# Program Specification

DIPLOMA

| | |
|---|---|
| Program: | **Renewable Energy Technology** |
| Program Code (as per Saudi university ranking): | 071303 |
| Qualification Level: | Level 5 |
| Department: | Diploma Department |
| College: | Applied College |
| Institution: | Umm AL-Qura University |
| Program Specification: | New ☒ updated* ☐ |
| Last Review Date: | April 08, 2025 |

*Attach the previous version of the Program Specification.

## Table of Contents

## A. Program Identification and General Information

### 1. Program's Main Location :

University Campus

### 2. Branches Offering the Program (if any):

N/A

### 3. Partnerships with other parties (if any) and the nature of each:

N/A

### 4. Professions/jobs for which students are qualified

Intermediate Diploma Holders in Renewable Energy Technology can lead to various professional opportunities and give several benefits. Students can qualify for the following professions/jobs:

- Solar PV Technician/Installer: Install, test, and maintain solar photovoltaic systems.
- Solar Thermal Technician: Focus on solar water heating and thermal systems, conducting routine inspections and repairs.
- Wind Turbine Technician: Assist with installation, inspection, and maintenance of wind turbines and their components.
- Operations & Maintenance (O&M) Technician: Ensure daily operation and regular upkeep of renewable energy facilities (solar or wind).
- Field Service Technician: Travel to sites for on-site installations, commissioning, troubleshooting, and system upgrades.
- Energy Auditor Assistant: Support senior auditors in evaluating energy use and recommending cost-effective, sustainable solutions.
- Project Coordinator (Renewable Energy): Help plan and manage the logistics of installation and maintenance projects.
- Junior Technical Sales/Support: Provide technical advice, sales assistance, and customer service for renewable energy products.
- Testing & Quality Control Technician: Work in labs or manufacturing settings to test and validate renewable energy components.
- Electrical/Electronic Technician for Renewable Systems: Handle electrical wiring, read schematics, and ensure compliance with safety standards in solar and wind projects.

## 5. Relevant occupational/ Professional sectors:

**Some of the relevant sectors for Renewable Energy Intermediate Diploma Holders are as follows:**

- **Renewable Energy Generation & Utilities: Work in solar power plants, wind farms, and utility companies.**
- **Construction & Engineering Firms: Join EPC contractors involved in designing and building renewable projects.**
- **Operations & Maintenance Services: Maintain and operate solar and wind facilities for specialized service providers or in-house teams.**
- **Manufacturing & Supply Chain: Engage in production or distribution of renewable energy equipment (panels, inverters, turbine parts).**
- **Consulting & Project Management: Support audits, feasibility studies, and project planning for renewable energy ventures.**
- **Public Sector & Government Entities: Contribute to policy development, regulatory frameworks, and large-scale initiatives (e.g., Vision 2030).**
- **Educational & Research Institutions: Assist in training programs or conduct R&D on new clean energy solutions.**
- **Environmental & Sustainability Organizations: Advance green initiatives through NGOs, CSR departments, or sustainability-focused groups.**

## 6. Major Tracks/Pathways (if any):

| Major track/pathway | Credit hours (For each track) | Professions/jobs (For each track) |
|---|---|---|
| **1.** | | |
| **2.** | | |
| **3.** | | |
| ... | | |

## 7. Exit Points/Awarded Degree (if any):

| exit points/awarded degree | Credit hours |
|---|---|
| 1. | |
| 2. | |
| 3. | |

## 8. Total credit hours: (60 hours)

## B. Mission, Objectives, and Program Learning Outcomes

### 1. Program Mission:

Empowering Saudi Arabia's energy transition by training skilled technicians in renewable energies technologies.

### 2. Program Goals:

1. Develop a strong foundation in renewable energy principles, focusing on solar and wind technologies, to ensure graduates are technically proficient.
2. Provide extensive lab work and field experience in system installation, operation, and maintenance to prepare students for real-world challenges.
3. Emphasize adherence to national and international standards, ensuring graduates uphold best practices in occupational health, environmental protection, and regulatory compliance.
4. Encourage continuous learning and problem-solving skills, enabling graduates to keep pace with evolving technologies and industry trends.
5. Align program outcomes with Saudi Vision 2030 by cultivating a skilled workforce committed to advancing sustainable energy solutions throughout the Kingdom.

