



**King Khalid University
College of Science
Department of Physics**



Quality Assurance Manual

Master of Science in Physics



1- Abbreviations

KPI	Key Performance Indicator
NCAAA	National Commission for Accreditation and Assessment
MSP	Master of Science in Physics Program
MSPPMC	Master of Science in Physics Program Management Committee
SAQF	Saudi Arabian Qualification Framework
KKU	King Khalid University

2- Quality Assurance Terms and their Definitions

Defining the terms and phrases is helpful in any discussion about quality assurance in higher education. The following definitions are commonly accepted and should be a valuable reference point for the manual.

Accreditation. Accreditation in higher education is a collegial process based on self-and peer assessment for public accountability and improvement of academic quality. Peers assess an institution's or educational program's quality and assist the faculty and staff in enhancing quality.

Key Performance Indicator (KPI). A key performance indicator (KPI) is a metric used to evaluate the success of an institution or one of its units in a particular activity in which it engages.

Quality. 'Fitness for purpose' – Juran' Conformance to requirements' – Crosby in higher education, this process ensures the delivery of agreed standards. These agreed standards should ensure that every educational institution where quality is assured has the potential to achieve a high level of quality.

Quality Assessment. Evaluating the quality of educational experience in institutions, particularly the quality of student learning.

Quality Assurance. An institution can guarantee with confidence and certainty that the standards and quality of its educational mission and vision are being achieved and enhanced.

Quality Audit. Examining institutional procedures for assuring quality and standards and whether the arrangements are implemented effectively and achieve stated objectives.

Quality Control. Institutions use verification procedures (both formal and informal) to monitor quality and standards to a satisfactory standard and as intended.

Quality Culture is creating a high level of internal institutional quality assessment mechanisms and the ongoing implementation of the results. Quality culture can be seen as the ability of the institution and program to develop quality assurance implicitly in the day-to-day work and marks a shift from periodic assessment to embedded quality assurance.

Quality Enhancement is the process of positively changing activities to provide continuous improvement in the quality of institutional provision.

Standards describe levels of attainment against which performance may be measured. Attainment of a standard usually implies a measure of fitness for a defined purpose.

3- Introduction

The Master of Science in Physics Program (MSPP) is one of the academic programs of the Physics department at the College of Science- King Khalid University. The MSPP is enforced to follow the regulations and guidelines of the University and the Ministry of Education of Saudi Arabia.

Due to the rapid growth in public and private colleges and universities, an effective quality assurance system is highly needed in Saudi Arabia's postgraduate programs. The quality assurance system is essential for achieving high-quality postgraduates. In 2004, Saudi Arabia established the National Commission for Accreditation and Assessment (NCAAA) to improve education performance according to specific standards. The responsibilities of the NCAAA are establishing standards, criteria, and procedures for accreditation, reviewing, and evaluating the performance of existing and new institutions, and accreditation of institutions and programs.

Accordingly, a deanship of academic development and quality was established to implement quality assurance mechanisms in all academic and administrative units of King Khalid University, assess performance in all areas of institution activity, enforce regulations that determine how work is efficiently implemented, as well as measure and evaluate performance against proven standards. In addition, the deanship has been charged with reviews, providing technical support, and advising all quality units of the University. Finally, the deanship is leading an effort to instill a quality culture to ensure that systems, processes, and outcomes exceed quality standards.

The Master of Science in Physics Program (MSPP) is committed to following the regulations, quality standards, and procedures of the deanship of academic development and quality of King Khalid University and the NCAAA.

4- Quality Standards

The NCAAA created the required standards for postgraduate programs. Moreover, the NCAAA developed the Saudi Arabian Qualification Framework (SAQF), specifying generic learning outcomes standards for each qualification level. The following are the seven standards that the NCAAA has identified for postgraduate programs:

- Mission and Goals
- Program Management and Quality Assurance
- Teaching and Learning
- Students
- Teaching Staff
- Learning Resources, Facilities, and Equipment
- Research and projects

The MSPP has adopted the seven quality standards of the NCAAA and the Saudi Arabian Qualification Framework (SAQF) to guarantee effective quality practices. The quality standards and procedures align the vision and mission of the MSPP with the college, department, and KKU's mission and goal. The MSPP works systematically to comply with the quality and accreditation standards as stated by the NCAAA.

To meet the NCAAA accreditation standards, the MSPP established a management committee (MSPPMC) to achieve adequate performance for the program. A coordinator leads the MSPPMC with support from the deputy coordinator. Also, eight other officers assist in covering all the activities of the MSPP (Fig1). The personnel of the MSPPMC has details and documented responsibilities. One of the MSPPMCs is the quality manager, who is responsible for applying the quality and accreditation standards in all the activities of the MSPP. In his position, the quality manager of the MSPP is a member of the departmental committee of academic development and quality,



which reports to the vice dean for academic development and quality. The vice dean for academic development and quality is under the guidance of the university academic development and quality deanship.

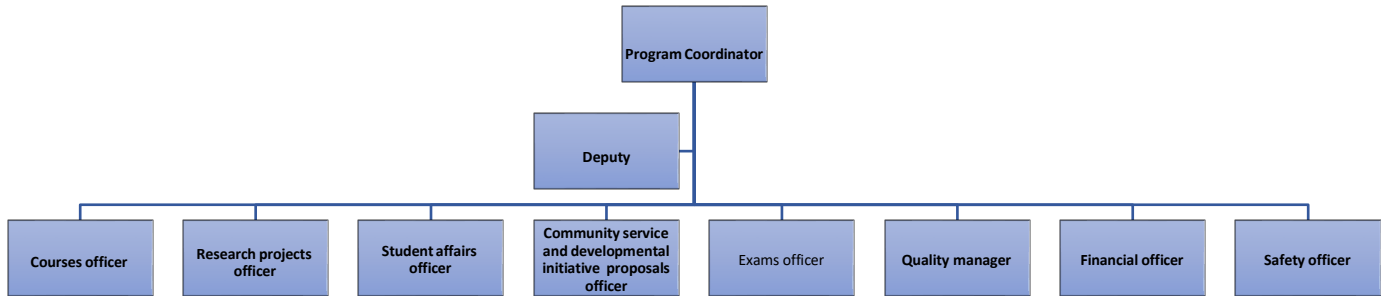


Fig.1: The organizational chart of the MSPP.

Quality Assurance of the MSPP

The MSPP is committed to continually improving its quality and performance in all activities. All academic and administrative staff of the MSPP participate in quality assurance (QA) and improvement, self-assessments, and cooperate with reporting and improvement processes in their nominated responsibilities and activities.

