerpts from the prospectus.

5.1.5 Admission on Migration Basis

Admission on migration shall be allowed in relevant discipline under extra ordinary circumstances subject to availability of seat(s) is in relevant discipline. Applicant must have passed First Year of studies completely in the institution where he/she was initially admitted. Admissions are only offered in Second Year. Student admitted on migration basis are given exemption in all such courses of First Year which he/she has passed during study in previous institution. However, he/she shall be required to register and pass all such courses of the discipline in which he/she is offered admission which he/she has not studied in previous institution.

5.2 Academic and Career Guidance to Students (Student Counseling)

Two faculty members are assigned as the student advisors for the students. The students are encouraged to freely consult the advisor for academic and career counseling. Every faculty member of the university is required to engage in advising students as a shared responsibility to help them identify and pursue their academic goals, actively participate in extracurricular activities, and to take advantage of emerging career opportunities in their respective domains. The University advising policy is based on the following principles:

- Faculty members are the most appropriate persons to guide students in course selections.
- Faculty members are knowledgeable enough to help students to fulfill their degree requirement.
- Utilizing faculty members is a financially feasible way of providing academic advising.
- Students want advice from faculty members.

A part from regular advising, at the beginning of each academic year, the university organizes an orientation day for the newly admitted students. During the induction day, the students are introduced to the academic program and plan of their major. In addition, the students are introduced to the university regulations and the academic and social services, facilities, events, and students' activities provided and organized by the university.

5.3 Students' Workload, Class Sizes and Completion of Courses

5.3.1. Net Instructional Hours

A course credit hour defined as one contact hour per week (if a course is 3 credit hours, means 3 contact hours per week for 16 weeks). One laboratory credit hour shall be three hours of practical lab work per week for sixteen weeks.

5.3.2. Student Academic Load

The courses for each Semester along with their credit hours for theory and practical are notified in the prospectus. In Chemical engineering program, 5-6 courses are offered in each semester of 14-19 credit hours.

5.3.3. Class Size

Theory classes consist of a single section and practical classes are divided into two section. Maximum no. of students per workstation is 3. Course teachers are responsible to complete the courses and update their course files.

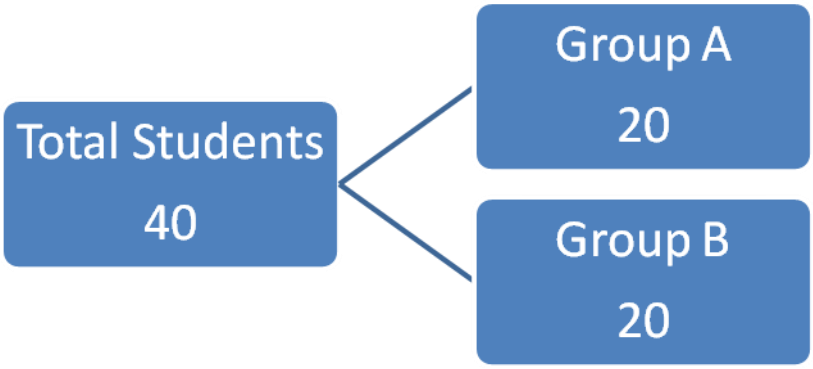


Figure 5-1 Lab Group Distribution

5.3.4. Course Completion

A 3-credit theory course includes minimum 48 lectures in a semester. Chairperson ensures that all theory class is executed as per the timetable. Course files are prepared for each course and are available in the department. Instructors are required to submit a course teaching / lesson plan in first week of each semester, to the students.

5.3.5. Semester Academic Load

There are total of 8 semesters in the curriculum of chemical engineering program, around 6 courses per semester. Academic load in a semester is in the range of 15-19 credit hours.

5.3.6. Completion of Courses

Chairperson ensures completion of courses as per schedule.

5.4. Co/Extra-Curricular Activities

Office of the Student's Affair organizes various extra-curricular activities. Several debating quiz and project competition are regularly organized in the University.

5.4.1. Industrial Liaison Office

The department has its Industrial Liaison Office which actively assists the students in providing internships during third year. It collects the CVs of fresh Engineers and assists graduates to find a job. The summary of Student Internships in the recent years is presented in Table 5-2:

Table 5-2Internship Details for Department of Chemical Engineering

Period	No. of Internships Offered	No. of Students on Internships	No. of Industries offering Internships
Summer 2020	**Not offered in 2020 due to COVID-19**		
Summer 2019	35	35	09
Summer 2018	27	27	08
Summer 2017	27	27	07

5.4.2. List of Major Events/Workshops/Seminars/Series of Lectures Held/Conducted During 2019/2020

Department of Chemical Engineering has also organized various events during the session 2019-2020 which are as under:

S. no.	Date	Activities
1	8 Feb 2020	Workshop on Modeling &Simulation in science & Chemical Engineering
2	17Feb 2020	'Rang-e-Ahang' A song competition
3	26 Feb 2020	Novatex Industrial Visit 3rd Year Batch B17
4	2 March 2020	NED Textile ITC Conference & DICE Competition
5	23 March 2020	Tarjuman e watan National Song Competetion
6	22 March 2020	Rashion Drive on Pandamic Covid-19 LockDown with Rotaract Club, JDC, Hopes, YouthImpact, & other different Org.
7	17 April 2020	Workshop by AERC on Writing Skillls
8	21 April 2020	Session on Management Skills by Lincolin Corner
9	5 May 2020	Siraat e Mustaqeem Online Ramzan Activity
10	19 July 2020	Moderate a Live session on Productivity Boosting
11	23 July 2020	Ehsas Schlorship for 6 students of Chemical Engineering Dept
12	11 Aug 2020	Making a National Song of University of Karachi Zameen e Watan
13	14 Aug 2020	Representative of Karachi University at Iqra University on VOS Event
14	16 Aug 2020	Umeed e Naubahar Online all Pak National Song Competition

15	19 Aug 2020	Rotary Youth Summit 2020
16	28 Oct 2020	Inaugural Ceremony of Block II Chemical Engineering Department
17	6 Nov 2020	Inauguration of Research Lab Dept of Chemical Engineering
18	10 Nov 2020	Cement Manufacturing Process
19	12 Nov 2020	Role of Chemical Engineers in industry.
20	16 Nov 2020	Useful Soft Skill for Chemical Engineers
21	24 Nov 2020	How RO works in industry

5.5. Industrial Visits

Industrial visits were discouraged, due to COVID-19 however the online/ on-campus presentations/ lectures by Officials of local industries were arranged.

5.6. Internships

Industries are reluctant to offer internships. As soon as the situation improves, the students would be sent to the following industries.

- Gatron Industries Limited
- Novatex Limited
- Byco Petroleum Pakistan Limited
- General Tyre and Rubber Company Pakistan Limited
- Pakistan Council of Scientific and Industrial Research (PCSIR)
- Tri-Pack Films Limited
- Pakistan Refinery Limited
- Artistic Milliners
- Archroma Pvt. Ltd.
- Denim Clothing Company
- Lucky Cement Limited Karachi
- Shan Food Limited
- National Food Limited
- Fauji Fertilizer limited
- Engro Polymer Limited

5.7. Scholarships

The Student Affairs Department arranges scholarships for the students which are based on merit and merit-cum-need based.

Chapter 6 Faculty and Supporting Staff (Criterion-5)

6.1. Academic Staff

Academic Staff includes local and foreign qualified PhDs, Masters and Bachelors in Chemical Engineering. Four of the faculty is on study leave in foreign countries and three members are associated with local PhD program. Five Teaching Associates cum lecturers are also working as dedicated faculty. All of them have masters in engineering.

6.2. Strength and Competencies

Department of Chemical Engineering recruits its academic staff with minimum 18 years of education. Department not only supports its academic staff to acquire higher education and skills but also motivate them to actively participate in research work. The department has a wide range of experts in the area of Chemical Engineering.

6.2.1. Full Time Dedicated Faculty

There are ten full time dedicated faculty members working in Chemical Engineering Department currently. Their details are given in the table above and [PEC-Annexure I].

6.2.2. Shared Faculty

Chemical Engineering Department appoints highly qualified faculty for non-engineering courses. Their details are given in [PEC-AnnexureJ].

6.2.3. Visiting Faculty

Senior professors are appointed as visiting faculty. Please see [PEC-AnnexureJ].

6.2.4. Pyramid of Academic structure

The department has appropriate number of faculty members of various professional levels to run the program. There is no bar on the number of positions to encourage promotion of deserving candidates. The number of PhDs is 3. The number of MSc /Master of Engineering qualified faculty is 07 (including PhD Scholars abroad) serving as assistant professors and lecturers.

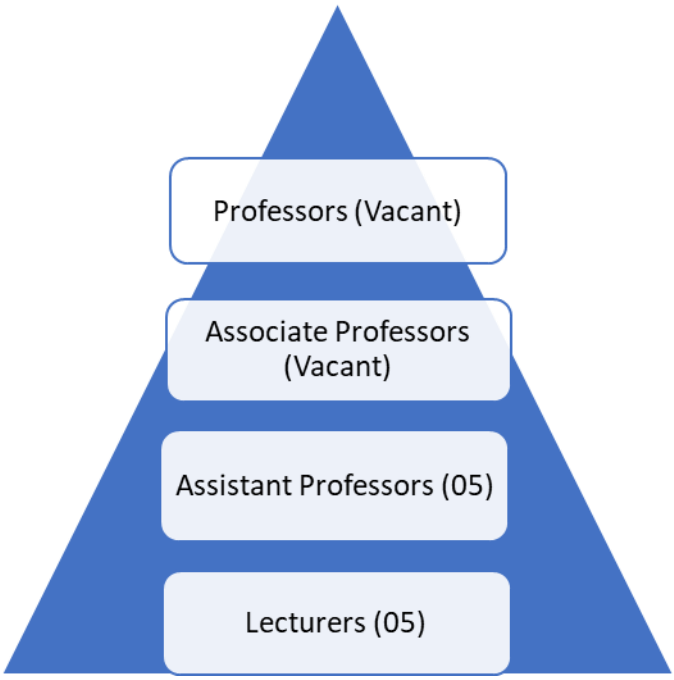


Figure 6-1 Pyramid of professional ranks at Chemical Engineering Department of UoK (Sanctioned Teaching posts = 14)

* Three lecturers, and one Assistant Professor are on S/L. Teaching Associate cum Lecturers on contract are working against these positions.

**** Posts for Professor and Associate Professor have been advertised, Selection Board meeting is scheduled shortly.

6.2.5. Full time faculty members Publications

List of research papers published by faculty members is given in [Appendix-C].

6.2.6. Faculty Workload and Student-Teacher Ratio

Faculty workload enables effective teaching including student-teacher ratio, student-teaching staff interaction, student advising and counseling, institutional service and research activities, professional development and interaction with industry. All faculty members besides teaching are also involved in supervising under graduate's research work/ final year projects, publications and administrative duties.

Faculty position since the start of undergraduate batch 2006-07, has been improving gradually. Total enrolled students presently are 164. Full time dedicated engineering faculty is 10 along with 5 teaching associates having a student-teacher ratio of 16.4:1. Details of credit hours assigned to the faculty for the year 2020 is given in [PEC-Annexure-K]. Faculty members are also engaged with the industry on various research/ final year projects. Furthermore, the faculty members actively participate in scientific events.

6.3. Outcome Based Education (OBE) Training

Most of the senior faculty members have got trainings on Outcome Based Education (OBE) system, its objectives and the Outcome Based Assessment (OBA) at different workshops, seminars. These senior faculty members are engaged in training the remaining faculty members in the department. As a result, all faculty members now have sound understanding of PEOs, PLOs and CLOs as per OBE system. The trainings held for the OBE system at University and Departmental level are given in Table 6-1.

Table 6-1 OBE Trainings

S.NO	Date	Trainer/ Speaker	Title	Participants
1.	21st June 2020	Karachi University LMS team	Training on LMS And Online Education Transfer Modes.	Faculty Members
2.	17th August 2020	Prof. Dr.M. Innayat Ali (NED UET)	Training on How to take online assessment as per OBE?	Faculty Members
3.	16th November, 2020	Engr. Nusrat (DUET Karachi)	Training on CQI	Faculty Members
4.	19th November, 2020	Prof. Dr. Zahoor & Dr. Faizan Raza (NED UET)	Submission of SAR as per OBE	Faculty Member
5.	24th November, 2020	Engr. Dr. Muhammad Shuaib Shaikh. (MUET, Jamshoro).	Implementation of CQI	Faculty Members
6.	24th November 2020	Prof. Dr. Zahoor (NEDUET)	Online submission of SAR as per OBE	Faculty members (Saqib Ali, Abdul Qudoos)

6.4. Technical and Administrative Staff

The proficiency and level of adequacy of supporting staff including both technical and administrative is adequate and fulfilling the department's need. The support staff also provides the necessary assistance to faculty members and students in practical matters whenever requested.

Table 6-2 List of technical staff

NAMES	QUALIFICATION	DESIGNATION
LAB ENGINEERS		
ENGR. SYED ALI AMMAR	B.E. (CHEMICAL, NFC IET)	LAB ENGINEER
ENGR. ZUBAIR AHMED	M.E. (ENVIRONMENT, NED UET)	LAB ENGINEER
TECHNICIANS		
ENGR. MUHAMMAD FAKHIR	B.E. (ELECTRONICS, DCET)	TECHNICIAN
MR. FAISAL SHAH	DAE (CHEMICAL)	TECHNICIAN
MR. WASIF AHMED	DAE (CHEMICAL)	TECHNICIAN
MR. MOHAMMAD IQBAL SIDDIQUE	DAE (CHEMICAL), B. TECH. (CHEM)	TECHNICIAN
LAB ASSISTANT		
MR. FAHAD JAMIL	INTERMIEDIATE, DIT	LAB ASSISTANT
MR. ZIA-UR-REHMAN	INTERMIEDIATE	LAB ASSISTANT
LAB ATTENDANT		
MR. SULTAN	INTERMEDIATE	LAB ATTENDANT
MR. ADNAN ABBAS	GRADUATE, DIT	LAB ATTENDANT
MR. ANWER ALI	GRADUATE, DAE	LAB ATTENDANT
MR. FAIZAN BASHIR	MATRIC	LAB ATTENDANT **(Late)**
MR. ISMAIL	INTERMEDIATE	LAB ATTENDANT
OFFICE STAFF:		
MR. S. NADEEM-UL-HASAN	GRADUATE, DIT	COMPUTER OPERATOR
MR. S.M. SHERAZ	M.A (I.R)	STORE KEEPER
MS. KAHKASHAN	M.P. A.	STORE KEEPER
OTHER STAFF		
MR. SURESH KUMAR	MIDDLE	SWEEPER

Chapter 7 Facilities and Infrastructure (Criterion-6)

7.1. Introduction

University of Karachi has basic IT infrastructure and allied facilities for supporting various research and educational activities of faculty members and students. This includes high speed internet access through a secure VPN, access to the PERN network, a video conferencing facility for domestic and foreign virtual collaboration. The University also provides LAN access to online journals through the HEC Digital library program.
The Main Communication Network (MCN) of University of Karachi provides state of the art LAN / WAN services including website maintenance, I.T. support, inter and intra departmental connectivity along with a variety of online database management services through portal

The Communication & Network Centre carries out operation and maintenance of University Network through Main Communication Network (MCN) that is part of Network Section which includes the centralized management of the Global as well as Campus wide connectivity and provision of robust Internet service in addition to all sorts of timely I.T. hardware/Software support and corporal management of the links between the departments.

The Chemical Engineering Department has fiber-optic connectivity and access of Wi-Fi network. The department has the facilities and infrastructure to support new trends in learning. All conference rooms, laboratories and classrooms provide support for learning. The department has the following facilities exclusively dedicated to undergraduate students.

7.2. Teaching and Learning Facilities

7.2.1. Lecture Halls

The department of Chemical Engineering has proper teaching and learning facilities which include classrooms, well- equipped labs, seminar library and conference room.

Table 7-1Class Room and Office Equipment Available

Items	Available
Class Rooms	04
Labs	14
Faculty Offices	05
Office Equipment	Latest PC's/Xerox machine / PA system/ Multimedia Projector/Overhead projector
Seminar Library	01
Conference room	01

7.2.2. Central and Departmental Libraries

University of Karachi has 01 Central Library having more than 02 thousand Engineering books. It has 02 sections i.e. reference and circulation with tent books, reference books and research journals of all discipline of Science, Engineering, Arts, Management and Pharmacy.

Seminar Library.

Department of Chemical Engineering has a separate Seminar library which can accommodate 50 students. It is maintained by qualified Seminar Librarian and contains around 3500 books.

Book Bank/Circulation Section (Central Library)

Total number of textbooks available in Book Bank and circulation section Department of Chemical Engineering is 3167.

7.2.3. Computer Laboratory

This is a general-purpose computing facility where students are allowed to perform general activities concerning their course work. The lab is equipped with 20 workstations. The lab is also used for conducting practical work of various courses like Computer Programming & Drafting etc.

List of Software available

The University has High Performance Computing Center which can be accessed by both Faculty as well as students. The Center houses various licensed software repository. The list of currently available software is mentioned in Table 7-2:

Table 7-2 List of software

No.	Software	Application Area
1	Auto CAD	Computer Aided Design & Drafting Software
2	KORF Hydraulics	Pipeline Engineering
3	HVAC Design Software	Heating, Ventilation
4	Aspen HYSYS	Chemical Engineering
5	MATLAB & Simulink	
6	HTRI	

7.2.4. HEC Digital Library

There is also a HEC digital library at University of Karachi. Students have the access to the digital library.
7.2.5. Journals and Magazines

Following journals and magazines are subscribed.

Table 7-3 List of Journals and Magazines.

S.NO	TITLE	PUBLISHER
1.	BUILD A TEAM DRILLING CONTRACTOR	MANAGEMENT INSTITUTE INTERNATIONAL ASSOCIATION OF DRILING CONTRACTROS
2.	CATALYSIS	RENE G GONALEZ
3.	CHEMICAL ENGINEERING PROGRESS(CEP)	AN-ALCHE PUBLICATION
4.	ENGINEERING DESIGN AND PROJECT MANGEMT CONSULTANT	-
5.	ENGINEERING & INDUSTRIAL REVIEW	MECATECH PVT LTD
6.	EXPLORATION & PRODUCTION(E&P)	-
7.	HYDROCARBON ENGINEERING	PALLADIAN PUBLIATION LTD
8.	HYDROCARBON PROCESSING	GULF PUBLISHING
9.	JOURNAL OF BASIC & APPLIED SCIENCES	EDUCATIONAL FORM, UNIVERSITY OF KARACHI
10.	KARACHI UNIVERSITY JOURNAL OF SCIENCE	UNIVERSITY OF KARACHI
11.	LNG INDUSTRY: A SUPPLEMENT TO HYDROCARBON ENGG	UNITED KINGDOM
12.	MHRAN UNIVERSITY RESARCH JOURNAL OF ENGINEERING & TECHNOLOGY QUARTERLY	MEHRAN UNIVERSITY
13.	NEWS & VIEWS	A HIGHER EDUCATION COMMISSION
14.	NUCLEAR ENGINEERING AND TECHNOLOGY	KOREAN NUCLEAR SOCIETY
15.	PETROLUM TECHNOLOGY QUARTERLY CATALYSIS(PTQ)	RENE G GONALEZ
16.	POWER ENGINEERING INTERNATIONAL(PEI)	PENNENERGY GROUP
17.	PTQ: PETROLUM TECHNOLOGY QUARTERLY	RENE G GONALEZ
18.	QUAID-E-AWAM UNIVERSITY	QUAID-E-AWAM UNIVERSITY
19.	THE CHEMICAL ENGINEER	INSTITUTION OF CHEMICAL ENGINEER
20.	PAKISTAN TEXTILE JOURNAL	ARCHOROMA PVT LTD -
21.	BIO TECHNIQUES	
22.	IN TECH	ISA SERVICE INCHARGE
23.	OFFSHORE ENGINEERING	
24.	PAKISTAN AND INTERNATIONAL JOURNAL	

Table 7-4 List of International Journals

S.NO	TITLE	PUBLISHER
1.	The Canadian Journal of Chemical Engineering	Online Library.Wily.com
2.	Journal of Chemical Engineering Data	**Pubs.acs.org**
3.	AICHE Journal American Institute of Chemical Engineering	Online Library.Wily.com
4.	Chemical Engineering Journal	
5.	Chemical Engineering Science	Elsevier.com
6.	Bio Chemical Engineering Journal	Elsevier.com
7.	Computer and Chemical Engineering	Elsevier.com
8.	Dynamic Programming in Chemical Engineering & Process Control	Ieeeaxplore.ieee.org
9.	International Journal of Chemical Engineering	Hindwai.com
10.	International Journal of Chemical Engineering & Application	Ijcea.org
11.	International Journal of Chemical Engineering Research	Ternationaljournalssrg.org
12.	Current Opinion in Chemical Engineering	Elsevier.com

7.3. Laboratories and Workshops

There are a number of laboratories having all the necessary facilities and equipment to carryout experiment by the students. Laboratory manuals/documentations/instructions for experiments are available and readily accessible to faculty and students and provided on the first day to all the enrolled students of the respective year. These instructions are kept with the Lab instructor of the concerned Lab so that it may easily be available to faculty members as well as the students. Details of Experiments and equipment are presented in PEC-Annexure List laboratories and workshop in the Department of Chemical Engineering is given below:

- Heat Transfer/Lab
- Mass Transfer Lab
- Simultaneous Heat & Mass Transfer Lab
- Fluid Mechanics Lab
- Particulate Technology Lab
- Computer Lab
- Chemical Reaction Engineering Lab
- Chemical Thermodynamics Engineering Lab
- Instrumentation and Process Control Lab
- Fuel and Combustion Lab
- Applied Chemistry
- Chemical Process Technology Lab
- Workshop
- Drawing Lab.

A new research facility entitled as “Research Laboratory” in the Department of Chemical Engineering has been added. The lab has been constructed with the funding of HEC against a NRPU project titled as: “Fabrication of Novel Sensing Device to Detect Arsenic from Drinking Water – A step toward portable real time sensor”. It consists of several research equipments for research students.

7.4. Recreational Facilities

7.4.1. Sports Facilities

The University campus provides ample facilities to the students for participation in games and sports, both outdoors and indoors. Facilities are provided for all the major sports including Cricket, Hockey, Football, Tennis, Badminton, Table Tennis, Body-Building and Athletics. A series of inter departmental games are held to provide participation to the maximum number of students. Outstanding sportsmen are encouraged to take part in the inter-university tournaments held under the umbrella of Higher Education Commission. There is a sports area specified for the girl's students. The sports area is a commanding feature of the campus landscape and has, amongst other things, tennis and squash courts, a playground**.**

7.4.2. Students' Organizations and Activities

There are several professional Societies in the campus. These Societies are headed by the faculty members (as Advisor and Assistant Advisor) and the students (as the office barriers). Many indoor and outdoor events are arranged on the platform of these Societies for the students during student week. Student Week is arranged every year in which many technical and nontechnical events are conducted.

7.4.4. Miscellaneous Campus Facilities

The University campus has various facilities including sports, cafeteria, transport, stationary and photocopy shop, canteen and seminar halls available for the faculty and students to meet their curricular and extra-curricular needs. The detail of these facilities is available on University website and a few of them are described below.

7.4.5. Transportation Facilities

The university campus has transportation facility for students and staff members. Private hired transport facility is also available for staff and faculty at reasonable rates.

7.4.6. Auditorium

There are several centrally controlled well-equipped and furnished auditoriums in the University.

7.4.7. Stationery and Photo State Shop

The University campus has Stationery and Photo State shop. The students can easily get their course related notes from the photo state shop.

7.4.8. Canteen and Cafeteria

There are several canteens and cafeteria facilities available for both students and staff members.

7.4.9. University Mosque

The University has several beautiful mosques.

Chapter 8 Institutional Support and Financial resources (Criterion-7)

8.1. General

Funds for University of Karachi are provided by HEC/ Government of Sindh. Which cover salaries, maintenance, laboratories, library etc. Additional funds for development are provided as per Government priorities. The University Budget is approved by University Senate.

8.2. Financial Support to Faculty

University of Karachi is a public sector institution which provide faculty development program for higher education, skills development, on-job training, and miscellaneous development programs funded by government sector. The department recruits PhD and MS qualified faculty with preference to PhD qualifications. Teachers are encouraged to proceed abroad for PhD studies.

8.2.1. Faculty Pay and Allowances Packages

Faculty pay is in accordance with the Government basic pay scale (BPS). All the allowances and benefits are offered as per Government rules. Details for pay scales are shown in Table8-1:

Table 8-1University of Karachi pay scales for faculty and support staff

Designation	BPS Grade
Professor	21
Associate Professor	20
Assistant Professor	19
Lecturer	18
Lab Engineer	17-18
Lab Technician	11 -14

8.2.2. Research Funding by University of Karachi

University of Karachi provides requisite funding to undergraduate students for their research in final year projects. In additions support for specific requirements of innovative and challenging research projects are also provided.

8.3. Financial Resources

Adequate financial resources are available for maintenance of well-equipped laboratories, latest apparatus, computer facilities with support staff, and day to day support of the department. Substantial resources are at hand for maintaining library. Faculty is directed to contact library officer for requirement of new books, research journals, and articles of desired kinds. Summary of financial resources and University Budget is provided in following Table 8-2. See PEC-Annexure L for further details.

Table 8-2 University of Karachi Budget for Current and Previous Years (Millions of Rupees)

Sr. No	Source of Income	Current Fiscal 2019-2020	Previous Fiscal Year 2018-2019
1	Recurring University Budget	2530.9165	2,300.858
2	Department of Chemical Engineering Recurring Budget	1.32	1.200
3	Lab running grant	0.66	0.600 (Expected)
4	University Development Budget	312.521	284.11
5	Tuition Fees and Others	8.8	8.000
6	Self-Finance	3.3	3.000
7	Books and journals	1.1	1.000

Chapter 9 Continual Quality Improvement (Criterion-8)

9.1. Quality Enhancement Cell

Realizing the challenges to be faced in the field of higher education during the 21st century, the impact of globalization and the need for knowledge-based economy, the University of Karachi established the Quality Enhancement Cell in 2006. The objectives of the cell were to support the university in its endeavors to improve the standard of education and research, make it more compatible with international requirements. The QEC believes that the issue of quality enhancement cannot be separate from the quest of excellence.

