

## **Quality Assurance Guidance**

**Taif University**

**College of Computers and Information Technology**

**Computer Engineering Department**

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## 1. Introduction

Education is the bedrock of individual opportunity and societal progress. Yet, simply providing access to schooling isn't enough. We need to ensure that the education offered is high-quality, effectively preparing students for the future. This is where educational quality assurance comes in. Educational quality assurance refers to the systematic processes used to monitor, evaluate, and improve the effectiveness of educational programs and institutions. It's not just about checking boxes; it's about creating a culture of continuous improvement that benefits everyone involved, from students and teachers to administrators and policymakers.

Through a combination of internal and external assessments, educational quality assurance works to ensure a well-rounded learning experience. This includes evaluating factors like curriculum design, teaching methods, student support services, and most importantly, student learning outcomes. By identifying areas of strength and weakness, educational quality assurance helps institutions refine their practices and ensure they are delivering a valuable education that equips students with the knowledge, skills, and critical thinking abilities they need to thrive in a complex world.

Educational quality assurance utilizes various tools and techniques to evaluate different aspects of education:

- **Curriculum and Plan Review:** Ensuring curriculum content and studying plan are aligned with the program goals and prepares students for future challenges.
- **Instructor Evaluation:** Assessing teaching effectiveness and providing support for professional development.
- **Student Assessments:** Evaluating program learning outcomes through standardized tests, performance-based tasks, LAB, ...etc.
- **Surveys:** Gathering feedback on the learning environment, school climate, and student support services.

Educational quality assurance is an ongoing process. By continuously monitoring, evaluating, and improving educational practices, we can ensure that all students have the opportunity to succeed and reach their full potential.

## 2. Program Quality Assurance System

The Department of Computer Engineering (CE) implements an internal quality system for its programs, consistent with the university's quality system (PDCA: Plan-Do-Check-Act) methodology, as illustrated in Figure 2.1.



Figure 2.1: The PDCA quality assurance methodology applied by the CE program

The CE program pursues excellence via its continuous improvement procedures and frequent program reviews by implementing all of the PDCA system's components.

The CE program adheres to the quality assurance processes shown in Figure 2.2 below and its quality assurance .

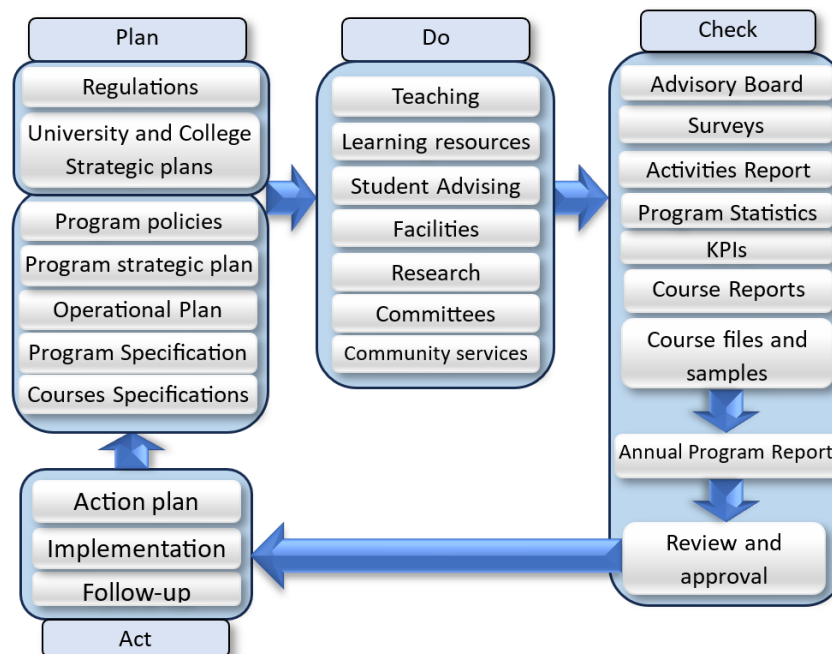


Figure 2.2: CE program's quality assurance processes for planning, data collection, analysis, development, and decision-making.