### 3. Program Learning Outcomes*

| | |
|---|---|
| **Knowledge and Understanding** | |
| K1 | Describe the core concepts of solar, wind, biofuels, and hydrogen generation energy systems, including basic operation, component functions, and energy conversion processes. |
| K2 | Explain the national and international standards, codes, and safety regulations relevant to installing and maintaining renewable energy systems. |
| K3 | Recognize the environmental benefits, economic considerations, and societal impacts of renewable energy adoption, with emphasis on Saudi Arabia's Vision 2030. |
| K4 | Identify key hardware (e.g., panels, turbines, inverters) and typical layouts used in solar PV and wind systems, understanding performance factors and limitations. |
| **Skills** | |
| S1 | Install, test, and maintain basic solar PV, wind turbine, biofuels and hydrogen generation systems, applying safe and correct procedures with relevant tools and equipment. |

| | |
|---|---|
| S2 | Diagnose common faults or performance issues in renewable energy systems and suggest corrective actions using structured analytical techniques. |
| S3 | Interpret schematics, wiring diagrams, and technical manuals to guide installation, operations, and maintenance activities. |
| S4 | Conduct routine inspections, performance evaluations, and system monitoring using appropriate instruments and data analysis methods. |
| S.5 | Work effectively in multidisciplinary teams to plan and execute small-scale renewable energy projects, demonstrating clear communication and task coordination. |
| **Values, Autonomy, and Responsibility** | |
| V1 | Uphold ethical standards, prioritizing safety, environmental stewardship, and integrity in all renewable energy-related tasks. |
| V2 | Demonstrate a willingness to update skills and knowledge in line with advancements in renewable energy technologies and industry practices. |
| V3 | Take responsibility for personal contributions and outcomes in project work, managing tasks efficiently and proactively. |
| V4 | Foster a positive team environment by respecting diverse perspectives, offering constructive feedback, and engaging cooperatively with peers and supervisors. |

* Add a table for each track or exit Point (if any)

## C. Curriculum

### 1. Curriculum Structure

| Program Structure | Required/ Elective | No. of courses | Credit Hours | Percentage |
|---|---|---|---|---|
| Institution Requirements | Required | 0 | 0 | 0 |
| | Elective | 0 | 0 | 0 |
| College Requirements | Required | 5 | 14 | 23.33 |
| | Elective | 0 | 0 | 0 |
| Program Requirements | Required | 13 | 35 | 58.33 |
| | Elective | 1 | 2 | 3.33 |
| Capstone Course/Project | | 1 | 3 | 5 |
| Field Training/ Internship | | 1 | 6 | 10 |
| Residency year | | | | |
| Others | | | | |
| **Total** | | 21 | 60 | 100 |

* Add a separate table for each track (if any).

### 2. Program Courses

| Level | Course Code | Course Title | Required or Elective | Pre-Requisite Courses | Credit Hours | Type of requirements (Institution, College, or Program) |
|---|---|---|---|---|---|---|
| Level 1 | | English Language (1) | Required | | 4 | College |
| | | Thermodynamics | Required | | 2 | Program |
| | | Basic science for engineering | Required | | 3 | Program |
| | | Applications in artificial intelligence | Required | | 2 | College |
| | | Fluid Mechanics | Required | | 3 | Program |
| | | Maintenance | Required | | 2 | Program |
| | | Engineering Drawing | Required | | 2 | |
| Level 2 | | English Language (2) | Required | | 4 | College |
| | | Wind energy | Required | | 3 | Program |
| | | Biofuel | Required | | 3 | Program |
| | | Heat Transfer | Required | | 3 | Program |
| | | Engineering Measurements | Required | | 3 | Program |
| | | Values and Ethics | Required | | 2 | College |
| Level 3 | | Energy Conversion and Storage | Required | | 2 | Program |

| Level | Course Code | Course Title | Required or Elective | Pre-Requisite Courses | Credit Hours | Type of requirements (Institution, College, or Program) |
|---|---|---|---|---|---|---|
| | | Photovoltaic Systems | Required | | 3 | Program |
| | | Thermal Solar Energy Systems | Required | | 3 | Program |
| | | Professional skills | Required | | 2 | College |
| | | Special Topics in Renewable Energy Systems | Elective | | 2 | Program |
| | | Graduation Project | Required | | 3 | Program |
| | | Hydrogen Generation | Required | | 3 | Program |
| | | | | | | |
| Level 4 | | Cooperative training | Required | | 6 | Program |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

* Include additional levels (for three semesters option or if needed).
** Add a table for the courses of each track (if any)

## 3. Course Specifications:

Insert hyperlink for all course specifications using NCAAA template (T-104)

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## 4. Program learning Outcomes Mapping Matrix:

Align the program learning outcomes with program courses' according to the following desired performance levels *(I = Introduced & P = Practiced & M = Mastered).*

| Course code & No. | Program Learning Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Knowledge and understanding | | | | Skills | | | | | Values, Autonomy, and Responsibility | | | |
| | K1 | K2 | K3 | K4 | S1 | S2 | S3 | S4 | S5 | V1 | V2 | V3 | V4 |
| English Language (1) | College requirement | | | | | | | | | | | | |
| Thermodynamics | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | |
| Basic science for engineering | ✓ | ✓ | ✓ | | ✓ | | ✓ | | | ✓ | | | |
| Applications in artificial intelligence | College requirement | | | | | | | | | | | | |

| Course code & No. | Program Learning Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Knowledge and understanding | | | | Skills | | | | | Values, Autonomy, and Responsibility | | | |
| | K1 | K2 | K3 | K4 | S1 | S2 | S3 | S4 | S5 | V1 | V2 | V3 | V4 |
| Professional skills | College requirement | | | | | | | | | | | | |
| Engineering Drawing | ✓ | | | | ✓ | ✓ | | | | | | | |
| English Language (2) | College requirement | | | | | | | | | | | | |
| Fluid Mechanics | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | ✓ | |
| Heat Transfer | ✓ | ✓ | | | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | |
| Engineering Measurements | ✓ | ✓ | | | ✓ | ✓ | ✓ | | | | | ✓ | ✓ |
| Values and Ethics | College requirement | | | | | | | | | | | | |
| Energy Conversion and Storage | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | | ✓ | | ✓ | |
| Photovoltaic Systems | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | | | ✓ | ✓ |
| Wind energy | ✓ | ✓ | | | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | |
| Biofuel | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | | ✓ | ✓ |
| Hydrogen Generation | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Thermal Solar Energy Systems | ✓ | ✓ | | | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | |
| Maintenance | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Special Topics in Renewable Energy Systems | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| Graduation Project | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Cooperative training | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

* Add a separate table for each track (if any).

## 5. Teaching and learning strategies applied to achieve program learning outcomes.

Describe teaching and learning strategies and curricular and extra-curricular activities adopted to achieve the Program's learning outcomes in all areas.

The following policies, teaching and learning strategies, learning experiences, and learning activities are followed to achieve the program learning outcomes:

- Lectures, practical and independent study assignments.
- Presentations on different topics.

- Realistic Case Studies
- Teamwork practical study assignments

### 6. Assessment Methods for program learning outcomes.

Describe assessment methods (Direct and Indirect) that can be used to measure the achievement of program learning outcomes in all areas.

The Program should devise a plan for assessing Program Learning Outcomes (all learning outcomes should be assessed at least twice in the bachelor program's cycle and once in other degrees).

The following direct assessment methods are as follows:

- Classwork and homework assignments.
- Exam
- Case Studies Presentations
- Teamwork reports / presentations
- Case Studies reports and presentations

On the other hand, a course survey is conducted to the student, and the results are collected and analyzed as a direct assessment method by the assessment committee.

## D. Student Admission and Support:

### 1. Student Admission Requirements

Registration requirements are determined by the Applied College at Umm Al-Qura University in accordance with the procedures approved for the diploma.

### 2. Guidance and Orientation Programs for New Students

(Include only the exceptional needs offered to the students of the Program that differ from those provided at the institutional level).

N/A

### 3. Student Counseling Services

(Academic, professional, psychological, and social)
(Include only the exceptional needs offered to the students of the Program that differ from those provided at the institutional level).

The academic advising and student support mechanism is as follows:

1- Each faculty member will announce his topics for the Capstone Project in the beginning of the academic year.
2- Each student will provide the program coordinator with 2 choices.

3- The curriculum committee will distribute the master's student among the faculty members, considering the student's choices, faculty member specialization, and faculty member announced topics.
4- Since then, the assigned faculty member/supervisor will also be the academic adviser for the student and will continue the process of academic advising until the student's graduation.
5- Each advisor will guide the student in selecting the most relevant courses according to his project topic and supervise all student's academic activities until finishing the Master's Capstone Research Project.

Afterward, the supervisor will recommend a jury to judge and assess the Capstone Project through student oral presentation and the written final professional report of the project.

### 4. Special Support

(Low achievers, disabled, gifted, and talented students).

The Applied College supports the students who have special needs, such as low achievers, disabled, gifted, and talented. The College introduces the best of the advising scheme and puts the plan of their schedules carefully to meet the college, and university expectations.