Quality Assurance (QA) according to Higher Education Funding Council, UOK is the means by which an institution can guarantee with confidence and certainty, that the standards and quality of its educational provision are being maintained and enhanced.

For the quality assurance process, the QEC acts as a focal point to maintain the quality of higher education and research. It works with Quality Assurance Agency of Higher Education Commission (QAA/HEC) in the process of capacity building of academia, awareness campaigns, training of teachers for preparing Self-Assessment Reports (SARs) of the various teaching programs in their respective departments. In this regard through a system of surveys and feedback the QEC attempts to protect the interest of students, teachers, employers, and other stakeholders in the field of higher education.

To ensure quality of programs and identify any flaw and drawbacks in the programs, the QEC performs quality audit of the all teaching and non-teaching departments.

9.1.1. QEC Objectives

The main responsibilities of the QEC are:

- To bring our educational standards at par with recognized international standards and to ensure that our students are of comparable quality with those educated elsewhere in the high-ranking reputed universities of the world.
- To encourage National and International cooperation for accreditation and understanding of quality provision in higher education.
- To protect students and other stakeholders from poor quality resources and to encourage the development of quality cross-border higher education that fulfills human, social, economic, and cultural needs.
- To educate and provide quality education to the national and international students in all academic disciplines, and to inculcate in them intellectual and practical faculties professions in the public and private sectors or establish their own enterprises.
- To provide an environment that is conducive to the evolution of intellectual thought, research, and experimentation for the benefit of the society.
- To assist in gathering and collection of knowledge for the socio-economic development of the country.
- To develop and treat students as pillars on which a humane and enlightened society could be built.
- To organize a system for assimilating feedback on our educational programs from the stakeholders such as teachers, students, employers, government, and non-government organizations.
- To popularize the philosophy of self-evaluation/ assessment among teachers, researchers, administrators, and students in the university.

9.1.2. QEC Functions

The Quality Enhancement Cell (QEC) at University is committed to continuous improvement in quality of education and research. It focuses on developing a quality culture in the university. It aims to regularly assess and review the performance of academic programs in the university based on the national and international parameters of quality and excellence in teaching and research. The Quality Enhancement Cell is responsible for planning, coordinating, and following up on the self-assessment (SA) activities in accordance with guidelines set by the Higher Education Commission, Islamabad.

The Quality Enhancement Cell (QEC) is headed by a Director reporting directly to Vice Chancellor. He is the university's focal person interacting with the relevant agencies/bodies at national and international levels. QEC is responsible for:

- Promoting public confidence that the quality and standards of the award of degrees are enhanced and safeguarded.
- Review of quality standards and the quality of teaching and learning in each subject area.
- Developing quality assurance processes and methods of evaluation to affirm that the quality of provision and the standard of awards are being maintained and to foster curriculum, subject and staff development, together with research and other scholarly activities.
- Review of academic collaboration with other institutions in terms of effective management of standards and quality of programs.
- Defining clear and explicit standards as points of reference to the reviews/audits to be carried out for developing program specifications. These are standard set of information clarifying what knowledge, understanding, skills and other attributes a student will have developed on successfully completing a specific program.

Figure 9-1QEC Process at University of Karachi

9.2. QEC Self-Assessment Procedure

Self-Assessment is an evaluative exercise conducted by the institution to assess whether academic programs meet their educational objectives and outcomes. The aim is to improve the quality of these programs, enhance student learning and; establish acceptable norms of reliability and validity in the university's certified output. The Self-Assessment of academic programs is conducted by Department assessment Team (DAT) constituted by the concerned Dean of Faculty

Deans nominate senior faculty members in departments working under them as coordinators to supervise the effective and timely completion of Self-Assessment Report and other documents within given time frame. Deans in consultation with the Chairperson nominate faculty members for the DAT. Each DAT is responsible for the timely completion and submission of the Self-Assessment Report and other documents of the academic program.

DAT liaise with the Quality Enhancement Cell through its coordinator. Soft and hard copies of Self- Assessment Report and other documents of academic programs are submitted by the Coordinator to the Quality Enhancement Cell with the approval of Chairperson/Dean according to the timeline suggested by Quality Enhancement Cell.

9.2.1. Department Assessment Team (DAT)

Department Assessment Team (DAT) is a group of 2-3 faculty members being nominated by the head of the department in collaboration with QEC approved by the statuary body. BOS. It is to be headed by a coordinator. It is the backbone of entire self-assessment and acts as a contact/focal group during the period of assessment process. Responsibilities of DAT include:

- Preparation of recommendations related to OBE and other academic related issues on the direction of Chairperson.
- Compiling the report by responding to each criteria/ standard given in the Self-Assessment Manual and integrating the collected information /feedback.
- Collecting relevant data on faculty, students, libraries, laboratories and infrastructure.
- Getting SA forms filled by students, alumni and employers.
- Writing summaries of feedback received through forms.
- Analyzing the feedback and drawing conclusions.
- Writing a foreword giving brief history of the program, particulars of the DAT, and date of starting / finalizing report writing.
- Check completeness of the SAR as per SA manual Look at the comprehensiveness / relevance of responses to various criteria and standards.
- Verify and authenticate the data / information given in SAR confirm/affirm the summaries of the feedbacks/ surveys made by the OBE team Review the conclusions drawn by the OBE team from the feedbacks / surveys.
- Carry out rubric evaluation of SAR List down the findings from the assessment exercise.
- Write down the AT report on the prescribed format for further submission to QEC.

9.3. Continuous Quality Improvement Process

The description and definition of CLOs is a top down process originating from the analysis of vision and mission of the university as shown below. This analysis gives rise to department's vision and mission. The program's educational objectives stem out of this and further help in finalization of learning outcomes of the program (PLOs) covering twelve areas of engineering education. In the light of program learning outcomes, the learning outcomes of each course are formulated. The review process on the other hand is reverse to this and starts at the bottom tier with the course assessments, tests, and exams, followed by review of achievement of Course Learning Outcomes (CLOs), then assessment of PLOs attainment and lastly PEOs achievement evaluation.

Figure 9-2 Description Process for PEOs, PLOs, and CLOs

CQI is a cyclic process comprising of three concentric cycles, namely; CLOs Assessment Review Cycle, PLOs Achievement Review Cycle, and PEOs Attainment Review Cycle. These cycles are pictorially shown in the Figure 9-3. The CLOs Assessment Review Cycle is completed after every semester whereas other two cycles span over a time period of 4 years (8 semesters). The results of innermost cycle of CLOs Assessment Review of used to evaluate the next outer cycle of PLOs Achievement Review. The results of this cycle with additional information are used to evaluate the Attainment of PEOs which is the outermost cycle of the process.

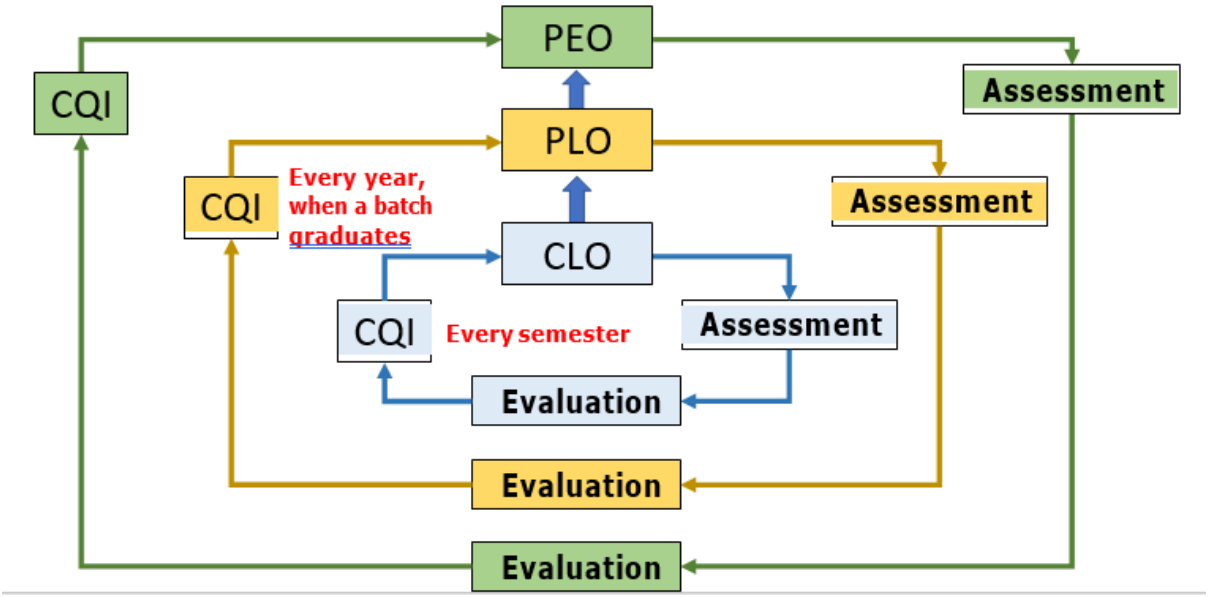
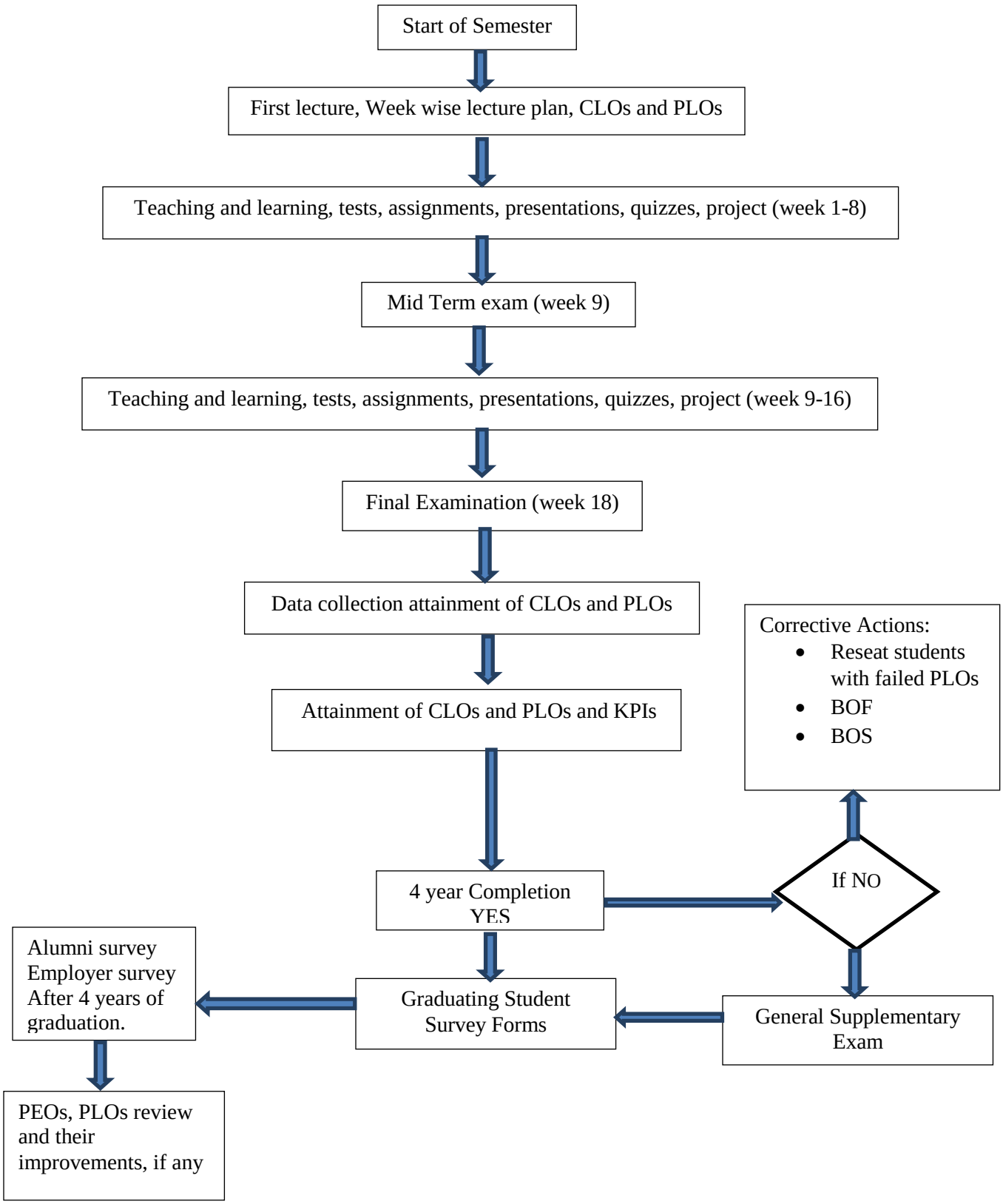


Figure 9-3 Continuous Quality Improvement (CQI) process

Data collection is the most important part of the continuous quality improvement process, and it is carried out throughout the semester in the form of evaluation of quizzes, assignments, presentations, class projects, mid-term exams and final exam at the end of each semester. This data is used for assessment of CLOs. The results of CLOs assessment for all the courses of the program when available after 4 years are used to evaluate the achievement of PLOs. However partial evaluation of achievement of PLOs can be made after every semester based upon courses conducted so far.

Additional data in the form of exit surveys, employers‟ feedback, alumni feedback and other stakeholder's feedback is added to evaluate the attainment of PEOs after the completion of program of studies.


Start of Semester
First lecture, Week wise lecture plan, CLOs and PLOs
Teaching and learning, tests, assignments, presentations, quizzes, project (week 1-8)
Mid Term exam (week 9)
Teaching and learning, tests, assignments, presentations, quizzes, project (week 9-16)
Final Examination (week 18)
Data collection attainment of CLOs and PLOs
Attainment of CLOs and PLOs and KPIs
4 year Completion YES
If NO
Corrective Actions:
Reseat students with failed PLOs
BOF
BOS
Graduating Student Survey Forms
General Supplementary Exam
Alumni survey Employer survey After 4 years of graduation.
PEOs, PLOs review and their improvements, if any

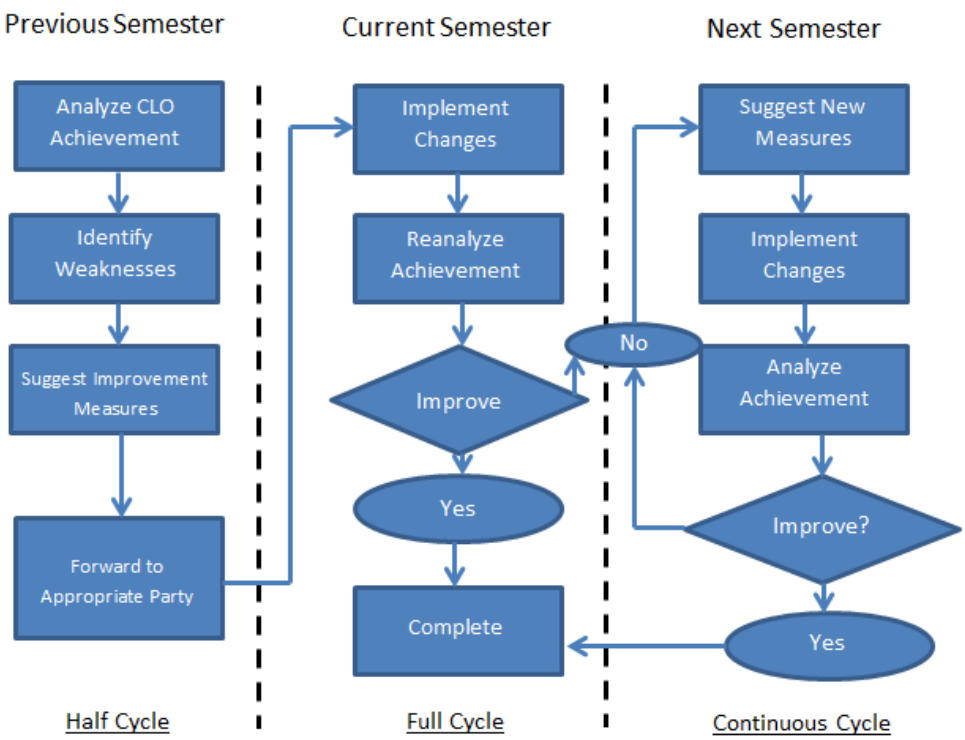


Figure 9-4 Implementation of CQI Process

The graduating students' exit surveys are carried out at the time of graduation. Alumni survey and employer survey is carried out after four years of graduation. Based on these surveys, appropriate administrative actions are taken to improve the learning process and changes are implemented in the next academic year.
The likely corrective actions at various levels of the program are as below:

Program Level Actions (Academic Council approval is required)

- Modify the curriculum
- Change core course.
- Change elective course

Course Level Actions (BOS approval is required)

- Change course contents
- Change course pre-requisites
- Change the team members

Student Level Actions (Chairperson Approval is required)

- Change specific Courses-PLO Mapping
- Student's counseling
- Specially arranged tutorials/assignments/exams
- Reappearing in course exam
- Repeating the entire course

Various actions that may be necessitated for CQI and DAT are listed below:

- Collect the completed course files
- Collection of final grading sheets for CLOs and PLOs evaluation
- Audit of course files for mapping of CLOs with PLOs
- Preparation and modification of CLOs and PLOs achievement summary for student, batch and course levels.
- Preparation of Internship and employer feedback reports
- Preparation of Final year design project assessment data
- Student's Feedback summary
- Preparation of Exit surveys summary report
- Processing the amendments and change cases through BOS, BOF, and Academic Council meetings.
- Implementation of the approved changes, amendments.

9.4. Individual Student PLO Achievement and PLO Deficiency Recovery

The OBE model at Chemical Engineering Department requires assessment of PLOs attainment. The PLOs attainment is accomplished through direct and indirect assessments. Details of the PLOs measurement are provided in the SAR. Figure9.5 shows the CQI process for PLOs attainment at cohort level. However, for individual students the attainment of PLOs is required and in case of deficiency in PLOs attainment is ensured through passing of additional assignments. The following paragraphs discuss the recovery of PLOs for individual students.

The department under supervision of Chairperson through Semester Examination Department, check the students" PLOs attainment. OBE coordinators under supervision of Chairperson are assigned to ensure individual students" PLOs deficiency recovery.

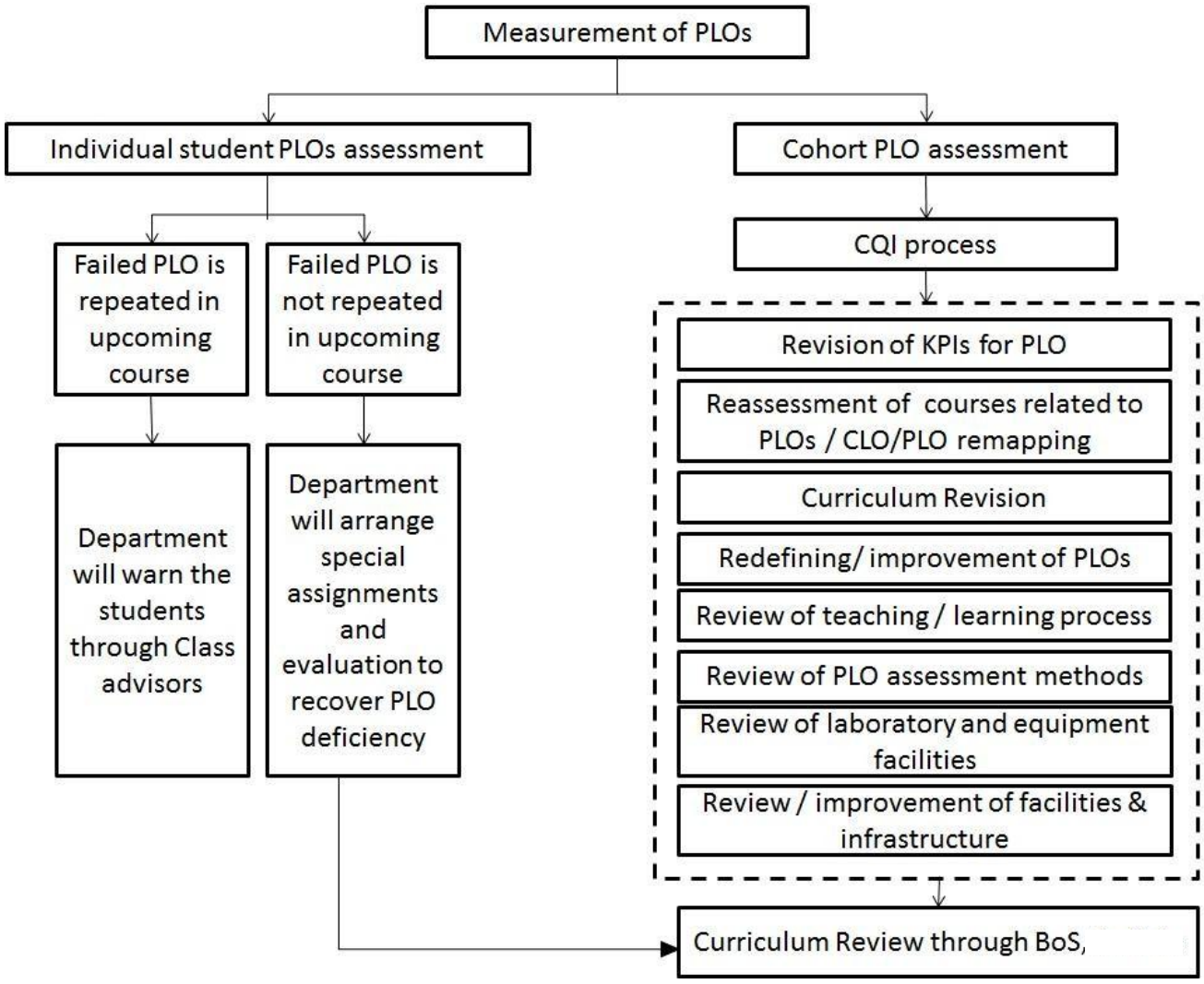


Figure 9-5 PLO Deficiency Recovery

Both direct and indirect assessment of PLOs for individuals usually takes place at the end of each semester where the individual has to achieve defined level of PLOs attainment as per KPI. At the end of each semester individual PLO attainment along with semester results are published by the DAT. Individual failing in PLOs attainment shall be informed through academic advisors with information to CQI coordinators through Chairperson (faculty).

The department will identify if the PLOs failed by individuals are going to repeat in the upcoming semester/s. Individual student will be counseled through student advisor to recover the failed PLOs that are repeated in the upcoming courses.

In case, if the PLO(s) failed by individual will not repeat in the upcoming course(s) (or the individual fails PLOs attainment in the final semester), the department will direct the respective faculty member to arrange special assignments for the students with PLOs deficiency. These special assignments/exams will take place during the semester break. The CQI team will suggest the PLO recovery through faculty member to the student on a prescribed Performa i.e. corrective action form Appendix-G.

Faculty will prepare a number of special assignments with appropriate learning domains and taxonomy levels. The assignments will be kept in custody of the concerned faculty member for use in future. These assignments will be conducted by the concerned teacher with the consultation of DAT.
At the end of summer semester examination department will publish and keep record of the PLO attainment results.

CQI process at PEO level

The CQI process at PEO level is shown in **Error! Reference source not found.**. The process starts with collecting the data from the stakeholder's feedback through surveys. The supervisory team develops the surveys forms and devises the survey mechanisms in consultation with the advisory team. The surveys are designed to acquire the stakeholder's opinion regarding the department graduate's performance by placing appropriate questions. The surveys also include sections for comments where the stakeholders can highlight if they have any particular concerns. The concerns or suggestions from all involved stakeholders support the periodic review of PEOs and may result in their improvement over time with the changing global requirements. The advisory team continuously acquires this feedback and then process the data to quantitatively evaluate the quality of education that stakeholders think off. The team then prepares their recommendations which are discussed in the QEC as well as shared with the advisory board. Appropriate measures are then taken to address the concerns and improve the quality standards. The possible actions are also listed.

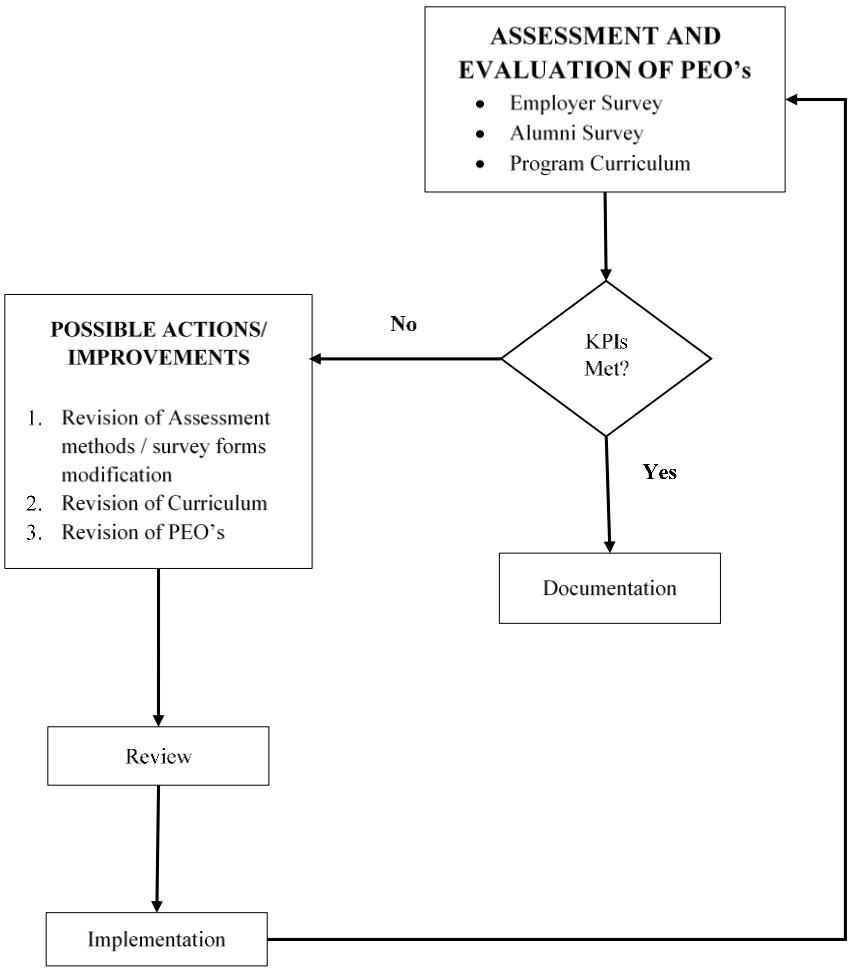


Figure 9 - 6 CQI process at PEO level

Chapter 10 Industrial Linkages (Criterion-9)

10.1. Industrial Linkages

University-Industry linkages are crucial and prolific to each other. It helps students to implement the engineering knowledge, investigate modern technological innovation, enhancement of the quality of education of scientists and engineers, and contributing towards national economic development through earliest exposure of its students to practical conditions. It gives students valued training on actual industry, which help students identify real time Engineering Problems and prepare them to create a link between class room learning and industrial practice. University of Karachi also enthusiastically and diligently involves creating industry linkages both in public and private sectors for supporting and encouraging students for industrial collaboration for research work, making use of our highly qualified faculty, modern laboratory facilities.