The CE program self-reviews by obtaining necessary data on students, faculty members, program activities, curriculum, and learning resources for accomplishing its intended goals after organizing and carrying out necessary actions. This information consists of the following:

- Program statistics, such as the total number of students enrolled, the total number of graduates, and any other facts relating to the current graduating batch's progress (cohort analysis of the current graduate batch).
- The program's learning outcomes assessment which is achieved by direct and indirect assessment methods (as outlined in the course specifications).
- The course reports are prepared by the course coordinators and are based on student and instructor feedback and assessments of the courses.
- The program activities that were carried out including community collaboration, research and innovation, professional development activities for professors and other staff, counseling and assistance for students, and program activity analysis.
- The values of the program's key performance indicators (KPIs) for the boys' and girls' campuses.
- The student surveys to assess the effectiveness and quality of the curriculum and
- Additional evaluations: Stakeholders (employers, alumni, and faculty members), the program advisory committee, and if there are any independent reviewers.

Every year, the CE program analyzes the data from the assessments gathered and the key performance indicators (KPIs) included in the program's annual report. Following comments on the data collected (as previously mentioned), an analysis is carried out to determine the strengths, areas for development and improvement suggestions. Based on these findings, a program improvement plan is prepared which outlines the actions to be performed, the person or committee responsible for implementing each action, the start and finish dates, the accomplishment indicators, the goal benchmark for each recommended action, and the priorities for improvements identified from the analyzed data. This improvement plan is discussed and approved for execution by the department council. The department then follows up and reviews the plan.

### 3. Program Quality Monitoring Procedures

The Computer Engineering department monitors program quality using program learning outcomes (PLOs) and program goals achievement. PLOs are statements of expectations that outline the knowledge, skills and values students are expected to have by the time they graduate. Since ABET approved the program in 2012, the program learning outcomes (PLOs) established in the CE program are the same as the ABET seven student

outcomes (SOs). The following essential elements are included in the PLOs Assessment and Review process:

**- PLOs evaluation and assessment via course evaluation**

A course assessment file (CAF), which records the students' performance and the achievement of related learning outcomes, is generated from the assessment results of the corresponding course. The related program learning outcome's attainment result is found via the course learning outcomes (CLOs), which are correlated with certain PLOs. The outcomes reflect the performance of the students as well as the PLOs that the course has attained. The course coordinator then reports the findings, analysis, and suggestions to the CE department after the course instructors review the outcome.

**- Course exit survey**

Additionally, PLOs are evaluated indirectly, obtained from each course's student feedback. Using surveys of course learning outcomes (CLOs) correlated with particular PLOs, it assesses the level of achievement of student's learning outcomes attained by a course.

**- Instructor's Feedback**

The instructors of all course sections report their comments and recommendations on the students' results in the CAF file. The course coordinator then considers these recommendations in the course report (CR).

**- Department Curriculum Committee (DCC)**

DCC considers instructors' comments and recommendations and the evaluation results submitted in the ASPIRE system. At the end of an academic semester, DCC examines the CR created by the course coordinator to examine if any modification to the course specification is required. If the committee recommends modifications, the department council is notified so that it may consider and approve the recommended modifications.

**- Other**

PLOs are also evaluated using feedback from program constituents and the advisory board committee. Feedback from stakeholders, including alumni, graduating students, and advisory boards, is gathered via surveys.

The program's goals are monitored throughout the program by the KPIs, advisory board committee recommendations, and surveys such as alumni and employer surveys.



#### **- Program KPIs**

Annually, the program committee measures, examines, and reports KPIs to the CE council for review and approval. Table G.1, shown in the next section, maps these KPIs to the goals.

#### **- Advisory board committee.**

A committee of the advisory board, appointed by the chair of CE, meets regularly for discussions about the program's goals, study plan, curriculum, and learning outcomes. The suggestions and remarks are documented in the minutes of the meetings, which are then examined and evaluated by the CE council to inform future program improvements.