The MSPP is led by its vision, mission, goals, and objectives, and it depends on three systems:

A. The MSPP Quality Assurance Manual updated in October 2022, the Quality Assurance manual of KKU and the academic regulations of postgraduate studies at KKU; B. Department of Physics – Head and the committee of academic development and quality; and C. College of science vice deanship for academic development and quality (Fig.3) who in turn reports for the university deanship for academic development and quality. The deanship of academic development and quality is under the guidance of the university vice president for development and quality (Fig 2 and Fig 4). KKU's deanship for academic development and quality is responsible for planning, implementing, and evaluating quality practices. Furthermore, it manages the progress toward the accreditation of the university academic programs.

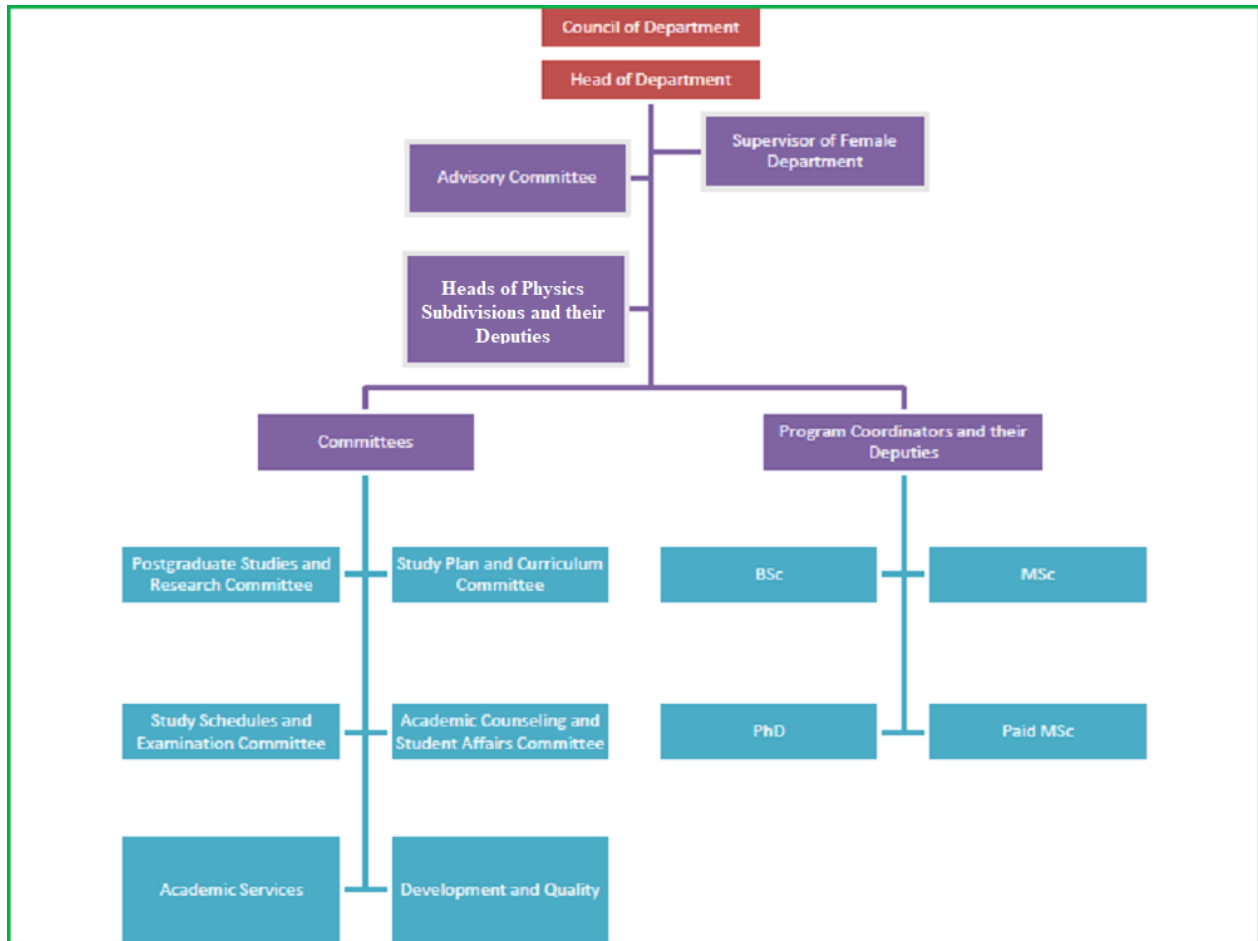


Fig. 2: The organizational structure of the Department of Physics. Shows how the academic programs coordinators and their committees cooperate with the other departmental committees and management units.

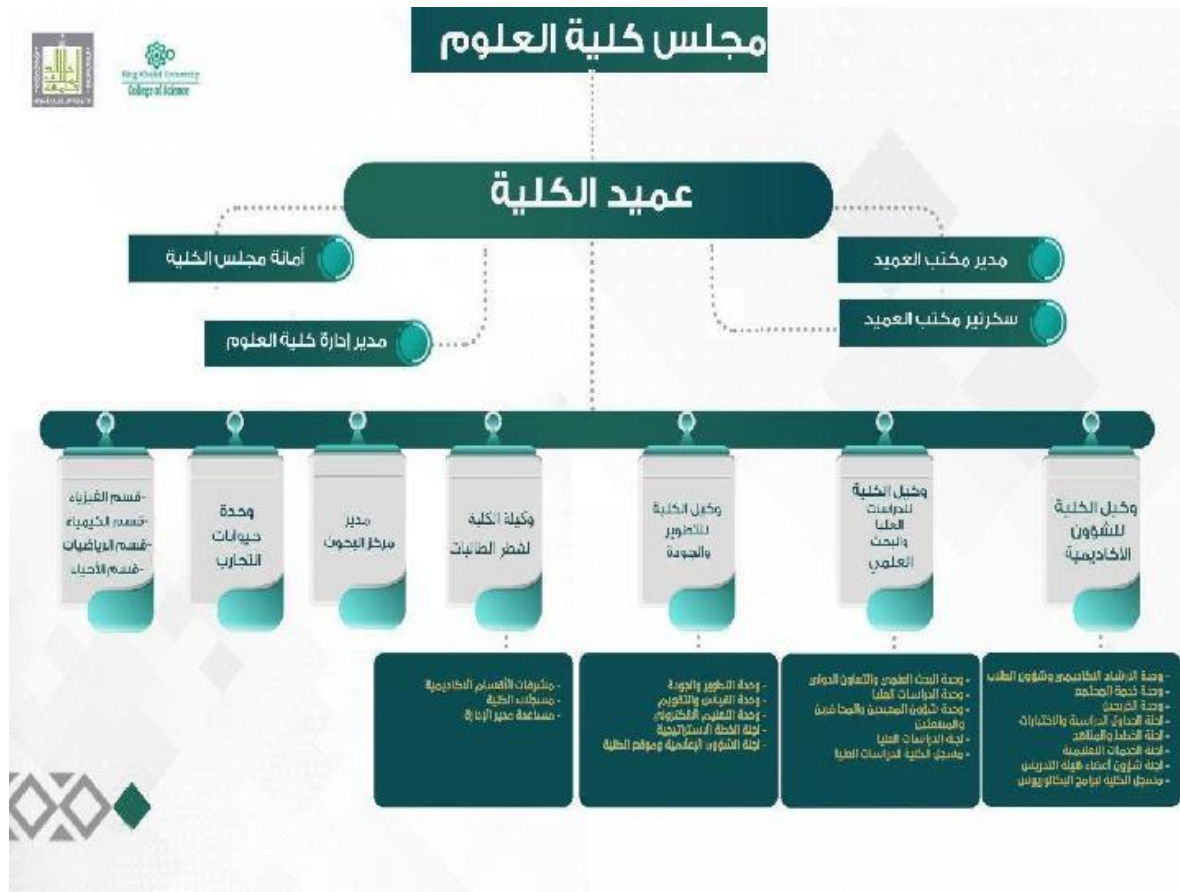


Fig. 3: The organizational chart of the College of Science.

