Quaid-e-Awam University of Engineering, Science and Technology Nawabshah (SBA)

MANUAL OF UNIFORM OBE IMPLEMENTATION FOR ENGINEERING DISCIPLINES

June 2023

Preamble

This document aims at establishing a comprehensive policy framework for implementation of Outcome Based Education (OBE) throughout QUEST keeping in mind the unified vision and shared commitment.

The purpose of this policy is to ensure consistent and synchronized adoption of OBE principles and practices across all engineering departments. Recognizing the significance of OBE as a transformative approach to engineering education, QUEST strives to uphold the highest standards of academic excellence, student-centric learning, and holistic development.

The beginning of this manual can be traced back to the initiation of OBE by the Pakistan Engineering Council (PEC), which now stands as a signatory of the Washington Accord for engineering education in Pakistan. The integration of OBE aligns QUEST with global best practices, enhances the quality of engineering education, and ensures the graduates' preparedness for real-world challenges.

This manual serves as a guideline for esteemed faculty, students, administrators, and other stakeholders involved in engineering education at QUEST. By adhering to this uniform policy, QUEST intends to foster a culture of fair assessment and continuous quality improvement.

While this document primarily targets engineering departments, other departments are encouraged to follow this manual, adapting it to suit the requirements of their respective accreditation bodies. Through this policy, we are committed to maintaining the highest standards of academic quality, aligning with the benchmarks set forth by PEC and other relevant accreditation bodies.

This manual has been prepared by the committee comprising the following members, as notified by the Registrar office vide letter No. QUEST/NH/-2211 dated 31.10.2022.

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Introduction

Pakistan has been declared as "Full Signatory" of the Washington Accord (WA) through the Pakistan Engineering Council (PEC). WA is a highly rigorous global standard on engineering education and accreditation system that grants substantial equivalence of degrees and international recognition to equate signatory countries of the world. It means that engineers registered with PEC will be considered as world class competent professionals and will not be evaluated for any immigration assessment for their degrees. These engineers will be eligible for professional jobs throughout the WA signatory countries.

Outcome Based Education (OBE) is an approach of curriculum design and teaching that focuses on what students should be able to attain at the end of course/program. Therefore, OBE is the underlying paradigm followed by global accreditation efforts such as the WA. It ensures:

- that graduates possess sufficient academic background and knowledge for pursuing their professional career in engineering
- that graduates have attained all prescribed Program Educational Objectives (PEOs), Program Learning Outcomes (PLOs), and Course Learning Outcomes (CLOs) in domains of Knowledge, Skills and Attitude
- to improve standards of professional engineering education through Continuous Quality Improvement (CQI)
- to provide guidelines for up-grading existing programs and development of new programs

OBE Implementation at QUEST

The overview of the OBE mechanism to be followed at QUEST is given in Figure 1.

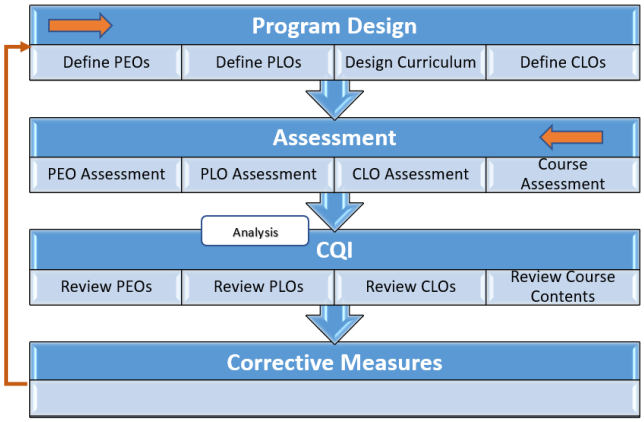

Figure 1: Overview of the OBE mechanism

The detailed process of OBE implementation is shown in Figure 2.

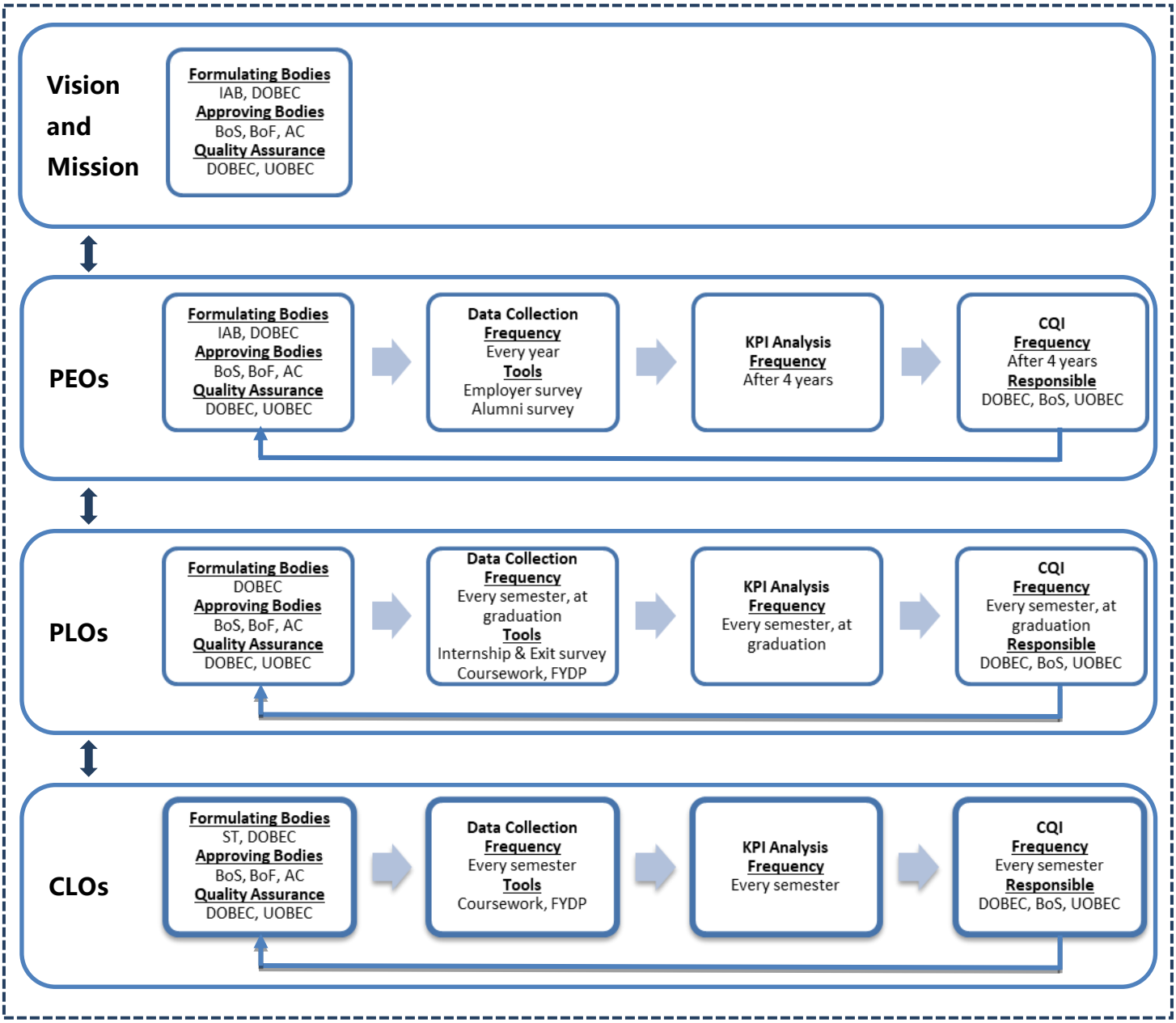

Figure 2: The detailed OBE process

Legends:

IAB (Industrial Advisory Board)
BoS (Board of Studies)
AC (Academic Council)
KPI (Key Performance Indicator)
FYDP (Final Year Design Project)
BoF (Board of Faculty)
DOBEC (Departmental OBE Committee)
UOBEC (University OBE Committee)
ST (Subject Teacher)
CQI (Continuous Quality Improvement)

The OBE system at QUEST is to be implemented through the following SOPs:

1. Committees

a. A University OBE Committee (UOBEC) shall be established to look after the matters of university-wide OBE implementation.
b. A Departmental OBE Committee (DOBEC) shall be established in all engineering departments to look after the matters of department-wide OBE implementation.
c. Every department shall nominate an OBE Coordinator who shall be responsible for coordinating all OBE related activities with the UOBEC.
d. DOBEC shall comprise of the Chairperson (as the committee head), the OBE Coordinator, and two faculty members.
e. A Departmental CQI Committee (DCQIC) shall be established to look after the overall CQI process of the program(s). It shall comprise the OBE Coordinator and two senior faculty members, one of them shall work as a head of the DCCQI.
f. A Curriculum Review Committee (CRC) shall be established at the department level to regularly update the curriculum based on the feedback from the subject teacher/faculty members, review it, and then report it to the DOBEC.
g. Allied departments, such as Basic Science and Related Studies (BSRS), shall also nominate an OBE Coordinator to look after OBE related activities for the courses being offered by their respective department in engineering disciplines. The information shall be communicated to the UOBEC through a memo. Any change shall also be reported to the UOBEC.