#### **- Surveys**

Several stakeholders are requested to respond to a prepared survey that seeks feedback on the program's goals. Among these stakeholders are advisory boards, employers, and alumni.

### **4. Arrangements to Monitor Quality of Courses Taught by other Departments.**

Courses delivered by IT and CS departments have the same quality monitoring as CE courses. However, courses delivered by departments in other colleges such as Basic Sciences, taught by the Faculty of Science, are yearly review by the Curriculum Review Committee as well as annual meetings with the Faculty of Science to maintain the high standards of curricular outcomes. An integration of basic sciences with CE topics should be maintained to provide high capabilities of CE students. In addition, CCIT-TU improved the degree of interaction between computer and information technology faculties and science faculties through a formal involvement of assigned basic science coordinators to follow-up with the course director and closely monitor details and completeness.

### **5. Arrangements Used to Ensure the Consistency between Main Campus and Branches**

- A course coordinator is assigned for each course.
- The coordinator supervises the teaching process and coordinate between all sections in both campuses (male and female sections)
- Both campuses should have a unified exam. If not, each campus put its own exam, the coordinator reviews the exams and make sure that all exams are consistent in both campuses.

- All assessment data for each section are submitted by the sections instructors through the ASPIRE system then Course Assessment File (CAF) reports are generated by the system (ASPIRE).
- Each instructor is required to upload a Faculty Assessment Report (FAR) with comments on the results of his taught classes.
- A Course Report (CR) that combines the CAF reports of all taught sections is generated by the ASPIRE for each course.
- The course coordinator reviews the FAR for all sections in both campuses and the combined CR generated by the ASPIRE, then summarizes all results and recommendations on the template of the course report approved by the NCAAA.
- Curriculum committee review all course reports and summarizes all comments, recommendations and improvement plans in one report and submit it to the department council for discussion and approval. The results and recommendations of this report are then presented in the annual program report.

## 6. Arrangements to Apply the Institutional Regulations Governing the Educational and Research Partnerships

### *For education:*

1. A student can study some courses in another institute.
2. The department council committee (DCC) review the request submitted by the student and give him approval to study some courses in another institute based on the following:
  - a. The course should be in the program plan.
  - b. The intersection between the proposed course and its equivalent should be more than 70%.
  - c. The student grade should be greater than or equal C.
  - d. The total number of courses studied outside the college should be less than 30% of the plan courses.

### *For research:*

1. The member can be engaged in a research project approved by another institute based on a permission of the college.
2. A research group formed by members inside the college can include members from outside the university.

A member can apply for a research project outside the university through the higher education and research deanship.



## 7. Assessment Plan for Program Learning Outcomes (PLOs), and Mechanisms of Using its Results in the Development Processes

All courses are evaluated after each semester by the course learning outcomes (CLOs) specified in the course specifications. The CLOs correspond to three categories of learning domains: knowledge, skills, and values. Following the computation of the accomplishments of each CLO in a given course, the values of the corresponding PLOs are summed across all courses in the program. As a result, each learning domain's accomplishments are analyzed; if a learning domain is doing poorly, it may be enhanced by revising the specifications of the course to address the issue. The investigation of course reports and program accomplishments will inform ongoing updates to the teaching strategies and assessment methods.

This mechanism is illustrated in Figure 2.2. The curriculum and program assessment committees participate in an iterative process during department council sessions. Table 7.2 displays the assessment strategy for the PLOs in terms of the assessment techniques used in the courses and how they are linked to each learning area. The details of each course's CLO mapping to PLO, as well as the evaluation techniques, are included in the course specifications. The mapping of CLOs to PLOs is shown in Table 7.1.