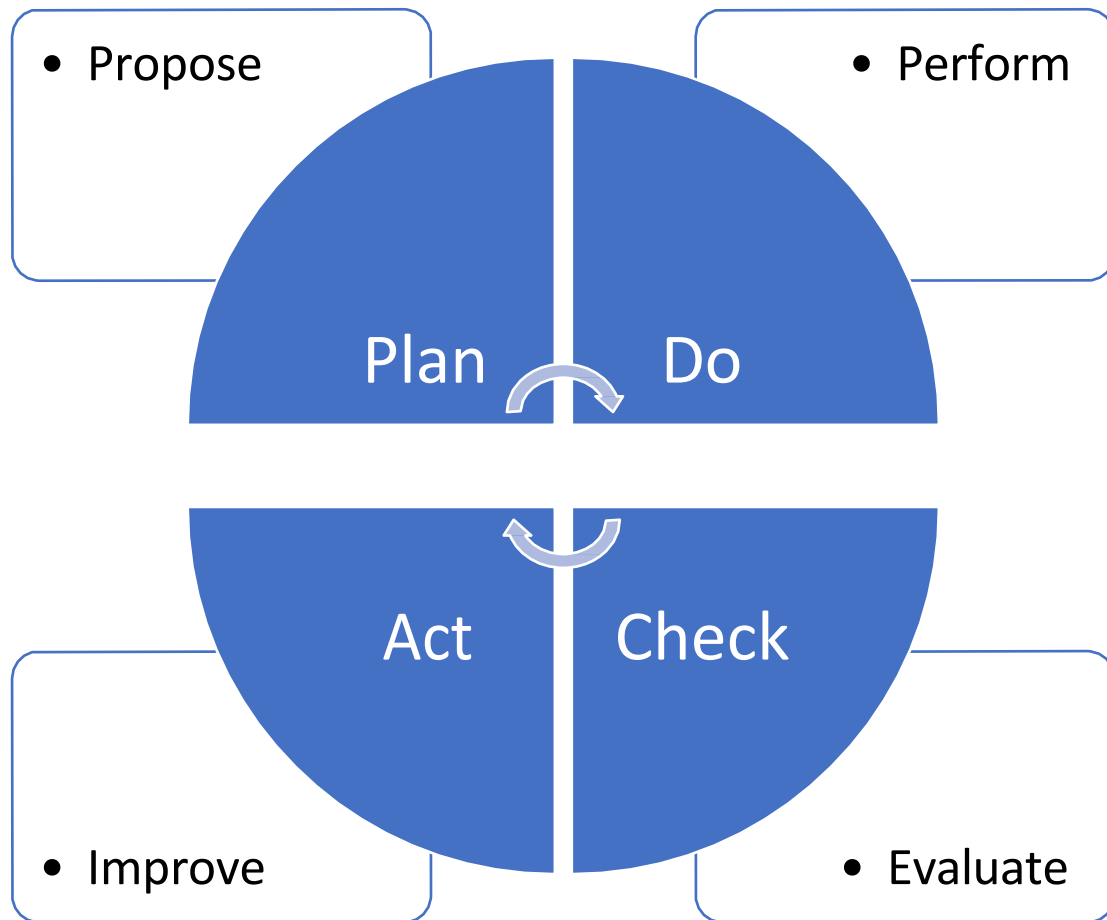


Fig. 5: Plan-Do-Check-Act Cycle. The planning step is done according to the academic regulations of the postgraduate studies at KKU.

The desire of the MSPP to implement quality assurance is because Quality assurance leads to the achievement of excellence and transparency and ensures a distinguished ranking in national, regional, and international postgraduate Physics programs.

5- Quality Assurance of the MSPP and Management at the Department

As a committee in the Physics department, the MSPPMC works with the committees and other organizational units to improve quality assurance practices (Fig 2). To facilitate harmony between the activities of the MSPPMC and the different departmental committees, the MSPPMC comprises eight officers who are "by their positions" members in the corresponding committees of the department (Fig.6).

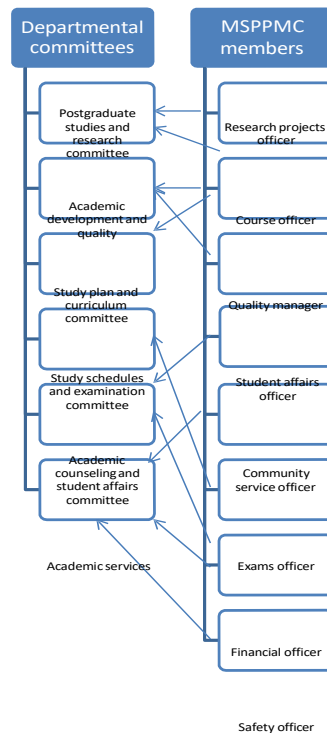


Fig. 6: Harmony between the MSPPMC officers and the corresponding departmental committees.

6- Goals of the MSPP Quality Assurance

The MSPP has established the following goals and objectives to ensure that all program activities are done according to the standards and aligned with the University, the College, and the department's mission, vision, and strategic goals and objectives. The goals of the MSPP are as follows:

- 1- Ensure that the program has well-defined program learning outcomes (PLOs) and course learning outcomes (CLOs).
- 2- Secure that the PLOs contribute to achieving the graduate's attributes.
- 3- Ensure all program quality documents are well managed and controlled.
- 4- Confirm that all the courses are monitored regularly, evaluated annually, and amended as needed.
- 5- Ensure that the completion rates of the students are kept for all courses and the program as a whole and included among key performance indicators (KPI).
- 6- Analyze course and program progression and completion rate besides the course and program evaluations.
- 7- Ensure that the student assessment methods are appropriate to achieve the learning outcomes.
- 8- Make sure that the teaching is of high quality.
- 9- Ensure that the student's research projects are appropriate for achieving learning outcomes, solving community problems, or community development.
- 10- Establish a comprehensive system for the evaluation of teaching and research effectiveness in all courses (by the students, graduates, staff, assisting staff, employees, and stakeholders)
- 11- Ensure that regular (at least annual) reports are provided to the departmental committee of academic development and quality on the delivery of each course.
- 12- Ensure that the teaching staffs have appropriate qualifications and experience.