10.2. Nurturing Industry-Academia Linkages

University of Karachi of Engineering and Technology strongly believes in sharing of knowledge and apply it on the nation's development. Therefore, it is necessary to connect knowledge-resources to the clusters of industries and the community. Keeping this in mind, University of Karachi has formulated integrated departments that help in establishing Industry-Academia Linkages and subsequently in commercializing our research. These include:

- Offices of Research, Innovation & Commercialization (ORIC)
- Students Guidance, Counseling and Placement Bureau)

All of the above offices play a vital role in establishing linkages between the industry and academia and therefore making a connection between industry needs and University research. It will create a pathway which ultimately leads towards national economic development. Consequently, results in practical applications and commercialization of research by undergoing a process of real time problem solving.
University of Karachi has extensive industrial linkages in public and private sectors both at National and International level and provides industry with research, commercial testing and consultancy services. Few of the organizations that University of Karachi has collaborated with are:

1. National Textile University Faisalabad (Karachi Campus)
2. Tri-Pack Films Ltd. Karachi
3. Pakistan Refinery Limited (PRL)
4. Novatex limited: Group companies ; Gatronova

10.3. Students Guidance, Counseling and Placement Bureau

The bureau was established in 1982 for guiding students from University of Karachi and outside regarding career opportunities. The bureau is conducting preparatory classes for Central Superior Services (CSS) and English Proficiency Courses (EPC) for more than three decades. The bureau also accommodates the graduating students of University of Karachi in searching employment opportunities through Career Counseling Seminars and Job Fares.
The bureau is planning expansion of activities to cater broader needs of students. Preparatory courses of IELTS, TOEFL, SAT, GRE, GAT etc. The bureau is also looking forward to prepare students for admission tests of

leading higher education institutions of Pakistan such as, IBA, LUMS, Medical Colleges and Engineering Universities.
One major task of the bureau is to establish a nexus between the corporate sector and our graduating students to accommodate them to find suitable working opportunity.

10.4. Industrial Collaboration

University of Karachi is involved in various industrial collaborations at national and international levels. Students of Chemical Engineering program have visited following industrial concerns with a view to promoting mutual learning, joint internship and training and industrial research.

- Archroma
- Artistic Milliners
- Byco Petroleum Pakistan Limited
- ENI
- Fauji Fertilizer Bin Qasim Limited
- GASCO Engineering
- Gatron Industries Limited
- General Tyre and Rubber Company Pakistan Limited
- Global PMC Pvt. Ltd.
- Habib Sugar Mills Limited
- Indus Pencils Limited
- JACOBS Engineering
- Novatex Limited
- Orient Water Services.
- Pak Oasis
- Pakistan Council of Scientific and Industrial Research (PCSIR)
- Pakistan Petroleum Ltd.
- Pakistan Refinery Limited
- SGS Pakistan
- SUPARCO
- Tri-Pack Films Limited
- ICI Chemicals Karachi.
- Lucky Cement Limited

In order to create connection between the chemical engineering programs with the chemical industry, the Chemical Engineering Department regularly arranges meeting with the technical resource person/engineer of chemical industry with the students. The engineer introduces the current problems faced by the industry and proposes real time problem based FYP. Financial assistance given by the company to that group of students who study industry related problem in their final year project with the company.

Table 10-1 Titles of Final Year Project

Titles for Final Year Projects (2020)

	Titles	External	Internal	Group Members
1	Rating of an MEA absorption system using tray and packing design as different column internals	NRL	Sir, Syed Ali Raza	Muhammad Anas Shehzad, Daniyal mujeeb, Muhammad Wasiq Fahim, Armash Sahab, Muhammad Sabeeh Khan
2	Solvent De-Asphalting for 200,000 BPD Refining based on DAS (UAE) Blend Crude	BYCO	Mrs. Kahksan Nawaz	Syed Muhammad Arsalan, Yamna Afzal, Muhammad Moiz Siddiqui, Syed zohaib ali, Ahmed Munim, Zohaib Shamim
3	Mild Hydrocracker for Desulfurizing Atmospheric Residue	BYCO	Sir. Abdul Qudoos	Samad Jan, Muhammad Osama khan, Muhammad Saifullah, Junaid Ali, Nazir Ahmed
4	Install a 5000 Barrels/day mini refinery on upstream site of Bolan Crude	PRL	Sir, Syed Ali Raza	Syed Adil Ahmed, Daniyal Ahmed Khan, Naveed Usmany, Arsalan Abbas, Syed Mohsin Ashraf Subzwari, Sheikh Muhammed Shahzaib
5	Ammonia Synthesis from thur coal gasification	PRL	Mrs. Ramsha	Zeerak , syed basit ali, faseeh ejaz, hammad ahmed, ikramullah Qureshi, , M.Arqam Nafees
6	To Convert Coal Sludge into concrete block/pavers	Novatex	Dr. Shagufta	Nukhbaa Masood, Serish Sarfraz, Syed Hussain Ali, Sharukh waseem, Rabia M. Iqbal
7	Design of 10000 MT Diesel storage facility	FRR pvt. Ltd	Sir. Muhammad Hasan Uddin	Noman Ahmed, Saad Ahmed, Shayan, Fahad Khan, Omead hashmi
8	Optimized process scheme selection and equipment design of N2 removal from Natural gas	PPL	Dr. Furqan	Ahmed Afnan Amjad, Faran Uddin Sheikh, M.Nabeel, M.Taha Mehmood
9	Treatment of industrial waste water using Nanoparticles		Mrs. Mehwish	Muhammad Faizan, Fasih Asif, Muhammad

				Hammad Khalid, Umair Haider, Syed Ateeb Ali
10	Treatment of industrial waste water using Nanoparticles		Dr. Yasir	Zeeshan afzal Muhammad Anus Ali murtaza Hamza ejaz Muhammad Baqir
11	Synthesis of Nanomaterial sensors & its application in drinking water		Sir. Saqib	Ahmed hassan, Sheikh umar, Bilal Hasan, Zeeshan Badar, Muhammad Umar
12	Production of ionic liquids for conventional lubricants	PSO Safiullah Process Engr. at PSO port qasim, NECO,Dr.Abdullah Shahid , Fedral Urdu, Chemistry	Sir. Abdul Samad	Muhammad Daniyal Kamil, Muhammad Irfan, Muhammad Arbab Ahmed,Azeem Razzak, Asaawira Aiman

DEPARTMENT OF CHEMICAL ENGINEERING

UNIVERSITY OF KARACHI

ANNEXURES

Annexure A: Knowledge Profile

S.No.	Attribute
K1	A systematic, theory-based understanding applicable to the discipline.
K2	Conceptually-based mathematics, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modeling applicable to the discipline.
K3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
K4	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.
K5	Knowledge that supports engineering design in a practice area.
K6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
K7	Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; the impacts of engineering activity: economic, social, cultural, environmental and sustainability.
K8	Engagement with selected knowledge of the recent innovation related to the discipline.

Range of Complex Problem Solving		
Attribute	**Examples**	
1	Preamble	Engineering problems which cannot be resolved without in-depth engineering knowledge, and have some or all of the characteristics listed below:
2	Range of conflicting requirements	Involve wide-ranging or conflicting technical, engineering and other issues.
3	Depth of analysis required	Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models.
4	Depth of knowledge required	Requires research-based knowledge much of which is at, or informed by, the forefront of the professional discipline and which allows a fundamentals-based, first principles analytical approach.

5	Familiarity of issues	Involve infrequently encountered issues
6	Extent of applicable codes	Are outside problems encompassed by standards and codes of practice for professional engineering.
7	Extent of stakeholder involvement and level of conflicting requirements	Involve diverse groups of stakeholders with widely varying needs.
8	Consequences	Have significant consequences in a range of contexts.
9	Interdependence	Are high level problems including many component parts or sub-problems.

	Attribute	**Complex Activities**
1	Preamble	Complex activities means (engineering) activities or projects that have some or all of the following characteristics listed below:
2	Range of resources	Involve the use of diverse resources (and for this purpose, resources include people, money, equipment, materials, information and technologies).
3	Level of interaction	Require resolution of significant problems arising from interactions between wide-ranging or conflicting technical, engineering or other issues.
4	Innovation	Involve creative use of engineering principles and research-based knowledge in novel ways.
5	Consequences to society and the environment	Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation.
6	Familiarity	Can extend beyond previous experiences by applying principles-based approaches.

Annexure B: Mapping of PEOs to PLOs/Graduate Attributes

PEO / PLO	1. Utilized and apply Chemical Engineering Knowledge, Scientific Techniques and tools to provide solution to complex Engineering Problems 2. Practice Knowledge and skills to improve socio-economic sustainability and global environment. 3. Play leading role in creating innovative and quality solutions for industrial and social problems in professional manner		
PEO: Program Educational Objectives PLO: Program Learning Objectives	**PEO-1**	**PEO-2**	**PEO-3**
Engineering Knowledge	✓		
Problem Analysis	✓		
Design/Development of Solutions	✓		
Investigation	✓		
Modern Tool Usage	✓		
The Engineer and Society		✓	
Environment and Sustainability		✓	
Ethics		✓	✓
Individual and Team Work			✓
Communication			✓
Project Management			✓
Lifelong Learning		✓	✓

Annexure C: System of Instructions and Examination

Nature of Academic Sessions: Semester wise	Total contact-hours for a Theory course per session: 48
No. of sessions in the Program (4/8/8/12) 8	Total contact-hours for a Practical course per session: 48
Duration of a session (in weeks) Total: 18 Teaching: 16	Weekly contact-hours for a Theory class: 3
Total No. of courses in the Program: 46	Weekly contact-hours for a Practical class: 3
No. of courses in a session: Min. 5 Max. 6	Generally, 6

Grade Sheet															
Intake Batch: 2017															
Session (Semester-I) 2017-2018															
			No. of Students Securing Grades (or %age Ranges, i.e. <40, 40-50, 50-60, 60-70, 70-80, 80-90, >90)												
			Total	A+	A	A-	B +	B	B-	C +	C	C-	D+	D	F
1.	CE-305	Mathematics-I (Calculus and Analytical Geometry)	39	5	3	11	5	3	2	1	3	4	0	2	0
2.	CE-307	Engineering Drawing	40	0	0	1	3	11	7	3	2	3	6	4	0
3.	CE-301	Chemical Process Principle	38	1	0	0	2	0	3	5	1	6	3	9	8
4.	CE-300	Applied Chemistry-I	36	0	1	6	4	1	3	3	3	4	2	2	7
Session (Semester-II)															
1.	CE-302	Chemical Engineering Thermodynamics-I	44	0	0	0	3	4	3	5	1	5	0	0	23
2.	CE-304	Mathematics-II (Applied Mathematics)	36	0	0	1	1	4	3	2	2	5	4	7	7
3.	CE-306	Computer & Computation	38	0	0	0	16	6	1	2	5	2	1	2	3
Session (Semester-III)															
1.	CE-401	Applied Chemistry-II	35	0	1	3	4	7	4	4	5	2	4	1	0
2.	CE-403	Chemical Process Principles-II	30	0	0	3	4	3	1	1	3	3	3	8	1
3.	CE-405	Mathematics-III	43	5	16	5	6	3	2	2	2	2	0	0	0
4.	CE-407	Fluid Mechanics	30	0	1	0	4	7	1	4	4	4	1	0	4

5.	CE-409	Electrical & Electronics Engineering	41	0		1	2	2	1	1	2	4	3	17	8
6.	CE411	Workshop Practice	41	0	2	13	8	9	5	1	0	3	0	0	0
Session (Semester): IV															
1.	CE-400	Chemical Process Technology-I	30	0	1	4	4	4	1	5	3	1	1	2	4
2.	CE-402	Heat Transfer	31	0	2	4	8	3	5	3	1	1	2	1	1
3.	CE-404	Particulate Technology	31	0	0	3	7	2	1	7	1	3	3	2	2
4.	CE-406	Logic & Critical Thinking	31	0	0	0	1	1	2	2	1	3	4	15	2
5.	CE-408	Mathematics-IV (Numerical Methods & Engineering Statistics)	31	0	1	3	6	5	4	3	1	1	0	6	1
6.	CE-410	Computer Aided Drawing	31	0	0	0	1	1	5	4	2	5	1	12	0
Session (Semester-V)															
1.	CE-501	Mass Transfer	30	21	7	2	0	0	0	0	0	0	0	0	0
2.	CE-503	Fuel & Combustion	30	6	8	4	8	1	1	1	1	0	0	0	0
3.	CE-505	Engineering Economics	30	11	16	0	3	0	0	0	0	0	0	0	0
4.	CE-507	Chemical Engineering Thermodynamics-II	30	0	16	7	7	0	0	0	0	0	0	0	0
5.	CE-509	Computer Programming & Software Application	30	0	1	9	11	6	1	2	0	0	0	0	0

Academic Calendar 2020

FIRST SEMESTER 2020

Orientation Day	*January 1, 2020*
Teaching	*January 2, 2020 to April 30, 2020*
Semester Examinations	*May 4, 2020 to May 22, 2020*
Semester Break	*May 25, 2020 to June 30, 2020*

SECOND SEMESTER 2020

Teaching	*July 1, 2020 to November 6, 2020*
Semester Examinations	*November 10, 2020 to December 4, 2020*
Semester Break	*December 7, 2020 to December 31, 2020*

Note:

a) The date for extra-curricular activities shall be announced later.
b) The University of Karachi shall observe Federal and Provincial gazetted holidays.
c) Eid holidays are subject to sighting of the moon.

ANNEXURE D: Mapping of courses to PLOs

Semester	Course No	Course Title	1	2	3	4	5	6	7	8	9	10	11	12
			Engineering Knowledge	*Problem Analysis*	*Design / Development*	*Investigation*	*Modern Tool Usage*	*The Engineer & Society*	*Environment and Sustainability*	*Ethics*	*Individual and Team Work*	*Communication*	*Project Management*	*Lifelong Learning*
			Level of Emphasis (Low, Medium, High)											
1	300.1	English-I	√							√		√		
	300.1	Islamic Studies / Ethics						√		√				√
	CE-301	Chemical Process Principles-I	√	√	√									
	CE-303	Physics	√		√									
	CE-305	Mathematics-I		√	√									
	CE-307	Engineering Drawing		√										√
2	300.2	Pakistan Studies						√	√					√
	300.2	English-II		√						√		√		√
	CE-300	Applied Chemistry-I	√	√		√				√		√		
	CE-302	Chemical Engineering Thermodynamics-I						√		√				√
	CE-304	Mathematics-II	√	√	√									
	CE-306	Computer & Computation	√		√									
3	CE-401	Applied Chemistry-II		√	√									
	CE-403	Chemical Process Principles-II		√										√
	CE-405	Mathematics-III						√	√					√
	CE-407	Fluid Mechanics		√						√		√		√
	CE-409	Electrical & Electronics Engineering	√											
	CE411	Workshop Practice	√	√		√								
4	CE-400	Chemical Process Technology-I		√	√									
	CE-402	Heat Transfer			√									
	CE-404	Particulate Technology	√	√		√								
	CE-406	Logic & Critical Thinking	√	√										
	CE-408	Mathematics-IV (Numerical Methods & Engineering Statistics)		√	√									
	CE-410	Computer Aided Drawing	√	√	√	√								
5	CE-501.1	Communication Skills	√											
	CE-501	Mass Transfer	√			√		√						
	CE-503	Fuel & Combustion	√						√					√
	CE-505	Engineering Economics	√	√	√	√								
	CE-507	Chemical Engineering Thermodynamics-II	√	√	√									
	CE-509	Computer Programming & Software Application	√	√				√						
6	CE-500	Engineering Materials	√	√	√		√		√					

	CE-502	Chemical Reaction Engineering	√		√									
	CE-504	Simultaneous Heat & Mass Transfer Operations								√	√	√		
	CE-506	Transport Phenomena	√		√				√					
	CE-508	Chemical Process Technology-II	√		√	√	√							
7	CE-601	Instrumentation & Process Control	√	√	√	√								
	CE-603	Chemical Process Design & Simulation	√	√	√									
	CE-605	Project Management	√						√		√		√	
	CE-607	Chemical Engineering Plant Design	√	√					√					
	CE-609	Chemical Engineering Plant Design Project "A"	√	√	√	√	√		√	√	√	√	√	√
		Elective-I	√	√	√	√								
8	CE-600	Chemical Engineering Plant Design Project "B"	√	√	√	√	√		√	√	√	√	√	√
	CE-602	Production & Operations Management	√								√		√	
	CE-604	Maintenances Engineering & Safety	√			√			√					
		Elective-II	√				√	√						
		Elective-III	√				√	√						
	Total		32	25	21	12	06	08	10	09	05	07	04	11

Annexure E: National Qualifications Framework Curriculum Design

Summary HEC-Framework (Required)					**Summary UoK-DCE-Framework (Current / Existing)**				
Domain	Knowledge Area	Total Courses	Total Credits	% Overall	Domain	Knowledge Area	Total Courses	Total Credits	% Overall
Non-Engineering	Humanities	7	14	30	Non-Engineering	Humanities	7	16	32.8%
	Management Sciences	1	3			Management Sciences	2	5	
	Natural Sciences	7	23			Natural Sciences	7	24	
	Sub Total	15	40			Sub Total	16	45	
Engineering	Computing	3	9	70	Engineering	Computing	4	9	67.2%
	Engineering Foundation	8	29			Engineering Foundation	9	32	
	Major Based Core (Breadth)	8	28			Major Based Core (Breadth)	7	26	
	Major Based Core (Depth)	3	9			Major Based Core (Depth)	5	15	
	Inter-Disciplinary Engineering Breadth (Electives)	7	12			Inter-Disciplinary Engineering Breadth	3	4	
	Senior Design Project	2	6			Senior Design Project	2	6	
	Industrial Training	0	0			Industrial Training	0	0	
	Sub Total	31	93			Sub Total	30	92	
	Grand Total	46	133	100		Grand Total	46	137	100

Summary HEC-Framework					**Summary UoK-DCE-Framework**				
(Required)					**(Revised- implemented since 2019)**				
Domain	Knowledge Area	Total Courses	Total Credits	% Overall	Domain	Knowledge Area	Total Courses	Total Credits	% Overall
Non-Engineering	Humanities	7	14	30	Non-Engineering	Humanities	7	13	31.62%
	Management Sciences	1	3			Management Sciences	3	5	
	Natural Sciences	7	23			Natural Sciences	8	25	
	Sub Total	15	40			Sub Total	18	43	
Engineering	Computing	3	9	70	Engineering	Computing	4	8	68.38%
	Engineering Foundation	8	29			Engineering Foundation	9	31	
	Major Based Core (Breadth)	8	28			Major Based Core(Breadth)	8	25	
	Major Based Core (Depth)	3	9			Major Based Core(Depth)	6	17	
	Inter-Disciplinary Engineering Breadth (Electives)	7	12			Inter-Disciplinary Engineering Breadth (Electives)	4	6	
	Senior Design Project	2	6			Senior Design Project	2	6	
	Industrial Training	0	0			Industrial Training	0	0	
	Sub Total	31	93			Sub Total	33	93	
Grand Total		46	133	100	Grand Total		51	136	100

Annexure F:Course Offerings

Semester No.	Sr. No.	Course Code	Course Title	Credit Hours	Knowledge Area
1	1	300.1	English-I	(3-0-3)	Humanities
	2	300.1	Islamic Studies / Ethics	(3-0-3)	Humanities
	3	CE-301	Chemical Process Principles-I	(3-0-3)	Engineering Foundation
	4	CE-303	Physics	(3-1-4)	Natural sciences
	5	CE-305	Mathematics-I	(3-0-3)	Natural sciences
	6	CE-307	Engineering Drawing	**(0-1-1)**	Inter Disciplinary Engineering Breadth
			Total Cr. Hrs.	**15-2-17**	
2	1	300.2	Pakistan Studies	(2-0-2)	Humanities
	2	300.2	English-II	(2-0-2)	Humanities
	3	CE-300	Applied Chemistry-I	(3-1-4)	Natural sciences
	4	CE-302	Chemical Engineering Thermodynamics-I	(3-1-4)	Engineering Foundation
	5	CE-304	Mathematics-II	(3-0-3)	Natural sciences
	6	CE-306	Computer & Computation	**(1-1-2)**	Computing
			Total Cr. Hrs.	**14-3-17**	
3	1	CE-401	Applied Chemistry-II	(3-1-4)	Natural sciences
	2	CE-403	Chemical Process Principles-II	(3-0-3)	Engineering Foundation
	3	CE-405	Mathematics-III	(3-0-3)	Natural sciences
	4	CE-407	Fluid Mechanics	(3-1-4)	Engineering Foundation
	5	CE-409	Electrical & Electronics Engineering	(2-0-2)	Inter Disciplinary Engineering Breadth
	6	CE411	Workshop Practice	**(0-1-1)**	Inter Disciplinary Engineering Breadth
			Total Cr. Hrs.	**14-3-17**	
4	1	CE-400	Chemical Process Technology-I	(3-0-3)	Engineering Foundation
	2	CE-402	Heat Transfer	(3-1-4)	Engineering Foundation
	3	CE-404	Particulate Technology	(3-1-4)	Engineering Foundation
	4	CE-406	Logic & Critical Thinking	**(2-0-2)**	Humanities
	5	CE-408	Mathematics-IV (Numerical Methods & Engineering Statistics)	(3-0-3)	Natural sciences
	6	CE-410	Computer Aided Drawing	**(0-1-1)**	Inter Disciplinary Engineering Breadth

			Total Cr. Hrs.	**14-3-17**	
5	1	CE-501.1	Communication Skills	**(2-0-2)**	Humanities
	2	CE-501	Mass Transfer	(3-1-4)	Engineering Foundation
	3	CE-503	Fuel & Combustion	(3-1-4)	Major Based Core (Breadth)
	4	CE-505	Engineering Economics	**(2-0-2)**	Humanities
	5	CE-507	Chemical Engineering Thermodynamics-II	(3-0-3)	Major Based Core (Breadth)
	6	CE-509	Computer Programming & Software Application	**(2-1-3)**	Computing
			Total Cr. Hrs.	**15-3-18**	
6	1	CE-500	Engineering Materials	(3-0-3)	Inter Disciplinary Engineering Breadth
	2	CE-502	Chemical Reaction Engineering	(3-1-4)	Major Based Core (Breadth)
	3	CE-504	Simultaneous Heat & Mass Transfer Operations	(3-1-4)	Major Based Core (Breadth)
	4	CE-506	Transport Phenomena	(3-0-3)	Major Based Core (Breadth)
	5	CE-508	Chemical Process Technology-II	(3-1-4)	Engineering Foundation
			Total Cr. Hrs.	**15-3-18**	
7	1	CE-601	Instrumentation & Process Control	(3-1-4)	Major Based Core (Breadth)
	2	CE-603	Chemical Process Design & Simulation	**(2-1-3)**	Computing
	3	CE-605	Project Management	**(2-0-2)**	Management sciences
	4	CE-607	Chemical Engineering Plant Design	(3-0-3)	Major Based Core (Breadth)
	5	CE-609	Chemical Engineering Plant Design Project "A"	**(0-3-3)**	Design Project
	6		Elective-I	(3-0-3)	Major Based Core (Depth)
			Total Cr. Hrs.	**13-5-18**	
8	1	CE-600	Chemical Engineering Plant Design Project "B"	(0-3-3)	Design Project
	2	CE-602	Production & Operations Management	(3-0-3)	Management sciences
	3	CE-604	Maintenances Engineering & Safety	(3-0-3)	Inter Disciplinary Engineering Breadth
	4		Elective-II	(3-0-3)	Major Based Core (Depth)
	5		Elective-III	(3-0-3)	Major Based Core (Depth)
			Total Cr. Hrs.	**12-3-15**	
			GRAND TOTAL	**112-25-137**	

List of Elective courses

Area of Specialization	Sr. No.	Course Code	Course Title	Credit Hours	Knowledge Area
Design Engineering	1	CE-610	Computational Fluid Dynamics (CFD)	3-0-3	Major Based Core (Depth)
Nuclear Engineering	1	CE-611	Mineral Procession		
Chemical Engineering	1	CE-613	Novel Separation Processes		
	2	CE-615	Polymer Engineering		
Energetic Materials	1	CE-614	Energetic Materials		
Process Engineering	1	CE-616	Chemical Wet Processing of Textile		

	2	CE-617	Process Analysis & Optimization		
Oil and Gas Engineering	1	CE-618	Petroleum Refinery Engineering		
	2	CE-619	Gas Engineering		
	3	CE-620	Petrochemicals		
Green Engineering	1	CE-621	Risk Management & Safety		
	2	CE-622	Environmental Engineering		
	3	CE-623	Renewable Energy Resources		
Energy and Power	1	CE-624	Industrial Energy Systems		
Biochemical Engineering	1	CE-625	Biochemical Engineering		
	2	CE-626	Biochemical Separations		
	3	CE-627	Biochemical Process and Products		