Course code & No.	Program Learning Outcomes						
	Knowledge and understanding	Skills			Values		
	K1	S1	S2	S3	V1	V2	V3
202261-3		I					
203206-4		I					
501215-3	I		I				
501220-3	I	I	I				
202262-3	I						
202263-3	I	I					
203207-4	I				I		

501222-3			I				
202364-3	I	I					
202365-3		I			I		
501324-3	I	I					
503323-3	I	I					
202366-3		I					
500321-2	I			I		I	I
503325-3	I	I					
503371-3	I	I					
202367-3	I			I			
501453-3	I	P					
503310-4	I			P			
503431-3	I			P			
503311-3	I	I		P			
503474-3	I	I					
502372-3	I	I	I				I
503413-4	I	I		P			
503432-3	M	M		M			
503443-4	I	I					
202368-3	I						
501343-3	I		I				I
503575-4	I	I		I			
503515-3	M	M		P			
503598-3	I	I	M		I	M	M
503599-3	I	I	M		I	M	M

503444-2	I	I	M		I	M	M
503592-3	I	I		I			
503546-3	M		M				
503576-3	M	M					
503528-3	M	M					
503535-3	M	M		M			
503537-3	M	M			M		
503539-3	M	M		M	M		
503519-3		M			M		
503547-3	M	M			M		
503551-3	I		M				
503553-3	I	M		P	M		
503555-3	I		I				
503557-3	M			P	M		
503559-3	M	M			M		
503577-3	M	M					
503578-3	M	M					
503579-3		M					
501554-3	M			P			
503574-3	M	M			M		
501583-3	M			P			
501481-3	M	M					
503566-3	M		M				

Table 7.1: Align the program learning outcomes with program courses, according to the following desired levels of performance (I = Introduced P = Practiced M = Mastered )

Figure 7.1 below illustrates the key participants involved in the review process and assessing the program's quality and intended program learning outcomes. Employers, students, faculty, and alumni assess the performance of the PLOs and program.

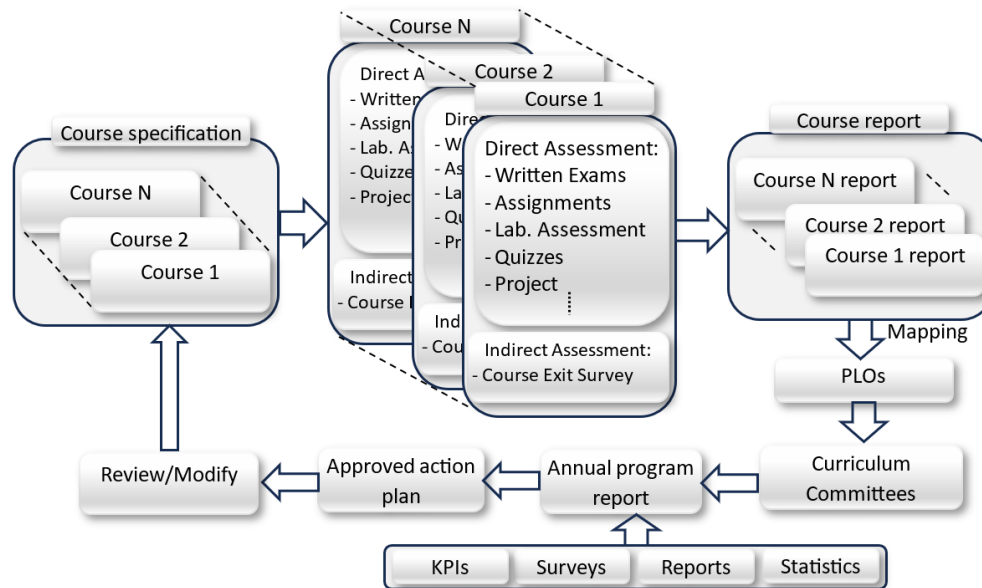


Figure 7.1: PLO assessment and review mechanism and its role in the development process.