7- Roles and Responsibilities of the Quality manager of the MSPP

- 1- Developing an overall strategy for Quality Assurance and Accreditation activities.
- 2- Achieving the objectives of the quality assurance and academic accreditation of the department, college, and University.
- 3- Assuring that curriculum is planned and implemented according to clear academic standards, with clearly defined objectives and learning outcomes.

- 6- Conducting satisfaction surveys such as evaluation of courses and the program by students and staff, analyzing the responses of the targeted groups, and taking corrective actions
- 7- Providing quality standards, measures, and key performance indicators for all the program activities.
- 8- Maintaining systematic collections of reports on performance, including data on indicators and benchmarks.
- 9- Providing benchmarking with national and international best practices.
- 10- Providing training for faculty and staff in the field of quality assurance.
- 11- Coordinating regular internal and external review cycles of the MSPP and monitoring the implementation of their recommendations.

8- Quality Assurance Framework/ Quality Control

Overview

A significant part of quality assurance is the assessment which has different methods to measure student achievements according to the course learning outcomes (CLOs). Assessment is a systematic process that includes collecting information about student learning and assessing learning outcomes. The MSPP has three major activities to be assessed regularly: 1) the teaching process, 2) the research projects process, and 3) the community service process. All the MSPP processes must have clearly defined goals, objectives, learning outcomes, and learning and assessment strategies. Therefore, all the MSPP processes should have the following attributes: 1. Well-defined goals, objectives, and outcomes; 2. Well-stated learning objectives and outcomes of each session; 3. Well-designed assessment plan to evaluate learning outcomes; 4. Independent quality assurance practices to evaluate staff, courses, and the program; and 5. Independent external reviewers for continuously monitoring the program delivery and outcomes, including the advisory committee suggestions.

The teaching process and its assessment

The teaching procedure is a cyclic procedure that starts by determining the learning outcomes and ends with feedback and improvement. The teaching cycle assessment is composed of seven steps (Fig.7): 1) Determining the expected learning outcomes for the program and courses; 2) Determining the criteria of learning quality (standards); 3) Creating the description of the courses and the program; 4) establish suitable learning environment; 5) teaching performance; 6) Systematic gathering, analyzing and interpreting evidence to evaluate the teaching performance (indirect assessment); and 7) feedback and improvement. Any course improvement or program improvement should not be put in place unless the different university councils and the university senate approve them.

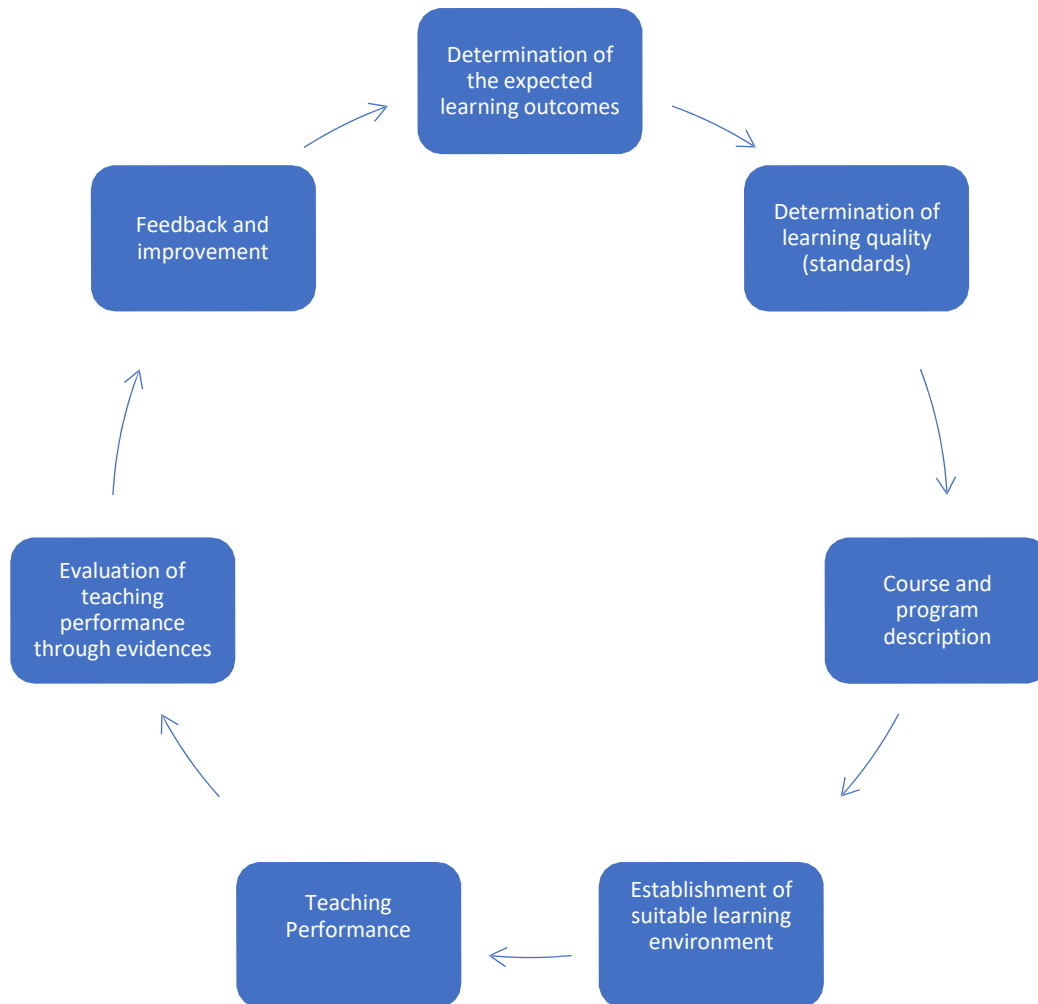


Fig.7: The teaching cycle and its assessment components

Steps for teaching performance

The teaching performance in the MSPP contains several steps as follows: 1) receipt of the course description from the quality manager of the program; 2) study of the course description carefully; 3) prepare teaching materials according to the teaching strategies and methods mentioned in the course description and according to textbooks and references of the course; 4) plan the assessment methods according to the course description; 5) create a timetable for all the activities of the course according to the university calendar; 6) implementation according to the timetable; 7) creating blueprints for all the summative assessment types; 8) introduce the students to the types of the questions in the midterms and final exams; 9) analyze the students marks and modify the distribution of the marks to achieve a bell shaped distribution of students

marks; 10) approve the students results by the program coordinator and head of the department (Fig.8). Different officers and committees are involved in the teaching process; quality manager, exams officer, program coordinator beside the course coordinator and his committee. The quality manager monitors the accuracy of the MSPP activities through the curriculum workshops at the end of each year.