2. General Procedure

a. The department shall get the framework approved by the Academic Council (AC) through the respective Board of Faculty (BoF).
b. AC may delegate its authority for any subsequent amendments in PEOs, PLOs and CLOs to the concerned BoF and/or BoS as defined in the relevant sections below. However, any change in the Vision and Mission statement shall be approved by the AC itself. Please note that all amendments in PEOs, PLOs, and CLOs shall be reported as action taken to the AC.
c. Every department shall maintain a control document of the framework including Vision and Mission statements, PEOs, PLOs, CLOs, Scheme of Studies, and Course profiles. The copy of which shall reside with the UOBEC.
d. The procedural cycle of different committees / bodies of the university is given in Figure 3.

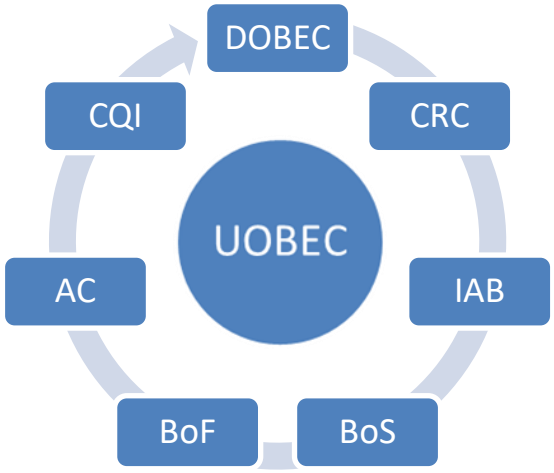

Figure 3: The working cycle of university committees/bodies

3. Vision and Mission Statements

a. The vision statement of a department shall be defined for the department in line with the vision of the university.
b. The mission statement of a department shall be defined for the program(s) offered by the department; not for the department itself. It should be in line with the mission of the University.
c. Vision and mission statements shall be proposed by the respective IAB and BoS and shall be approved by the AC through the concerned BoF.

4. Program Educational Objectives (PEOs)

a. The PEOs shall encompass all the key attributes of the PLOs.
b. The number of PEOs for any program shall range from 3 to 5.
c. PEOs shall be proposed by the respective IAB and BoS and shall be approved by the respective BoF.

5. Program Learning Outcomes (PLOs)

a. The number of PLOs (also called Graduate Attributes) shall be 12, given in Table 1, as recommended by PEC.
b. Each PLO shall be mapped to at least four (4) different courses.
c. PLOs shall be adopted by the respective BoS.

Table 1: Program Learning Outcome (PLOs)

PLO	Description
PLO 1	**Engineering Knowledge:** An ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PLO 2	**Problem Analysis:** An ability to identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PLO 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.
PLO 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.
PLO 5	**Modern Tool Usage:** An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.
PLO 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 consequent responsibilities relevant to professional engineering practice and solution to complex engineering problems.
PLO 7	**Environment and Sustainability:** An ability to understand the impact of professional engineering solutions 8in societal and environmental contexts and demonstrate k9nowledge of and need for sustainable development.
PLO 8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PLO 9	**Individual and Teamwork:** An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.
PLO 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.
PLO 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.
PLO 12	**Lifelong Learning:** ability to recognize importance of and pursue lifelong learning in the broader context of innovation and technological developments.

6. Course Learning Outcomes (CLOs)

CLOs are specific statements that describe the knowledge, skills, or attitudes that students are expected to acquire or demonstrate upon completion of a particular course. CLOs are designed to align with the goals and objectives of the course.

a. The number of CLOs for a 3-CH theory course shall be 2-4 and for a 2-CH theory course be 2-3.
b. The number of CLOs for a 1-CH lab course shall be 1-2 and for a 2-CH lab course be 1-3.
c. Each CLO must be mapped to a single PLO.
d. Two CLOs in a course may possibly be mapped to the same PLO.
e. CLOs shall be formulated by the DOBEC in coordination with faculty/subject teacher and shall be approved by the respective BoS.
f. CLOs for non-engineering courses shall be adopted as provided by the respective administering department. The course profiles for common non-engineering courses shall remain uniform in all engineering disciplines.

7. Key Performance Indicators (KPIs)

a. The KPI statement shall clearly specify the complete evaluation criteria.
b. A minimum criterion for KPI evaluation and attainment, at individual as well as cohort level, shall be made uniform for all engineering disciplines.

7.1 PEO KPIs

a. PEO KPIs shall be evaluated for each PEO separately.
b. PEO KPI statements shall be defined at program level.

Program Level

a. PEO KPIs shall be evaluated for a batch on the data collected from employer feedback surveys and alumni feedback surveys.
b. In survey forms, the PEO KPI statements shall specify the criteria in the form of scales from 1 to 5.
c. The data collection shall be done annually and KPI evaluation for a batch shall be carried out after 4 years from graduation.
d. To attain a PEO, 50% of the survey form responses must attain a score of 3 or above on a scale of 1 to 5.

7.2 PLO KPIs

a. PLO KPIs shall be evaluated for each PLO separately.
b. PLO KPI statements shall be defined at three levels: student, course and program.

Student Level

a. At student level, the PLO KPIs shall be evaluated on CLO scores of the students in the respective mapped course(s) and FYDP.
b. If a PLO is mapped to more than one CLO in a single course, then the scores of the linked CLOs shall be averaged to give one score for that PLO.
c. The data shall be collected and analyzed at the end of each semester.
d. To attain a PLO in a course at student level, the student shall be required to obtain at least 50% average score in the CLOs mapped to the PLO in that course.
e. For final PLO attainment at the time of graduation, the PLOs be attained through Direct Cohort (80%) and Indirect Cohort (20%), see Table 2.
f. For Direct Cohort, each PLO must be attained in at least 50% of the respective mapped courses, with an average score of least 50%. This score shall be reflected in the PLO attainment sheet as given in Appendix-I.
g. For Indirect Cohort, at least 50% of the students/ responses must attain a score of 3 or above on a scale of 1 to 5 through survey forms.

Table 2: Cohort level Direct and Indirect Assessment

PLO No.	PLO Description	PLO Direct Assessment (%) Average	PLO Indirect Assessment (% response 3 or above)	A: Cohort Indirect (PLO% of Graduating Survey*0.2)	B: Cohort Direct (PLO% of Batch *0.8)	Cumulative (A & B)
1	Engineering Knowledge					
2	Problem Analysis					
3	Design & Development of Solutions					
4	Investigation					
5	Modern Tools Usage					
6	The Engineer and Society					
7	Environment and Sustainability					
8	Ethics					
9	Individual and Teamwork					
10	Communication					
11	Project Management					
12	Lifelong Learning					

Course Level

a. At the course level, the PLO KPIs shall be evaluated on PLO scores of all students in the respective mapped course(s).

b. The data shall be collected and analyzed at the end of each semester.
c. To attain a PLO at course level, at least 50% of the students must attain that PLO.

Program Level

At program level the PLO KPI shall be evaluated based upon the following data:

a. Final PLO attainment statistics of all the courses including FYDP at the time of graduation.
b. Data collected from internship feedback forms.
c. Data collected from Exit surveys.
d. In survey forms, the PLO KPI statement shall specify the criteria in the form of scales from 1 to 5.
e. The data for a particular batch shall be collected and analyzed at the time of graduation.
f. To attain a PLO at program level, at least 50% of the mapped courses must attain the respective PLO and at least 50% of the students/responses must attain a score of 3 or above on a scale of 1 to 5.

7.3 CLO KPIs

a. CLO KPIs shall be evaluated for each CLO separately.
b. CLO KPI statements shall be defined at two levels: student and course.