Faculty members gather student data (course grades and course survey responses) for their courses and submit the assessment materials to the Aspire system to evaluate the program learning outcomes. Aspire is a centralized web-based platform that facilitates the administration of course-related data. It offers a flexible method for uploading the curriculum committee-approved copies of the curricula and the instructor's assessment data for each course. The PAC-managed Aspire system compiles the aggregated data, which also produces analytical reports at the program and course levels. Based on the analysis's findings, the curriculum committee suggests reviewing or changing CLOs and PLOs. These recommendations are then included in the annual program report, which the university's higher education administration, the CE council, and the Quality Deanship approve. While course data and surveys are gathered every semester, data from the entire academic year must be gathered to assess all PLOs to guarantee that all outcomes are covered.

The following additional stakeholders may also impact the evaluation of the program's learning outcomes:

- **Exiting Students**

When they graduate, students must complete an exit student survey that assesses their knowledge, perspective, and confidence in the program's learning outcomes and whether they need revision. This survey should be collected by the end of each academic year.

- **Alumni**

Feedback is also obtained from former students. The program administrators need to maintain up-to-date contact information for their graduates. In order to maintain its database with the businesses and academic institutions where the graduates are employed, the alum office seeks to stay in touch with the graduates. The office additionally prompts the alumni to complete an alum survey.

- **The Advisory Board Committee**

The feedback of the advisory board committee is requested on the PLOs and program goals through their recommendations and the corresponding survey.

- **Employers**

Employer input is necessary to evaluate and enhance the program entities. A database of employers is updated regularly based on the connections made by the Alumni Office. The

Alumni office should contact managers and employers each year to invite them to participate in evaluating the graduates' performance among their workforces. They are requested to complete the employer survey. The primary areas of emphasis for the survey include technical knowledge, communication, ethical conduct, and problem-solving abilities. An annual report given to the department chair by the alum office summarizes the suggestions and concerns raised by the employers. The committees within the department discuss the report and recommend remedial measures that need to be agreed upon by the department council before being put into effect.

PLOs	Assessment time	Assessment measures and tools	Assessor	Assessment method
K1: Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	At levels 3 to 10 starting from 2022	Direct: Exams	Instructor	- Written Exams - Assignments
		Indirect: Surveys	Students	- Course exit Survey - Learning Quality surveys

<b>S1:</b> Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	At levels 3 to 10 starting from 2022	Direct: Exams	Instructor	- Written Exams - Assignments - Graduation Project Evaluation - Practical Test
		Indirect: Surveys	Students	- Course exit Survey - Learning Quality surveys
<b>S2:</b> Communicate effectively with a range of audiences.	At levels 9 to 10 starting from 2022	Direct: Exams	Instructor	- Oral Presentation - Graduation Project Evaluation
		Indirect: Surveys	Students	- Course exit Survey - Learning Quality surveys
<b>S3:</b> Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	At levels 4 to 10 starting from 2022	Direct: Exams	Instructor	- Written Exams - Assignments - Oral Presentation - Graduation Project Evaluation - Practical Test
		Indirect: Surveys	Students	- Course exit Survey - Learning Quality surveys
<b>V1:</b> Acquire and apply new knowledge as needed, using appropriate learning strategies.	At levels 3 to 5 and levels 8 to 10 starting from 2022	Direct: Exams	Instructor	- Assignments - Graduation Project Evaluation - Practical Test
		Indirect: Surveys	Students	- Course exit Survey - Learning Quality surveys
<b>V2:</b> Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	At levels 8 to 10 starting from 2022	Direct: Exams	Instructor	- Written Exams - Assignments - Graduation Project Evaluation
		Indirect: Surveys	Students	- Course exit Survey - Learning Quality surveys
<b>V3:</b> Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	At levels 9 to 10 starting from 2022	Direct: Exams	Instructor	- Oral Presentation - Graduation Project Evaluation - Practical Test
		Indirect: Surveys	Students	- Course exit Survey - Learning Quality surveys

Table 7.2: CE Program Learning Outcomes (PLOs) Assessment Plan



## 8. PLO assessment and review mechanism and its role in the development process.

Evaluation Areas/Aspects	Evaluation Sources/References	Evaluation Methods	Evaluation Time
Effectiveness of teaching	Leaders, Students, Alumni, Teaching Staff	Survey, Class Observation	End of the semester
Learning resources	Teaching Staff, Students	Survey	End of the semester
Leadership	Teaching Staff, Students	Survey	End of the semester
Effectiveness of the program	Alumni, Graduate Employers	Survey	End of the semester

Table 8.1: PLO assessment and review mechanism.

