DEPARTMENT OF PHYSICS

LAHORE COLLEGE FOR WOMEN UNIVERSITY, LAHORE

SELF-ASSESSMENT REPORT

for BS Program

Submitted to

Quality Enhancement Cell,

Lahore College for Women University, Lahore

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CRITERION 1: PROGRAM MISSION, OBJECTIVES AND OUTCOMES

Standard 1-1: The program must have documented measurable objectives that support college and institution mission statements.

- Document institution, college and program mission statements.
- State program objectives. Program educational objectives are intended to be statements that describe the expected accomplishments of graduates during the first several years following graduation from the program.
- Describe how each objective is aligned with program, college and institution mission statements.
- Outline the main elements of the strategic plan to achieve the program mission and objectives.
- Provide for each objective how it was measured when it was measured and improvements identified and made. Table 4.1 provides a format for program objectives assessment.

BS PROGRAM

Mission Statement

BS research program is designed to prepare graduate students to perform best in different branches of Physics. Lab experiments and independent projects have been assigned to improve their skills for advanced studies and specialization.

LEARNIN GOBJECTIVES

- To provide sound basic education in Physics for students planning career in science, engineering and other disciplines
- To prepare students for Post Graduate Studies
- To encourage students to participate in research projects appropriate to their academic abilities and experience
- To develop scientific attitude and demonstrate professional skills in teaching and research.
- To prepare and train students for advanced studies and specialization in recently emerging technologies

Objectives	How Measured	When Measured	Improvements Identified (Based on outcome Examination)	Improvements Made
1	Mid term Test	As per tentative date sheet from examination branch	Enhancement in learning	To encourage creativity analytical thinking, critical analysis and innovative problem solving skills.
2	Assignment		Enhancement in learning	To create basic skills in teaching and research.
3	Final term Test	As per tentative date sheet from examination branch	Enhancement in learning	To encourage creativity analytical thinking, critical analysis and innovative problem solving skills.
4	Quiz/seminar		Confidence and competition developed	To develop expertise and skills necessary to be an effective educator and faculty member.

5	Final exam	As per tentative date sheet from examination branch	Enhancement in learning	Students can provide innovative and creative solutions to Physics problems

OUTCOMES

- Students know the concepts of the basic branches of Physics.
- Students perform new experimental projects related to Physics theories.
- Students have the ability to do small independent project.
- Students have developed effective communication skills and professionalism.

Table 4.1 Program Objectives Assessment

Standard 1.2: The program must have documented outcomes for graduating students. It must be demonstrated that the outcomes support the program objectives and that graduating students are capable of performing these outcomes.

- Describe how the Program Outcomes support the Program Objectives. In Table 4.2 show the outcomes that are aligned with each objective.

Program Objectives	**Program Outcomes**			
	1	**2**	**3**	**4**
To provide opportunity for considerable personal development.	Students can provide significant intellectual contributions in the fields of Physics.	Students can communicate effectively both orally and in written form	Students can provide innovative and creative solutions to Physics problems	Students can communicate effectively both orally and in written form
To encourage creativity analytical thinking, critical analysis and innovative problem solving skills.	Students can provide significant intellectual contributions in the fields of Physics.	Students with advanced capabilities in leadership and management	Students with advanced capabilities in leadership and management	Students can conduct empirical research and think analytically
To develop within each candidate the expertise and skills necessary to be an effective educator and faculty member	Students can provide significant intellectual contributions in the fields of Physics.	Students with advanced capabilities in leadership and management	Students with advanced capabilities in leadership and management	Students can communicate effectively both orally and in written form

Table 4.2: Outcomes versus Objectives

- Describe the means for assessing the extent to which graduates are performing the stated program outcomes/learning objectives.

1. Conducting a survey of graduating seniors every semester.
2. Conduct a survey of alumni every two years.
3. Conduct a survey of employers every two years.
4. Carefully designed questions asked during senior project presentations. These questions should be related to program outcomes.
5. Outcome examinations.

The program outcomes are the byproducts of the program objectives and are interrelated. An example of interrelation between the program objectives and the program outcomes is shown in the following table.

Program Objectives	Program Outcomes					
	Students are able to discriminate between right and wrong	**Students have clear concepts of Physics**	**Handling of experimental apparatus**	**Literature review**	**Selection of research topic**	**Analysis of experimental results**
Character building of students	*	–	–	–	–	–
To learn students basic knowledge of different fields of Physics	–	◊	–	–	–	–
To implement gained knowledge through experimental labs	–	–	◊	–	–	–
To conduct research projects effectively	–	–	–	◊	◊	◊

Legend: *Denotes **Substantial** Contribution to the objectives

◊ Denotes **Moderate** Contribution to the objectives

– Denotes **No** Contribution to the objectives

Standard 1.3: The results of program's assessment and the extent to which they are used to improve the program must be documented.