## E. Faculty and Administrative Staff:

### 1. Needed Teaching and Administrative Staff

| Academic Rank | Specialty | | Special Requirements / Skills (if any) | Required Numbers | | |
|---|---|---|---|---|---|---|
| | General | Specific | | M | F | T |
| Professor | 1 | 6 | - | 7 | - | 7 |
| Associate Professor | 1 | 10 | - | 11 | - | 11 |
| Assistant Professor | - | 23 | - | 23 | - | 23 |
| Lecturer | - | 7 | - | 7 | - | 7 |
| Teaching Assistant | 1 | 4 | - | 5 | - | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Technicians and Laboratory Assistants | 1 | 8 | - | 9 | - | 9 |
| Administrative and Supportive Staff | 1 | 6 | - | 7 | - | 7 |
| Others (specify) | 1 | 10 | - | 11 | - | 11 |

## F. Learning Resources, Facilities, and Equipment:

### 1. Learning Resources

Learning resources required by the Program (textbooks, references, e-learning resources, web-based resources, etc.)

For each course offered during the academic semester, there is a textbook that is adopted by the instructor/instructors for each course. The textbook coordinator, who is nominated through the department to be responsible for ordering the textbooks, implements the following complete cycle:

- Starting from preparing a list of expected courses offered in the following semester one month before the end of the current semester, the list circulated to all the faculty members to add, modify, or verify the textbook adopted for the next semester in full detail (name, author, year, and ISBN) as well as the expected number of students in each course.
- The coordinator contacts the university bookstore, which is responsible for making the textbook available by the beginning of each semester and updates them by the requisition list.
- The bookstore arranges with the publishers to ensure the availability of the required books on time.
- Feedback from the faculty members and the bookstore representatives runs continuously to ensure that the cycle works appropriately.

### 2. Facilities and Equipment

(Library, laboratories, classrooms, etc.)

The textbook coordinator has direct contact with the sector representative of each publisher to ensure a high standard of service is provided to the instructors through the following steps:

- The publisher got a copy of the requisition that was sent to the university bookstore in advance as well as a contact list for each faculty member, which includes the course that will be offered by him.
- The publisher, through this data, could send any supplementary kit and/or electronic username and password for the internet resources to each instructor.

- The publisher will contact the faculty members and update them with all the textbooks that are available or recently published in their field of interest.
- Faculty members could get an evaluation copy for a textbook, provided they are teaching the same topics and have the potential to adopt it; if they decide that, the order could be done for the evaluation copy through the department coordinator and the publisher.
- Meeting with the coordinators periodically on the campus gives a clear vision of the departmental objectives and expectations from the publisher regarding the quality and pricing.

The Applied College provides excellent teaching classrooms. Classrooms are adequately equipped with chairs and desks, instructor desks, and a whiteboard, data show. Also, each classroom is equipped with a wireless network allowing instructors to use their laptops. There are 25 classrooms available, with seating of about 30 students each. In addition, there are about 15 big classrooms with about 70 seats and different studios for engineering drawing. Scheduling classrooms in these buildings is the responsibility of the university. Most of these classrooms and studios have access to natural daylight, and all of them are air-conditioned. The laboratories are housed in the engineering building. Each lab is used to teach one course or more. A short description of the teaching laboratories and equipment in use for each laboratory course is provided below.

## 3. Procedures to ensure a healthy and safe learning environment

(According to the nature of the Program)

The general safety measures taken in the Applied College are summarized as follows:

- The college building is equipped with surveillance cameras for security purposes.
- A University Health Center is available for all students.
- Smoke detectors are installed everywhere in the college building.
- Fire extinguishers are installed everywhere in the college building.
- Sprinklers are installed everywhere in the college building.
- All labs are equipped with an Emergency Button enclosed in a breakable glass that can be activated in emergency situations.
- An emergency evacuation procedure is affixed in laboratories and in different appropriate places in the college building.
- A General computer laboratory safety procedure is affixed in each laboratory.

**Laboratory Safety Guidelines**

- The Applied College and the College of Engineering offer these suggestions for improving laboratory safety. We believe that understanding inherent hazards and learning how to be safe should be an integral and important part of the education process.
- The Applied College and the College of Engineering, to ensure safe practices in the laboratories, have adopted the following guidelines. They will be consistently enforced. Non-compliance will result in suspension from the laboratory.

**Personal Safety**

- Perform non-unauthorized experiments, tasks or job and perform given experiments, tasks or job only according to directions.
- Never work in a laboratory alone or at least without another person within easy call.
- Wear safety glasses or face shields when working with hazardous materials and/or equipment.