Student Level

a. A CLO at student level shall be evaluated on multiple attempts during the course work.
b. All attempts made available in a course for a particular CLO shall comply with the corresponding taxonomy level.
c. The number of attempts for each CLO shall be at least three (3) for Cognitive and Psychomotor domains and two (2) for Affective domain. A CLO pertaining to cognitive domain shall include the compulsory final examination attempt.
d. For CLO attainment at student level, the student must obtain at least 50% average percentage score from all attempts. The same score shall be counted for the corresponding PLO score evaluation.

Course Level

a. At course level, the CLO KPI shall be evaluated on CLO scores of all students in the particular course.

b. The data shall be collected and analyzed at the end of each semester.

c. To attain a CLO at course level, at least 50% of the students must attain that respective CLO. All KPIs along with related information have been summarized in Table3.

Table3: KPIs evaluation and attainment criteria for PEO, PLO, and CLO

	Level	**Evaluation Tool**	**KPI**	**Data Collection Frequency**	**Data Analysis Frequency**
PEO	Program	-For Indirect Cohort: Employer and Alumni Surveys	50% of the responses must attain a score of 3 or above on a scale of 1 to 5.	Every year	4 years from graduation
PLO	Student	CLO scores of the student in the mapped course(s)	Each PLO must be attained in at least 50% of the respective mapped course(s), with an average score of at least 50%	Every semester	Every semester
	Course	PLO scores of all the students in the mapped course	At least 50% of the students must attain that PLO		
	Program	- For Direct Cohort: Final PLO attainment statistics of all the courses including FYDP -For Indirect Cohort: Internship Feedback Form and Exit Survey	For Direct Cohort, at least 50% of the mapped courses must attain the PLO. For Indirect Cohort, at least 50% of the students/ responses must attain a score of 3 or above on a scale of 1 to 5.	At the time of graduation	At the time of graduation
CLO	Student	Course work	The student must obtain at least 50% average percentage score from all attempts.	Every semester	Every semester
	Course	CLO scores of all students in the course	At least 50% of the students must attain that CLO		

8. Course Files

a. A course file shall be maintained for every course by the respective course teacher during the semester. However, course contents, teaching plan, CLOs, their mapping to the PLOs, and the class activities shall be communicated to the students at the start of the semester.

b. At the end of the semester, the complete course file (both in hard and soft form) shall be submitted to the DOBEC.
c. For the courses being taught by the shared faculty members, the Chairperson of their departments are required to ensure that the course files of the offered courses are maintained and submitted to the DOBEC of the concerned department at the end of semester.
d. The list of (signed) documents to be attached with the course file is given in Table 4. It shall also be highlighted on the cover page of the course file.

Table4: Documents/contents of the course file

S. No.	Theory	Lab
01	Course timetable including consulting hours	Lab timetable including consulting hours
02	Course contents including CEP (if applicable)	Lab contents including OEL
03	Course plan including lecture notes for 15 weeks	Lab plan for at least 15 weeks
04	CLOs and their mapping with PLOs	CLOs and their mapping with PLOs
05	Course activities and marks/percentage distribution (for both GPA and OBE)	Lab activities and marks/percentage distribution (for both GPA and OBE)
06	Assignments, quiz, tests, mid, and final questions papers etc.	Question papers, assignments, mini projects etc.
07	Student list and attendance	Student list and attendance
08	Assessment (Theory, Sessional, CEP, etc.)	Assessment (Lab including OEL, sessional, etc.)
09	Attainment (CLOs and PLOs)	Attainment (CLOs and PLOs)
10	CQI report including CAR and assessment	CQI report including CAR and assessment
11	Faculty course review report	Faculty course review report
12	Teaching feedback report	Teaching feedback report
13		Master manual and 3 assessed students' manuals (best, average and worst)

9. Final Year Design Project (FYDP)

A Final Year Design Project (FYDP) is the mandatory activity that requires students to apply their theoretical and practical knowledge towards the end of an engineering program. It involves a range of activities including literature review, problem analysis, design, modeling, and simulation using various methods and means including hardware and software tools.

a. FYDP shall encompass complex engineering problem(s) and design of systems, components

or processes integrating core areas with appropriate consideration for public health and safety.

b. FYDP shall include cultural, societal, and environmental considerations encompassing SDGs.
c. FYDP should lead to an integration of knowledge and practical skills required in the PLOs.
d. A FYDP Committee shall be constituted for each program by the concerned HoD comprising of 3 faculty members, one of them shall work as FYDP Coordinator.
e. FYDP of total 6-CH shall span over two consecutive semesters, i.e., 7th and 8th semesters, with titles FYDP-I and FYDP-II respectively having 3-CH and 100 marks each.
f. The assessment of a FYDP shall be carried out ONLY through well-defined rubrics.
g. The complete SOP and rubrics for FYDP are given in Appendix–II.

10. Survey Forms

a. The designed survey forms shall be simple and easy to understand and should not take too much time of the person filling in the form.
b. PEO / PLO mapping of a question should be clearly indicated.
c. One criteria / question should map to only one PEO / PLO.
d. Evaluation scales for each criterion should be consistent in all survey forms.
e. A comments section should be added to get any additional feedback.
f. The survey form can be made available online through Google Forms.
g. The different types of forms are given below:
    i. The **Internship Feedback Form** should be uniform for all the departments and is given in Appendix-III.
    ii. The Exit / Graduating Survey Form should be uniform for all the departments and is given in Appendix-IV.
    iii. The Alumni Survey Form should be uniform for all the departments; however, PEO mappings of the questions should be program specific. It is given in Appendix -V.
    iv. The Employer Form should be uniform for all departments; however, PEO mappings of the questions should be program specific. It is given in Appendix-VI.

11. Student Internships

a. All students should be encouraged to do an internship in a relevant academic, research, or business organization relating to the discipline.
b. A student shall carry out at least 6 - 8 weeks of supervised internship, with single internship of not less than three (3) weeks duration.

c. Every department shall nominate an Internship Coordinator to monitor the related activity in coordination with the Directorate of Industrial Liaison (DIL).
d. Duration of internship shall be indicated on the Survey Form.
e. In the case of more than one eligible internship by a student, the best internship feedback score shall be counted.

12. Evaluation and Assessment

Learning can be divided into three domains:

12.1 Cognitive Domain

This is the commonly used domain. It deals with the intellectual side of learning. Different levels of categories and their verbs under the cognitive domain are given in Figure 4.