**Evaluation Areas/Aspects** (e.g., leadership, effectiveness of teaching & assessment, learning resources, partnerships, etc.)

**Evaluation Sources** (students, graduates, alumni, faculty, program leaders, administrative staff, employers, independent reviewers, and others (specify))

**Evaluation Methods** (e.g., Surveys, interviews, visits, etc.)

**Evaluation Time** (e.g., beginning of semesters, end of academic year, etc.)

## 9. Program KPIs

No	KPIs Code	KPIs	Target	Measurement Methods	Measurement Time
1	KPI-P-01	Percentage of achieved target level of KPI of program operational plan	70%	Percentage of performance indicators that achieved the target level in the operational plan annually to the total number of targeted indicators per year	End of the year
2	KPI-P-02	Students' Evaluation of quality of learning in program	3	Average rating of the overall quality of students' learning experiences on a five-point scale in an annual survey of final year students	End of the semester

3	KPI-P-03	Students' evaluation of the quality of their courses	3	Average rating of the overall students' evaluation of courses on a five point scale in an annual survey	End of the semester
4	KPI-P-04	Completion Rate	70%	Proportion of students entering undergraduate programs who complete the program in minimum time (i.e., in the set period)	End of the year
5	KPI-P-05	First-Year Students Retention Rate	75%	Percentage of first-year undergraduate students who continue at the program the next year to the total number of first-year students	End of the year
6	KPI-P-06	Students' performance in the professional and/or national examinations (if any)	N/A	N/A	N/A
7	KPI-P-07	Proportion of graduates who employed or enrolled in further study	50%	Proportion of graduates from the program who within a year of graduation are: a. employed b. enrolled in further study	End of the year
8	KPI-P-08	Average Number of students in the class	40	Average Number of students in each teaching sessions (lecture, small group, tutorial, laboratory, and clinical sessions)	End of the semester
9	KPI-P-9	Employers' evaluation of the program graduate's proficiency	3	The average rating of employers for the proficiency of the program's graduates on a scale of five levels in an annual survey	End of the year

10	KPI-P-10	Student satisfaction with the services	3	Student satisfaction rate for the various services offered by the program (restaurants, transport, sports facilities, academic guidance ...) on a five-level scale in an annual survey of students	End of the semester
11	KPI-P-11	Ratio of students to teaching staff	40:1	Total number of full-time and full-time equivalent teaching staff to the total number of students in the program	End of the semester
12	KPI-P-12	Percentage of teaching staff distribution	A: 30% Female 70% Male B: Assistant Professor: 50% Associate Professor: 30% Full Professor: 20%	Percentage of teaching staff distribution based on: a. Gender b. Branches Academic Ranking	End of the year
13	KPI-P-13	Proportion of teaching staff leaving the program	5%	Proportion of teaching staff leaving the program annually for reasons other than age retirement to the total number of teaching staff.	End of the year
14	KPI-P-14	Percentage of publication of faculty members	60%	Number of full-time faculty members who published at least one research during the year to total faculty members	End of the year

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15	KPI-P-15	Average research per faculty member	1	The average number of refereed or published research per each faculty member during the year.	End of the year
16	KPI-P-16	Average of citations in refereed journals	10	Number of citations in refereed journals per total number of publications	End of the year
17	KPI-P-17	Satisfactions of beneficiaries with learning resources	3	Satisfactions of beneficiaries of the adequate and diversity of learning resources (references, databases, etc.) on scale of five levels in an annual survey	End of the year

Table 9.1: Key Performance Indicators from NCAAA.