## G. Program Quality Assurance:

### 1. Program Quality Assurance System

Provide a link to the quality assurance manual.

https://drive.uqu.edu.sa/_/quality/files/%D8%AF%D9%84%D9%8A%D9%84%20%D8%A7%D9%84%D8%AC%D9%88%D8%AF%D8%A9%2015-%D9%81%D8%A8%D8%B1%D8%A7%D9%8A%D8%B1-2022.pdf

### 2. Procedures to Monitor Quality of Courses Taught by other Departments

Indirect assessment of SOs through Faculty Survey is important because it is the judgment of the instructor teaching the course. Obviously, the instructor knows from the direct assessment how well the students have attained SOs. The judgment of the instructor will be usually about the same as reflected by the direct assessments. However, the instructor observes the performance of students over the semester and there may be reasons to believe that the students' ability as reflected by the direct assessments are not true. Thus, indirect assessment through Faculty Survey is necessary. It shows the perception the instructor has about the students' abilities attained in the course. In this survey, the instructor indicates, for each PLO, his opinion about the real abilities attained by the students. Therefore,

the input is very simple. An in-house Excell sheet takes the input from the instructor and then converts it to SO satisfaction using the same PLO-SO mapping as discussed earlier.

**Exit Survey**
In each semester, all graduating students are required to fill in a survey form and go through an exit interview by the Surveys Committee of the department.

## 3. Procedures Used to Ensure the Consistency between Main Campus and Branches (including male and female sections).

Diploma students of the Renewable Energy Technology program acquire abilities as prescribed by the required Student Outcomes through various courses during the two-year degree program. These courses are from various departments from different colleges and span over a wide range of subject areas. Even though all such courses contribute a little or more towards attaining the required Student Outcomes, assessment and evaluation presented here to demonstrate the attainments of Student Outcomes are limited to the core courses of the program, including the Capstone Project.

The above refers to the courses that are taken by all students enrolled in the program, and the department has full control over them for devising the assessment and evaluation processes as well as implementing the improvement plans.
The courses that are not considered in the Student Outcomes evaluation processes are the following:
- General courses to satisfy the program requirements
- Elective courses of the Renewable Energy Technology program

It must be re-emphasized that all the above courses that are not considered in the evaluation of the attainment of student outcomes contribute to the abilities related to student outcomes. The preference here to exclude the above from the evaluation of the Student Outcomes attainment has the following main reasons:
We will demonstrate that all the students' outcomes are attained to the required satisfaction level through the Renewable Energy Technology core courses, as mentioned above. Therefore, the abilities gained through other compulsory

courses, and elective courses represent "a plus" and are not required to be evaluated.
The student outcomes attained in various elective courses are different, and therefore the attainment of student outcomes in these elective courses is not representative of the abilities of all students in the program. However, the data from these elective courses are collected just like all core courses.
The core courses of the program used in the evaluation of Student Outcomes attainment cover all the student Outcomes, though not equally.

## 4. Assessment Plan for Program Learning Outcomes (PLOs),

***A-1 Accreditation Software***

The Applied College is using an in-house Excell sheet. The college decided to use a software package to achieve the following goals:

a) To cut down the instructor's time and effort in preparing the course file and data collection.
b) To increase the reliability of the collected data.
c) To allow error-free processing of large amounts of data and thus enable the department to analyze and evaluate all courses within a week after obtaining the data files from the instructors.
d) To obtain faculty's opinions on a few issues that may help improve the PLO and SO attainments.
e) To identify any course that has an issue and to take corrective measures.
f) To enable the chairman of the department to re-view the SO attainments and "Loop-closing" in each semester.
g) To maintain a unified database for syllabus of all courses.
h) To make the assessment and evaluation system highly sustainable.

The in-house Excell sheet is satisfied all the above requirements. This sheet has been extensively used by the instructors in preparing the course files.

**A-2 Assessment Processes Summary**

The attainment of SOs is continually assessed and evaluated through several processes. The evaluation system is automated through an in-house Excell sheet mentioned above. The evaluation system maintains a unified database containing the syllabus, CLO-SO maps for all courses, Program Satisfaction Criterion and various other data. The evaluation system itself is being improved continually. At this time the system has reached a very stable and reliable status with a very high degree of sustainability and the department was quite successful, drastically cut

down the instructors' time in preparing the course files and the evaluation of data. To understand the assessment processes, the following two points are to be noted:

**a.** In the direct assessment process, reliance on some "SO-based" questions in a *subset* of courses was not fruitful. Complete data for all core courses are required to make decisions that bring improvement. Since the instructor teaching the course is more oriented towards the "Course Learning Outcomes" PLOs and naturally plans to assess the PLOs of the course and considers students' attainment of the PLOs of the course as the major responsibility, we let the instructor focus on the PLOs for proper assessment of the course PLOs. The in-house Excel sheet converts the PLO based data to the SO based data through the PLO-SO map of the course.