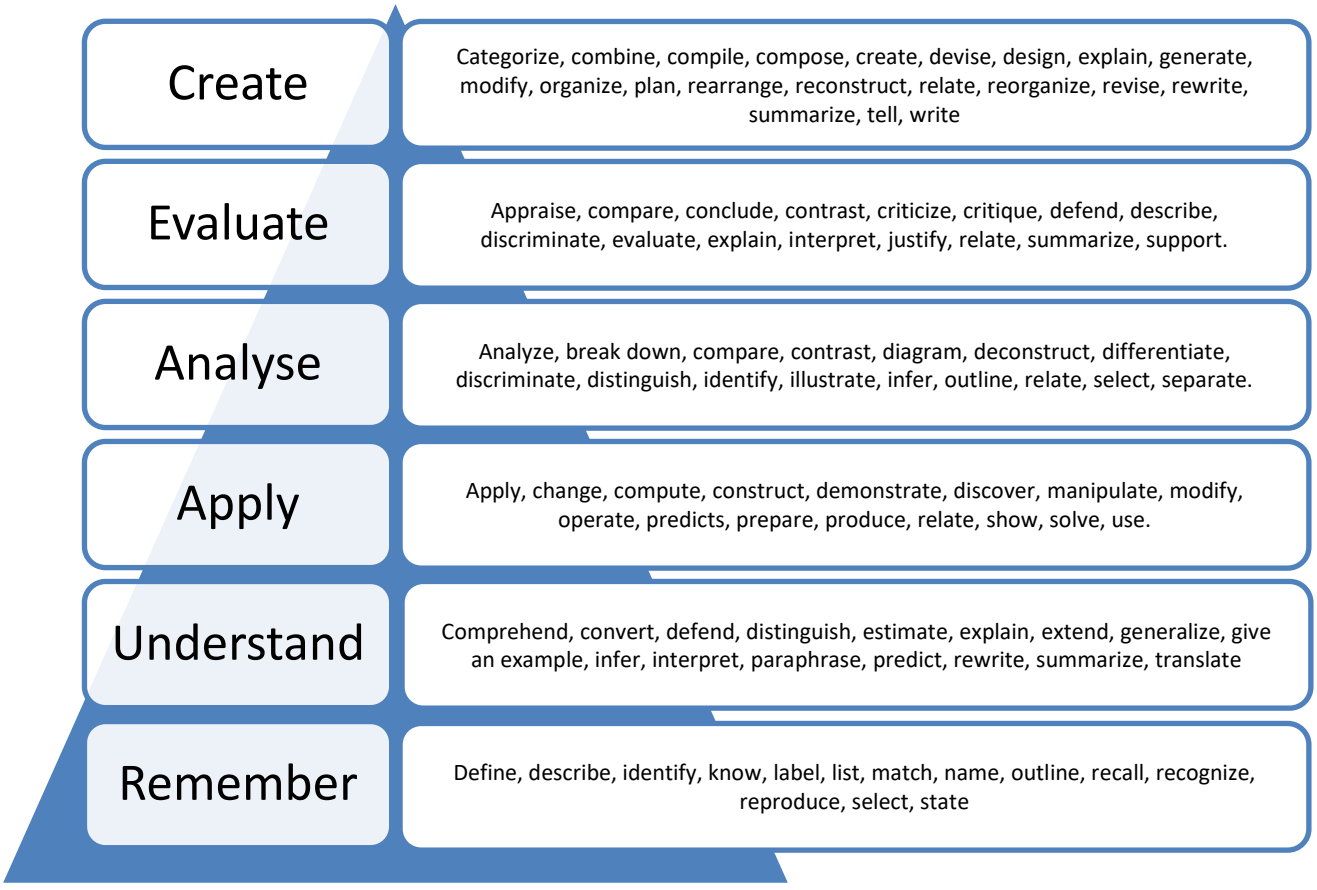

Figure 4: Cognitive Domain categories and alternate verbs

12.2 Affective Domain

This domain includes objectives relating to interest, attitude, and values relating to learning information. Different levels of categories and their verbs under the cognitive domain are given in Figure 5.

a. CLO assessment under the Affective domain shall ONLY be conducted through pre-defined rubrics.
b. The maximum taxonomy level for Affective rubric in any engineering program shall be from A3 to A4 as per Bloom's Taxonomy level. A3 is typical level attained in course based/classroom-based learning during undergraduate education and A4 is the level that can be attained with a combination of classroom learning and mentored projects/activities.
c. A separate rubric shall be designed for each level of Affective taxonomy, and a higher-level rubric shall be inclusive of all prior levels' attributes.
d. Following seven PLOs have been identified where affective assessment is applicable:
    i. PLO-6 The Engineer and Society
    ii. PLO-7 Environment and Sustainability
    iii. PLO-8Ethics
    iv. PLO-9 Individual and Teamwork
    v. PLO-10Communication
    vi. PLO-11 Project Management
    vii. PLO-12 Lifelong Learning

e. Affective domain should be in at least 10 courses and its weightage should not exceed 10% of the total curricula weightage.
f. A separate rubric has been proposed for each of the two levels per identified PLO and is given in Appendix-VII.
g. Affective domain assessment shall only be performed by the course teacher. At least two assessments shall be conducted during the semester in order to provide multiple chances. Each student shall be evaluated separately.
h. As a guideline, Tab1e6 provides the meanings for taxonomy verbs for different types of affective domain assessment tools.

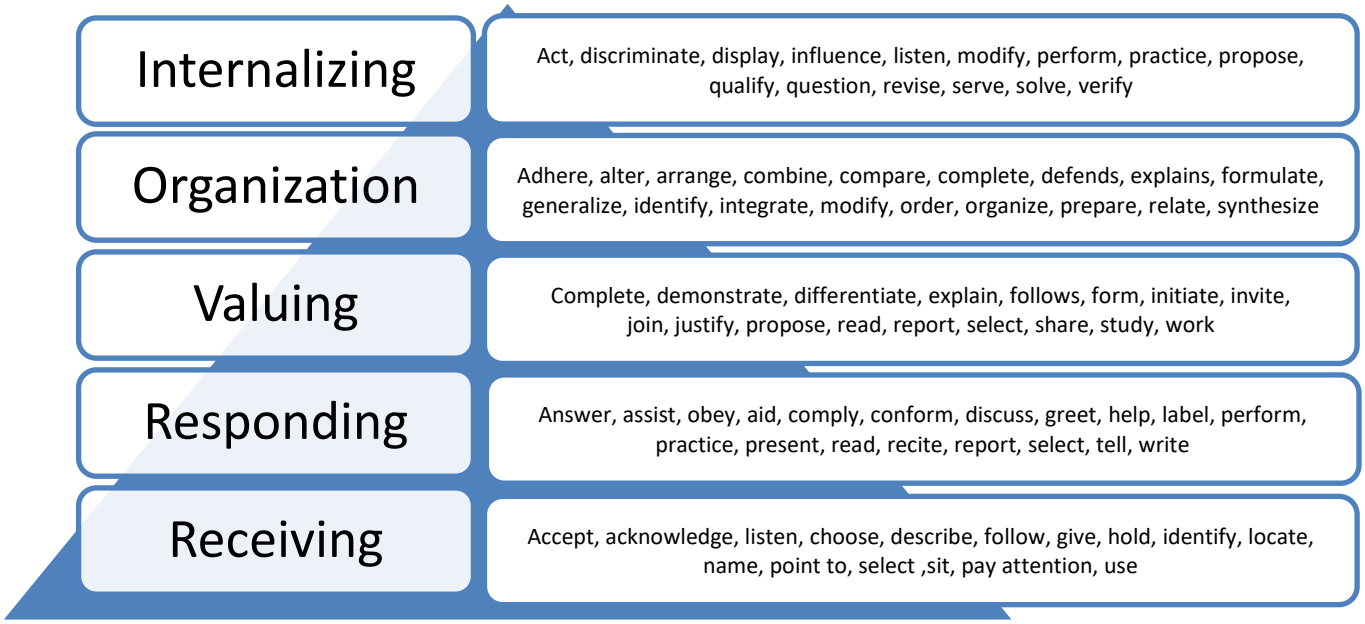

Figure 5: Affective domain categories and alternate verbs

Tab1e 6: Guidelines for affective domain assessment tools and evaluation

Affective Domain Assessment Tools						
Taxonomy verbs	**Presentation**	**Discussion**	**Interview**	**Filed visit**	**Case study**	**Self-reporting**
Acknowledge	Listening to questions	Listening to others opinion	Listening to questions	Listening to demonstration	Identifying the objectives of case	Identifying a self-matter/ issue
Practice	Willingly responding to questions	Willingly responding in context of discussion	Willingly responding to questions	Willingly asking/ responding to questions	Stating the case with context	Willingly state details related to the matter/ issue
Value	Expressive Quality of reasoning, arguments, and thoughts	Expressive quality of reasoning, arguments, and thoughts	Expressive Quality of reasoning, arguments, and thoughts	Seriousness during the visit.	Expressive Quality of reasoning, arguments, and thoughts	Expression of strength/ weakness or positive/ negatives of the issue
Display	Body language and behavior	Respectful behavior to others' opinion	Body language and behavior	Body language and behavior	Respectful behavior to others' opinion	Behavior and willingness towards resolving the issue

12.3 Psychomotor Domain

This domain focuses on motor skills and actions that require physical coordination. Different levels of categories and their verbs under the psychomotor domain are given in Figure 6.

a. Psychomotor assessment shall be performed by the lab teacher during practical performance.
b. CLO assessment under the psychomotor domain shall ONLY be conducted through pre-defined rubrics.
c. The maximum taxonomy level for Psychomotor rubric in any engineering program shall be limited to level 3 (P3) as per Bloom's Taxonomy level given in Figure 3.
d. A separate rubric shall be designed for each of the three levels, and a higher-level rubric shall be inclusive of all prior levels' skill sets. These rubrics are given in Appendix-VIII.
e. For the software related courses being offered in, for example, ICT related engineering programs, a separate "Software Based Rubric" may be defined by the DOBEC in consultation with subject experts (wherever needed) and approved by the respective BoS.