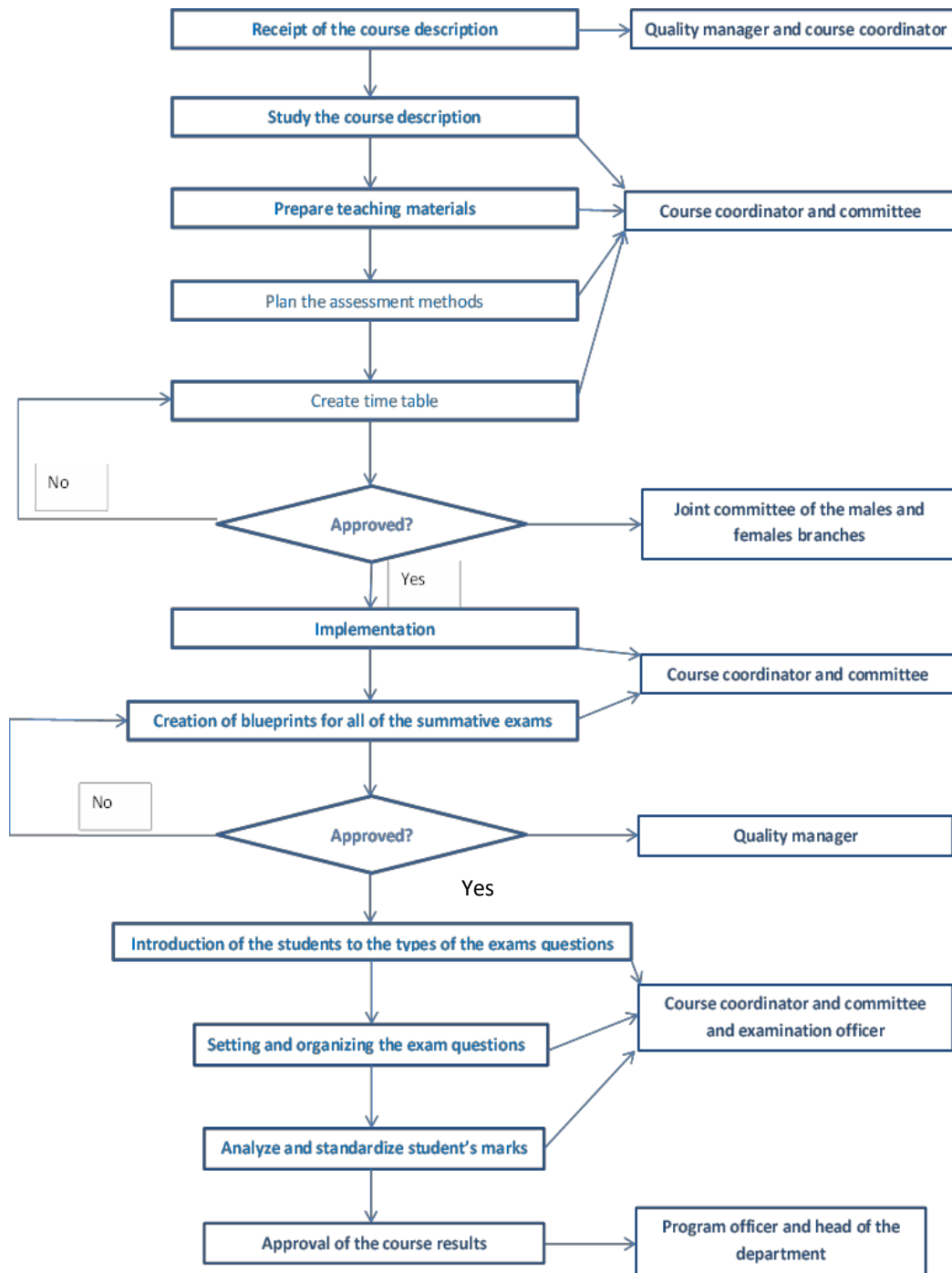


Fig. 8: The teaching procedure and its control. The figure shows the steps of the course performance and its control process.

The research projects process and its evaluation

The research projects of the MSPP student's ninth steps are organized as a cyclic procedure (Fig.9). The first step is identifying a research problem suggested by the staff

of the MSPP according to the local community needs and for the purpose the community development. Secondly, the supervisors lead the students to do a literature review about the identified research problem. The third step is writing a research proposal following the format of KKU. The fourth step is to apply for the approval of the research proposal from the departmental postgraduate studies committee, the council of the Physics department, the faculty council, and the council of the university postgraduate studies deanship. After the research proposal's approval, the research project's needs are prepared to ensure the research project's completion within a thin specified period. The sixth step of the research project is to perform the planned experiments following the scientific rules. Seventhly, the obtained data are organized and analyzed. The eighth step of the research report is written according to the format and rules of KKU, and the final step is the viva (Fig.9).

Control of the research project activities

The research project is controlled in two significant steps: the proposal's approval and the research report's revision (Fig.10). Moreover, according to the university rules, report progress is created every semester.