**b.** Due to the automation, the ease and the speed available through the in-house Excel sheet, the "Formative Assessment" now includes all courses. The philosophy in the Formative Assessment is because SOs are in fact the abilities at the time of graduation and not the abilities demonstrated in individual courses. All courses taken before graduation are just preparing the students to attain the SOs. Therefore, the Formative Assessments represent the quality of learning and teaching and the data from these assessments are indicators of students' progress towards the attainment of SOs. The SOs are demonstrated by the students in their Master's Capstone Research Projects completed in the senior year. The graduation projects cover all the SOs. For this reason, we call the assessment of the Graduation Project as "Summative Assessment".

Other than the direct Formative and Summative Assessments, five other indirect assessment processes constitute a system of assessment and evaluation. A summary of these processes is given in Table A2.1. Following the table, a brief description of each process is given to help the reader have a quick view of the processes. The details of these processes are given in the later sections.

Table A2.1- Assessment processes

| S/N | SO Assessment Process | Assessment Type | Frequency | Data Collected by: | Data Processing | Evaluated by: |
|---|---|---|---|---|---|---|
| 1 | Formative Assessment | Direct | Each Semester | Instructors | An in-house Excell sheet | Assessment Committee |
| 2 | Summative Assessment | Direct | Each Semester | Project Supervisor | An in-house Excell sheet | Assessment Committee |
| 3 | Course-wise Student Survey | Indirect | Each Semester | Instructors | An in-house Excell sheet | Assessment Committee |
| 4 | Course-wise Faculty Survey | Indirect | Each Semester | Instructors | An in-house Excell sheet | Assessment Committee |
| 5 | Exit Survey | Indirect | Each Semester | Assessment Committee | Assessment Committee | Assessment Committee |
| 6 | Alumni Survey | Indirect | Every 3 years | Assessment Committee | Assessment Committee | Assessment Committee |
| 7 | Employers Survey | Indirect | Every 3 years | Assessment Committee | Assessment Committee | Assessment Committee |

***A-2-1 Formative Assessment***

For each course, course assessment data are collected by the instructor in a prescribed format. The data for each core course is input to the in-house Excel sheet by the instructor. The in-house Excel sheet produces all the required analyses and evaluation data. It also produces a printout of the complete course file for accreditation purposes. The results are finally reviewed and evaluated by the chair of the assessment committee. The compiled results are reviewed and evaluated by the Assessment Committee.

***A-2-2 Summative Assessment***

The Capstone Project over a period of one semester under the supervision of a faculty member with a good design background. The tasks are defined in a document approved by the department. The in-house Excel templates are available for the instructors to report the assessments of all the tasks of the Capstone Project.

The data are processed, and all the required analysis of data and the evaluation are produced by the in-house Excel sheet.

***A-2-3 Course-wise Student Survey Assessment***

For each course, the in-house Excel sheet produces a PLO satisfaction survey form. The instructor distributes the survey form to the students at the end of the semester before the final examination. The students fill in the survey form to tell their opinion about how well they think they have learned based on their perception. The data is entered into the in-house Excel sheet by the instructor. The software does the rest of the processing.

***A-2-4 Course-wise Faculty Survey Assessment***

For each course, the instructor enters his own opinion about students learning based on his perception at the end of the course. The data is entered into the in-house Excel sheet by the instructor. The software does the rest of the processing.

***A-2-5 Exit Survey Assessment***

Exit survey is conducted just before the final examinations of each semester... All graduating students fill in a survey form. In this survey the graduating students give their assessments of how well they have attained the SOs. The data is compiled and reviewed by the Assessment Committee.

***A-2-6 Alumni Survey Assessment***

The Alumni survey is performed at an interval of three years. The survey has other purposes but one of the objectives is to obtain the opinion of the alumni about how they found themselves in the abilities relevant to the SOs at the time of graduation.

***A-2-7 Employer Surveys***

Employment survey is carried out every three years. There are several items on the questionnaire. One major purpose of the survey is to determine the opinions of the employers about the abilities of the graduates of the diploma related to each SO at the time they were hired after graduation.

**A-3 Assessment Processes Details**

***A-3-1 Formative Assessment***

Since all data processing is done by the in-house Excel sheet which has been thoroughly checked by comparing with calculations done manually in different departments of the university, the key to success in achieving the reliability of the

direct course assessment and evaluation system is the data collection and data entry. The data to be collected by the instructor during the whole semester are described in the following sections.

***A-3-1-1 SO Assessment Plan***

The first piece of information that is required by all instructors is a SO assessment plan for the courses they are teaching and share it with the students in the first week of classes. The purpose of this plan is to increase the awareness of the course relevant SOs among the students and to re-emphasize the faculty of the importance of SO assessment though done implicitly through the assessment of the PLOs. This helps the instructor in keeping in view the relevant SOs whenever designing an assessment for PLOs. At the same time, it helps the students in paying attention to their abilities that are required at the time of graduation.