Annexure G: Laboratories & Lab Work

Sr#	Name Laboratory (Staff Names - Qualification)	Name of Lab.	Type(s) of Workstation (No. of each type)	Nature of Experiments	Number of Students per Work Station
1	**HEAT TRANSFER / MASS TRANSFER / SIMULTANEOUS HEAT AND MASS TRANSFER** Engr. Zubair Ahmed - Lab Engineer (BE Chemical) Mr. Syed Wasif Ahmed - Technician (DAE Chemical) Mr. Muhammad Asif - Lab Attendant (DIT)	Heat Transfer,	Heat Exchanger(s): Double Pipe Co-current and Counter-current (2), Shell & Tube (1), Shell and Coil (1), Helical Coil (1)	Hands-on	3
			Electric Furnace for Heat Loss through bricks (1)	Hands-on	3
			Heat Loss through Insulated Pipes (1)	Hands-on	3
			Film wise and Drop wise Condensation (1)	Hands-on	3
			Cooling Tower (1)	Hands-on	3
			Heat Transfer Service Unit for Determination of Gas/Liquid Thermal Conductivity (1)	Hands-on	3
		Mass Transfer,	Gas Diffusion: Gaseous Mass Transfer and Diffusion Coefficient Unit Edibon (1), Arnold Cell (2), Winklemann Apparatus (1),	Hands-on	3
			Liquid Mass Transfer and Diffusion Coefficient Unit (2)	Hands-on	3
			Gas absorption column – UOP7 (1)	Hands-on	3
			Liquid-Liquid Extraction Column (2)	Hands-on	3
			Solid Liquid Extraction – Hexane/ Oil/ meal (1) Solid Liquid Extraction – Water/ Oxalic Acid/ Sand (1)	Hands-on	3
			Vacuum Crystallizer (1)	Hands-on	3
			Mechanical Shaker for Determination of	Hands-on	3

			Equilibrium Curve for Adsorption of Activated Carbon – Acetic Acid System (1)		
		Simultaneous Heat & Mass Transfer	Batch Distillation: Differential Distillation (2), Fractional Distillation (2), Azeotropic Distillation (1),	Hands-on	3
			Cooling Tower (1)	Hands-on	3
			Drying: Oven for Rate of Drying (1), Fixed bed Dryer (1), Fluidized bed Dryer (1)	Hands-on	3
2	**THERMODYNAMICS / FUELS AND COMBUSTION** Engr. Ali Ammar Jaffery - Lab Engineer (BE Chemical) Mr. Iqbal Siddiqui - Technician (B.Tech Chemical) Mr. Faizan Bashir - Lab Attendant (Matric)	Thermodynamics	Bomb Calorimeter (1),	Hands-on	3
			Call Ender and Barns Apparatus (2)	Hands-on	3
			Vapor Compression Cycle (1)	Demonstration	3
			Vapor Compression Cycle – COP (1)	Hands-on	3
			Mechanical Heat Pump (1)	Hands-on	3
			Solubility Apparatus (1)	Hands-on	3
			Partition Coefficient (2)	Hands-on	3
			Calorimeter (4)	Hands-on	3
		Fuels & Combustion	Bomb Calorimeter (1),	Hands-on	3
			Conradson Carbon Residue (1)	Hands-on	3
			Gas Chromatography (1),	Hands-on	3
			Pour Point and Cloud Point (1)	Hands-on	3
			Distillation – ASTM D-86 (1),	Hands-on	3
			ORSAT Apparatus (1)	Hands-on	3
			Pensky Martin Close cup (1)	Hands-on	3
			Cleveland Open Cup (1)	Hands-on	3
			Coal Proximate Analysis: Oven (1), Muffle Furnace (1)	Hands-on	3
			Viscosity INDEX, ASTM D-2270 (2)	Hands-on	3
			Fractional Distillation (2)	Hands-on	3

3	**FLUID MECHANICS / PARTICULATE TECHNOLOGY** Engr. Ali Ammar Jaffery - Lab Engineer (BE Chemical) Mr. Faisal Shah - Technician (DAE Cehmical) Mr. Sultan - Lab Attendant (Intermediate)	Fluid Mechanics	Bourdon Manometer (1),	Hands-on	3
			Valves (1)		
			Venturi Tube (1),	Hands-on	3
			Friction Losses of Different Pipes (1),	Hands-on	3
			Overhead Tank (1),	Hands-on	3
			Single Centrifugal Pump (1),	Hands-on	3
			Series/Parallel Centrifugal Pumps (1),	Hands-on	3
			Reynolds Number (1),	Hands-on	3
			Minor Losses (1),	Hands-on	3
			Hydraulic Bench – V-Notch/U-Notch (1)	Hands-on	3
			Hydraulic Bench – Venturi/Orifice/Overall Losses (1)	Hands-on	3
		Particulate Technology	Jaw Crusher (1),	Hands-on	3
			Ball Mill (1),	Hands-on	3
			Sieve Analyzer (1),	Hands-on	3
			Pin Mill (1),	Hands-on	3
			Solid – Solid Mixture (1),	Hands-on	3
			Magnetic Separator (1),	Hands-on	3
			Plate & Frame Filter Press (1),	Hands-on	3
			Cyclone Separator (1),	Hands-on	3
			Liquid-Liquid Mixer (1),	Hands-on	3
			Solid-Liquid Mixer (1),	Hands-on	3
			Reverse Osmosis Pilot Plant (1)	Hands-on	3
			Centrifuge Separator (1),	Hands-on	3
4	**COMPUTER LABORATORY** Engineer BE (Electronics) Mr. Adnan Abbas - Lab Attendant (B.Com)	Computer & Computation	Introduction General Operations (1),	Hands-on	1
			Ms. Office (1),	Hands-on	1
			Network Operations (1),	Hands-on	1
		Computer Aided Drawing	AUTOCAD (1)	Hands-on	1
		Computer Programing & Software Application	Matlab Premier (1)	Hands-on	1
			Turbo C++ (1)	Hands-on	1
		Process Simulation	Aspen Exchanger Design & Rating (1)	Hands-on	1
			KORF Hydralics (1)	Hands-on	1

			ASPEN HYSYS V 8.8 (1)	Hands-on	3
5	**CHEMICAL REACTIONS ENGINEERING** Engr. Ali Ammar Jaffery - Lab Engineer BE (Chemical) Engr. M Fakhir - Technician (BE Electronics) Mr. Anwer Ali - Lab Attendant (DAE Mechanical)	Chemical Reactions Engineering	Single Double and Triple stage CSTR, (3)	Hands-on	3
			Plug Flow Reactor, Liquid Reactor (1)	Hands-on	3
			Stage Reactors for E/F Curve, (1)	Hands-on	3
			Armfield Chemical Reactor, (1)	Hands-on	3
			Shrinking Core Model Apparatus, (1)	Hands-on	3
			Apparatus for Order of Reaction, Integral/Differential (4)	Hands-on	3
6	**INSTRUMENTATION & PROCESS CONTROL** Engr. M Fakhir - Technician (BE Electronics) Mr. Anwer Ali - Lab Attendant (Intermediate)	Instrumentation & Process Control	pH Control (1),	Hands-on	3
			Pressure Control (1),	Hands-on	3
			Temperature Control (1),	Hands-on	3
			Flow Control (1),	Hands-on	3
			Level Control (1),	Hands-on	3
			Pressure Sensor Calibrator (1),	Hands-on	3
			DCS Control System (1),	Hands-on	3
			Thermocouple Calibrator (1),	Hands-on	3
7	**APPLIED CHEMISTRY / CHEMICAL TECHNOLOGY** Engr. Ali Ammar - Lab Engineer (BE Chemical) Mr. Fahad Jameel - Lab Assistant (Inter./DIT) Mr. Zia ur Rehman - Lab Assistant (Intermediate)	Applied Chemistry-I	General Equipment for Physical/Analytical Chemistry Practical's (12)	Hands-on	3
		Applied Chemistry-II	General Equipment for Organic Chemistry Practical's (12)	Hands-on	3
		Chemical Process Technology-II	Melting point tester (1),	Hands-on	3
			Soxhelet apparatus (2),	Hands-on	3
			Kjhaldhal apparatus (2),	Hands-on	3
			Rotavapor – Vacuum Distillation (2),	Hands-on	3
			Decolorization Apparatus (1),	Hands-on	3
			Differential Distillation – Saponification Number (1),	Hands-on	3
			Water Bath (2)	Hands-on	3
			Hot Plate Magnetic Stirrer (2),	Hands-on	3
			Autoclave – Food Preservation (1),	Hands-on	3
8	**ENGINEERING**	Workshop	Elementary Machine Shop	Hands-on	1

	WORKSHOP Mr. Iqbal Siddiqui - Technician (B.Tech Chemical) Mr. Anwer Ali - Lab Attendant (DAE Mechanical)	Practice	(1),		
			Carpentry Shop (3),	Hands-on	1
			Welding & Cutting (1)	Hands-on	1
			Drilling Machine Bench (1),	Hands-on	1
			Grinder Machine Bench (1),	Hands-on	1
			Lathe Machine (2)	Hands-on	1
9	**ENGINEERING DRAWING** Mr. Iqbal Siddiqui - Technician (B.Tech Chemical) Mr. Anwer Ali - Lab Attendant (DAE Mechanical)	Engineering Drawing	Drawing Bench (35)	Hands-on	

Annexure H: Student Admissions & Enrolments

S.No.	Intake Batch	Batch ID	Total Students Admitted as per admission committee	Present Strength as per semester examination Cell	No. of Section(s)
1.	2017	B16----	45	44	1
2.	2018	B17----	45	36	1
3.	2019	B18----	50	44	1
4.	2020	B19----	24	22	1
	Total		164	146	

*

Permission to increase strength was given in vide letter no.PEC/EA&EC/UoK/Chemical2016 Dated: November 21, 2016

Annexure I: Faculty Strength

Sr. No.	Name	PEC #	Designation	Joining Date	Details of Qualifications			Specialization	Experience Teaching (Total) Years	Dedicated / Shared	Cr. Hrs. taught in a session	
					Degree	Year	Institution				Previous	Current
1.	Engr. Dr. Shagufta Ishteyaque	CHEM/ 2353	Assistant Professor & Incharge of Department	11th Feb 2006	Ph.D.	2014	UOK	Chem. Engg.	14.5(30.5)	Dedicated	8.5+5	1.5+5
					ME	2010	NEDUET	Chem. Engg.				
					BE	1990	MUET	Chem. Engg.				
2.	Engr. Dr. M. Yasir Khan	CHEM/ 6880	Assistant Professor	Mar 2007	Ph.D.	2016	CBNU, S. Korea	Chem. Engg.	13.5 (13.5)	Dedicated	9 + 5	4.5+5.0
					ME	2009	NEDUET	Chem. Engg.				
					BE	2004	MUET	Chem. Engg.				
3.	Dr. M. Furqan Ali	CHEM/ 7095	Assistant Professor	Oct 2009	PhD	2019	BUCT, China	Chem. Engg.	11(11)	Dedicated	7.5+5.0	2.5+7.0
					ME	2011	NEDUET	Chem. Engg.				
					BE	2008	DCET	Chem. Engg.				
4.	Engr. Adeel ur Rehman	CHEM/ 6909	Assistant Professor	Oct 2014	ME	2010	NEDUET	Chem. Engg.	13(15)	Dedicated	S.L	
					BE	2006	DCET	Chem. Engg.				
5.	Engr. Mehwish Altaf	CHEM/ 7563	Assistant Professor	Oct 2014	ME	2013	NEDUET	Chem. Engg.	6(10)	Dedicated	2.5+5	3.0+7.0
					BE	2008	MUET	Chem. Engg.				
6.	Engr. M. Saquib Ali	CHEM/ 8437	Lecturer	Nov 2010	ME	2016	NEDUET	Chem. Engg.	9.5(12)	Dedicated	3+5	4.5+5.0
					BE	2008	MUET	Chem. Engg.				
7.	Engr. Kashif Hussain Mangi	CHEM/ 7531	Lecturer	March 2012	PhD	In progress	Uni. Nantes, France	Chem. Engg.	6(8)	Dedicated	FSL	
					ME	2013	MUET	Enviro. Engg.				
					BE	2008	MUET	Chem. Engg.				
8.	Ms. Kahkashan Nawaz	-	Lecturer	16th July 2009	PhD	In progress	UOK	Chem. Engg.	11.5(11.5)	Dedicated	5+3	3+5.
					MPhil	2018	UOK	Applied Chemistry				
					BCT	2008	UOK	Chem. Tech.				
9.	Engr. Ahsan Abdul Ghani	CHEM/ 8939	Lecturer	Sep 2014	PhD	In progress	South Korea	Chem. Engg.	9(10.5)	Dedicated	S.L	
							NEDUET					
					ME	2013						
					BE	2010	UOK	Chem. Engg.				
10.	Engr. Obaid ur	CHEM/ 7781	Lecturer	Oct 2014	PhD	In progress	Petronas Malaysia	Chem. Engg.	6(9)	Dedicated	S.L	

	Rehman				ME	2013	NEDUET					
					BE	2009	DCET	Chem. Engg.				
11.	Engr. Shoaib Saleem	CHEM/ 9010	Lecturer	Oct 2014	PhD	In progress	ZJU, China	Chem. Engg.	8(9.5)	Dedicated	S/L	
					ME	2013	NEDUET	Chem. Engg.				
					BE	2010	UOK	Chem. Engg.				
12.	Dr. Fasiullah Khan		Adjunct Professor	Oct 2019	BSc		UOK	(Hon)	45(45)	Dedicated	----	3+2
					MSc		UOK	Applied Chemistry				
					PhD		UK	Chemical Engineering				
13.	Engr. Hasan	CHEM/ 14425	Teaching Associate cum Lecturer	21st Jan 2019	ME	2018	NEDUET	Chem. Engg.	2.0(2.5)	Dedicated	3.5+3	-----
					BE	2015	UoK	Chem. Engg.				
14.	Engr. Ramsha	CHEM/ 15109	Teaching Associate	16th July 2018	ME	2018	NEDUET	Polymer Engg.	3.0(3.0)	Dedicated	2.5+7	3.0+7.0
					BE	2015	UoK	Chem. Engg.				
15.	Engr. Syed Ali Raza	CHEM/ 15922	Teaching Associate	16th July 2018	ME	2018	NEDUET	Chem. Engg.	2.5(2.5)	Dedicated	4.5+7.0	5.5+5.0
					BE	2016	UoK	Chem. Engg.				
16.	Engr. Abdul Samad	CHEM/ 15123	Teaching Associate	1st August 2019	ME	In progress	NEDUET	Environment Engg.	1.0(1.0)	Dedicated	2.5+6	-----
					BE	2016	UoK	Chem. Engg.				
17.	Engr. Abdul Qudoos	CHEM/ 15294	Teaching Associate	1st August 2019	ME	2019	Mehran UET	Chem. Engg.	3.5(4)	Dedicated	5+7.0	5.5+7.0
					BE	2016	Mehran UET	Chem. Engg.				
18.	Engr. Ammarah Batol	CHEM 9487	Teaching Teaching Associate	15th October, 2020	ME	2013	UET Lahore	Chem. Engg.	6(6)	Dedicated	-----	3.0+0
					BE	2011	UET Lahore	Chem. Engg.				
19.	Engr. Muhammad Hassanian	CHEM/ 16863	Teaching Associate	15th October, 2020	BE	2017	NED	Chem Engg.	0(3.0)	Dedicated	-----	3.0+7.0
					ME	2020	NED	Chem Engg.				

List of Lab Engineers

Name	PEC #	Details of Qualification			Specialization	Joining Date	Labs Conducted (Contact Hours)	
		Degree	Year	Institution			Current Semester	Last Semester
Engr. Zubair Ahmed Kalwar	CHEM/6103	BE	2004	MUET	Chemical	2015	12	12
		ME	2010	NEDUET	Environmental			
Engr. Ali Ammar Jafrey	CHEM/12096	BE	2010	NFCIET	Chemical	2014	12	12

List of Shared Faculty

Sr. No.	Name	Designation	Details of Qualifications		Specialization	Department	Cr. Hrs. taught in BE Semester	
			Degree	Institution			Previous	Current
1.	Dr. Najeeb Alam Khan	Associate Professor	PhD	UoK	Applied Mathematics	Department of Mathematics	3+0	-
2.	Dr. Muhammad Ayaz	Lecturer	PhD	UoK	Applied Mathematics	Department of Mathematics	3+0	3+0
3.	Ms. Mehwish Mobeen	Lecturer	Mphil	UOK	Applied Chemistry	Department of Applied Chemistry	1.5	0
4.	Ms. Shumila Shafkat	Lecturer	M.Sc.	UoK	English	English	3+0	-

List of Visiting Faculty

S. No.	Name	Organization	Designation	Specialization		Department	Cr. Hrs. taught in BE Semester	
				Degree	Institute			
1.	Dr. Engr. Sajid Mirza	SUPARCO	Director (retd.)	PhD	University of Wales, UK	Chemical Engineering	3+0	1.5+0
2.	Dr. Shakir Hussain	University of Karachi	Teacher	PhD	University of Karachi	Islamic Studies	-----	2+0
3.	Engr. M. Zubair khan	PPL					3+0	----
4.	Engr. Zohair Hassan	Culligan Waters Pakistan	Compliance Officer	M.E	NED University	Environmental Engineering	3+0	----
5.	Engr. Kamal Pasha	NED University	Assistant Professor	M.E	NED University	Mechanical Engineering	2+0	0+1
6.	Mr. Azeemuddin Zia	University of Karachi	Visiting Faculty	MSc.	University of Karachi	Physics	2+1	__
7.	Ms Maleha	University of Karachi	Visiting Faculty	MSc.	University of Karachi	Computer science	2+1	___
8.	Ms. Saima Ashraf	University of Karachi	Visiting Faculty	MPhil	University of Karachi	Computer Science	2+1	0+1

9.	Ms Faryal	University of Karachi	TA	MA	University of Karachi	Psychology	2+0	-----
10.	Mr. Abdul Rasheed	University of Karachi	Assistant Professor (Retired)	MSc.	University of Karachi	Applied Chemistry	-----	1.5+0
11.	Mr. Habib	University of Karachi	Teaching Associate	MS	NED UET Karachi	Computer science	-----	2.0+0
12.	Dr. Asim Saeed	NED	Assistant Professor	PhD	England	Mechanical Engineering	-----	0+1

Annexure J: Faculty Summary

Present Scenario

In the program since last PEC Visit

	Faculty teaching Engineering Subjects					Faculty teaching Non-Engineering Subjects				
	B.E.	M.E.	MPhil	Ph.D.	Total	BSc/BA	MSc/MA	MPhil	PhD	Total
Dedicated Faculty (Departmental)	-	2	1	3	6	-	-	-	-	-
Shared Faculty (Departmental)	-	-	-	-	-	-	-	-	-	-
Shared Faculty (from other Departments)	-	-	-	-	-	-	1	1	2	4
Visiting Faculty	-	3		2	5	-	5	1	1	7
TA cum Lecturers	-	5	-	-	5	-	-	-	-	-

Number of New Faculty members inducted

B.E.	0
ME	2
MS	0
PhD	1

(6 TA's cum Lecturers are working against on 3 lecturers and one Assistant Professor on S/L Total no. of faculty post sanctioned position is 14)

Scenario at the time of Last PEC Visit

Number of Faculty members who left the program since last PEC Visit

	Faculty teaching Engineering Subjects					Faculty teaching Non-Engineering Subjects				
	B.E.	M.E.	MPhil	Ph.D.	Total	BSc/BA	MSc/MA	MPhil	PhD	Total
Dedicated Faculty (Departmental)	-	3	1	3	7	-	-	-	1	1
Shared Faculty (Departmental)	-	-	-	-	-	-	-	-	-	
Shared Faculty (from other Departments)	-	-	-	-	-	1	1	1	2	5
Visiting Faculty	-	1	-	2	3	-	-	-	-	-
TA	1	4	-		5	-	-	-	-	-

B.E.	1
ME	1
MS	1
PhD	1

Annexure K: Faculty Workload

Sr. No.	Name	Degree Level	Last Semester Loading			Current semester Loading		
			Credit Hours		Course Titles	Credit Hours		Course Titles
			TH	PR		TH	PR	
1.	Engr. Dr. Shagufta Ishteyaque	BE	2.5	5	Instrumentation and Process Control (Th+Pr), Project Management (Th) , Chemical Engineering Plant Design Project A	1.5	5.0	Particulate Technology (Th+PR) , Chemical Engineering Plant Design Project B
		ME/PhD	6	0		6.0	0.0	Polymer, Advanced Polymer Engineering (Th)
2.	Engr. Dr. M. Yasir Khan	BE	3	5	Elective I (Th), Fuel & Combustion (Pr) , Chemical Engineering Plant Design Project A	3.5	5.0	Heat Transfer (Th+PR), Elective-II(Th), Chemical Engineering Plant Design Project B
		ME/PhD	6	0				
3.	Engr.Dr. M. Furqan Ali	BE	1.5	5	Fluid Mechanics-I (Th+Pr), Chemical Engineering Plant Design Project A	2.5	7.0	Transport Phenomena, CRE(Th+PR), Chemical Engineering Plant Design Project B
		ME/PhD	6	0				
4.	Engr. Adeel Rehman	S/L						
5.	Engr. Mehwish Altaf	BE	2.5	5	Mass Transfer (Th+Pr), Engg. Economics (Th), Chemical Engineering Plant Design Project A	3.0	7.0	Mass Transfer (Th), Maintenance Engg. &Safety (Th), CPP-II(PR), CPT(PR), Chemical Engineering Plant Design Project B
6.	Engr. M. Saquib Ali	BE	3	5	Chemical Engg. Thermo-II (Th) Fuel & Combustion (Th+Pr) , Chemical Engineering Plant Design Project A	4.5	5.0	Chemical Engg. Thermo-II, SHMT(Th+PR), Production and Operation Management (Th), Chemical
7.	Engr. Kashif Mangi	FSL						
8.	Ms. Kahkashan Nawaz	BE	5	5	Applied Chem-I(Th+Pr), Applied Chem-II(Th) & Fuel & Combustion (Th) , Chemical Engineering Plant Design Project	3.0	7.0	Applied Chem-II(Th+Pr), CPT-II(Th), CAD(PR), Chemical Engineering Plant Design Project B
9.	Engr. Ahsan Abdul Ghani	S/L						
10.	Engr. Obaid ur Rehman	S/L						
11.	Engr. Shoaib Saleem	S/L						
12.	Prof. Dr. Fasiullah Khan	BE				3.0	2.0	Simultaneous Mass and Heat Transfer (Th), Chemical Reaction Engineering (Th+PR).
13.	Engr. Ramsha	BE	2.5	7	Applied Chem-I(Pr), Applied Chem-II(Th), Mass Transfer (Th+Pr) , Chemical Engineering Plant Design Project A	3.0	7.0	Applied Chem-II(Th+Pr), CPT-II(PR+Th), Chemical Engineering Plant Design Project B
14.	Engr. Ali Raza	BE	4.5	7	I&C(Th+Pr), Fluid Mechanics Th+Pr), CPP-II(Th) , Chemical Engineering Plant Design Project A	4.0	5.0	Particulate Technology (Th+PR), CPP-I(Th), CPP-II(Th), CPP-I(Th), Chemical Engineering Plant Design Project B

15.	Engr. Hasanuddin	BE	3.5	5	Chemical Engg. PD (Th), Chemical Simulation (Th+Pr), Thermo-I(Th+Pr), Project	Left		
16.	Engr. Samad Ahmed	BE	2.5	7	PM(Th), Thermo-II(Th), Software Applications (Pr), Engineering Drawing (Pr) and Communication Skills (Pr) Chemical Engineering Plant Design Project A	Left		
17.	Engr. Abdul Qudoos	BE	5	7	Engineering Materials (Th), Chemical Engg. Thermo-I(Th+Pr), CPP-II(Th), Chemical Engineering Plant Design Project A	5.5	7.0	Engg. Materials (Th), CPP-II(Th+Pr), Elective-III(Th), Workshop Practices (PR), Chemical Engineering Plant Design
18.	Engr. Muhammad Hasnain	BE				3.5	7.0	Heat Transfer (Th+Pr), Transport Phenomena (Th), Computer Application (Pr),
19.	Engr. Ammarah Batool	BE				3.0	--	Engineering Materials (Th), Maintenance Engineering & Safety.

Annexure L: Financial Health

Sr. No	Source of Income	Current Fiscal Year 2019-2020	Previous Fiscal Year 2018-2019
1	Recurring University Budget	2530.916	2,300.858
2	Department of Chemical Engineering Recurring Budget	1.32	1.200
3	Lab running grant	0.66	0.600 (Expected)
4	University Development Budget	312.521	284.11
5	Tuition Fees and Others	8.8	8.000
6	Self-Finance	3.3	3.000
7	Books and journals	1.1	1.000

Annexure M: Internship Feedback Form

UNIVERSITY OF KARACHI
Department of Chemical Engineering

INTERNSHIP FEEDBACK FORM

Student's Name :
Batch#:
Contact Number:
Email id:

Evaluation of Programme Effectiveness

Please identify the degree to which you are satisfied by your performance, skills and abilities in the following areas.

1: Excellent 2: Very Good 3: Good 4: Fair 5: Poor

100-90% 89-70% 69-60% 59-50% Less than 50

Sr. No.	Parameters	PLO No.	Satisfactory ←——————→ Unsatisfactory				
			1	2	3	4	5
1	**Engineering Knowledge:** Knowledge of specialized are example: Processing, Production, Quality etc.	1					
2	**Investigation & Problem Solving:** Identify problems and generates and evaluates solution to the problems.	2 & 4					
3	**Design/Development of Solutions** Ability to design a system/component/Process	3					
4	**Testing and characterization:** Use the latest testing and characterization techniques and result analysis	5					
5	**Safety & Environment:** Follow the HSE rules guided by organization	7					
6	**Interpersonal skills:** Appropriately interacts with others	8 & 10					

7	**Responsibility and reliability:** Demonstrates a consistent level of self-discipline, organization and dependability	9&6					
8	**Teamwork:** Works well with others, demonstrates good citizenship and acts ethically in order to complete projects and meet objectives.	9					
9	**Oral Presentation Skills:** Effectively communicates verbally in a concise, articulate and professional manner	10					
10	**Written Communication Skills:** Effectively communicates in writing in a concise and professional manner	10					
11	**Planning & Organizational Skills:** Organizes and prioritizes tasks and materials in order to manage projects, complete tasks and locate information easily	11					
12	**Learning:** Ability to assimilate. Comprehend and apply new information	12					

General Comment.

1. Please make any additional comments or suggestions, which you think would help strengthen our programs for the preparation of graduates in future.