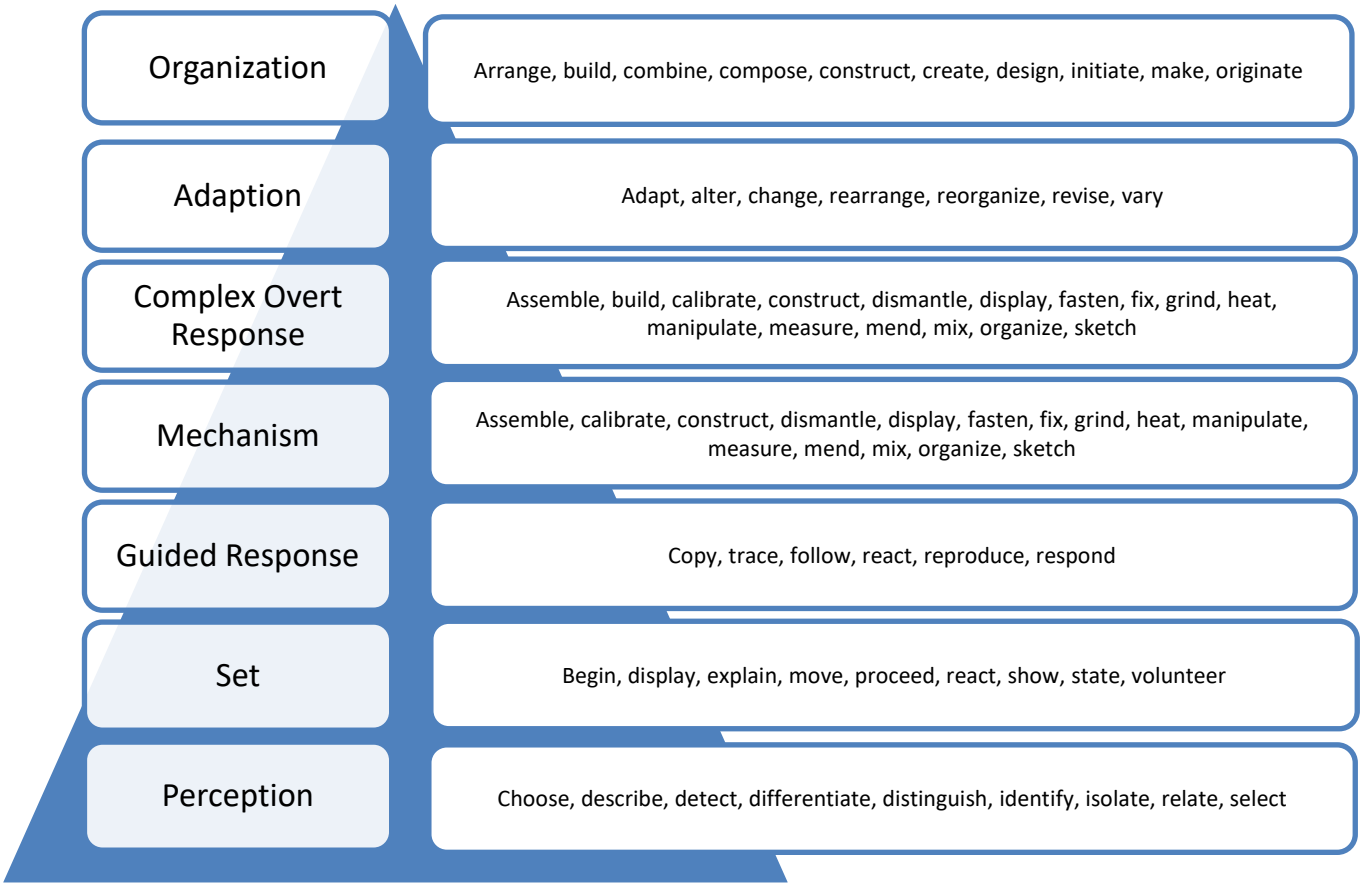

Figure 6: Psychomotor domain categories and alternate verbs.

13. Continuous Quality Improvement (CQI)

a. The DOBEC shall collect PEO, PLO, and CLO data and analyze the respective KPIs as indicated in section 6 of this document.
b. In case of failure of any KPI, corrective action shall be initiated by the DOBEC and approved by the respective BoS.
c. For PEO, PLO and CLO CQI, the actions to be taken are listed in Table 8, in ascending order severity-wise.
d. Any corrective action taken shall be initiated through the DOBEC. It shall be documented and approved by the respective responsible bodies as shown in Figure 2. The template for the Corrective Action Request (CAR) form is given in Appendix-IX.
e. A CQI report shall be prepared by the DOBEC and submitted to the UOBEC after approval from the respective BoS at the end of every semester. The template for the CQI Summary Report to be generated at the end of each semester is given in Appendix-X.
f. The UOBEC shall obtain and verify completion of closed loop CQI process involving plan-do-check-act cycle, to ensure proper implementation of OBE system in all engineering disciplines.
g. The UOBEC shall conduct an annual audit to monitor the administration and implementation of the framework in all engineering departments.
h. The UOBEC shall also arrange refresher training for the relevant faculty members at regular intervals.

Figure 2 summarizes the complete CQI process for any engineering program.

Table 8: CQI actions for PEO, PLO, and CLO

	KPI Achieved	**KPI Not Achieved**		
		Program Level	**Course Level**	**Student Level**
PEO	No action required	1. Review of curriculum strategies 2. Review of assessment methods 3. Review of the relevant KPIs 4. Review of PEOs	N/A	N/A

PLO	No action required	1. Review of teaching and learning process.	1. Review of teaching and learning process.	1. Warning through the progressive attainment sheet.
		2. Review of PLOs assessment methods.	2. Review of CLOs assessment methods.	2. Student counseling.
		3. Review of Course-PLO mapping and the relevant KPIs.	3. Review of CLO- PLO mapping and the relevant KPIs.	
		4. Review of curriculum design.	4. Review of curriculum design.	
CLO	No action required	N/A	1. Review of CLO assessment methods.	1. Student provided further chances through direct assessment tools.
			2. Review of CLOs and taxonomy levels.	2. Student counseling.
			3. Review of students' course feedback.	
			4. Review of CLO KPI	
			5. Faculty advice by DOBEC.	
			6. Faculty training	

14. Complex Engineering Problems and Activities (CEPs and CEAs)

a. Students shall be provided adequate exposure to Complex Engineering Problems (CEPs) and Complex Engineering Activities (CEAs) throughout the duration of the program.
b. CEPs and CEAs shall cover the desired attributes as listed in Table9 and Table10 (as per PEC Manual of Accreditation 2019).
c. Preferably, all the core engineering courses and FYDP shall include CEPs.
d. CEAs comprising mainly Open-Ended Labs (OELs) and Problem Based Learning (PBL) shall be included in all the courses having practical.
e. CEPs/ CEAs shall be properly defined. Description may include at-least the following:
    i. Problem description
    ii. Constraints/ Assumptions
    iii. Identification of areas where use of computational/ modern tools is required.
    iv. Expected outcome.
f. CEPs/ CEAs shall be evaluated through pre-defined rubrics, and not by any other means. The

criteria defined in the rubric shall cover the attributes selected for the activity from Table 8 and Tab1e 9. Explicit mapping shall be provided.

g. The rubric shall be communicated to the students at the time of assignment of the complex engineering activity.

h. The rubric shall have well defined criteria and levels of attainments/scales as shown in Appendix-XI.

i. Evidence of exposure to complex engineering problems/activities shall be provided in the respective Course File, including statement of CEP/CEA and rubric based evaluation.

Tab1e 8: Range of Complex Problem Solving

Attribute	Description
Preamble	Engineering problems which cannot be resolved without in-depth engineering knowledge, and have some or all the characteristics listed below:
Range of conflicting requirements	Involve wide-ranging or conflicting technical, engineering or other issues.
Depth of analysis required	Have no obvious solution and require abstract/critical thinking, originality in analysis to formulate suitable models.
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 fundamental-based, first principles analytical approach.
Familiarity of issues	Involve infrequently encountered issues.
Extent of applicable codes	Are outside problems encompassed by standards and codes of practice for professional engineering.
Extent of stakeholder involvement and level of conflicting requirements	Involve diverse group of stakeholders with widely varying needs.
Consequences	Have significant consequences in a range of context.
Interdependence	Are high level problems including many component parts or sub-problems

Tab1e 9: Range of Complex Engineering Activities

Attribute	Description
Preamble	Complex activities mean (engineering) activities or projects that have some or all the following characteristics listed below:
Range of resources	Involve the use of diverse resources (for this purpose, resources include people, money, equipment, materials, information and technologies).

Level of interaction	Require resolution of significant problems arising from interactions between wide ranging or conflicting technical, engineering or other issues.
Innovation	Involve creative use of engineering principles and research-based knowledge in novel ways.
Consequences to society and the environment	Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation.
Familiarity	Can extend beyond previous experiences by applying principles-based approaches.

15. Open Ended Labs (OELs)

a. An OEL is where students are given the freedom to develop their own experiments, instead of merely following the already set guidelines from a lab manual or elsewhere. It will enable students to think critically and out of the box.
b. Each lab work/practical course shall include at least one OEL.
c. The OEL shall be evaluated through pre-defined rubrics, and not by any other means.
d. The rubric for the OEL is given in Appendix-XII.