Table 4-7, 4-8 and 4-9 show the choices available to the instructor for three different aspects of the SO assessment plan. Figure 4-2 shows a typical instructors' input in the in-house Excel sheet.

**Table 4-7:** SO Introduction to Students - Choices for Instructors

| Choice No. | When will the SO be introduced to the students? |
|---|---|
| 1 | In the first week of classes |
| 2 | In the second week of classes |
| 3 | Any time before mid-term |
| 4 | After the mid-term |
| 5 | Last week of classes |
| 6 | Never |

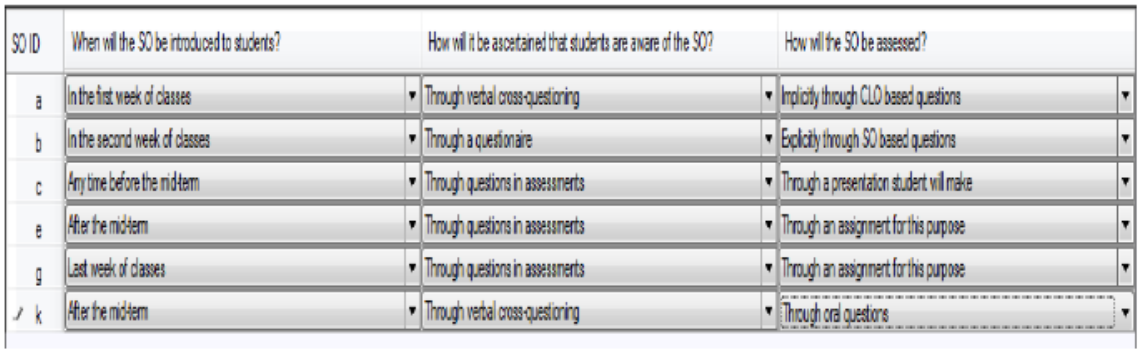
**Table 4-8:** SO Students Awareness Check - Choices for Instructors

| Choice No. | How will it be ascertained that students are aware of the SO? |
|---|---|
| 1 | Through verbal cross-questioning |
| 2 | Through a questionnaire |
| 3 | Through questions in assessments |
| 4 | No. Nothing will be done. |

**Table 4-9:** SO Assessment Method - Choices for Instructors

| Choice No. | How will the SO be assessed? |
|---|---|
| 1 | Implicitly through CLO based questions |
| 2 | Explicitly through SO based questions |
| 3 | Through a presentation, student will make |
| 4 | Through an assessment for this purpose |
| 5 | Through oral questions |
| 6 | Not applicable (because no plan to assess) |

Here the instructor enters the plan of SO evaluation. The questions and the possible answers are shown in the screen snapshot in Figure 4-2. The SOs in the first column is only those that are relevant to the course. This information is gathered from all instructors for increased awareness of the faculty teaching the course and the students and may be used by the Assessment and Evaluation Committee to resolve any issues concerning the satisfaction of SO attainment.



| SO ID | When will the SO be introduced to students? | How will it be ascertained that students are aware of the SO? | How will the SO be assessed? |
|---|---|---|---|
| a | In the first week of classes | Through verbal cross-questioning | Implicitly through CLO based questions |
| b | In the second week of classes | Through a questionaire | Explicitly through SO based questions |
| c | Any time before the mid-term | Through questions in assessments | Through a presentation student will make |
| e | After the mid-term | Through questions in assessments | Through an assignment for this purpose |
| g | Last week of classes | Through questions in assessments | Through an assignment for this purpose |
| k | After the mid-term | Through verbal cross-questioning | Through oral questions |

**Figure 4-2:** An example of SO Assessment Plan Input

### *A-3-1-2 Assessment Contribution Data*

For the purpose of data input to the in-house Excel sheet, an assessment is characterized by four attributes:

a) An assessment ID (usually the serial order of occurrence of assessment)
b) A name given to the assessment by the instructor
c) Raw marks used for grading the assessment
d) Actual marks out of 100 that the assessment contributes to the final grade

An example is shown in Table 4-10. It is worth noting that data shown in Table 4-10 is typically maintained by all instructors universally and therefore it is no additional burden on the instructor.