_____

_____

_____

_____

_____.

Signature

_____

Annexure N: Employer Feedback Form

UNIVERSITY OF KARACHI
Department of Chemical Engineering

EMPLOYER'S FEEDBACK FORM

Name of Student/Employee:
Organization:
Supervisor Name:
Designation/Department:
Contact Number:
Email id:

Evaluation of Programme Effectiveness

Please identify the degree to which you are satisfied by the performance of our abovementioned students by virtue of their skills and abilities in the following areas.

1: Excellent 2: Very Good 3: Good 4: Fair 5: Poor

100-90% 89-70% 69-60% 59-50% Less than 50

Sr. No.	Parameters	PLO No.	(A)	(B)	(C)	(D)	(E)
1	Math and English	1					
2	Problem formulation and solving skills	2					
3	Collecting and analyzing appropriate data	4					
4	Ability to link theory to practice	3					
5	Ability to design a system/component/Process	3					

6	IT knowledge	5					
7	Creativity	12					
8	Oral Communication	10					
8	Report writing	10					
9	Presentation Skills	10					
10	Ability to work in teams	9					
11	Leadership	9					
12	Independent Thinking	9					
13	Motivation	6					
14	Reliability	8					
15	Appreciation of ethical values	8					
16	Time management skills	11					
17	Safety practice	7					
18	Discipline	8					
19	Sustainable use of resources	7&6					

General Comment.

2. Please make any additional comments or suggestions, which you think would help strengthen our programs for the preparation of graduates who will enter your field.

_____

_____

_____

_____

_____.

3. Please specify what is expected from our degree holders in the practical life.

_____

_____

_____

_____

_____

_____.

Information about Organization

- Name of the Organization _____.
- Address _____.
- Phone No. _____.
- Types of Business _____.
- Number of degree holders employed in your organization:

Please return the duty filled in Performa to the Chairperson/ Director, Department/Centre/ Institute of _____ university of Karachi.

Employer's Signature:_____.

Designation: _____.

Annexure O: Alumni Feedback Form

UNIVERSITY OF KARACHI
Department of Chemical Engineering

ALUMNI FEEDBACK FORM

Student's Name:
Batch#:
Supervisor Name:
Designation/Department:
Contact Number:
Email id:

Evaluation of Programme Effectiveness

Please identify the degree to which you are satisfied by the performance of our above mentioned students by virtue of their skills and abilities in the following areas.

1: Excellent	2: Very Good	3: Good	4: Fair	5: Poor
100-90%	89-70%	69-60%	59-50%	Less than 50

Sr. No.	Parameters	PLO No.	Satisfactory ←——————→ Unsatisfactory				
			1	2	3	4	5
1	**Engineering Knowledge:** Knowledge of specialized are example: Processing, Production, Quality etc.	1					
2	**Investigation & Problem Solving:** Identify problems and generates and evaluates solution to the problems.	2 & 4					
3	**Design/Development of Solutions** Ability to design a system/component/Process	3					
4	**Testing and characterization:** Use the latest testing and characterization techniques and result analysis	5					
5	**Safety & Environment:** Follow the HSE rules guided by organization	7					
6	**Interpersonal skills:** Appropriately interacts with others	8 & 10					

7	**Responsibility and reliability:** Demonstrates a consistent level of self-discipline, organization and dependability	9&6					
8	**Teamwork:** Works well with others, demonstrates good citizenship and acts ethically in order to complete projects and meet objectives.	9					
9	**Oral Presentation Skills:** Effectively communicates verbally in a concise, articulate and professional manner	10					
10	**Written Communication Skills:** Effectively communicates in writing in a concise and professional manner	10					
11	**Planning & Organizational Skills:** Organizes and prioritizes tasks and materials in order to manage projects, complete tasks and locate information easily	11					
12	**Learning:** Ability to assimilate. Comprehend and apply new information	12					

General Comment.

1. Please make any additional comments or suggestions, which you think would help strengthen our programs for the preparation of graduates who will enter your field.

_____

_____

_____

_____

_____.

Student's Signature_____

Annexure P : Graduate Survey Form

PLO Indirect Assessment
(Questions mapped with PEOs)
Department of Chemical Engineering
University of Karachi

Graduate Survey Form

General Perspective: (1=Poor 2= Satisfactory 3= Fair 4= Good 5= Excellent)

1. Did the university provide sufficient exposure to Practical and Research related work?

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

2. How much satisfied are you with the teaching mechanism adopted at the university?

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

3. How do you rate that the Teaching Methodology at university stimulate you towards learning?

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

4. How much satisfied are you with the career-oriented sessions conducted at the university?

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

5. How much satisfied are you with load of course content?

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

6. How likely are you to recommend this university to others?

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Departmental Perspective: (1 is the lowest, 05 is the highest)

7. How much effective was the teaching within your major at the department?

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

8. How much satisfied are you with the laboratory/research facilities at the department?

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

9. How much satisfied are you with the computer/ software-based labs at the department?

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

10. How much satisfied are you with the teaching aid/ Books/Reference material at the department?

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

11. How much satisfied are you with the learning environment of classes?

☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

12. **What are your most favorite experiences at the department?**

13. Your recommendation:

Name: _____ **Designation:**_____

Company Name:_____ **Email ID:** _____

Annexure Q: Industrial Advisory Board Meeting

OFFICE OF THE DEAN FACULTY OF SCIENCE
UNIVERSITY OF KARACHI

November 23, 2020

A meeting of the Industrial Advisory Board will be held on Wednesday the 25th November 2020 at 04:00 p.m. in the Office of the Department of Chemical Engineering, University of Karachi.

You are requested to make it convenient to attend the meeting.

AGENDA

Item No.1: To consider Internship & visits of students during Covid-19

Any others items with the permission of the Chair.

To:

1. **Dr. Muhammad Mansha,** G.M. SUPARCO
2. **Engr. S.M.A Imran,** Chief Process Engineer Pakistan Petroleum Ltd.
3. **Muhammad Haris,** Head of HR, SGS Pakistan Ltd.
4. **Engr. M. Haroon,** G.M. BYCO Refinery Ltd.
5. **Engr. Allah Buksh Memon,** G.M. Lucky Cement Ltd.
6. **Engr. Chaudry Anis,** G.M. Novatex Ltd.
7. **Dr. Muhammad khusro,** G.M. HR, General Tyre.
8. **Mr. Zeeshan Zaki,** Manager Process Byco Refinery.
9. **Dr. Muhammad Ali Mirza,** G.M. Project, Pakistan Refinery Ltd.
10. **Mr. Nisar Malik,** G.M. Operations, National Refinery Ltd.
11. **Muhammad Shahid,** Manager Operations- DAP, Fauji Fertilizer Bin Qasim Ltd.
12. **Dr. Arshad Mehmood,** Head of Business Development & Product Stewardship, Archroma Pakistan Ltd.
13. **Muhammad Saad Khan,** Manager New Venture Department, Engro Polymer & Chemical Ltd.

23-11-2020

Prof. Dr. Nasira Khatoon,
Dean,
Faculty of Science & Engineering,
University of Karachi

Tel: / Fax : 99261077, 99261300-7 Ext: 2255

Department of Chemical Engineering
University of Karachi

Date: November 24, 2020

NOTICE

Dear Colleagues,

Meeting regarding of Industrial Advisory Board will be held on 25th November 2020 (Wednesday) at 04:00 p.m. in the Department based on single agenda i.e. Internship / Visit of students during COVID-19. Following internal and external are also requested to attend the meeting.

1. Engr. Rana Zaheer (Ex. G.M. Byco Refinery)
2. Prof. Dr. Fasihullah Khan (Ex-Chairman, Dept. of Chemical Engineering, UOK)
3. Dr. M. Yasir Khan (Senior Most Assistant Professor, Dept. of Chemical Engineering, UOK)

Incharge

c.c. Dean Faculty of Engineering

November 25, 2020

Industrial Advisory Board Meeting

Minutes of Meeting

A meeting of Industrial Advisory Board was held on (Wednesday) November 25, 2020 at 04:00 pm in the conference room of Department of Chemical Engineering.

The following members attended the meeting:

- Prof. Dr. Nasira Khatoon, Dean faculty of Engineering
- Dr. Shagufta Ishtiaque, In-charge and Asst. Prof. Department of Chemical Engineering
- Dr. Yasir Khan, Asst. Prof. Department of Chemical Engineering
- Prof. Dr. FasihUllah Khan, Adjunct Professor, Department of Chemical Engineering
- Engr. M. Haroon, G.M, BYCO Refinery Ltd.
- Rana Zaheer, Former G.M., BYCO Refinery Ltd.
- Engr. S.M.A. Imran, Chief Process Engineer, Pakistan Petroleum Ltd.
- Shahana Kaukab, G.M. HR, Archroma Pakistan
- Mr. Zeeshan Zaki, Manager Process, BYCO Refinery Ltd.

The following were approved unanimously:

Item No: 1:

To consider Internships and Industrial Visits for students during Covid-19.

Resolution:

1. Official letters should be sent by the Department for the requirement of internships during Covid-19.
2. Concept of Virtual Internships for students in the form of online seminars, lectures, assignments, video and graphics can be arranged for students to make familiar with the industrial and office environment.
3. Department of Chemical Engineering can request different industrial sectors to cater limited number of students (in different groups) for a short/ reduced period (few hours) in order to fulfil their internship requirements.

Any other item (Suggestions by Industrial Advisory Board Members):

1. Monthly or weekly interactions between students and industrial experts should be arranged to gain exposure.
2. Attention should be given more on utilities sector during academics in the form of lecture series by industrial experts.

25th November 2020

Department of Chemical Engineering
University of Karachi
Attendance for meeting

Industrial Advisory Board meeting held on 25th November 2020

S.No.	Name of Teacher	Designation	Signature
1.	Engr.S.M. A. Imran	Chief Process Engineer PPL	
2.	Engr.Haroon Rasheed Ansari	G.M. Advisory BYCO Petroleum Pakistan	
10.	Mr. Zeeshan Zaki	Manager Process, BYCO Petroleum Pakistan Ltd.	
11.	Dr. Arshad Mehmood	Head of Business Development & Product Stewardship, Archroma Pakistan Ltd.	
12.	Engr Rana Zaheer Ahmed	Self Employed	
13.	Shahana Kaukab	G..M. HR Archroma Pakistan Ltd.	

APPENDIX-A

HEALTH AND SAFETY POLICY

Registrar

University of Karachi
University Road
Karachi-75270
Pakistan

"SAY NO TO CORRUPTION"

NOTIFICATION

On the recommendation of the In Charge, Department of Chemical Engineering, University of Karachi, the Competent Authority is pleased to nominate the following staff for Lab-Safety Management System in the Department of Chemical Engineering in order to meet the requirement of Pakistan Engineering Council (PEC) with immediate effect.

1. **Engr. Zubair Ahmed**
   Lab. Engineer
2. **Muhammad Iqbal Siddiqui**
   Jr. Technician

The above staff are responsible for overall safety in Labs of Chemical Engineering

REGISTRAR

Copy to:

- In Charge, Chemical Engineering
- The Chairman, PEC, Islamabad
- Secretary to Vice Chancellor
- File concerned

DEPUTY REGISTRAR
GENERAL

Office of the Registrar, University of Karachi. Direct Tel. No. 92-21-99261344
Exchange Tel. No. 92-21-99261300 to 99261314 (Ext-2233) Fax-99261343
E-mail: registrar@uok.edu.pk Website: www.uok.edu.pk

20th November 2020

AGENDA

SAFETY COMMITTEE

DEPARTMENT OF CHEMICAL ENGINEERING

Date: 23rd November 2020	Venue: Conference Room	Time: 09:30a.m. (Sharp)

AGENDA POINT:

- Formation of Safety committee.
- Department Safety policy 1st Draft Attached.
- Any other item.

Dr. Shagufta Ishteyaque
Incharge

20th November 2020

AGENDA

SAFETY COMMITTEE

DEPARTMENT OF CHEMICAL ENGINEERING

Date: 23rd November 2020	Venue: Conference Room	Time: 09:30a.m. (Sharp)

AGENDA POINT:

- Formation of Safety committee.
- Department Safety policy 1st Draft Attached.
- Any other item.

S. No	Name of Members	Designation	Signature
1.	Dr. Shagufta Ishteyaque	Convener	
2.	Engr. Syed Muhammad Hasnain	Co- Convener	
3.	Engr. Muhammad Zubair	Coordinator	
4.	Mr. Muhammad Iqbal Siddiqui	Coordinator	

Dr. Shagufta Ishteyaque
Incharge

MINUTS OF MEETING

SAFETY COMMITTEE

DEPARTMENT OF CHEMICAL ENGINEERING

Date : 23rd November 2020	Venue: Conference Room	Time: 09:30 a.m. (Sharp)

AGENDA 01:

- Finalized members for safety committee.

AGENDA 02:

- Finalized following forms for all laboratories of chemical Engineering Department.
  1) Lab Safety check list
  2) Accident Report form.

S. No	Name of Member	Designation
1.	Dr. Shagufta Ishtiaque	Convener
2.	Engr. Syed Muhammad Hasnain	Co- Convener
3.	Mr. Muhammad Iqba Siddiqui	Coordinator

Dr. Shagufta Ishtiaque
Incharge,

HEALTH AND SAFETY POLICY

DEPARTMENT OF CHEMICAL ENGINEERING

UNIVERSITY OF KARACHI

1. Introduction

The Department of Chemical Engineering (DCE) has issued a statement of policy with respect to the health and safety of everyone who uses DCE premises.

DCE, as a department, distinguishes the importance of its staff and students understanding and appreciating the extent of their individual responsibilities in preserving a safe working environment. We expect their full co-operation in ensuring that the Health and Safety Policy and Procedures of the department are observed, starting with reading and understanding this document.

This document is intended to ensure DCE's statement of Health and Safety Policy to bring these policies to the attention of all employees and students.

The Health and Safety Policy Statement is supplemented by individual procedures covering a range of activities and everyone must ensure they are aware of the safety precautions appropriate to the area in which they work. This responsibility is successively devolved through DCE's management structure, all DCE staff and students carry a personal responsibility for the health and safety of those affected by their actions.

I would always encourage you to adopt a positive attitude towards health and safety requirements and to promote a healthy and safe working environment for ourselves, our students and others affected by the work of the department.

This Policy will be reviewed and updated on at least an annual basis, or more frequently with the changes in legislation.

.

2. Purpose

The department of Chemical Engineering (DCE) of University of Karachi is committed to the highest standards of education and research. DCE, as an employer, is committed to providing and maintaining a healthy and safe working environment that promotes wellbeing for all its employees, students and any other people who may be affected by its activities.

3. Organizational Scope

The ultimate responsibility for ensuring implementation of this Policy lies within the DCE.

The Safety team, corresponding teachers and Lab Staff are responsible for ensuring compliance with DCE Health and Safety Policy within their areas of control and are required to report on their health and safety action plans. They have a key role in encouraging a positive attitude to health and safety through appropriate management and arrangements. Those with supervisory or managerial responsibility of their labs and respective area are accountable to the departmental administration for managing risks to health and safety under their control.

All staff and students have a responsibility to promote a healthy and safe working environment to safeguard their own health and safety and that of their colleagues and are required to abide by rules and requirements made under the authority of this policy. Failure to do so could result in disciplinary action.

4. Objective

This Policy has the following objectives:

i. To comply with requirements of relevant legislation of University of Karachi and its practices.

ii. To identify significant hazards (the potential for harm), assess risks (the likelihood of that harm being realized) from activities involving those hazards and manage those risks.

iii. To promote a positive attitude to health, safety and wellbeing at the University amongst all staff and students

iv. To ensure that employees, students and others are adequately informed of the relevant identified risks.

v. To ensure that all employee, students and others receive appropriate instruction, training and supervision.

vi. To ensure that staff and students are competent to deal with the risks they encounter.

vii. To consult widely with staff, students and with employee's representatives on health and safety matters.

viii. To monitor actively the management of risks to health and safety.

ix. To review the effectiveness of health and safety risk management and where appropriate to implement improvements.

x. To provide expert occupational health and safety advisory services.

xi. To ensure that arrangements made under this Policy also take into account managing risks to the environment, in compliance with the Karachi University's Policy.

5. Policy Guidelines

5.1. Responsibilities of Supervisors, and In-charge staff

Every teacher or staff member who manages or directly supervises the work of others is responsible for their health and safety. Employees who are direct in charge of any specified area are required to:

i. Ensure complete safety training and made aware of the University Health and Safety Policy, the names of key staff with specific health and safety responsibilities, fire evacuation and first aid arrangements to all new employees reporting to them.

ii. Ensure adequate supervision of employees within their own area of responsibility and ensure that the staff acquires health and safety training, including compulsory training as necessary.

iii. There should be effective communication and adequate consultation concerning health and safety with members of supervisors, staff, and students.

iv. Attend appropriate management health and safety training / briefings.

v. Ensure health and safety matters brought to their attention are dealt with expediently and appropriately. In cases where issues cannot be rectified by them within prescribed working days, supervisory staff should identify and communicate an expected timescale for resolution.

vi. Ensure risk assessments are undertaken where appropriate for areas and activities within their jurisdiction and are made aware of how to report any accidents.

vii. Promote active participation in health and safety matters amongst staff and include health and safety as a standing agenda item at staff meetings.

viii. Suspend activities if health and safety is being compromised, and seek advice from the DCE chairperson.

ix. Adequately investigate any accidents or ill-health that occurs to their staff and any accidents to students/visitors. They must record the findings and recommendations, with action plans for improvement.

x. Any matter brought to their attention relating to health and safety receives prompt and appropriate action. Any matter found to be in breach of statutory requirements which cannot be effectively dealt with at their own level is escalated upwards appropriately.

xi. As part of the annual performance management process, ensure suitable and enough evaluation of staff, to confirm they can undertake their duties without harm to themselves or others, and identify safety training needs.

5.2. Duties of all Employees

Under the legislation, all members of staff are responsible for looking after their own health and safety and that of others with whom they are working. They must:

i. Comply with all local and university health and safety policies and procedure, follow any health and safety instructions provided by area coordinator or the safety team, and attend appropriate health and safety training, including compulsory training as necessary.
ii. Report any accidents, defects, unsafe circumstances (e.g. near misses) or work-related ill health of which they become aware, using the appropriate reporting systems.
iii. Ensure that their working methods or areas do not present unnecessary or uncontrolled risks to themselves or others;
iv. Make use of items and protective equipment provided for health and safety reasons. Never intentionally or recklessly interfere with or misuse any equipment provided for health and safety or firefighting.
v. Be aware of fire precautions, evacuation arrangements and first aid provision for their respective area.
vi. Inform the area coordinator if they are not confident and that, they are competent to carry out a work activity safely, rather than compromising their own safety or the safety of others.

5.3. Responsibilities of Students

It is a condition of enrolment that students agree to abide by the University health and safety policy and procedures, particularly in relation to emergency preparedness and general safe behavior. Students must also adhere to the authorized opening and closing time of DCE and comply with instructions from DCE staff responsible. DCE expects all student to play an active role in managing health and safety risks by

i. Completing any compulsory Health and Safety training as required.
ii. Making use of items and protective equipment provided for health and safety reasons. Never intentionally or recklessly interfere with or misuse any equipment provided for health and safety or firefighting.
iii. Be aware of fire precautions, evacuation arrangements and first aid provision for their respective area and complying with the need to evacuate DCE in the event of an emergency alarm, or being requested to do so by safety team or DCE staff.
iv. Considering health and safety risks prior to undertaking practical activities and discussing them with their class advisor or student counselor, and reporting health and safety incidents or accidents happened.
v. Students, if allowed to bring their children or young people (i.e. anyone under 12) in the premises of DCE, must always keep with them during their stay. Student should not bring their children (i.e. anyone under 12) near the lab area of DCE.

6. Lab Specific Trainings at DCE

The Laboratory In-charge must provide and maintain a record of training specific to the work conducted in the laboratory for their laboratory staff. This training includes, but is not limited to:

i. Location of emergency equipment, including fire extinguishers, eyewashes and emergency showers. Demonstrate how to use the equipment.

ii. The health and safety training courses required for the type of research conducted in the laboratory.

iii. Specific safety precautions that must be taken with hazardous chemicals, biological materials, or radiation, including proper disposal, laboratory-specific, task-specific and equipment-specific hazard reviews and Standard Operating Procedures (SOPs).

The DCE is also planning to purchase more safety equipments in future.

7. Standard Operating Procedures

Safe operating procedures are a critical component of Safety Policy to provide a systematic and organized approach to workplace safety.

7.1. General Personal Safety

i. Smoking is strictly prohibited within the premises of laboratories, classrooms and offices, of DCE.

ii. Eating, drinking, applying cosmetics or lip balm, and handling contact lenses are prohibited in areas where chemicals, biological or radioactive substances are handled.

iii. Clothing that is extremely loose or tight fitting should be avoided.

iv. Appropriate Personal Protective Equipment (PPE) will be used where indicated;

v. Frequent hand washing is an important safety precaution, which should be practiced after contact with laboratory equipment, specimens and machines. Proper hand washing techniques include soap, running water and 10-15 seconds of friction or scrubbing action. Hands are washed;

   a. After completion of work and before leaving the laboratory.
   b. After removing gloves.
   c. Before eating, drinking, or using lavatory facilities.
   d. Immediately after accidental skin contact with chemicals or other potentially hazardous materials.

vi. Wearing contact lenses in the laboratory is discouraged and requires extra precaution if worn. Gases and vapors can be concentrated under the lenses and cause permanent eye damage. In the event of a chemical splash into an eye, it is often nearly impossible to remove the contact lens to irrigate the eye because of involuntary spasm of the eyelid. Persons who use contact lenses should inform their supervisor and must wear no-vent goggles.

7.1.1. Working Alone

Hazardous experiments shall not be performed alone in a laboratory. Persons working alone shall decide with other persons in the building or with UPD to check on them periodically. It is vitally important not to cover or black out lab door windows so that the lab may be observed.

7.1.2. Unattended Operation

Operations and experiments that continue unattended for several hours or overnight must be pre-approved by the supervisor or laboratory in-charge. Plans should be made to eliminate

the risk of hazards in the event of a failure in power, water, gas or other service. Water cannot be left running. Do not cover or black out lab door windows. Room lights should be left on and a notice should be placed on the lab door with the name and number of the researcher running the experiment and any pertinent information.

7.1.3. Personal Protective Equipment (PPE)

The Laboratory In-charge must ensure that all required PPE is readily available to the students and researchers, and must be properly used in the laboratory and ensure that PPE needs are regularly assessed and restocked/replaced when necessary. The indicated PPE's are:

i. Lab coats or disposable aprons should be worn in the lab to protect you and your clothing from contamination. Lab coats should be buttoned and be long enough to cover the wearer to below the knees. Lab coats should not be worn outside the laboratory.
ii. Lab footwear should consist of normal closed shoes to protect all areas of the foot from possible puncture from sharp objects and/or broken glass and from contamination from corrosive reagents and/or infectious materials.
iii. Gloves should be worn for handling chemicals. No glove will provide universal protection from all chemicals. Gloves must be selected on the basis of the material being handled and their suitability for the particular laboratory operation. Cuts and abrasions should be kept bandaged in addition to wearing gloves when handling hazardous materials.
iv. Protective eyewear and/or masks may need to be worn when contact with hazardous aerosols, caustic chemicals and/or reagents are anticipated.

7.1.4. First Aid

The University has a robust system in place to make first aid provision to staff, students and anyone using the premises. A first aid kit shall be located in a clearly visible place in each laboratory and required region. The area coordinator and the safety team maintain a list of all first aiders.

7.2. Chemical and Gas Safety

To provide a safe working environment, all personnel should be aware of potentially hazardous materials and the proper way of handling this material. Avoid unnecessary exposure to chemicals. Occupational Safety and Health Administration (OSHA) requires any necessary information in the form of Material Safety Data Sheets (MSDS) concerning the handling of hazardous materials to be available to all laboratory personnel, so that they may

achieve and maintain safe working conditions.

When working with hazardous substances, risk assessments must be undertaken before work commences and hazards must be removed or controlled where possible.

Persons working with hazardous substances must undertake all necessary training as required. Information on chemical substances must be stored and made available to staff and students who may use such substances and/or be affected by their use.

7.2.1. Toxic and Corrosive Materials (acids and alkali):

i. To avoid dangerous splatter, always add acid to water.
ii. Toxic materials should be labeled with special tape when used in compounded reagents and stored in separate containers. These materials should be handled carefully and kept in the hood during preparation.
iii. Acids and alkali should be carried by means of special protective carriers when transported.
iv. Acid and alkali spills should be covered and neutralized by using the material from -the 'spill bucket'. All material, spill and compound, should be swept up and placed in a plastic bucket for proper disposal.
v. In case of spillage, wash all exposed human tissue (including eyes) generously with water and notify your supervisor for proper reporting of the incident.

7.2.2. Carcinogens

i. All laboratory chemicals identified as carcinogens must be labeled as Carcinogen.
ii. When working with these substances, protective clothing and gloves should be worn.

7.2.3. Flammable Compounds

i. All flammable reagents should be kept in the flammable storage facilities (closet or refrigerator) at all times when not in use.
ii. Any solutions compounded from these reagents should be labeled as Flammable.
iii. Flammable substances should be handled in areas free of ignition sources.
iv. Flammable substances should never be heated using an open flame.
v. Ventilation is one of the most effective ways to prevent accumulation of explosive levels of flammable vapors. An exhaust hood should be used whenever appreciable quantities of flammables are handled.
vi. Flammable compounds should be placed in proper receptacle for disposal.

7.2.4. Compressed Gases

i. The storage of all compressed gases shall be in containers designed, constructed, tested and maintained in accordance with the OSHA specifications and regulations.
ii. In the laboratory, gas containers are to be limited to the number of containers in use at any time. Low pressure (LP) gases shall also be limited to the smallest size container.
iii. Containers shall be securely strapped, chained or secured in a cylinder stand so that they cannot fall.
iv. Oxidizing gases should be separated from flammable gases.

7.2.5. Radiation Safety

i. Radioactive material should be labeled as Radioactive and stored in a proper container so as to prevent spillage or leakage.
ii. These materials must be handled carefully. Remember, the amount of radiation exposure decreases with distance.
iii. Radioactive spills should be absorbed with absorbent towel. The area should be cleaned with soap and water and then decontaminated with a product such as 'count-off'. The area of the spill is then monitored for any residual radioactivity. If the area is not decontaminated, the above regimen is repeated and re-monitored.
iv. In the case of a radioactive spill in a high traffic area, the area will be 'roped off' until proper decontamination has been achieved.
v. In the case of a major radioactive spill, all personnel in the area must be notified. The appropriate safety officer must be notified and all attempts to keep contamination at a minimum must be used.