16. Environment, Health and Safety (EHS) Policy

a. To ensure that all educational, research, and campus activities of the university are conducted safely and in a manner that protects the health of employees, students, and the environment.
b. A university wide EHS committee shall be constituted to ensure that all operations are conducted in adherence with sound EHS practices consistent with teaching and research excellence.
c. Accordingly, the EHS committee shall prepare and distribute EHS SOPs to all the departments of the university.

17. Sustainable Development Goals (SDGs)

a. SDGs were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.
b. The 17 SDGs, as shown in Table 11, recognize that ending poverty and other deprivations must go together with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change.
c. One or more of these SDGs shall be encompassed in FYDPs, mini projects, internships, and community services performed by students.

Table 11: SDGs

Goal	Description	Goal	Description
1	No Poverty	**2**	Zero Hunger
3	Good Health and Well-being	**4**	Quality Education
5	Gender Equality	**6**	Clean Water and Sanitation
7	Affordable and Clean Energy	**8**	Decent Work and Economic Growth
9	Industry, Innovation, and Infrastructure	**10**	Reduced Inequality
11	Sustainable Cities and Communities	**12**	Responsible Consumption and Production
13	Climate Action	**14**	Life below Water
15	Life on Land	**16**	Peace and Justice Strong Institutions
17	Partnerships to achieve the Goal		

18. Quality Policy

The QUEST University commits to meeting standards of academic excellence and providing platform of creativity, diversity, and equity for achieving national and global harmony through:

a. adopting and implementing the mechanism of continual quality improvement to enhance the standards of teaching and research.
b. developing progressive curricula and offering conducive learning environment for the development of valued human resource
c. fulfilling social responsibility
d. managing intellectual property
e. meeting all the applicable regulatory necessities including data security

Appendix-I

Quaid-e-Awam University of Engineering, Science and Technology, Nawabshah

PLO Attainment Score Sheet

Student Name:		**Father's Name:**	
Roll No.:		**Batch:**	
Department:		**Result declared on:**	

Semester	Course Code	Course Title	Program Learning Outcomes (PLOs)											
			01	02	03	04	05	06	07	08	09	10	11	12
1st														
2nd														
3rd														
4th														
5th														
6th														
7th														
8th														
Aggregated PLO Score														
PLO Attainment Status (Pass / Fail)														

---------- ----------

Issued by **Controller of Examination**

Appendix-II

SOPs and Rubrics for FYDP

The complete SOPs and Rubrics for the

Final Year Design Project (FYDP) are given in a separate manual/document.

Appendix-III

Quaid-e-Awam University of Engineering, Science and Technology, Nawabshah

DEPARTMENT OF SOFTWARE ENGINEERING

Internship Feedback Form

(To be filled by the employer)

The main purpose of this feedback form is to assess our student's internship work completed under your supervision. We highly appreciate your time in completing this survey to help us out in improving the overall academic quality of our program.

Note: The information provided in this form shall remain CONFIDENTIAL.

Student Name: _____

Roll No.: _____

Contact / Email: _____

Organization of Internship: _____

Duration of Internship: _____

Please evaluate the internee's performance by ticking the appropriate number on the scale from 0 to 4.
(4 = Excellent, 3 = Very Good, 2 = Good, 1 = Average, 0 = Fail)

SN	Criteria	PLO	4	3	2	1	0
1	Possess and apply relevant knowledge and skill	1					
2	Analytical approach towards solving a problem	2					
3	Ability to design/develop solutions for different problems	3					
4	Ability to investigate design process	4					
5	Has the potential to use modern tools	5					
6	Possess knowledge to assess societal, health, safety, legal and cultural issues	6					
7	Ability to understand the impact of sustainable and environmental issues	7					

8	Punctuality and discipline	8					
9	Ability to work as a team member	9					
10	Interpersonal and communication skills	10					
11	Demonstrate management skill	11					
12	Demonstrate lifelong learning through consistent commitment for continuous improvement	12					

Any other comments:

Please make any additional comments or suggestions, which you think would help us to strengthen our program. (For example, change in courses, contents, technology, platform, etc.)

_____

_____

_____

_____

Signature: ----------

Name: ----------

Designation: ----------

Contact / email: ----------

Date: ----------

Appendix-IV

Quaid-e-Awam University of Engineering, Science and Technology, Nawabshah

DEPARTMENT OF SOFTWARE ENGINEERING

Exit / Graduating Survey Form

(To be filled by the student at the time of graduation)

The purpose of this survey is to take input from graduating students regarding the quality of education and technical skills they have acquired during their stay at this department.

Note: The information provided in this form shall remain CONFIDENTIAL.

Batch: _____

Section: _____

Graduating Year: _____

Please tick the appropriate number on the scale from 0 to 4.
(4 = Excellent, 3 = Very Good, 2 = Good, 1 = Average, 0 = Fail)

SN	Criteria	PLO	4	3	2	1	0
1	The program provides adequate engineering knowledge.	1					
2	The program provides sufficient problem analysis skills.	2					
3	The program helps design and develop solutions to technical problems	3					
4	The program helps perform investigation of a technical problem	4					
5	The program provides adequate skills to use modern tools	5					
6	The program makes aware about social issues related with engineering	6					
7	The program included sustainability and environmental aspects	7					
8	The program teaches ethical and professional responsibilities	8					
9	The program gives an opportunity to work as an individual or in team	9					

10	The program enhances the skills of oral and written communication.	10					
11	The program offers management skills	11					
12	The program opens a way for lifelong learning	12					

Any other comments:

Please make any additional comments or suggestions, which you think would help us to strengthen our program. (For example, change in courses, contents, technology, platform, etc.)

_____

_____

_____

_____

Date: ----------

Appendix-V

Quaid-e-Awam University of Engineering, Science and Technology Nawabshah

DEPARTMENT OF SOFTWARE ENGINEERING

Alumni Survey Form

(To be filled by the alumni)

The main purpose of this survey is to obtain alumni input regarding the quality of education and their preparedness for market-oriented skills during the graduation period at this department. We highly appreciate your time in completing this survey to help us out in understanding your satisfaction and experience in improving the overall academic quality of our program.

Note: The information provided in this form shall remain CONFIDENTIAL.

Alumni Name: _____

Batch / Roll No.: _____

Graduating Year: _____

Currently working at: _____

Designation: _____

Please tick the appropriate number on the scale from0 to 4.
(4 = Excellent, 3 = Very Good, 2 = Good, 1 = Average, 0 = Fail)

SN	Criteria	PEO	4	3	2	1	0
1	Engineering knowledge						
2	Problem formulation and solving skills						
3	Collecting and analyzing appropriate data						
4	Ability to design a system/component/process/ program/ module						
5	Appreciation of ethical values and difference of opinion						
6	Taking part in activities to build better society						
7	Desire of improving personal skills/ personality						

8	Ability to work in teams and listen to others						
9	Ability to work in challenging environments						
10	Able to think independently and make decisions						
11	Ability to meet deadlines / manage time						
12	Communication and presentation skills						
13	Technical report writing skills						

Any other comments:

Please make any additional comments or suggestions, which you think would help us to strengthen our program. (For example, change in courses, contents, technology, platform, etc.)

_____

_____

_____

_____

Signature: ----------

Name: ----------

Date: ----------

Appendix-VI

Quaid-e-Awam University of Engineering, Science and Technology, Nawabshah

DEPARTMENT OF SOFTWARE ENGINEERING

Employer Survey Form
(To be filled by the Employer)

The main purpose of this survey is to obtain employer input regarding the quality of education and preparedness for market-oriented skills of our graduates. We highly appreciate your time in completing this survey to help us out in understanding your perception regarding our graduate's skills.

Note: The information provided in this form shall remain CONFIDENTIAL.

Employer Name: _____

Designation: _____

Organization: _____

Employee Name: _____

Working since: _____

Organization type: _____

(R and D/ Production / Service Provider / Academic / Technical)

Please evaluate the graduate's performance by ticking the appropriate number on the scale from 0 to 4.
(4 = Excellent, 3 = Very Good, 2 = Good, 1 = Average, 0 = Fail)

S. No.	Criteria	PEO	4	3	2	1	0
1	Able to demonstrate professional knowledge concerning his/ her area of specialization						
2	Able to investigate, analyze and design solutions for complex engineering problems						
3	Tends to learn and adopt to the latest technology						
4	Is self-motivated, committed and punctual						
5	Able to demonstrate/uphold professional ethics while exercising his/her profession?						