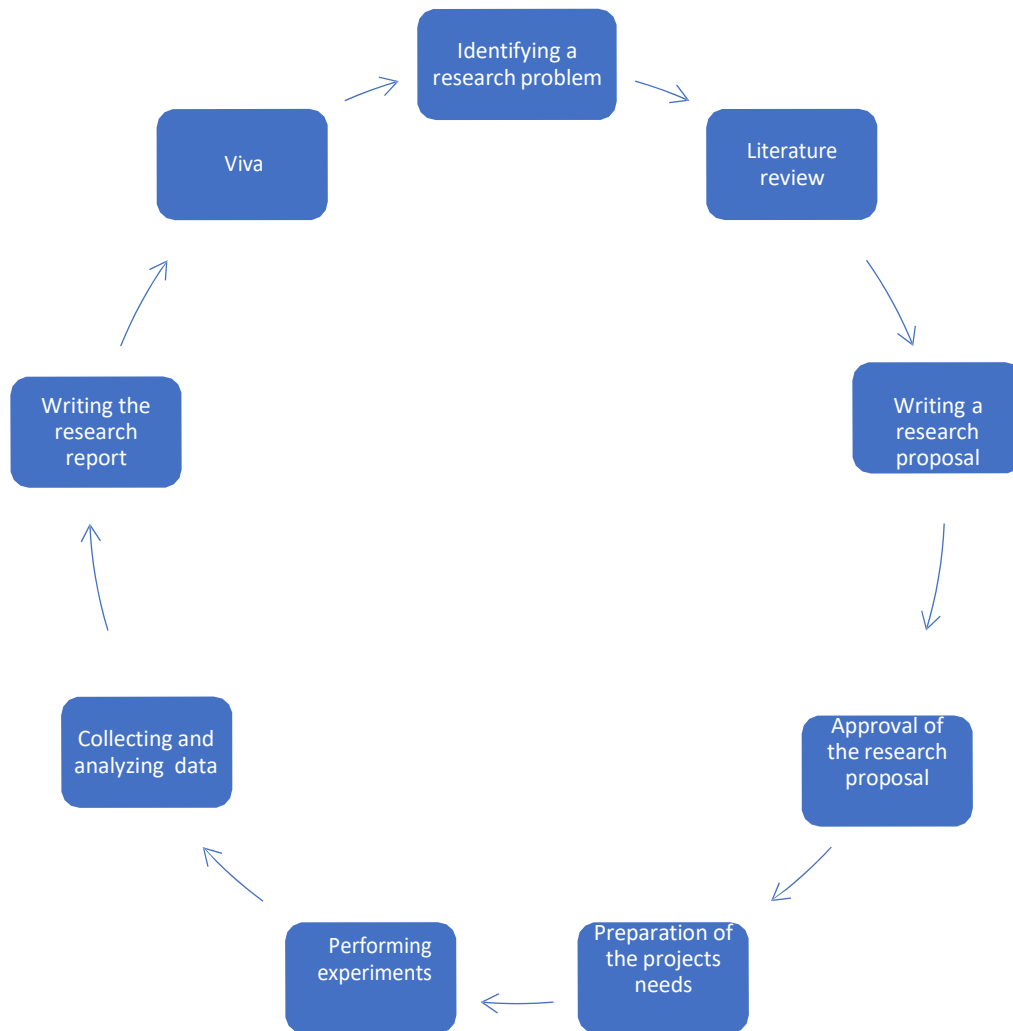


Fig. 9: The steps of the MSPP research projects.

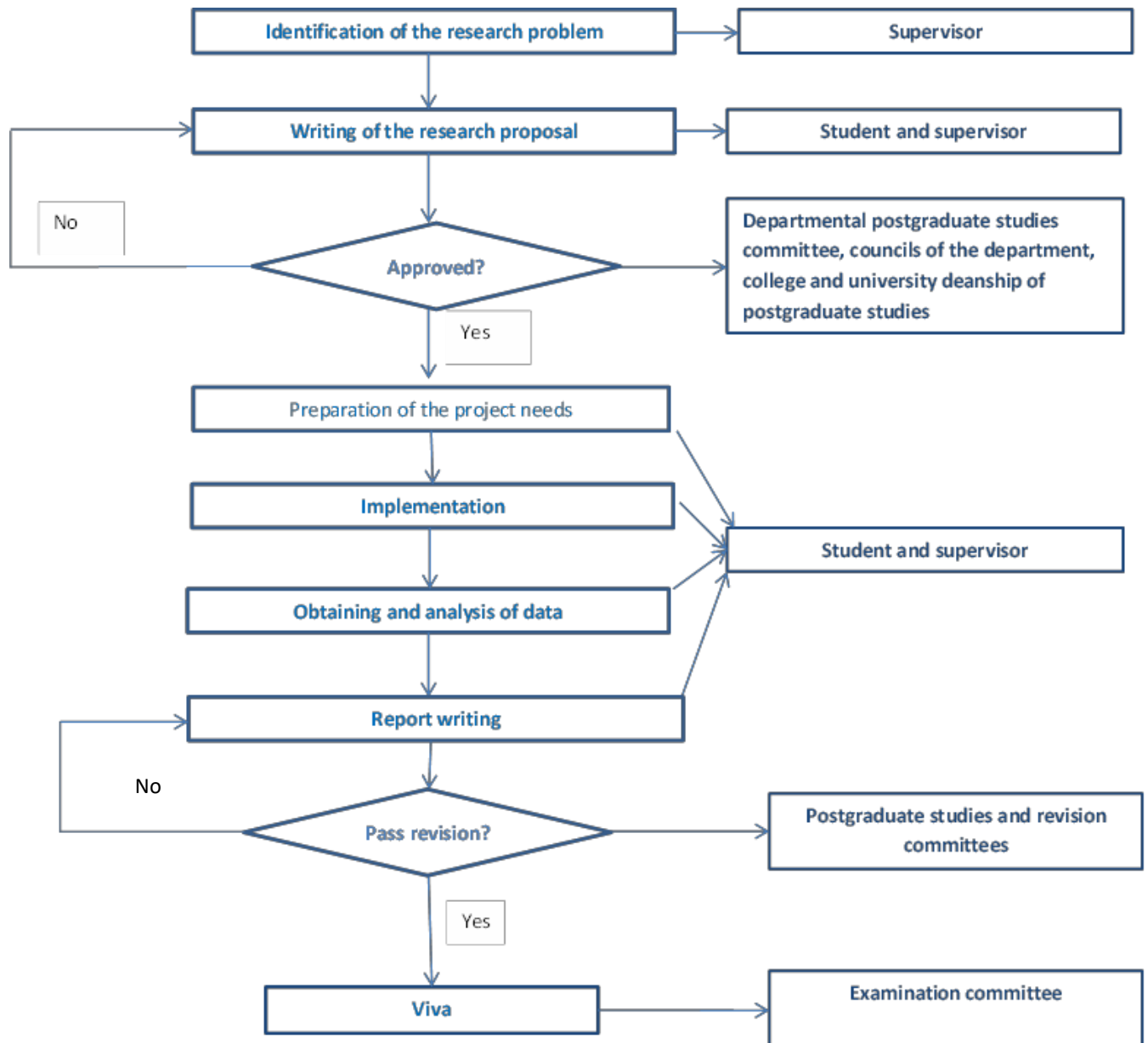


Fig. 10: The research projects procedure and its control.

The community service process and its evaluation

The MSPP serves the Saudi community in different ways: 1) Conducting MSc graduation research projects according to the research priorities of the Asir region

precisely and of Saudi Arabia in general; 2) The MSPP staff members act as consultants for the research centers in KKU and for the service centers in the Ministry of Education; 3) Provide logistic assistance for the 2030 vision of the Kingdom of Saudi Arabia, and 4) The MSPP students participate in various community services which are controlled and evaluated by the MSPPMC and the deanship of the continuous education and community services of KKU.

The examination Procedure

The Physics department and the College of Science examination committees manage the examinations. The examination officer of the MSPP is a member of the examination committee of the Physics department. The examination procedure is composed of seven steps: 1) Organizing the timetable of the examinations; 2) Creating exam blueprints; 3) Setting exam questions and distribution of their marks; 4) approving the exam questions; 5) preparing the exam hard copies; 6) Organizing exams and invigilation sessions; 7) marking the student's papers; 8) approving and 9) Announcing the results [Fig.11].