7.2.6. Labeling

The manufacturer's label will provide the initial information on the handling of any substance. Directions found on the label must be followed. All bottles and chemical containers must be labeled, including, flasks, beakers, etc. If abbreviations are used, a reference list of the abbreviations must be posted in the lab.

7.2.7. Fume Hoods

Chemical fume hoods are intended to remove vapors, gases and dusts of toxic, flammable, corrosive or otherwise dangerous materials. It is important for lab staff to understand how the chemical fume hood in the lab functions. All laboratory personnel must be trained in proper

use of fume hoods.

7.3. Fire Safety

Every person involved in the DCE must have knowledge about the following:

i. Know where all emergency exits, fire extinguishers and fire alarms are located.

ii. Know how to properly operate appropriate fire alarms and fire safety equipment.

iii. Portable fire extinguishers are classified by their ability to handle specific classes of fires:

   a. For burning combustible materials (wood, paper, clothing, trash). GREEN TRIANGLE WITH THE LETTER 'A', uses water or an all-purpose dry chemical.

   b. For burning liquids: RED SQUARE WITH THE LETTER 'B', uses foam, a dry chemical or carbon dioxide.

   c. For electrical fires: BLUE CIRCLE WITH THE LETTER 'C' uses non-conducting extinguishing agents (carbon dioxide or a dry chemical).

   d. Multipurpose: Recommended for all types of fire. Most common extinguisher found in most laboratories.

iv. If a fire extinguisher is used, it cannot be rehung on the wall with it being serviced, as it will lose pressure and will not work again.

All staff should know the proper procedure for notifying colleagues and proper personnel of a fire i.e.

R- Rescue- Without entering a hazardous situation or area, rescue and remove all individuals from the area.

A- Alarm- Activate alarms/alert occupants in the building

C- Confine- all doors, windows and access to the affected area must be closed to confine spread of the fire and smoke. All access must then be restricted to emergency response personnel only.

E- Evacuate - evacuate the area to allow the emergency response crews to fight the fire. Report to the assigned rally point for a head count.

OR

E- Extinguish - attempt to extinguish the fire only if,

i. Training has been received on how to use a fire extinguisher.

ii. The proper extinguisher is available.

iii. The fire is still small enough to be handled by the fire extinguisher to be used.

7.4. Electrical Safety

i. Extension cords are intended only for temporary use with portable equipment. The permanent use of extension cords is prohibited.

ii. All equipment must be properly grounded.

iii. Never operate electrical equipment with fluid spillage or with wet hands.

iv. Never use plugs with exposed or frayed wires.

v. If there are sparks or smoke or any unusual events occur, shut down the instrument and notify the manager or safety officer. Electrical equipment that is not working properly should not be used.

vi. If a person is shocked by electricity, shut off the current or break contact with the live wire immediately. Do not touch the victim while he is in contact with the source of current unless you are completely insulated against shock. If the victim is unconscious, call the ambulance service and carry the victim to the nearest hospital.

7.5. Cut Safety

Sharps (needles, broken glass, scalpels, razor blades, etc.) must not be disposed in the regular waste stream. Needles and scalpels must be placed in red plastic “sharp” boxes and disposed off as biomedical waste, no matter if they are contaminated with a biological substance or not. Broken glass must be placed in a rigid puncture resistant container.

Uncapped needles must not be left where someone may sustain a needle stick. Used needles cannot be recapped, broken, bent or sheared. If the needle and syringe are to be used again, it should be placed in a wide mouth jar, beaker, or otherwise secured, so that staff using the area are protected from a needle stick injury. New needles (and syringes) should be stored in a secure cabinet.

Razor blades, microtome blades and other objects that may puncture trash bags or boxes, no matter if they are contaminated or not, must be disposed off into sharps boxes.

7.6. Construction Safety

For any construction work, all the respective workers are engaged to conduct their work in accordance with the terms and conditions of the contract, health and safety legislation, university procedures, codes of practice and without endangering the university's employees, students or others;

7.7. Laboratory Security

Laboratory security is everyone's responsibility. The basic requirements are:

i. Control access. Restrict labs to authorized personnel only.
ii. Keep laboratory door locked when no one is in the lab.
iii. Maintain an inventory. Know where and how much hazardous material is in the lab. An inventory must be carried out and updated at least annually to cross check against the previous inventory, cull out unused or expired chemicals, and check the condition of caps, bottles and labels.
iv. Report any unaccounted loss of hazardous material to the chairperson of DCE.
v. Train all laboratory staff on security procedures and why they are important.

8. Laboratory Equipment

The types of equipment and instrumentation used in DCE lab settings are as diverse as the various experiments and research performed. Although each will have its own specific safety requirements, there are some general guidelines to follow whenever operating any lab equipment and instrumentation:

i. Always keep the manufacturer's operating manual with the instrument.
ii. Follow recommended maintenance procedures outlined in the manual.
iii. New operators should be trained by qualified lab personnel and familiarize themselves with the operating manual, including all pertinent safety information.
iv. Never remove hazard-warning labels from an instrument.
v. Ensure that all equipment is grounded.
vi. If compressed gases are used with the instrument, follow the predefined rules for the storage and use of respective compressed gas by renowned regulatory body.
vii. Use protective equipment recommended by the manufacturer when using the instrument.

9. Fire Emergency

This Safety Code of Practice sets out what supervisors, teachers, staff, students and visitors must do to ensure that all persons are trained in what to do in a fire emergency.

To comply with the DCE Safety Policy, formal fire drills must be carried out every semester. NOTE: False alarm evacuations are not considered replacements for formal fire drills. The team organizing the drill must make the Chairman of DCE aware in advance of the planned drill so that account can be taken of potentially dangerous experiments or other work activities where a drill could lead to an unsafe situation arising e.g. in laboratories.

Information on what to do in the event of fire is available to all building occupants, including visitors. Fire drill is to be followed as per designed plan of DCE.

The objective of fire drill is to;

i. Assess the reliability of fire emergency equipment such as fire alarms and evacuation path and gates.
ii. Check that those with specific roles carry them out effectively, e.g. Area coordinator, Laboratory in-charge and Safety team members.
iii. Suitability of procedures for evacuating those people who are unable to escape without assistance.
iv. A record of the overall evacuation time will be needed for the Fire Risk Assessment, so it is important the total evacuation time is noted.

Non-compliance must be considered a serious offense and disciplinary measures should be taken against the individual concerned.

Any fire drill rated “Unsatisfactory” will be rescheduled and reevaluated later.

10. Concluding remarks

The DCE will take all responsible steps necessary to provide a healthy and safe environment for work and study. Compliance with all statutory obligations is the minimum standard. In this regard Safety Committee has been formulated in March 2020 by the University of Karachi as per attached letter of PEC. To implement proper Safety Policies, regular meeting has also been conducted in the department as per attached. The Safety Committee has finalized a Safety Checklist Report and Accident Report format to avoid future incidents. The safety policy of DCE can only be effective if there is commitment by the chairperson/Incharge all teaching and non-teaching staff, Lab Engineers, Lab Technicians, students, and others at the DCE.

Department of Chemical Engineering
University of Karachi

(To be completed with the Lab-Safety Management System Investigator in Department of Chemical Engineering)

Accident Report Form

INCIDENT SPECIFICS

Date: _____ **Time:** _____ AM / PM **Location:** Room # _____

☐ **TEACHING LAB INCIDENT** ☐ **RESEARCH LAB INCIDENT**

Course: _____ **Section:** _____

Experiment:_____

Person(s) Involved: _____(signature):_____

_____(signature): _____

Witness(es): ___(signature):_____

INCIDENT TYPE (check/circle all that apply)

☐ **INJURY**: Cut Chemical Burn Burn Chemical Exposure Other: _____

☐ **FIRE**: Electrical Fire Solvent Metal Paper/Wood Other:_____

☐ **EXPLOSION/IMPLOSION**: High Pressure Low Pressure Chemical Equipment Malfunction Other:

_____

☐ **CHEMICAL EXPOSURE**:

Spill Container Break Leak Vapor Liquid Solid
Other:

_____

☐ **ILLNESS** (symptoms): Fainting Nausea Dizziness Other: _____

DESCRIPTION OF ACCIDENT

(Example: Individual sustained a laceration on the third finger of the right hand while washing a beaker

MATERIALS INVOLVED IN THE ACCIDENT

(Example: 6M HCl acid resulted in a burn, broken glass resulted in a cut)

treatment

(Example: hand was rinsed under cold water for 15 min)

SAFETY EQUIPMENT USED (check/circle all that apply):

First Aid Kit Fire Extinguisher Spill Cleanup Kit Eye Wash Shower
Neutralizing Material Other:
_____

☐ Student was NOT sent to the infirmary

☐ Student was sent to the infirmary at _____ AM PM, accompanied by
_____

FOLLOW UP

Student's cell phone number: _____

Follow up contact (print): _____ Follow up date: _____

Lab Teacher Name: _____ (signature):_____

Safety Coordinator Name: _____ (signature):_____

Incharge
Department of Chemical Engineering (signature):_____

Safety Committee reviewed (date): _____

DEPARTMENT OF CHEMICAL ENGINEERING
UNIVERSITY OF KARACHI

Date From ____________ to_____________

Safety Checklist of Equipment (Daily)

Name of Lab:____

Name of Subject Teacher: ____________________________________

Name of Lab Engineer:____

Name of Lab Technician:______________________________________

Please Check(✔) mark in box indicate inspection complete and satisfactory.

Inspection Item	Monday		Tuesday		Wednesday		Thursday		Friday	
	Working	Not Working	Working	Not Working	Working	Not Working	Working	Not Working	Working	Not Working
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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APPENDIX-B

UNIVERSITY OF KARACHI

DEPARTMENT OF CHEMICAL ENGINEERING

CORRECTIVE ACTION FORM FOR CQI OF CLOs & PLOs

Course Code & Title: _____

Course Teacher: _____

Meeting of OBE Team dated: _____

Suggested Corrective actions for CLOs

1. Review of student course feedback.
2. Review of assessment methodologies.
3. Course Content Review.
4. Review of course learning outcome statement
5. Faculty Training

Suggested corrective actions for PLOs

1. Review of CLO amassment method.
2. Review CLO-PLO mapping.
3. Review of curriculum.

Recommendations of OBE Team

_____ _____

Approved by CTD OBE Team

APPENDIX-C

Research Publications

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4. Mujtaba Ellahi, M. Y. Rafique, **Shagufta Ishtiaque**, M. Furqan Ali, and Jameel Memon, "Study on the Effects of Epoxy Resin Based Polymer Dispersed Liquid Crystal Films Using Polythiol Group (–SH) as Hardener and Catalyst", Materials Focus, Thomson router**,** Vol. 4, ISSN 2169-, pp. 197–201, 2015. **(ESCI) Web of Science (Thomson Reuters)**
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The International Journal of Engineering and Science (IJES), ISSN 2250-3021, pp. 2280-8785, Vol. 06, **2016.** (**International Journal)**

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11. S. Sikandar, **Shagufta Ishtiaque**, N. Soomro, Hazard and Operability (HAZOP) study of wastewater treatment unit producing biohydrogen, Sindh University. Research. Journal**.** (Sci. Ser.) Vol. 48 (1) pp.131-136, ISSN 1813-1743 2016. **(HEC-Y category)**

12. W. Khan, V. Inglezakis, **Shagufta Ishtiaque**and K. Moustakas "Application of Decision Support Software tool in solid waste management in Karachi, pp I–III Waste Management 48, ISSN: 0956-053X Elsevier, 2017. (IF 0.8)

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21. **Shagufta Ishteyaque,** Shahina Naz, Aziza Aftab, Arshad Faruqui and Asia Neelam, Analysis of Barrier Properties of Low-Density Polyethylene films (LDPE) after addition of natural Polyphenolic extract, Journal of Chemical, Biological and Physical Sciences,Vol. 8, ISSN:2249-1929, DOI:10.24214/Jchps.A.8.2.21019, pp. 210-219,**2018.** **International**
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24. **Shagufta Ishteyaque,** Shahina Naz, Rahmanullah Siddiqi, Syed Umer Abdullah, Kekshan Khan, Jawad Ahmed, Muhammad Badaruddin, "Antioxidant Activities of Extracts from Terminalia catappa, Carrisacarandas, and Opuntiaficusindica fruits", Recent Innovations in Chemical Engineering,pp.106-112, Vol 7, ISSN 2405-5212, 2014. **International Journal**
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APPENDIX-D

Sample Course Profile

Course Profile
CE-404 Particulate Technology
Department of Chemical Engineering
University of Karachi

Course Code and Title:	CE-404 Particulate Technology					
Credit Hour: 4 (3+1)	**Contact Hours:**	3+1	**Semester:**	IV	**Year:**	2020

Counselling Hours:	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
	14:00 -15:30	14:00 –15:30	14:00 – 15:30	--	--

Course Teacher Name:	Engr. Syed Ali Raza/Dr.Shagufta Ishtiyquae

Course Content

Characterization of particle and particulate systems (Sieve analysis, Particle size analysis); Processing (Granulation, Sedimentation); Particle Formation (Granulation, Size Reduction); Description & Energy calculations for coarse to ultrafine size reducing equipment, Agglomeration.
Storage and Transport (Hopper Design, Conveyers and its types Pneumatic Conveying, Standpipes, Slurry Flow);
Mechanical Separation (Filtration and its types, Settling, Cyclones); Properties of Particulate Systems (Colloids, Respirable Drugs, Coal-Water Slurries, Slurry Rheology). Hazards identification of Mechanical equipments.
Motion of particles in fluid; drag force on a spherical particle, motion of bubbles and drops, accelerated motion of particles in centrifugal field
Sedimentation of fine particles and coarse particles
Solid-Liquid mixing; types of mixing and mixing mechanism. Equipment for solid-liquid mixing
Flow through porous media, Carman-Kozney equation
Electrostatic Precipitation: Basic operating principles, the physics of precipitation, factors effecting the design and performance of electrostatic precipitators.
Powder, ultra-fine and nanoparticles technology

Course Objectives

This course deals with:

To provide the understanding of the fundamentals of particulate technology with emphasis on applications in chemical and process industries.

Course Learning Outcomes (CLO)

CLO #	**CLO**	**Domain**	**Taxonomy Level**	**PLO**
On completion of the course, the student will be able to:				
CLO-1	**Define** the basic principles of Particulate Technology and laws.	Cognitive	C1	1
CLO-2	**Discuss** the characterization, operations and formation of particles and particulate Systems.	Cognitive	C2	2
CLO-3	**Calculate** Power consumption, efficiency etc. of different types of equipment used in particulate operations.	Cognitive	C3	3
CLO-4	**Observe** the results developed through experimental work by utilizing the theoretical knowledge of particulate technology.	Psychomotor	P1	4

Performance Criteria

Assessment Type	**Marks**	**Schedule (Week No.)**	**CLO Assessed**
Test 1(Mid-term exam)	30	8th	1 ,2 and 3
Assignments			
Test-2			
Presentations	--	--	--
Open Ended Lab		--	4
Complex Engineering Problem			
Lab Sessional	10	--	--
Final Examination	70	--	1,2,3
Final Lab	40	--	4
Total	150		

Resources

Textbook/Reference Book:	1. Coulson J.M, Richardson J.F., "Chemical Engineering-Particle technology and separation processes" Vol 2, 5th Ed. 2007, Pergamon Press. 2. McCabe Warren L, Smith Julian C, Harriot Peter., "Unit Operations, 7th Ed., 2010, McGraw-Hill Inc. 3. "Introduction to Chemical Engineering" by Walter Lucius Badger, Julius Thomas Banchero

APPENDIX-E

Courses Learning Outcomes (CLOs) of all courses.

Course Code	Course Name	CLO Description
1st SEMESTER		
300.1	English-I	I. Write varied contents including official letters, e-mails, and applications and summarize the texts using appropriate grammatical mechanisms and cohesive devices.
		II. Apply skimming, scanning and detailed reading and listening strategies to understand gist of the text/conversation.
		III. Demonstrate their skills using English language to express their point of view, show arguments and deliver a presentation in a real-life situation.
300.1	Islamic Studies / Ethics	I. **Effectively** maintained his/her identity in a multicultural world
		II. **Find** solutions to his/her problems from own cultural practices, rather than be influenced by external ideologies.
		III. **Know** why Muslims fail to equip themselves with essential survival tools needed in the world today.
CE-301	Chemical Process Principles-I	I. **Identify** basic process variables and convert units of physical quantities for subsequent calculations.
		II. **Describe** principles and methods for carrying out material balances.
		III. **Apply** material balances to chemical processes with single or multiple units.
CE-303	Physics	I. **Explain** the basic concepts and laws related to circular and simple harmonic motion with Applications,
		II. **Explain** the basic terms and the laws related to light and nuclear energy.
		III. **Acquire** and demonstrate skills in performing basic practices in Physics
CE-305	Mathematics-I	I. **Evaluate** the functions and their derivatives.
		II. **Assess** the Integral calculus with applications and apply the vector calculus in the field of engineering
		III. **Develop** the concepts of two- and three-dimensional geometry
		IV. **Analyze** area and volume of bounded regions by using multiple integrals
CE-307	Engineering Drawing	I. **Understand** and recognize engineering drawing and graphics as a language of communication.
		II. **Apply** engineering visualization principles and projection theory in engineering drawing development.
		III. **Produce** orthographic projections, isometric views and sectional views of different mechanical parts.
2nd SEMESTER		
300.2	Pakistan Studies	I. Trace the Muslim Nationalism in South Asia and the creation of Pakistan
		II. Explore the Constitutional, Political and Diplomatic History of Pakistan
		III. Analyze the Geo-strategic importance of Pakistan and contemporary challenges to Pakistan
300.2	English II	
CE-300	Applied Chemistry-I	I. **Explain** theories and laws of inorganic compounds and Analytical Instrumental Techniques.
		II. **Solve** problems related to inorganic and Analytical Chemistry.
		III. **Determine** the concentration and amount of different substances through volumetric analysis, gravimetric analysis, p-H metry, spectroscopy and

			chromatography using laboratory apparatus.
CE-302	Chemical Engineering Thermodynamics I	I.	**Understand** the chemical engineering thermodynamics terminology and Laws of Thermodynamics.
		II.	**Explain** the underlying principles of phase equilibrium in one-component and two-component systems.
		III.	**Calculation**involve heat, work and energy, properties of ideal and real mixture based on thermodynamics principles.
		IV.	**Organize** Chemical Engineering Thermodynamics I theory by experimental tools in laboratory.
CE-304	Mathematics-II	I.	**Assess** The formation and the solution methods of first order linear and non-linear differential equation
		II.	**Evaluate** higher order linear and partial differential equations
CE-306	Computer & Computation	I.	**Acquire** and demonstrate skills in performing various tasks on basic and advanced features of Word and Presentation software.
		II.	**Acquire** and demonstrate skills in performing various tasks on basic and advanced features of Algorithm design and testing.
3rd SEMESTER			
CE-401	Applied Chemistry-II	I.	**Explain** reactions and manufacturing process of organic compounds and basic scope of biochemistry.
		II.	**Solve**problems related to thermodynamics and kinetics of chemical reactions in unit process.
		III.	**Determine** the percentage yield of some organic compounds after their preparation, effect of optimum conditions on yield of product and identification of organic and biochemical compound using laboratory apparatus.
CE-403	Chemical Process Principles-II	I.	**Describe** all process species in feed and product streams and illustrate a systematic approach to material balance calculations.
		II.	Do energy balances to account for the energy that flows into or out of each unit of a process, to **Calculate**the net energy requirement for the process and to design ways to reduce the energy requirement to improve process profitability.
CE-405	Mathematics-III	I.	**Perform** the basic operation of matrix algebra and solution of system of linear equations.
		II.	**Apply** Laplace Transformation and find its application
CE-407	Fluid Mechanics	I.	**Explain** theories and principles related to fluid mechanics.
		II.	**Apply**theories to solve simple and complex systems involving fluid flow
		III.	**Analyze** fluid flow measurements using laboratory euipements.
CE-409	Electrical & Electronics Engineering	I.	**Explain** the basic concept of Electrical quantities and laws and the principle of operation, Construction and characteristics, of electrical machines.
		II.	**Define** the industrial electronic machines, digitalelectronics, sensors and transducers
CE-411	Workshop Practice	I.	**Identify** basic difference of tools and procedures used in wood and metal working.
		II.	**Execute** the assigned jobs in different working materials and with their respective tools.
		III.	**Inject** safety and safe operating procedures during their assigned jobs.
4th SEMESTER			
CE-400	Chemical Process Technology-I	I.	**Define** and identify various methods and raw materials, process flow diagrams, conditions and parameters of different chemical process industries.
		II.	**Discuss** and explain various environmental aspects related to emissions and their effect on environment in process industry.

		III.	**Use** research methods to demonstrate new technological advancements in the Chemical Process Industries.
CE-402	Heat Transfer	I.	**Describe** the basic heat transfer, modes, boiling & condensation
		II.	**Solve** problems for different heat transfer mechanism; conduction, convection and radiation
		III.	**Design** of sensible & latent heat transfer equipment on industrial scale
CE-404	Particulate Technology	I.	**Explain** the particulate system with respect to physical processing, equipment etc.
		II.	**Discuss** the characterization of particulate, operation of equipment and formation of particles, hazards of equipment etc.
		III.	**Calculate** Power consumption, efficiency etc. of different types of equipment used in Particulate operations.
		IV.	**Evaluate** the results developed through experimental work by using the theoretical knowledge of Particulate Technology.
CE-406	Logic & Critical Thinking	I.	**Separate** bad information from good information
		II.	**Analyze** arguments and construct cogent arguments
		III.	**Understand** causal connection in systems
CE-408	Mathematics-IV (Numerical Methods & Engineering Statistics)	I.	Root of non-linear equation(x)=0 and its computation and iterative methods for the solution of simultaneous linear algebraic equations.
		II.	Interpolation and extrapolation and Numerical differentiation and integration
		III.	Numerical Solution of ODE
		IV.	Computational software Mathematical
		V.	Numerical integration and differentiation, Trapezoidal rule, Gaussian quadrature
CE-410	Computer Aided Drawing	I.	**Acquire** the basics of CAD software.
		II.	**Apply** CAD tools in the formation of 2D and 3D drawings.
5th SEMESTER			
CE-501.1	Communication Skills	I.	Draft varied texts including formal letters, CV, cover letter for jobs, and Technical Reports using mechanisms of academic writing integrated with paraphrasing and summarizing techniques.
		II.	Understand, interpret and infer the texts critically and apply the knowledge in real life situations by participating in public speaking acts and group discussions.
CE-501	Mass Transfer	I.	**Explain** the concepts of diffusion, convective, single phase and interphase mass transfer.
		II.	**Illustrate** expressions related to mass transfer co-efficient and mass flow.
		III.	**Solve** numerical related to Liquid-Liquid extraction, absorber, solvent extractor and adsorption vessel for given flow conditions.
		IV.	**Demonstrat**e diffusivity measurement for gases and liquids, mass transfer coefficient of gases solid and liquid system, adsorption equilibrium, stages of leaching and other mass transfer operations using laboratory equipment.
CE-503	Fuel & Combustion	I.	Selection composition and sources of industrial fuels renewable energy. Define & Discuss flame & its Types.
		II.	Discuss & Analyze principles of combustion, combustion of oil, coal and gas. Types of boilers. Furnaces and waste heat recovery. Calculations based on fuel and energy.
		III.	Turbulent premised flame, Regime and flame stabilization. Gas turbine engines

			spark ignition engine. Droplet-gas-phase, inter-phase droplet combustion.
		IV.	Organize practical of Fuel and Combustion.
CE-505	Engineering Economics	I.	**Explain** various types of cost involved in production and process industry.
		II.	**Analyze** engineering projects using appropriate method based on Monetary and non-monetary factors related to project
		III.	**Apply** different kinds of interest to a principal amount and calculate Tax Rate.
CE-507	Chemical Engineering Thermodynamics-II	I.	**Understand** the concepts of heat, work, lost work, entropy and procedures for estimating the thermodynamic properties.
		II.	**Calculate** problems dealing with multi-phase chemical systems, reactive systems and the properties of ideal and real mixtures based on thermodynamic principles
		III.	**Solve** the problems of heat engines, refrigeration processes and different cycles.
CE-509	Computer Programming & Software Application	I.	**Explai**n the Algorithm to coding, Program structure, defining data, Mathematical expressions, logical expressions, and bit operation
		II.	**Understand** the concept of library functions, text related functions, modularization, arrays recursion, secondary storage files, Program flow control and iterative statements
6th SEMESTER			
CE-500	Engineering Materials	I.	**Explain** the various types, properties and applications of engineering materials and materials of construction.
		II.	**Demonstrate** nature, types and rate of corrosion, selection of equipment in environmental contexts
		III.	**Evaluate** problems for material testing, stresses and strains considerations and corrosion protection methods
CE-502	Chemical Reaction Engineering	I.	**Describe** and **Discuss** kinetics, rate equations and catalysis.
		II.	**Model**and propose different combination of non-catalytic and catalytic reactors.
		III.	**Apply** reactor design algorithms to non-catalytic and catalytic processes.
		IV.	**Demonstrate** reaction engineering theory by experimental tools in laboratory.
CE-504	Simultaneous Heat & Mass Transfer Operations	I.	**Identify** the theoretical background of humidification/dehumidification, mechanism of moisture movement during drying, types of distillation.
		II.	**Select** types of dryers, calculate efficiency of cooling tower and dryers.
		III.	**Calculate** number of plates, for binary separation using different methods, multicomponent distillation, key component in multicomponent mixtures, azeotropic distillation, and column design.
		IV.	**Organize** lab related to differential, fractional & azeotropic distillation, drying, transfer unit of cooling tower.
CE-506	Transport Phenomena	I.	**Develop** the model equations for flow in falling film, circular tube, Annulus, two adjacent immiscible fluids and creeping flow around a sphere.
		II.	Fourier's Law, Energy equation and application to heat transfer problems involving conduction, forced and frees convection. **Develop** energy transport equations for heat conduction with electrical heat, nuclear heat, viscous heat, chemical heat sources. Mass transport equations, species conservation equations for binary and multicomponent mixtures and Temperature and concentration distribution in turbulent pipe flows
		III.	**Solve** the problem involving Newton's Law of viscosity, pressure and temperature dependency of viscosity. Estimation of viscosity of pure gas and

			mixture of gases. Solve the real industrial problems related to momentum, energy and mass transport.
CE-508	Chemical Process Technology-II	I.	**Identify** the steps involved in different Process Industries.
		II.	**Explain** the pretreatment process for various Raw Materials.
		III.	**Demonstrate** complete process of an industry through block/process flow diagram.
		IV.	**Perform** Synthesis of few chemical products in laboratory
7th SEMESTER			
CE-601	Instrumentation & Process Control	I.	**Analyze** the terminology of instrumentation with respect to types of sensors for measurement, transmitters, controllers, actuators, recorders switches etc.
		II.	**Apply** instrumentation and control strategies for Chemical Processes and Industrial Applications with the help of PI &D and Block diagrams etc.
		III.	**Develop** the problems of Mathematical Modeling by using material and energy balances by Laplace Transforms and other techniques.
		IV.	**Evaluate** results developed through experimental work by different control parameters.
CE-603	Chemical Process Design & Simulation	I.	To **analyze** Integrated Process Design, Process Synthesis by Hierarchical Approach, Optimization, Heat and power integration and Cooling Water Systems.
		II.	To **evaluate** problems of Separation systems, three phase separators, Cooling Water Systems and Optimization.
		III.	To **apply** Block flow diagram, Process Flow diagrams (PFD) and Piping & instrumentation Diagram (P&ID) in various units and processes.
		IV.	To **get** confidence and at least basic proficiency in various simulation programs like Aspen HYSYS etc.
CE-605	Project Management	I.	**Analyze** basic project management principles, concepts & techniques with respect to different organizations.
		II.	**Propose** solution to problems of project growth, planning, scheduling and controlling with respect to industries.
		III.	**Assess** project management skills
CE-607	Chemical Engineering Plant Design	I.	**Explain**of basic steps of design project, knowledge of documentations and ability to Explain HAZOP for various chemical process units
		II.	Ability to **Solve** size and design calculations of equipments for liquid solid and gas separations, temperature and pressure swing regeneration, fluidized bed, pipeline, PSVs, PRVs, reaction vessels and pressure vessel design.
		III.	Ability **Calculate** problems of mass and energy balance, optimization, refrigeration cycles, pinch method to optimize process heat recovery and design of heat transfer units and pumps.
8th SEMESTER			
CE-602	Production & Operations Management	I.	**Understand** the basic concept, history, functions and decisions of operation Management.
		II.	**Explain** production planning methods, MRP, management chart and work method.
		III.	**Apply** management techniques in location selection, plant layout, inventory control, achieving competitive advantage etc.
CE-604	Maintenances Engineering & Safety	I.	**Categorize** basic principles and requirements of plant maintenance and safety.
		II.	**Develop** Maintenance program and HAZOP document for chemical processing plant.
		III.	**Evaluate** possibilities and causes of accidents in industry.