6	Demonstrates responsible behavior towards the environment and society						
7	Appreciates the difference of opinion and ethical values of others						
8	Able to work in a team and cooperate with others						
9	Possesses necessary communication skills						
10	Able to meet deadlines and manage time constraints						
11	Capable to think independently and can work in challenging environments						

Any other comments:

Please make any additional comments or suggestions, which you think would help us to strengthen our program. (For example, change in courses, contents, technology, platform, etc.)

_____

_____

_____

_____

Signature and stamp: ----------

Name: ----------

Date: ----------

Appendix-VII

Quaid-e-Awam University of Engineering, Science and Technology, Nawabshah

DEPARTMENT OF SOFTWARE ENGINEERING

Affective Domain Rubrics

Course (course code): _____

Student Name: _____

Roll No.: _____

Activity Title: _____

PLO 6: The Engineer and Society - Level-A3					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Acknowledges responsibilities and attitudes, relevant to practice of engineering including: societal, health, safety, legal and/or cultural issues	Always	Often	Sometimes	Rarely	Never
Practices responsibilities and attitudes, relevant to practice of engineering including: societal, health, safety, legal and/or cultural issues	Always	Often	Sometimes	Rarely	Never
Values responsibilities and attitudes, relevant to practice of engineering including: societal, health, safety, legal and/or cultural issues	Always	Often	Sometimes	Rarely	Never

Total Score: ---------- **Weighted Score (%):** ----------

Remarks: ----------

Instructor's signature: ----------

PLO 6: The Engineer and Society - Level-A4					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Acknowledges responsibilities and attitudes, relevant to practice of engineering including: societal, health, safety, legal and/or cultural issues	Always	Often	Sometimes	Rarely	Never
Practices responsibilities and attitudes, relevant to practice of engineering including: societal, health, safety, legal and/or cultural issues	Always	Often	Sometimes	Rarely	Never
Values responsibilities and attitudes, relevant to practice of engineering including: societal, health, safety, legal and/or cultural issues	Always	Often	Sometimes	Rarely	Never
Displays responsibilities and attitudes, relevant to practice of engineering including: societal, health, safety, legal and/or cultural issues	Always	Often	Sometimes	Rarely	Never

Total Score: ---------- **Weighted Score (%): ----------**

Remarks: ----------

Instructor's signature: ----------

PLO 7: Environmental and Sustainability - Level-A3					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Acknowledges the importance of sustainability in the practice of engineering.	Always	Often	Sometimes	Rarely	Never
Comply with the concepts and principles of sustainability in the practice of engineering.	Always	Often	Sometimes	Rarely	Never
Value the benefits of sustainability in the practice of engineering.	Always	Often	Sometimes	Rarely	Never

Total Score: ---------- **Weighted Score (%): ----------**

Remarks: ----------

Instructor's signature: ----------

PLO 7:Environmental and Sustainability - Level-A4					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Acknowledges the importance of sustainability in the practice of engineering.	Always	Often	Sometimes	Rarely	Never
Comply with the concepts and principles of sustainability in the practice of engineering.	Always	Often	Sometimes	Rarely	Never
Value the benefits of sustainability in the practice of engineering.	Always	Often	Sometimes	Rarely	Never
Integrate a commitment to sustainability principles in the everyday practice of engineering.	Always	Often	Sometimes	Rarely	Never

Total Score: ---------- **Weighted Score (%): ----------**

Remarks: ----------

Instructor's signature: ----------

PLO 8: Ethics - Level-A3					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Acknowledges the importance of ethical behavior in the practice of engineering.	Always	Often	Sometimes	Rarely	Never
Comply with the code of ethics and requirements.	Always	Often	Sometimes	Rarely	Never
Value ethical behavior in the practice of engineering.	Always	Often	Sometimes	Rarely	Never

Total Score: ---------- **Weighted Score (%):** ----------

Remarks: ----------

Instructor's signature: ----------

PLO 8:Ethics - Level-A4					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Acknowledges the importance of ethical behavior in the practice of engineering.	Always	Often	Sometimes	Rarely	Never
Comply with the code of ethics and requirements.	Always	Often	Sometimes	Rarely	Never
Value ethical behavior in the practice of engineering.	Always	Often	Sometimes	Rarely	Never
Adhere to ethical behavior in accordance with the code of ethics and requirements.	Always	Often	Sometimes	Rarely	Never

Total Score: ---------- **Weighted Score (%): ----------**

Remarks: ----------

Instructor's signature: ----------

PLO 9:Individual and Teamwork - Level-A3					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Acknowledges the importance of teamwork, leadership, diversity and inclusion.	Always	Often	Sometimes	Rarely	Never
Practices concepts and principles of teamwork, leadership, diversity and inclusion.	Always	Often	Sometimes	Rarely	Never
Values the need for teamwork, leadership, diversity and inclusion.	Always	Often	Sometimes	Rarely	Never

Total Score: ---------- **Weighted Score (%): ----------**

Remarks: ----------

Instructor's signature: ----------

PLO 9:Individual and Teamwork - Level-A4					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Acknowledges the importance of teamwork, leadership, diversity and inclusion.	Always	Often	Sometimes	Rarely	Never
Practices concepts and principles of teamwork, leadership, diversity and inclusion.	Always	Often	Sometimes	Rarely	Never
Values the need for teamwork, leadership, diversity and inclusion.	Always	Often	Sometimes	Rarely	Never
Displays effective teamwork, leadership, diversity and inclusion.	Always	Often	Sometimes	Rarely	Never

Total Score: ---------- **Weighted Score (%): ----------**

Remarks: ----------

Instructor's signature: ----------

PLO 10:Communication - Level-A3					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Acknowledges the importance of effective and persuasive communication to technical and non-technical audiences.	Always	Often	Sometimes	Rarely	Never
Practices effective and persuasive communication to technical and non-technical audiences.	Always	Often	Sometimes	Rarely	Never
Values effective and persuasive communication to technical and non-technical audiences.	Always	Often	Sometimes	Rarely	Never

Total Score: ---------- **Weighted Score (%): ----------**

Remarks: ----------

Instructor's signature: ----------

PLO 10:Communication - Level-A4					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Acknowledges the importance of effective and persuasive communication to technical and non-technical audiences.	Always	Often	Sometimes	Rarely	Never
Practices effective and persuasive communication to technical and non-technical audiences.	Always	Often	Sometimes	Rarely	Never
Values effective and persuasive communication to technical and non-technical audiences.	Always	Often	Sometimes	Rarely	Never
Displays effective and persuasive communication to technical and non-technical audiences.	Always	Often	Sometimes	Rarely	Never

Total Score: ---------- **Weighted Score (%): ----------**

Remarks: ----------

Instructor's signature: ----------

PLO 12:Lifelong Learning - Level-A3					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Acknowledges the need for lifelong learning.	Always	Often	Sometimes	Rarely	Never
Participates in lifelong learning opportunities.	Always	Often	Sometimes	Rarely	Never
Values lifelong learning in the practice of engineering.	Always	Often	Sometimes	Rarely	Never

Total Score: ---------- **Weighted Score (%): ----------**

Remarks: ----------

Instructor's signature: ----------

PLO 12:Lifelong Learning- Level-A4					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Acknowledges the need for lifelong learning.	Always	Often	Sometimes	Rarely	Never
Participates in lifelong learning opportunities.	Always	Often	Sometimes	Rarely	Never
Values lifelong learning in the practice of engineering.	Always	Often	Sometimes	Rarely	Never
Establishes a lifelong learning plan to support one's own professional development.	Always	Often	Sometimes	Rarely	Never

Total Score: ---------- **Weighted Score (%): ----------**

Remarks: ----------

Instructor's signature: ----------

Appendix-VIII

Quaid-e-Awam University of Engineering, Science and Technology, Nawabshah

DEPARTMENT OF SOFTWARE ENGINEERING

Psychomotor Domain Rubrics

Course (course code): _____

Student Name: _____

Roll No.: _____

Activity Title:

Level - P1					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Equipment Identification Ability to recognize equipment as well as its components for a lab work	with accuracy, speed, and correct terminology	with accuracy and correct terminology	with accuracy	with less accuracy	Not able to identify equipment
Equipment Use Able to describe the use of the equipment for the lab work	Frequently	Often	Occasionally	Rarely	Never describes the use of equipment
Equipment Handling Handles equipment with required care	Frequently	Often	Occasionally	Rarely	Doesn't handle equipment with required care
Safety Adherence Adherence for safety procedures	Fully	Moderately	Somewhat	Slightly	Doesn't adhere to safety procedures
Group work Contributes in a group based lab work	Frequently	Often	Occasionally	Rarely	Never participates