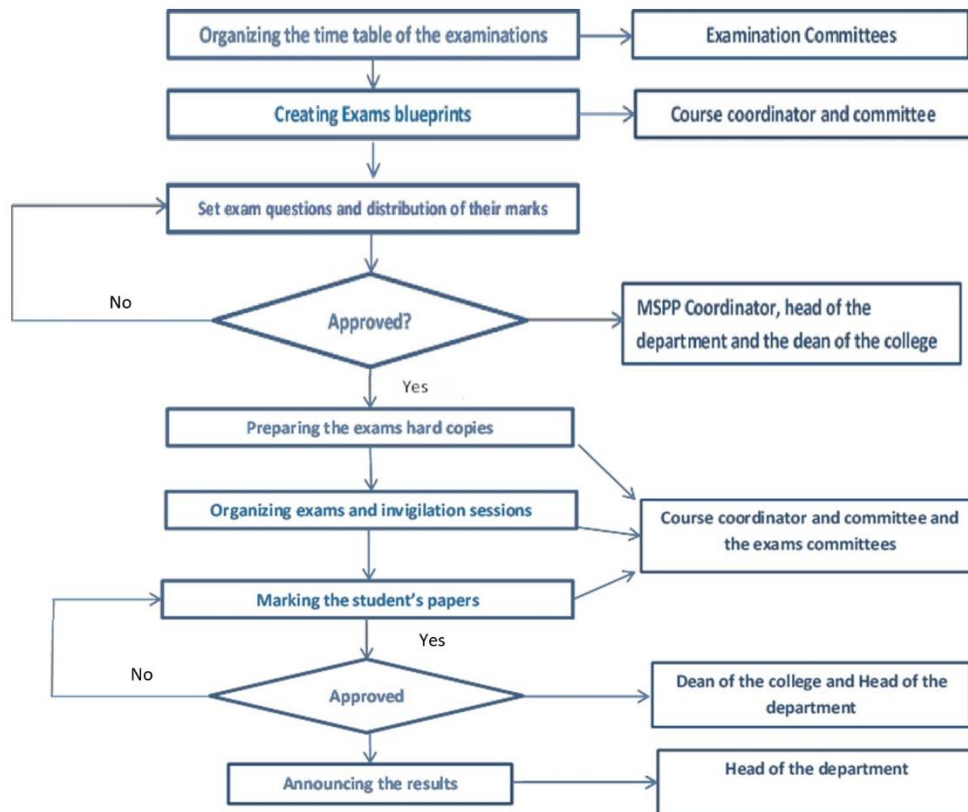


Fig.11: Examination procedure

9- Key Performance Indicators and Benchmarking

Key Performance Indicators

Identification of Performance Indicators (KPI)

According to the NCAAA, the MSPP has identified a set of KPIs to assess quality practices. The KPIs of the MSPP can be classified into different types; surveys from students, employees, staff members, graduates, and stakeholders beside data analysis (Table.1). The KPIs of the MSPP are derived by the MSPPMC and approved by the academic development and quality committee of the department and the unit of development and quality of the college.

Collection of Data

To conduct surveys and collect data, the MSPPMC has scheduled the surveys and data collection and analysis as shown in table 1.

Key Performance Indicator	Collection Methodology	Collection time
Students' evaluation of the quality of learning experience in the program	Survey	End of the academic year
The proportion of courses in which student evaluations were conducted during the year*	data	End of the academic year
Employee Satisfaction Rate*	Survey	End of the academic year
The ratio of students to teaching staff	Data	End of the academic year
Students' evaluation of the quality of the courses	Survey	End of the academic semester/year
Graduates' employability	Data	After graduation

and enrolment in postgraduate programs		
Completion rate/Graduation Rate	data	End of the academic year
First-year student retention rate	data	End of the academic year
Rate of published research per faculty member	Data pooled from Scopus/private analytics	End of the academic year
Citations rate in refereed journals per faculty member	Data	End of the academic year
Percentage of publications of faculty members	Data	End of the academic year
Conference presentations/attendance per faculty member*	Data	End of the academic year
The proportion of teaching staff leaving the program	Data	End of the academic year

Key Performance Indicator	Collection Methodology	Collection time
Students' satisfaction with the offered services, including the IT	Survey	End of the academic year
Student evaluation of academic and career counseling*	Survey	End of the academic year

Evaluation and Implementation of Action Plan

The MSPP is committed to monitoring the achievement of its goals through its Key Performance Indicators. The MSPP compares its actual KPI values to the planned KPIs, and the different university councils should approve the results to devise closing-the-loop strategies. Recommendations from the comparative KPIs studies must be summarized as action plans.

Benchmarking

Benchmarking compares processes and performance metrics to best practices from the same institution or other institutions. Internal benchmarking is done annually by comparing the current performance of the MSPP with its previous performance and, in some cases, with the current performance of KKU. The performance of the MSPP is evaluated by evaluating the students' satisfaction rate with the various services offered by the University (such as restaurant, transportation, and sports facilities), an annual satisfaction survey of beneficiaries with the IT services, end of Academic year survey, satisfaction of the students by the academic counseling service, satisfaction of staff and employees by the academic performance of the program and the data analysis as mentioned in Table 1. Moreover, the MSPP adopted the MSC in Chemistry Department- Science College- at KKU as an internal benchmark to evaluate its performance.

External benchmarking is considered a valuable tool for the improvement of academic programs. The MSPP adopts the Master of Science in Physics program of King Abdelaziz University as an external benchmark to improve its practices.

Consultants and External Reviewers

Consultants and External Reviewers/Experts are engaged in some subject areas to complement the staff in the deanship of academic quality and development. Experts have experience in designing, implementing, and reviewing quality assurance systems. Others may have broad experience in learning outcomes assessment, KPIs, deployment and analysis of surveys and evaluations, strategic and operational planning, performance evaluations, environmental scanning and reporting, and assessment of non-academic units. Consultants are usually hired on an annual basis, as and when required.

10- Self-Study Report and Review of the MSC

Program Evaluation is essential to help the MSPPMC and the Department of Physics to learn about the program's quality and to investigate whether it satisfies the internal and external stakeholder's needs. The MSPP follows a systematic process for the evaluation of the program. Qualitative and quantitative methods are used to understand the students' ideas about the learning and teaching strategies, assessment methods, and course delivery effectiveness. Furthermore, the MSPP evaluates the students' satisfaction with the infrastructure and the offered services like learning resources, information technology services, and counseling services. The results of quantitative and qualitative evaluation methods are used for the control and improvement of the MSPP performance and quality.

The self-study report of the MSPP contains seven sections as follows: 1) program profile; 2) program self-study and its process; 3) evaluation concerning quality standards; 4) independent evaluations; 5) conclusions; 6) action recommendations; and 7) attachments or evidence [Fig 12]. The quality manager of the MSPP organizes program reviews every three years. The regular MSPP review involves evaluating all the activities of the MSPP.