CE-623	Renewable Energy	**I.**	**EXPLAIN** basic properties and solve design problems of different renewable sources of energy and technologies for their utilization
		II.	**DESIGN** and development for renewable energy sources and future of Pakistani renewable energy resources
		III.	**DIFFERENTIATE** different renewable sources of energy by environmental aspects
CE-618	Petroleum Engineering	I.	**Understand** nature of crude oil, evaluation of petroleum products, main and auxiliary processes.
		II.	To **Apply** knowledge of distillation and other unit operations for petroleum processing.
		III.	**Illustrate** conversion processes for improving quantity and quality of petroleum products.

APPENDIX-F

Samples of some Complex Engineering Problems

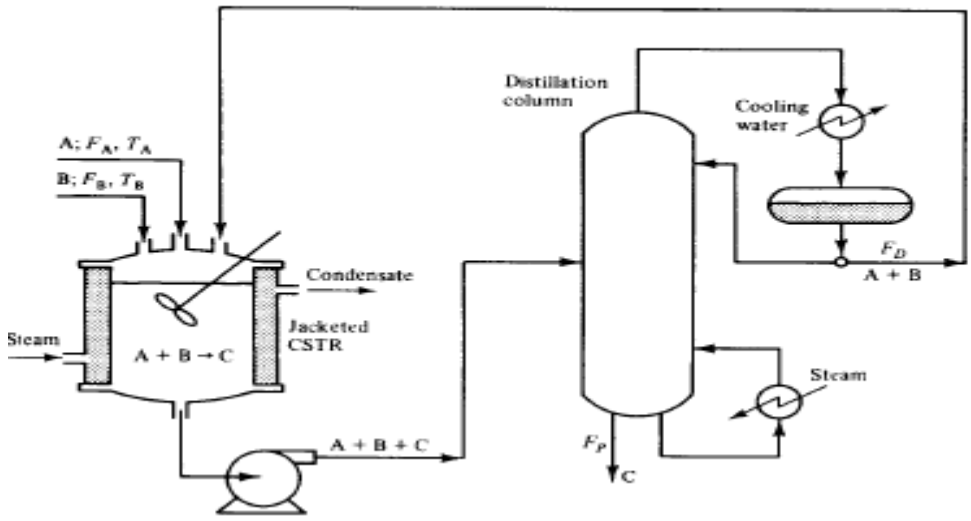
DEPARTMENT OF CHEMICAL ENGINEERING
UNIVERSITY OF KARACHI

CE-601 Instrumentation & Process Control
Complex Engineering Problems

A1:

Consider a simple chemical plant composed of two units a CSTR and a distillation column. The raw materials entering the reactor are A and B with flow rates F_A and F_B and temperatures T_A and T_B respectively. They react to yield C. The reaction is endothermic and the heat is supplied by steam which flows through the jacket of the reactor. The mixture of C and unreacted A and B enters the distillation column, where A+B is separated from the top as the overhead product and C is taken as the bottom product.

1. Develop a control strategy temperature, flow, level and pressure for each unit by placing the instruments for its controlling.
2. Develop a feed backward control strategy for the whole integrated process.
3. Develop a feed forward control strategy for the whole integrated process.



A2:

Design a detailed feed backward and feed forward control philosophy of a balanced draft crude heating furnace with its controlled, manipulated variables and disturbances. State which control strategy is efficient?

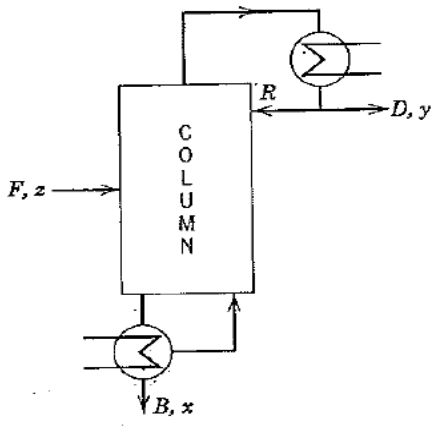
A3:

Design a detailed feed backward and feed forward control strategy of a water tube boiler 3 element control system. State which control strategy is efficient?

A4:

A distillation column shown in figure is used to distill a binary mixture. Symbols x, y and z are denote mole fractions. Of the more volatile component, while B, D, R and F represent molar flow rates. It is desired to control distillate composition y despite disturbances in feed flow rate F, all flow rates can be measured and manipulated with the exception of F, which can only be measured. A composition analyzer provides measurements of y.

1. Propose a feedback control method and sketch the schematic diagram.
2. Suggest a feed forward control method and sketch the schematic diagram.
3. Develop the strategy for controlling its temperature and pressure by the placing the instruments using feedback ward and feed forward control loop.



A5:

To effectively remove volatile organic compounds (VOCs) and hazardous air pollutant emissions, one can use a membrane separation process. This is a visible process when the air stream contains relatively high concentration (10,000 ppm) of vapors. A schematic representation of this process is sketched in figure.

The VOC- contaminated air stream is first compressed (to about 45-200 psig) and the compressed mixture is sent to the condenser where the organic vapor condenses and is recovered for reuse. The no condensed air stream (typically 1% organics) proceeds to the membrane unit. To induce selective permeability of the gases, a pressure difference is created across the membrane by a vacuum pump. Organic vapors are enriched on the permeate side and returned upstream. Cleaned gas is vented to atmosphere. For this process,

1. Identify all relevant control objectives and indicate which is the primary one. State all possible disturbances.
2. Identify all controlled variables (outputs) and the available manipulated variables (inputs).
3. Suggest a feedback controller and a feed forward controller to satisfy a control objective identified in (1).

4. How would we control its temperature and pressure by placing instruments? Show its control strategy in feedback control loop.

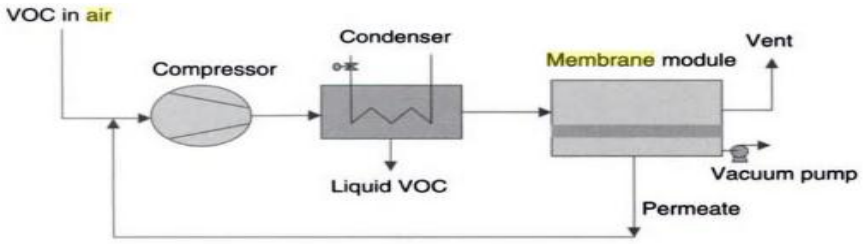
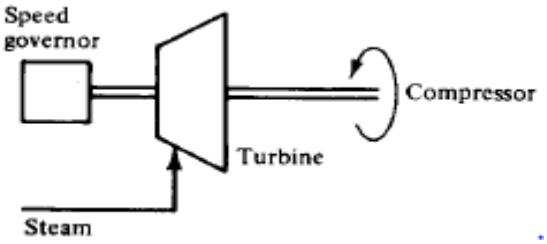


FIGURE I.3 Schematic representation of a membrane separation process.

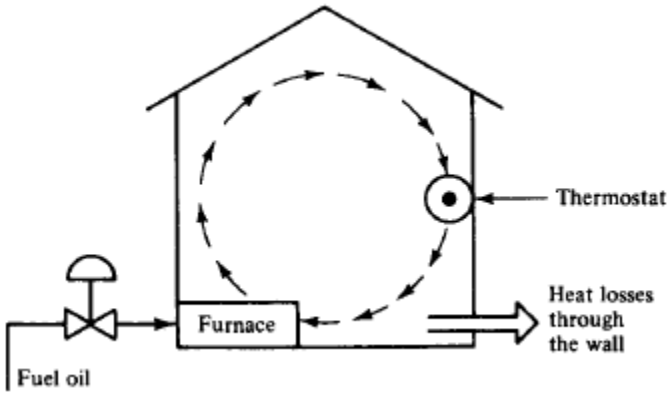
A6:
A steam turbine drives a compressor whose load can charge with time. Small variations in the shaft speed of the turbine are controlled through the use of a fly ball speed governor. For this system:

1. Identify all the external disturbances.
2. Identify all the available manipulated variables.
3. Also determine the basic control objective and design a feedback control system and feed forward control system that can be used to satisfy the control objective.



A7:
Consider the air-heating system used to regulate the temperature in a house. The heat is supplied from the combustion of fuel oil.

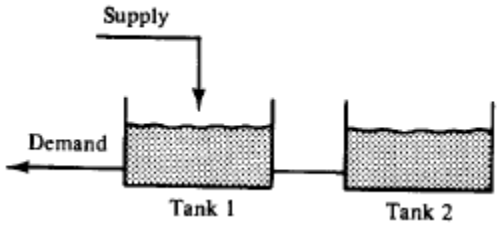
1. Identify the control objectives, the available measurements, and manipulated variables. What are the external disturbances for such a system?
2. Develop a feedback control configuration to achieve your control objectives.
3. Is a feed forward control configuration possible for achieving your control objectives?



A8:

The below figure shows a system of two tanks which are used for the temporary (tank 1) and longer-term (tank-2) storage of a liquid chemical product. The demand is satisfied from the temporary storage tank, while tank 2 is used to accumulate the liquid product in excess of the demand.

1. Identify the external disturbances, control objectives, measurements, and manipulated variables.
2. Develop feedback and feed forward control configurations to achieve your control objectives.
3. Is there any situation that may arise during which you cannot avoid overflowing of the storage tank?

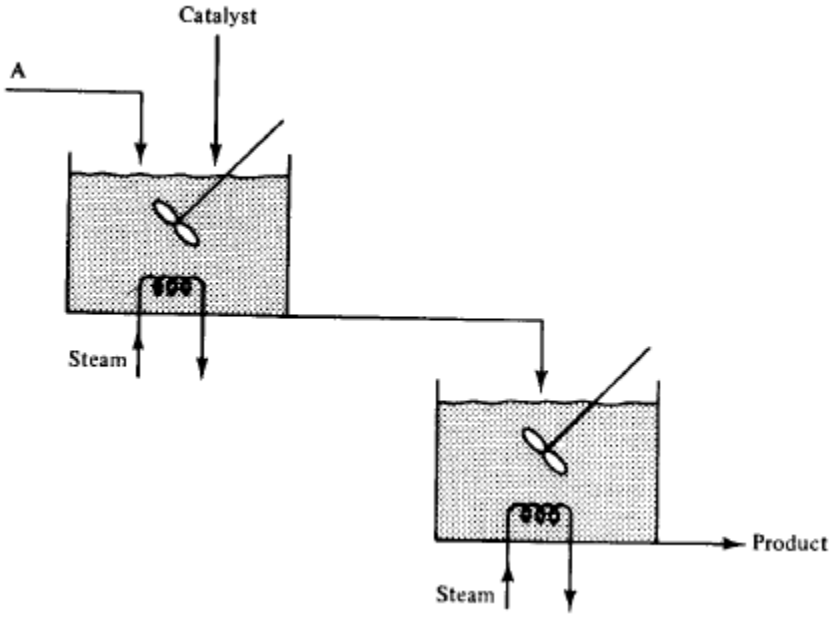


B1:

Consider a system of two continuous stirred tank reactors in series as shown in figure, where the following endothermic reaction takes place:

$$A + \text{Catalyst} \longrightarrow B$$

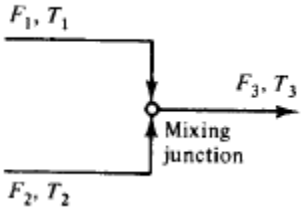
1. Identify the control objectives for the operation of the two CSTRs.
2. Classify the variables of the system into inputs and outputs and subsequently classify the inputs into disturbances and manipulated variables and the outputs into measured and unmeasured outputs. Is this a SISO or a MIMO system?
3. Develop a feedback control configuration that satisfies your objectives using a composition analyzer at the exist stream of the second CSTR.
4. Develop an inferential control configuration that uses temperatures and flow rates only, assuming that a composition analyzer is not available.
5. Develop a feed forward control configuration that can be use composition analyzers if they are needed.
6. In your opinion, which system is easier to control, the two-CSTR system shown in figure or an equivalent one-CSTR system that achieves the same conversion? Explain qualitatively why.



B2:

Two liquid streams with flow rates F1 and F2 and temperatures T1 and T2 flow through two separate pipes which converge at a mixing junction as shown in figure. We want to maintain constant the flow rate F3 and the temperature T3 of the liquid stream resulting from the mixing of the first two streams.

1. Identify the control objectives, disturbances, available measurements, and manipulated variables. Is this a SISO or a MIMO system?
2. Develop a control system that uses only feed forward controllers.
3. Develop a control system that uses only feed forward controllers.
4. Develop two different control systems that use both feedback and feed forward controllers.

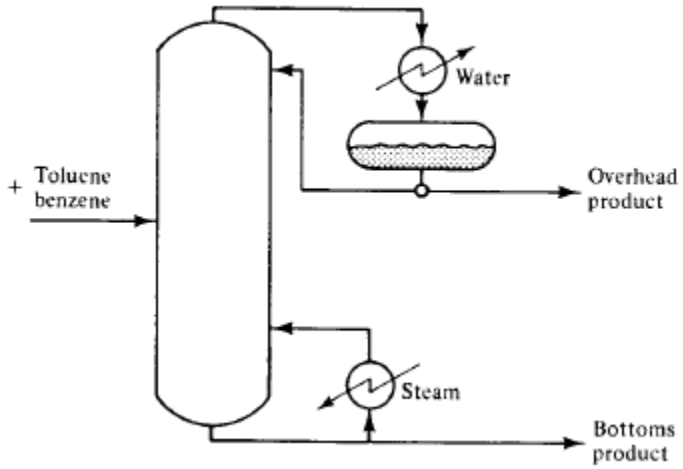


B3:

In the below given figure the distillation configuration for the separation of benzene from toluene is given. The feed to the distillation comes from the reactor, where toluene has been hydrodealkylated to produce benzene:

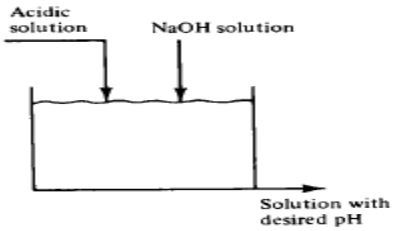
$$\text{Toluene} + H_2 \longrightarrow \text{benzene} + CH_4$$

After the excess $H_2$and the produced CH_4have been removed in a flash unit. For the distillation system:

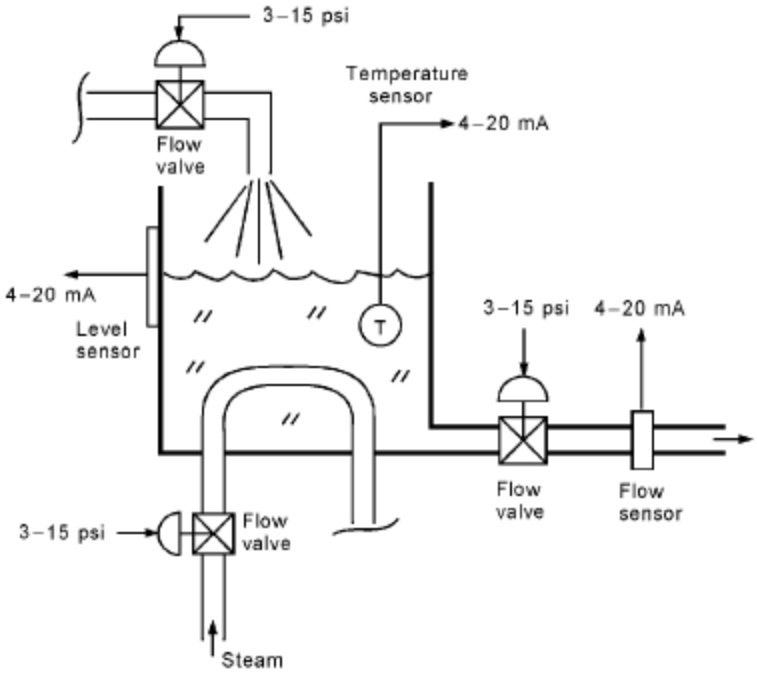


1. Suggest a feed forward controller that will control the operation of the column in the presence of changes in the feed flow rate.
2. Suggest a feedback control configuration to account changes in the feed flow rate.
3. If the control objective is to keep the purity of the overhead product (benzene) constant and the use of concentration measuring devices (gas chromatographs, infrared analyzers, etc.) is not recommended due to their low reliability, suggest an inferential control configuration. What secondary measurements would you use? How would you use them, in principle, to estimate the unmeasured composition of the overhead product?

B4:
Describe the steps that you would go through in designing a control system for maintaining the pH of the liquid in a stirred tank at a desired value? What questions must you resolve? Develop both feedback and feed forward control configurations for this system.



B5:



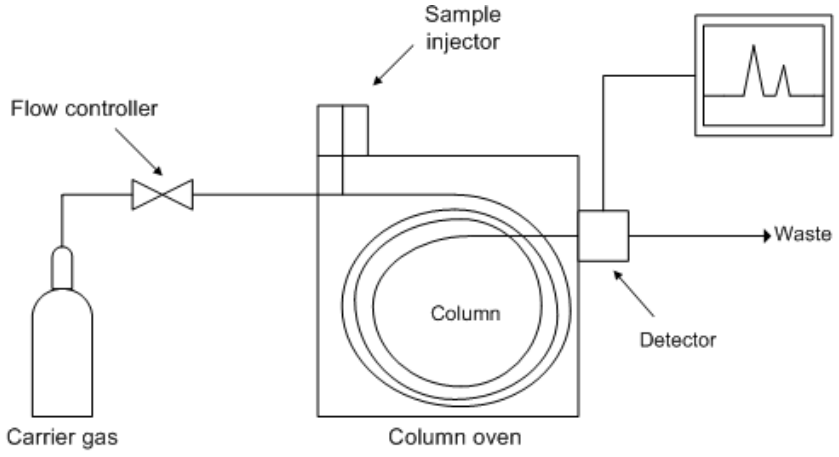
The above figure shows a manufacturing process diagram. In this process, the following independent control requirements must be satisfied:

1. Control the level at L_{SP}.
2. Control the temperature at T_{SP}.
3. Control the output flow rate at Q_{SP}.

Complete the diagram showing the control loops by using the block diagram error-detector symbols and controller blocks. Include necessary signal converters.

B6:

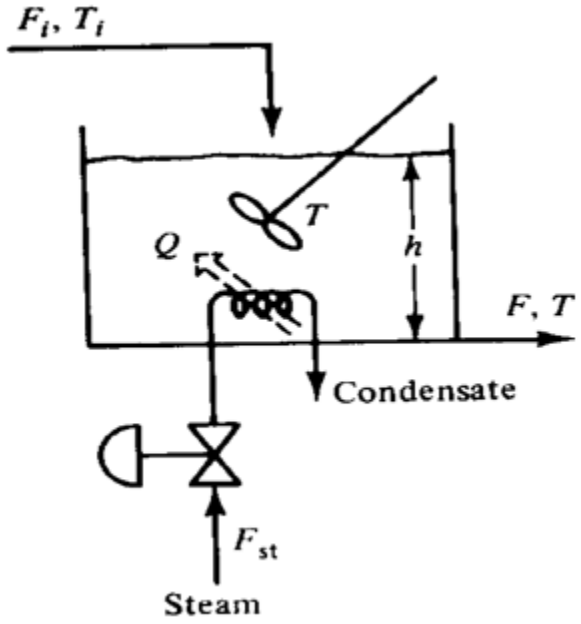
Identify error in the diagram of gas chromatography (GC) and explain detail of instrumentation and control strategy of GC with the help of block diagram and control loop.



B7:
Consider the stirred tank heater as shown in figure. A liquid enters the tank with a flow rate Fi and a temperature Ti, where it is heated with steam having flow rate Fst. Let F and T be the flow rate and temperature of the stream leaving the tank. The tank is considered to be well stirred, which implies that the temperature of the effluent is equal to the temperature of the liquid in the tank.
The operational objectives of this heater are:

1. To keep the effluent temperature T at a desired value Ts.
2. To keep the volume of the liquid in the tank at a desired value Vs.

Develop the control strategy feed forward and feed backward for controlling the above two requirements.



APPENDIX-G

Samples of Open-ended Labs

DEPARTMENT OF CHEMICAL ENGINEERING
UNIVERSITY OF KARACHI

Instrumentation & Process Control
Open Ended Lab

S.#	Groups	Title
1	B-5	Design & fabricate calibration of K-type thermocouple by using standard technique.
2	B-1	Comparison of mechanical thermometer with T-type thermocouple and thermostat.
3	B-2	Design & fabricate pilot tube for measurement of air.
4	B-7	Design and fabricate pneumatic pressure control loop.
5	B-4	Design and fabricate capacitance type level sensor to measure level of water tank.
6	B-6	Design and Fabricate of venture meter for the measurement of flow of water.

S.#	Groups	Title
1	A-5	Design and Fabricate Temperature measurement system by using RTD.
2	A-2	Design and Fabricate float type of level sensor in case of level control system of DCS and compare your measurement results with respect to accuracy and repeatability.
4	A-4	Design and fabricate Temperature calibrate unit based on RTD (Resistance Temperature detector)
5	A-3	Design and fabricate pressure control unit using another pressure sensor.
6.	A-7	Design and fabrication of flow measurement system by using orifice meter as sensor.
7.	A-8	To make water level indicator with alarm using transistors.

APPENDIX-H

Industry Linkage correspondence:

NOVATEX LIMITED

LIAISON OFFICE:
Ground Floor, G&T Tower,
18 Beaumont Road, Civil Lines-10,
Karachi-75530, Pakistan.
Phone : (+92 21) 35659585-7
Fax : (+92 21) 35659549
E-mail : headoffice@novatex.com
Web Site : www.gatronova.com

PLANT
117-83, Railway Siding Off. Export Processing Zone Road
Near Wheat Godown, Landhi, Karachi - 75160,
Pakistan.
Phones : (+92 21) 35017484 to 85
E-mail : novafac@novatex.com

Dated : 15th October, 2020

The Incharge,
Department of Chemical Engineering,
University of Karachi.

Subject : Utilization of coal waste into manufacturing of concrete paving block

It is our pleasure to collaborate as an industrial sector with the researchers of Karachi University for supporting the product which is ecofriendly and not going to pose environmental threats to the environment. The research topic is "utilization of coal waste into manufacturing of concrete paving block"

Novatex agrees if research work is satisfactory as per the industrial requirements, then we might provide financial support to some extent.

Regards,

Ch. Anis Ahmed
General Manager Plant

Fwd: topics for design projects (FYDP)

From: Shagufta Ishtiaqque Chemical Technology (shaguftai@uok.edu.pk)

To: m.hasanuddin777@gmail.com

Cc: myasir@uok.edu.pk; kk_nawaz@uok.edu.pk; mehwish.imam@uok.edu.pk; ramshaz.noori@yahoo.com; adeelrehman@uok.edu.pk; msaqib@uok.edu.pk; furqanrk@uok.edu.pk; syedali1251@outlook.com; sammadkhan93@gmail.com

Date: Tuesday, January 21, 2020, 08:36 AM GMT+5

--------- Forwarded message ---------
From: **Muhammad Mirza** <muhammad.mirza@prl.com.pk>
Date: Sat, Jan 18, 2020 at 11:39 AM
Subject: RE: topics for design projects (FYDP)
To: Shagufta Ishtiaqque Chemical Technology <shaguftai@uok.edu.pk>

Topics:

1. Install a 5000 Barrels/day mini refinery on upstream site of Bolan Crude
2. An Oligomerization unit of 4000 Barrels/day to convert LPG stream to Oligomerate for Motor Gasoline Pool.
3. Produce the Motor gasoline and Diesel from Thur Coal.
4. Provide OT and IT link platform in DCS system for Predictive analysis using AI.
5. Ammonia Synthesis from thur coal gasification
6. Mixed Cracking for Bottom of Barrel Processing of reduced crude capacity 25,000 Barrels/day

Thanks and best Regards

Mohammad Ali Mirza

Head of Projects Process Engineering
Pakistan Refinery Limited
P.O. Box # 4612, Korangi Creek Road, Karachi 74000 Pakistan
Tel Off : +92 21 35122131-40 (Ext: 209)

Direct : +92 21 35092636
Cell : +92 300 8286213

Email : muhammad.mirza@prl.com.pk
URL : www.prl.com.pk

Please consider the environment before printing this E-mail.