Total Score: ---------- **Weighted Score (%):** ----------

Remarks: ----------

Instructor's signature: ----------

Level – P2					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Equipment Identification Ability to recognize equipment as well as its components for a lab work	with accuracy, speed, and correct terminology	with accuracy and correct terminology	with accuracy	with less accuracy	Not able to identify equipment
Equipment Use Able to describe the use of the equipment for the lab work	Frequently	Often	Occasionally	Rarely	Never describes the use of equipment
Equipment Handling Handles equipment with required care	Frequently	Often Frequently	Occasionally	Rarely	Doesn't handle equipment with required care
Procedural Skills Understand the procedure and Displays skills to act upon sequence of steps in lab work	Fully	Moderately	Somewhat	Slightly	Not able to either learn or perform lab work procedure
Safety Adherence Adherence for safety procedures	Fully	Moderately	Somewhat	Slightly	Doesn't adhere to safety procedures
Group work Contributes in a group based lab work	Frequently	Often	Occasionally	Rarely	Never participates

Total Score: ---------- **Weighted Score (%): ----------**

Remarks: ----------

Instructor's signature: ----------

Level – P3					
Criterion	**Level of Attainment**				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Equipment Identification Ability to recognize equipment as well as its components for a lab work	with accuracy, speed, and correct terminology	with accuracy and correct terminology	with accuracy	with less accuracy	Not able to identify equipment
Equipment Use Able to describe the use of the equipment for the lab work	Frequently	Often	Occasionally	Rarely	Never describes the use of equipment
Equipment Handling Handles equipment with required care	Frequently	Often Frequently	Occasionally	Rarely	Doesn't handle equipment with required care
Procedural Skills Understand the procedure and Displays skills to act upon sequence of steps in lab work	Fully	Moderately	Somewhat	Slightly	Not able to either learn or perform lab work procedure
Response Ability to imitate the lab work on his/her own	Fully	moderately	somewhat	slightly	Not able to imitate the lab work
Observation's Use Displays the skills to perform related mathematical calculations using the observation from lab work	Fully	moderately	somewhat	slightly	Not able to use lab work observation into mathematical calculations
Safety Adherence Adherence for safety procedures	Fully	Moderately	Somewhat	Slightly	Doesn't adhere to safety procedures
Group work Contributes in a group based lab work	Frequently	Often	Occasionally	Rarely	Never participates

Total Score: ---------- **Weighted Score (%): ----------**

Remarks: ----------

Instructor's signature: ----------

Appendix-IX

Corrective Action Request (CAR)

CAR shall be generated by the QOBE, sample is given below:

	Faculty of EECSE	**Doc #**	CAR/Even-2022/SE/0001
		Issue Date	12-02-2023
	Corrective Action Request CLO 1	**Department**	Software Engineering

INITIATOR

Name(Originator)	Prof. Dr. Pardeep Kumar
CAR No./ REF	CQI/Even-2022/SE/0001
Designation	

Nature of Problem CLO failed due to poor performance overall The following students of 20SW have shown serious deficiency in Course Learning Outcome attainment in the courses they have taken in the Even-2022 semester. 1. 20WS41 - Muhammad Moinuddin	**References** 1. SW206 - Computer Networks Even-2022
Signature (Initiator)	**Date**

Corrective Action

Assign Additional Take Home Assignment

Remarks

Agreement/Decision on the Solution

Additional Assignment to be assigned to clear CLO

Signature of HOD/ Date	**Signature of QA/ Date**

Appendix-X

CQI Summary Report

Appendix-XI

Quaid-e-Awam University of Engineering, Science and Technology, Nawabshah

DEPARTMENT OF SOFTWARE ENGINEERING

Complex Engineering Problem (CEP)

Course (course code): _____

Batch: _____

Semester / Year: _____

Credit Hour: _____

Instructor: _____

Note:

1. This assignment should be undertaken by the students individually.
2. Assessment of this assignment will be done through the CEP rubrics.
3. The solution of the CEP should contain the followings:

1. **Problem Statement**

2. **Background**

3. **Objectives**

4. **Methodology**

5. **Design / Implementation**

6. **Outcome**

Quaid-e-Awam University of Engineering, Science and Technology, Nawabshah

DEPARTMENT OF SOFTWARE ENGINEERING

Rubrics for the

Complex Engineering Problem (CEP) / Complex Engineering Activities (CEAs)

Criterion	Level of Attainment				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Problem Definition Identifies the problem with key challenges, constraints, and objectives.	Professionally identified with solutions	Identified all the components	Identified key challenges and objectives.	Identified objectives only	Not identified
Methodology Provides the methodology to solve the defined problem.	With professional standards	With all the required details	With reasonable details	With basic details	Not provided
Analysis Performs thorough and rigorous analysis and validates it by available data and relevant resources.	Advance level analysis is performed with validation	Detailed analysis is performed	Reasonable analysis is performed	Basic analysis is performed	Not performed
Feasibility Justifies the feasibility of the solution in terms of technical, economic, environmental, and societal factors.	Justified professionally	Justified with full detail	Justified with required details	Justified with basic details	Not provided
Implementation Provides a roadmap for implementation of the solution, including a timeline, resources, and metrics for success.	Implemented all details professionally	Implemente d with full details	Implemented with required details	Implemented with basic details	Not provided
Communication and documentation Provides documented report in due time that communicates the solution clearly and effectively and also addresses the concerns of stakeholders.	Professionally documented and submitted in due time	Covers full details and submitted in due time	Covers required details and submitted in due time	Covers limited detail submitted in due time	Not submitted
Impact Provides the impact of solution on the problem, and achievement of the desired outcomes	Professionally	Efficiently	Adequately	Inadequately	Not provided

Total Score: ---------- **Weighted Score (%):** ----------

Remarks: ----------

Instructor's signature: ----------

Appendix-XII

Quaid-e-Awam University of Engineering, Science and Technology, Nawabshah

DEPARTMENT OF SOFTWARE ENGINEERING

Open-Ended Lab (OEL)

Course (course code): _____

Batch: _____

Semester / Year: _____

Credit Hour: _____

Instructor: _____

Note:

1. This assignment should be undertaken by the students individually.
2. Assessment of this assignment will be done through the OEL rubrics.
3. The solution of the OEL should contain the followings:

1. **Problem Statement**

2. **Objectives**

3. **Methodology**

4. **Design / Implementation**

5. **Outcome**

Quaid-e-Awam University of Engineering, Science and Technology, Nawabshah

DEPARTMENT OF SOFTWARE ENGINEERING

Rubrics for the Open-Ended Lab (OEL)

Criterion	Level of Attainment				
	Excellent (4)	**Very Good (3)**	**Good (2)**	**Average (1)**	**Fail (0)**
Background knowledge	Thorough study and all the questions have been answered correctly.	Adequate study and more than half of the questions have been answered correctly.	Sufficient study and half of the questions have been answered correctly.	In-adequate study and less than half of the questions have been answered correctly.	No study and none of the questions have been answered.
Select Appropriate Equipment and Tools	Relevant and smart selection of equipment and tools to achieve desired objective along with proper reasoning.	Satisfactory selection of equipment and tools to achieve desired objective along with proper reasoning.	Satisfactory selection of equipment and tools to achieve desired objective without proper reasoning.	Unsatisfactory selection of equipment and tools to achieve desired objective.	No use of equipment and tools leading towards major errors in the objective.
Analysis and Results	Appropriate data collected, correct analysis and results correctly interpreted.	Appropriate data collected but insufficient analysis and results adequately interpreted.	Inappropriate data collected but sufficient analysis and results inadequately interpreted.	Inappropriate data collected; no understanding of analysis and results incorrectly interpreted.	No data collection, analysis and results interpretation.
Conclusions and Recommendations	Significant findings are summarized. Precisely concluded. Excellent suggestion for further research.	Significant findings are summarized. Good conclusion. Good suggestion for further research.	Significant findings are summarized. Acceptable conclusion. Acceptable suggestion for further research.	Findings are poorly summarized. Poor conclusion. Poor suggestion for further research.	No findings are summarized. Poor conclusion. No suggestion for further research.
Report Writing	Report meets all requirements, and it is prepared in original and creative way to engage readers.	Report meets all prescribed requirements.	The requirements of report writing are not properly addressed.	The report submitted but not according to requirements.	Report was not prepared, or they have not required elements.

Total Score: ---------- **Weighted Score (%):** ----------

Remarks: ----------

Instructor's signature: ----------