**Table 4-10:** Typical Assessment Marks Contribution Data

| Assessment ID | Assessment Name | Raw Marks (Used for grading the assessment) | Marks Contribution to Final Grade (%) |
|---|---|---|---|
| 1 | Quiz 1 | 20 | 5 |
| 2 | Homework 1 | 100 | 5 |
| 3 | Quiz 2 | 20 | 5 |
| 4 | Mid-Term | 20 | 20 |
| 5 | Term-Project | 50 | 15 |
| 6 | Final Exam | 100 | 50 |
| **Total marks contribution: (must add up to 100)** | | | **100** |

### *A-3-1-3 PLO Marks Allocation Data*

Keeping track of the PLO marks allocation data is an important part of the process. The instructor in each assessment must specify the marks allocated to each question and the PLO that it addresses. In some assessments like quizzes, only a single PLO is addressed, while there are others like the final examination and other periodic examinations (such as “Mid-term” examination) that have questions belonging to different PLOs.

If an assessment is a "Single PLO Assessment" i.e. it has all questions belonging to the same PLO, it makes things simple because keeping track of the students' marks for the assessment is enough. The instructor does not need to keep track of students' marks in each different question. Figure 4-3 shows the PLO Marks Allocation data required for a "Single PLO" assessment.
However, if an assessment is "Multiple PLO Assessment", the questions in the assessment belong to different PLOs as shown in Figure 4-4. In this case, it is required that marks of students for all questions belonging to each PLO be recorded. In such cases, the data collection is a little burdensome on the instructor but there is no other way to determine how the students are performing in a particular PLO that in turn provides their performance in the respective Sos.

## 5. Program Evaluation Matrix

| Evaluation Areas/Aspects | Evaluation Sources/References | Evaluation Methods | Evaluation Time |
|---|---|---|---|
| ***Formative Assessment*** | Instructors | An in-house Excel sheet | Each semester |
| ***Summative Assessment*** | Master's Capstone Research Project supervisors | An in-house Excel sheet | Each semester |
| ***Course-wise Student Survey Assessment*** | Students | An in-house Excel sheet | Each semester |
| ***Course-wise Faculty Survey Assessment*** | Instructors | An in-house Excel sheet | Each semester |
| ***Exit survey*** | Students | Assessment Committee | Each semester |
| ***Alumni Survey Assessment*** | Students | Assessment Committee | Every 3 years |
| ***Employer Surveys*** | Employer | Assessment Committee | Every 3 years |

**Evaluation Areas/Aspects:** e.g., leadership, effectiveness of teaching & assessment, learning resources, services, partnerships, etc.
**Evaluation Sources:** students, graduates, alumni, faculty, program leaders, administrative staff, employers, independent reviewers, etc.
**Evaluation Methods:** e.g., Surveys, interviews, visits, etc.
**Evaluation Time:** e.g., beginning of semesters, end of the academic year, etc.

## 6. Program KPIs*

The period to achieve the target (____) year(s).

| No. | KPIs Code | KPIs | Targeted Level | Measurement Methods | Measurement Time |
|---|---|---|---|---|---|
| 1 | KPI-PG-1 | Percentage of achieved indicators of the program operational plan objectives | 90% | Indirect | Yearly |
| 2 | KPI-PG-2 | Students' Evaluation of quality of learning experience in the program | 80% | Indirect | Yearly |
| 3 | KPI- PG-3 | Students' evaluation of the quality of the courses | 80% | Indirect | Yearly |
| 4 | KPI-PG-4 | Students' evaluation of the quality of scientific supervision | 80% | Indirect | Yearly |
| 5 | KPI-PG-5 | Average time for students' graduation | 2 years | Direct | Yearly |
| 6 | KPI-PG-6 | Rate of students dropping out of the program | 10% | Direct | Yearly |
| 7 | KPI-PG-7 | Employers' evaluation of the program graduates' competency | 80% | Indirect | Every 3 years |
| 8 | KPI-PG-8 | Students' satisfaction with the provided services | 80% | Indirect | Yearly |
| 9 | KPI-PG-9 | Ratio of students to faculty members | 100% | Direct | Yearly |
| 10 | KPI-PG-10 | Percentage of faculty members' distribution based on academic ranking | 100% | Direct | Yearly |
| 11 | KPI-PG-11 | Proportion of faculty members leaving the program | 10% | Direct | Yearly |
| 12 | KPI-PG-12 | Satisfaction of beneficiaries with learning resources | 80% | Indirect | Yearly |
| 13 | KPI-PG-13 | Satisfaction of beneficiaries with | 80% | Indirect | Yearly |

| No. | KPIs Code | KPIs | Targeted Level | Measurement Methods | Measurement Time |
|---|---|---|---|---|---|
| | | research facilities and equipment | | | |

*including KPIs required by NCAAA

## H. Specification Approval Data:

| | |
|---|---|
| **Council / Committee** | **Umm Al-Qura University Council** |
| **Reference No.** | **851141114462/190394** |
| **Date** | **22/11/1446** |

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