From: Shagufta Ishtiaqque Chemical Technology <shaguftai@uok.edu.pk>
Sent: Tuesday, 7 January 2020 11:35 AM
To: A_Shujjat@ppl.com.pk; Zeeshan Zaki Khan <zeeshan.zaki@byco.com.pk>; Anis Ahmed <anis_ahmed@rocketmail.com>; Mr. Nabeel Afzaal (Q.M.R - G-I) - gatfac <qmr@gatron.com>; Qazi Naeemuddin <Qazi.Naeemuddin@archroma.com>; Imran Bokhari <b_imran@ppl.com.pk>; Muhammad Mirza <muhammad.mirza@prl.com.pk>
Cc: Kahkashan Zawaz Chemical Engineering <kk_nawaz@uok.edu.pk>; Hasan Uddin <m.hasanuddin777@gmail.com>
Subject: topics for design projects (FYDP)

Dear sir/Madam

Kindly provide the FYDP topics for our final yr . Chemical Engineering students.Thanks for your your cooperation.

Regards

--

Engr Dr. Shagufta Ishtiyaque
B.E(Chemical),M.B.A(MIS),M.E,PhD(Chemical)
In charge (Asst. Professor)
*Department of Chemical Engineering
University of Karachi**
* Ph # 9221-99261300-ext 2535
Cell No 0300-2071927

Respected Faculty members
Kindly provide design project topics to engr HAsan before 24th jan to dispaly on the notice board.
Thanks
--
Engr Dr. Shagufta Ishtiyaque
B.E(Chemical),M.B.A(MIS),M.E,PhD(Chemical)
In charge (Asst. Professor)
*Department of Chemical Engineering
University of Karachi**
* Ph # 9221-99261300-ext 2535
Cell No 0300-2071927

Fwd: topics for design projects (FYDP)

From: Shagufta Ishtiaqque Chemical Technology (shaguftai@uok.edu.pk)

To: ramshaz.noori@yahoo.com

Date: Monday, November 23, 2020, 04:00 PM GMT+5

---------- Forwarded message ---------
From: **Shagufta Ishtiaqque Chemical Technology** <shaguftai@uok.edu.pk>
Date: Mon, 23 Nov 2020, 00:45
Subject: Fwd: topics for design projects (FYDP)
To: Abdul Qudoos <abdulqudoosj@gmail.com>, <kehkashan_kurian@yahoo.com>, Kahkashan Zawaz Chemical Engineering <kk_nawaz@uok.edu.pk>

Take print and add in the SAR

---------- Forwarded message ---------
From: **Zeeshan Zaki Khan** <zeeshan.zaki@byco.com.pk>
Date: Thu, 9 Jan 2020, 15:52
Subject: RE: topics for design projects (FYDP)
To: Shagufta Ishtiaqque Chemical Technology <shaguftai@uok.edu.pk>
Cc: Kahkashan Zawaz Chemical Engineering <kk_nawaz@uok.edu.pk>, Hasan Uddin <m.hasanuddin777@gmail.com>

Dear Madam,

Some projects come to mind:

1. Production of N-Methyl Aniline (Octane Booster) for Commercial 92 RON PMG (Premium Motor Gasoline) Requirements of Pakistan
2. Solvent De-Asphalting for 200,000 BPD Refining based on DAS (UAE) Blend Crude
3. Mild Hydrocracker for Desulfurizing Atmospheric Resid
4. Production of MMT (Octane booster) for the commercial requirements of Pakistan

Best Regards,

Zeeshan

From: Shagufta Ishtiaqque Chemical Technology [mailto:shaguftai@uok.edu.pk]
Sent: Tuesday, January 07, 2020 11:35 AM
To: A_Shujjat@ppl.com.pk; Zeeshan Zaki Khan <zeeshan.zaki@byco.com.pk>; Anis Ahmed <anis_ahmed@rocketmail.com>; Mr. Nabeel Afzaal (Q.M.R - G-I) - gatfac <qmr@gatron.com>; Qazi Naeemuddin <Qazi.Naeemuddin@archroma.com>; Imran Bokhari <b_imran@ppl.com.pk>; Muhammad Mirza <muhammad.mirza@prl.com.pk>
Cc: Kahkashan Zawaz Chemical Engineering <kk_nawaz@uok.edu.pk>; Hasan Uddin <m.hasanuddin777@gmail.com>
Subject: topics for design projects (FYDP)

Dear sir/Madam

Kindly provide the FYDP topics for our final yr . Chemical Engineering students.Thanks for your your cooperation.

Regards

--

Engr Dr. Shagufta Ishtiyaque
B.E(Chemical),M.B.A(MIS),M.E,PhD(Chemical)
In charge (Asst. Professor)
*Department of Chemical Engineering
University of Karachi**
* Ph # 9221-99261300-ext 2535
Cell No 0300-2071927

Fwd: urgent/Topics for Final Year Students

From: Shagufta Ishtiaqque Chemical Technology (shaguftai@uok.edu.pk)

To: ramshaz.noori@yahoo.com

Date: Monday, November 23, 2020, 04:03 PM GMT+5

---------- Forwarded message ---------
From: **Shagufta Ishtiaqque Chemical Technology** <shaguftai@uok.edu.pk>
Date: Mon, 23 Nov 2020, 00:39
Subject: Fwd: urgent/Topics for Final Year Students
To: Abdul Qudoos <abdulqudoosj@gmail.com>

Kindly take print

---------- Forwarded message ---------
From: **Shagufta Ishtiaqque Chemical Technology** <shaguftai@uok.edu.pk>
Date: Mon, 17 Feb 2020, 11:12
Subject: Re: urgent/Topics for Final Year Students
To: Kahkashan Nawaz Chemical Engineering <kk_nawaz@uok.edu.pk>, Hasan Uddin <m.hasanuddin777@gmail.com>
Cc: <tab60@hotmail.com>, Registrar UoK <registrar@uok.edu.pk>

Dear Faculty members
Kindly provide list of FYDP topics based on industrial project and research based(mentioning on the list) today before 3 pm
Thanks

On Mon, Feb 17, 2020 at 8:28 AM Kahkashan Nawaz Chemical Engineering <kk_nawaz@uok.edu.pk> wrote:
> noted with thanks sir Imran and madam shagufta. Cooperations of ppl with department are always commendable.
>
> Thanks with warm regards,
>
> On Mon, Feb 17, 2020, 8:24 AM Ali Imran S. M. Bokhari [CE (PR)] <b_imran@ppl.com.pk> wrote:
> > 1. LPG Recovery by Lean Oil Solvent Extraction Method
> > 2. Optimized Process Sceme Selection and Equipment Design for N2 Removal from Natural Gas.
> >
> > Get Outlook for Android
> >
> > ---
> > **From:** Shagufta Ishtiaqque Chemical Technology <shaguftai@uok.edu.pk>
> > **Sent:** Sunday, February 16, 2020 11:57:15 PM
> > **To:** Ali Imran S. M. Bokhari [CE (PR)] <b_imran@ppl.com.pk>
> > **Cc:** Kahkashan Zawaz Chemical Engineering <kk_nawaz@uok.edu.pk>
> > **Subject:** urgent
> >
> > Dear Ms KEksghan
> > kindly email the topic so that we will show PEC for the industrial linkage
> >
> > --
> > *Engr Dr. Shagufta Ishtiyaque*
> > B.E(Chemical),M.B.A(MIS),M.E,PhD(Chemical)
> > In charge (Asst. Professor)
> > *Department of Chemical Engineering
> > University of Karachi**
> > * Ph # 9221-99261300-ext 2535
> > Cell No 0300-2071927
>
> ---
>
> Promote green workplace practices by conserving paper
>
> ---
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--
Engr Dr. Shagufta Ishtiyaque
B.E(Chemical),M.B.A(MIS),M.E,PhD(Chemical)
In charge (Asst. Professor)
*Department of Chemical Engineering
University of Karachi**
* Ph # 9221-99261300-ext 2535
Cell No 0300-2071927

APPENDIX-I
ADMISSIONS

VERSITY OF KARACHI

FINAL LIST

CHELOR MORNING PROGRAM ADMISSIONS-2019

DATED: 11-01-2019

list of the selected candidates who have completed the admission's formalities & paid the prescribed fee

S. No.	Form No.	Name	Father's Name	DPRT CODE	Final %	Type	Remarks
41	111636	AYISHA RUBAB	ABDUL RAZZAQ	CHE	75.09	Merit	
42	112066	HAROON KHAN	KHWAJA MUHAMMAD	CHE	75.09	Merit	
43	112958	HAFIZA WAJIHA NAZ	NAZEER AHMED	CHE	77.00	Merit	
44	125578	MUHAMMAD FAHAD FRAZ	RANA DILFRAZ AHMED	CHE	70.64	Self Fin.	
45	126116	MUHAMMAD AAMIR	NABI SHAH	CHE	70.55	Self Fin.	
46	126963	MUHAMMAD HUZAIFA AFAQ	AFAQ HAIDER	CHE	64.18	Self Fin.	
47	127928	SAAD ULLAH KHAN	SAMI ULLAH	CHE	66.36	Self Fin.	
48	128011	SYED USAID JAWED	JAWED NADEEM	CHE	68.73	Self Fin.	
49	130486	MIR HUSAMUDDIN WASIF	MIR ALIMUDDIN WASIF	CHE	64.82	Self Fin.	

Director Admissions
University of Karachi

Total students admitted as per admission Committee = 49

NOTE: University reserves the right to correct any inadvertent error that may be detected in the admission list.

ERSITY OF KARACHI

FINAL LIST

HELOR MORNING PROGRAM ADMISSIONS 2018

DATED : 12-02-2018

st of the selected candidates who have completed the admission's formalities / paid the prescribed fee.

	Form No.	Name	Father's Name	DPRT CODE	Final %	Remarks
HEMICAL ENGINEERING (B.E.)						
	6829	MUHAMMAD BILAL AJMAL	MUHAMMAD AJMAL	CHE	76.09	
2	33981	HAFIZA RIMSHA	SAFEER MUHAMMAD	CHE	76.73	
	54643	FABEHA NADEEM	MUHAMMAD NADEEM	CHE	78.55	
4	81895	HAFIZ MUHAMMAD HARIS	JALEEL AHMED FAROOQI	CHE	76.91	
	121444	ABDUL AHAD ANSARI	MUHAMMAD ASLAM	CHE	79.55	
6	162071	MUHAMMAD FARAZ	ABDUL KARIM	CHE	76.18	
7	188235	ZEESHAN ALI	AESHAD ALI	CHE	79.91	
	191308	MUHAMMAD ALI	MUHAMMAD KHALIL UR REHMAN BHUTTA	CHE	82.75	
9	220383	SIDRAH HASAN	AHMED SHUMILE HASAN	CHE	80.91	
	283035	MUHAMMAD ASSAM BIN ZAHID	MUHAMMAD ZAHID IQBAL	CHE	78.00	
.1	287471	SAFDAR ALI	MASHOOQUE ALI	CHE	87.09	
	305907	NAEEM IQBAL	ABDUL QAYYUM	CHE	78.27	
.3	341503	RIDA ALI SIDDIQUI	MEHTAB ALI	CHE	77.45	
	379773	AHMED RAZA	ABDUL WAHEED	CHE	78.45	
.5	387085	AMNA LIAQUAT	LIAQUAT ALI CHOHAN	CHE	76.36	
	404219	SOHAIL AHMED	MIR MUHAMMAD	CHE	80.00	
	408184	MUHAMMAD ALI	RAFIQUDDIN	CHE	79.09	
8	424742	MUHAMMAD SHUJA ALI	MUHAMMAD SHAMIMUDDIN	CHE	77.45	
	472622	RAZA ALI KHAN	RAZI ULLAH KHAN	CHE	80.91	
0	504544	SYED TALIB HUSSAIN JAFRI	SYED RIASAT HUSSAIN JAFRI	CHE	80.09	
	537451	AMBREEN	MUHAMMAD SARFARAZ KHAN	CHE	77.09	
	570898	MAHNOOR ASHRAFI	GHULAM HUSSAIN	CHE	77.18	
	578618	HUZAIFA	SYED MUHAMMAD JAWEED	CHE	77.64	
4	640869	MUHAMMAD ASAD	MISBAH-UL-ISLAM	CHE	70.80	
	641344	MOHAMMAD AHMER	MOHAMMAD AJAZ	CHE	83.18	
6	677918	MALIKA KAZIM	MUHAMMAD KAZIM HASSAN	CHE	78.09	
7	698157	ABDULLAH RAFIQUE	MUHAMMAD RAFIQUE	CHE	76.27	
	719886	SABA WASEEM	AAMER WASEEM	CHE	79.09	
9	724950	SYED MUHAMMAD SHAHZIL REHMAN	NAEEM-UR-REHMAN	CHE	77.27	
	785493	NIMRA SHAHID	MUHAMMAD SHAHID PERVAIZ	CHE	82.36	

ote : University reserves the right to correct any inadvertent error that may be detected in the admission list.

CHE - 211

ERSITY OF KARACHI

FINAL LIST

HELOR MORNING PROGRAM ADMISSIONS-2018

DATED : 12-02-2018

st of the selected candidates who have completed the admission's formalities / paid the prescribed fee.

	Form No.	Name	Father's Name	DPRT CODE	Final %	Remarks
HEMICAL ENGINEERING (B.E.)						
	6829	MUHAMMAD BILAL AJMAL	MUHAMMAD AJMAL	CHE	76.09	
2	33981	HAFIZA RIMSHA	SAFEER MUHAMMAD	CHE	76.73	
	54643	FABEHA NADEEM	MUHAMMAD NADEEM	CHE	78.55	
4	81895	HAFIZ MUHAMMAD HARIS	JALEEL AHMED FAROOQI	CHE	76.91	
	121444	ABDUL AHAD ANSARI	MUHAMMAD ASLAM	CHE	79.55	
6	162071	MUHAMMAD FARAZ	ABDUL KARIM	CHE	76.18	
7	188235	ZEESHAN ALI	AESHAD ALI	CHE	79.91	
	191308	MUHAMMAD ALI	MUHAMMAD KHALIL UR REHMAN BHUTTA	CHE	82.75	
9	220383	SIDRAH HASAN	AHMED SHUMILE HASAN	CHE	80.91	
	283035	MUHAMMAD ASSAM BIN ZAHID	MUHAMMAD ZAHID IQBAL	CHE	78.00	
1	287471	SAFDAR ALI	MASHOOQUE ALI	CHE	87.09	
	305907	NAEEM IQBAL	ABDUL QAYYUM	CHE	78.27	
3	341503	RIDA ALI SIDDIQUI	MEHTAB ALI	CHE	77.45	
	379773	AHMED RAZA	ABDUL WAHEED	CHE	78.45	
5	387085	AMNA LIAQUAT	LIAQUAT ALI CHOHAN	CHE	76.36	
	404219	SOHAIL AHMED	MIR MUHAMMAD	CHE	80.00	
7	408184	MUHAMMAD ALI	RAFIQUDDIN	CHE	79.09	
8	424742	MUHAMMAD SHUJA ALI	MUHAMMAD SHAMIMUDDIN	CHE	77.45	
	472622	RAZA ALI KHAN	RAZI ULLAH KHAN	CHE	80.91	
0	504544	SYED TALIB HUSSAIN JAFRI	SYED RIASAT HUSSAIN JAFRI	CHE	80.09	
	537451	AMBREEN	MUHAMMAD SARFARAZ KHAN	CHE	77.09	
	570898	MAHNOOR ASHRAFI	GHULAM HUSSAIN	CHE	77.18	
	578618	HUZAIFA	SYED MUHAMMAD JAWEED	CHE	77.64	
4	640869	MUHAMMAD ASAD	MISBAH-UL-ISLAM	CHE	70.80	
	641344	MOHAMMAD AHMER	MOHAMMAD AJAZ	CHE	83.18	
6	677918	MALIKA KAZIM	MUHAMMAD KAZIM HASSAN	CHE	78.09	
7	698157	ABDULLAH RAFIQUE	MUHAMMAD RAFIQUE	CHE	76.27	
	719886	SABA WASEEM	AAMER WASEEM	CHE	79.09	
9	724950	SYED MUHAMMAD SHAHZIL REHMAN	NAEEM-UR-REHMAN	CHE	77.27	
	785493	NIMRA SHAHID	MUHAMMAD SHAHID PERVAIZ	CHE	82.36	

ote : University reserves the right to correct any inadvertent error that may be detected in the admission list.

... OF KARACHI

FINAL LIST

...OR MORNING PROGRAM ADMISSIONS-2018

DATED : 12-02-2018

...st of the selected candidates who have completed the admission's formalities / paid the prescribed fee.

S. No.	Form No.	Name	Father's Name	DPRT CODE	Final %	Remarks
31	797020	GHULAM MUSTAFA KHAN	AFZAL AHMED KHAN	CHE	76.91	
32	822887	SYED ASHHAD ASIF	SYED ASIF AZHER	CHE	76.27	
33	959602	MUHAMMAD FAROOQ	SAEED AHMED	CHE	77.73	
34	974865	SYEDA SHAHLA QAYYUM SHAH	SYED QAYYUM HUSSAIN SHAH	CHE	81.35	
35	994939	MOHSIN HABIB	GHULAM HABIB CHISHTI	CHE	79.18	
36	2318374	MOHAMMAD HUZAIFA QAZI	MUHAMMAD MASHOOD QAZI	CHE	NULL	Self-Fin.
37	2753358	TAHA ZAFAR	ZAFAR QAYYUM	CHE	NULL	Self-Fin.
38	4164286	MUHAMMAD SHADAB KHAN	MUHAMMAD ADIL KHAN	CHE	NULL	Self-Fin.
39	5202683	SYED MUBASHSHIR SHAH	SYED MUBARAK SHAH	CHE	NULL	Sports
40	6728426	MUHAMMAD TAHA SIDDIQUI	MEHMOOD AHMED SIDDIQUI	CHE	NULL	KU.EMP.
—	7277947	IMAD UDDIN AHMED SIDDIQUI	NASIR UDDIN	CHE	NULL	KU.EMP.
42	7398217	MAAZ ALI	ALTAF ALI ANSARI	CHE	NULL	Self-Fin.
43	7413054	ASAD ALI	MUHAMMAD ASLAM	CHE	NULL	Self-Fin.
44	7960181	MUHAMMAD FAAZ BIN AQUIL	MUHAMMAD AQUIL AHMAD	CHE	NULL	Self-Fin.

List received from admission Committee = 44 enrolled students

Note : University reserves the right to correct any inadvertent error that may be detected in the admission list.

University of Karachi

Morning Program Admissions 2017

FINAL LIST

Dated: 13-Feb.-2017

B.E.

CHEMICAL ENGINEERING

List of the selected candidates along with enroment forms & original documents who have completed the admission's formalities.

S #	Form #	Name of the Student	Father's Name	Acd %	Remarks
1	009509	DANIYAL AHMED KHAN	ZAFAR AKHLAQUE AHMED	75.73	
2	009816	MUHAMMAD SABEEH KHAN	MUHAMMAD ASAD KHAN	77.18	
3	009868	SAMAD JAN	MUHAMMAD NAEEM	76.09	
4	010137	SHEIKH MUHAMMAD SHAHZAIB	SHEIKH MUHAMMAD AIJAZ	74.91	
5	010465	HAMMAD AHMED	SHAKIL AHMED	75.27	
6	010672	MUHAMMAD MOIZ	MASROOR HUSSAIN SIDDIQUI	77.00	
7	011526	MUHAMMAD OSAMA KHAN	MEHMOOD KHAN	74.82	
8	011720	SYED HASSAN AHMED	SYED FAHIM AHMED	75.18	
9	011721	USAID HUZAIFA	TARIQ UR REHMAN	74.73	
10	012060	RABIA	MUHAMMAD IQBAL CHHIPA	75.91	
11	012155	ARSALAN ABBAS	WASEEM HUSSAIN	75.45	
12	012658	FARAN UDDIN SHEIKH	MOIN UDDIN SHEIKH	76.55	
13	013179	SHAHRUKH WASEEM	WASEEM AHMED QURESHI	74.00	
14	013575	MARIA MUHAMMAD SIDDIQ	MUHAMMAD SIDDIQ	76.82	
15	013691	SYED MOHSIN ASHRAF SUBZWARI	SYED TARIQ ASRAF SUBZWARI	76.18	
16	013757	HUZAIFA ARQAM	RASHID HUSSAIN	76.55	
17	014335	SYED MUHAMMAD ARSALAN	MUHAMMAD IBRAHIM	77.00	
18	014393	SYED ADIL AHMAD	SYED IMRAN AHMAD	77.91	
19	014671	SYED TABISH HAIDER	SYED MUHAMMAD AFZAL	77.27	
20	014875	MUHAMMAD NAVEED USMANY	MUHAMMAD NADEEM USMANY	77.00	
21	015251	NUKHBA MASOOD	MASOOD SHERAZ KHAN	73.64	
22	015372	MUHAMMAD IRFAN	ABDUL QADIR	79.27	
23	015962	AHMED AFNAN AMJAD	MUHAMMAD AMJAD	74.55	
24	016380	MUHAMMAD TAHA MAHMOOD KHAN	MUHAMMAD MAHMOOD KHAN	74.82	
25	016586	MUHAMMAD ANUS	MUHAMMAD SHAHZAD	79.27	
26	017261	ZOHAIB SHAMIM	MOHAMMAD SHAMIM	76.00	
27	017449	MUHAMMAD SAFIULLAH	DOST MUHAMMAD	77.00	
28	017510	JUNAID ALI	LIAQAT ALI	78.27	
29	018025	MUHAMMAD DANIYAL KAMIL	KHALID HUSSAIN KAKEPOTO	81.64	
30	018209	ZEERAK ABDUR REHMAN RABBANI	GHULAM RABBANI	74.09	
31	018506	NAZIR AHMED	MUHAMMAD ILYAS	74.09	
32	018808	SEHRISH SARFARAZ	SARFARAZ ALAM	81.86	
33	019358	MUHAMMAD WASIM AKRAM	MUHAMMAD AKRAM	79.50	
34	019674	MUHAMMAD YOUNIS	ZULFIQAR ALI MAHAR	77.73	
35	019892	MUHAMMAD ARBAB AHMED	SHABBIR AHMED	77.75	
36	019902	MUHAMMAD NABEEL	MUHAMMAD IRSHAD AHMED	77.45	
37	020481	MUHAMMAD USAMA KHAN	ASIF ALI KHAN	73.91	
38	021192	YAMNA AFZAL	MUHAMMAD AFZAL	79.55	
39	043191	AZEEM RAZZAK	ABDUL RAZZAK JANJUA	65.55	KU Emp.
40	043392	MUHAMMAD AREEB TARIQ	TARIQ REHMAT	60.00	KU Emp.

Note: University reserves the right to correct any inadvertent error that may be detected in the admission list.

CHE - 001

Director Admissions
University of Karachi

University of Karachi
Morning Program Admissions 2017

FINAL LIST

Dated: 13-Feb.-2017

B.E.
CHEMICAL ENGINEERING

List of the selected candidates along with enroment forms & original documents who have completed the admission's formalities.

S #	Form #	Name of the Student	Father's Name	Acd %	Remarks
41	043639	SYED ZOHAIB ALI	SYED RAFAT ALI	66.00	KU Emp.
42	043836	SYED BASIT ALI	MUHAMMAD UMER	75.00	Donor St.
43	045144	ROHMA KHAN	MUHAMMAD ASHRAF KHAN	60.55	Donor St.
44	045229	MUHAMMAD WASIQ	FAHIM UDDIN	68.55	Donor St.
45	045234	DANIYAL MUJEEB	MUJEEB UR REHMAN	70.82	Donor St.
46	045243	MOHAMMAD ARQAM NAFEES	NAFEES UD DIN	66.91	Donor St.
47	045248	MUHAMMAD KHIZAR	MUAMMAD SULEMAN QURESHI	72.73	Donor St.
48	045254	IKRAMULLAH QURESHI	AMANATULLAH QURESHI	69.00	Donor St.
49	045457	YAAR KHAN	GHULAM SARWAR KHAN	69.55	Donor St.
50	045507	MOHI UDDIN	ABDUL GHAFOOR REHMANI	62.18	Donor St.
51	045508	SYED HUSSAIN ALI	SYED USMAN ALI	65.73	Donor St.

Director Admissions
University of Karachi

Total students admitted as per admission Committee : 51

Note: University reserves the right to correct any inadvertent error that may be detected in the admission list.

CHE - 002

University of Karachi
Semester Examinations Section

Tel: 021-99261070
99261300-7/2457
ses@uok.edu.pk

NO.SES/CHE/PEC/2020-
March 03, 2020.

Dr. Shagufta Ishteyaque
Incharge
Department of Chemical Engineering
University of Karachi
Karachi.

Subject: **Verification of list of existing students on the basis of Semester Examination record**

Dear Madam

Please refer to your letter along with its enclosure bearing No.3126, dated February 24, 2020 on the subject mentioned above.

I am furnishing below the verified list of current students provided to you by Dr. Yasir Khan for onward transmission to PEC, as desired:

S.No.	Intake Batch	Allowed Intake	Total Students Admitted	Present Strength	No. of Students
1.	B15 2016	50	45	44	01
2.	B16 2017	50	45	44	01
3.	B17 2018	50	45	36	01
4.	B18 2019	40	50	44	01
5.	B19 2020	40	24	22	01
	Total:	230	215	190	

Thank you for your time and kind consideration!

Kindest regards!

Yours sincerely

Dr. Taseer Ahmed Khan
In charge & Head Tabulator
Semester Examinations Section

Copy to the following for information, please:

1. The Dean, Faculty of Engineering/Science.
2. File Concerned.