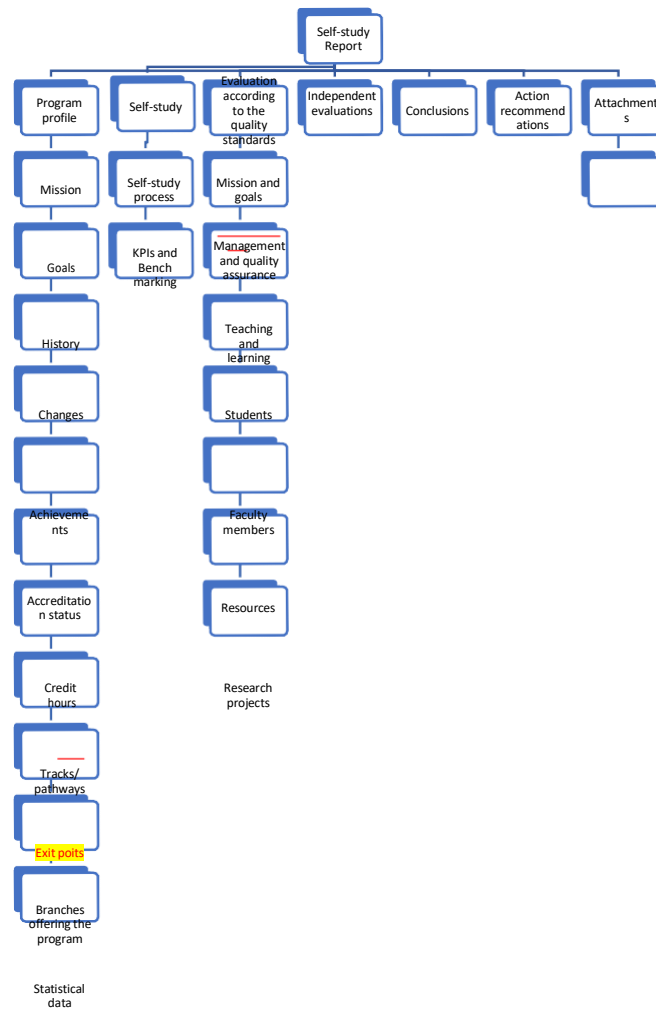


Fig. 12: Structure of the Self-Study Report.

11- Document Control and Management

Documents of any program seeking accreditation should cover all the program's activities. The documents should cover all the administrative and technical policies, procedures, descriptions, working sheets and forms, equipment management procedures, and organizational charts.

Documents control is essential because it helps the management of the files and supports the MSPP management and performance control. Document control includes how the documents are stored and accessed. Each document should be labeled with the following information: issuance date, title, serial number, revision number, issuing

committee/ staff, revision committee/ staff, and approving person.

The documents of the MSPP are classified into Academic Regulations (R), Descriptions (D), Procedures (P), Working sheets or forms (W), and Charts (C) (Table. 2).

Table 2. The documents of the MSPP and their codes

	Academic Regulations	Description	Procedure	Working sheet	Chart
1	R.1. The statute of the Council of higher education and Universities (2)	D.1. MSPP Description	P.1. The teaching procedure and its control	W.1. MSPP Annual Report	C.1. The organizational Chart of the MSPP
2	R.2. Academic regulations for postgraduate studies in Saudi Universities	D.2. Self-study Report	P.2. The research projects procedure and its control	W.2. Courses Reports for the courses offered in MSc program W.2.1. Advance Classical Mechanics (Phys 511) W.2.2. Advance Mathematical Mechanics (Phys 512) W.2.3. Statistical Mechanics (Phys 513) W.2.4. Quantum Mechanics I (Phys 531) W.2.5. Electromagnetic Theory (Phys 521) W.2.6. Advanced Physics Lab (Phys 641) W.2.7. Seminar (Phys 675) W.2.8. Quantum Mechanics II (Phys 632) W.2.9. Solid State Physics (Phys 551) W.2.10. Special Topics in Solid State Physics (Phys 652)	C.2. The organizational chart of the Physics department

				<p>W.2.11. Nuclear Physics (Phys 561)</p> <p>W.2.12. Special Topics in Nuclear Physics (Phys 662)</p> <p>W.2.13. Atomic Structure and Spectroscopy (Phys 571)</p> <p>W.2.14. Quantum Optics (Phys 572)</p> <p>W.2.15. Master Thesis (Phys 680)</p>	
3	R.3. Guidelines for departmental committees	D.3. Quality Assurance Manual	P.3. The examination procedure and its control	W.3. survey of Student satisfaction by the program	C.3. The organizational chart of the college of science

	Academic Regulations	Description	Procedure	Working sheet	Chart
4	R.4. Students' requirements for joining the MSPP	<p>D.4. Courses Descriptions</p> <p>D.4.1. Advanced Classical Mechanics (Phys 511)</p> <p>D.4.2. Advance Mathematical Mechanics (Phys 512)</p> <p>D.4.3. Statistical Mechanics (Phys 513)</p> <p>D.4.4. Quantum Mechanics I (Phys 531)</p>		W.4. Survey of employee's satisfaction	C.4. Plan-Do-Check-Act Cycle.

		<p>D.4.5. Electromagnetic Theory (Phys 521)</p> <p>D.4.6. Advanced Physics Lab (Phys 641)</p> <p>D.4.7. Seminar (Phys 675)</p> <p>D.4.8. Quantum Mechanics II (Phys 632)</p> <p>D.4.9. Solid State Physics (Phys 551)</p> <p>D.4.10. Special Topics in Solid State Physics (Phys 652)</p> <p>D.4.11. Nuclear Physics (Phys 561)</p> <p>D.4.12. Special Topics in Nuclear Physics (Phys 662)</p> <p>D.4.13. Atomic Structure and Spectroscopy (Phys 571)</p> <p>D.4.14. Quantum Optics (Phys 572)</p> <p>D.4.15. Master Thesis (Phys 680)</p>			
5	R.5. Guidelines for writing the MSC thesis	D.5. The Responsibilities of the MSPPMC members		W.5. Survey student evaluation of the courses	C.5. The teaching cycle and its assessment components

6	R.6. Guide to student's rights and responsibilities	D.6. The responsibilities of the course coordinator		W.6. Survey Students' satisfaction with the offered services, including the IT	C.6. The steps of the MSPP research projects
7	R.7. Research ethics at KKU			W.7. Survey Student evaluation of academic and career counseling	C.7. Harmony between the MSPPMC officers and the corresponding departmental committees
	Academic Regulations	Description	Procedure	Working sheet	Chart
8				W.8. Application form to join the MSPP	
9				W.9. Acceptance delay request	
10				W.10. Study delay request	
11				W.11. Withdraw request	
12				W.12. One-semester withdrawal request	
13				W.13. Graduate Admissions Recommendation Form	
14				W.14. Research point proposal form	
15				W.15. General Framework	

				of Research Proposal	
16				W.16. Report of research thesis and viva	
17				W.16. Decision of the Viva committee	

Head of Physics Department

Dr. Thekrayat AlAbdulaal