Describe the actions taken based on results of periodic assessments.

- Describe major future program improvements plans based on recent assessments.
- List strengths and weaknesses of the program.

- List significant future development plans for the program.
- Courses outline is modified and more skills of teaching are added to meet modern time requirement.
- Program is satisfactory.

Standard 1.4: The department must assess its overall performance periodically using quantifiable measures.

1.4.1 Performance Measures:

Ta**ble 3: No. of Students Enrolled**

Program	Session	No. of Students
	2014-2018	40
BS (Hons.) Physics	2015-2019	43
	2016-2020	46
	2017-2021	52
	2018-2022	54

ii) Table 4: Student-Faculty Ratio

Year	No. of Students	No. of Faculty Members	Student-Faculty ratio
2015-2019	43	23	2:1
2016-2020	46	23	2:1
2017-2021	52	23	2:1
2018-2022	54	23	2:1

iii) Table 5: No. of Students Passed Out

Program	Passing out Year	No. of Students
BS (Hons.) Physics	2018	40

IV) Table 6:Percentage of Honor Students & Attrition Rate

Year	%age of Honor Students **Criteria:** CGPA 3.75 and above	Attrition Rate $\frac{(\text{Admitted} - \text{pass out})}{\text{Admitted}} * 100$
2018	14 (35%)	0

v) Table 7: Faculty Training, Seminars and workshops (Appendix A)

Year	No. Of Trainings, Seminars and workshops
2018	05
2017	05

vi) Papers Published at National & International Level

Table 8: Number of Publications (Appendix B)

Year	Papers published
2018	**06**

vii. Books in Library

400 books (Approx.) of Physics are available in Postgraduate Library PG-I

Research Areas

The Faculty is involved in research in the following areas:

1. Experimental: Material science
2. Theoretical: Plasma Physics

Collaborations

1. CASP, GCU
2. CSSP, University of the Punjab
3. NILOP, Islamabad

Departmental Achievements (others)

- 1st position obtained for BS (Hons.) Physics for academic year 2012 and 2013.
- 1st and 2nd positions obtained for BS (Hons.) Physics for academic year 2014 and 2015.

Honors and Awards

Research incentive = 04 papers

CRITERION 2: CURRICULUM DESIGN AND ORGANIZATION

Provide the following information about the program's curriculum:

A. Title of degree program.
B. Definition of credit hour.
C. Degree plan: attach a flow-chart showing the prerequisites, core, and elective courses.
D. Complete Table 4.3 showing curriculum breakdown in terms of mathematics and basic sciences, major requirements, social sciences and other requirements.
E. For each course in the program that can be counted for credit provide 1-2 pages specifying the following:

- Course title
- Course objectives and outcomes
- Catalog description
- Text book (s) and references
- Computer usage
- Laboratory

Content breakdown in credit hours (if applicable) as basic science, math, engineering science, and design for engineering discipline, general education requirements, business requirements and major requirements for the Business Studies and others.

➢ For above required information, scheme of studies for BS (Hons.) Physics is attached as Appendex 1.

Semester	Course No:	Category (Credit Hours)				
		Maths& Basic Sciences		Core Courses	Humanities & Social Sciences	Technical Electives
		Maths	Basic Sciences			
I -IV		01		04	03	01
V-VIII		-		18	-	
Total		01		22	03	
Minimum Requirements						

Table 4.3 **Curriculum course requirements**

Standard 2.1: The curriculum must be consistent and supports the program's documented objectives.

- Describe how the program content (courses) meets the program objectives.
- Complete the Table 4.4linking courses to program outcomes. List the courses and tick against relevant outcomes. A sample of such a matrix is shown below.

Courses or Group of Courses	Program Outcomes			
	1	2	3	4
Compulsory subjects (Eng, Isl. & Pak. Studies)	To improve spoken Eng. And communication skills	Character building	To improve general knowledge about Pakistan	
Computer Sciences	To improve computer skills	To promote e-learning		
Physics	To learn basic fields of Physics	To learn basic skills of research		

Table- 4.4: Courses versus Program Outcomes

Standard 2.2: Theoretical background, problems analysis and solution design must be stressed within the program's core material.

Table 13: **Elements of Courses**

Elements	Courses	No of Courses
Theoretical background	*****	*****
Problem solving	*****	*****
Solution design	*****	*****

***** Theoretical background, Problem solving and Solution design are the core elements for each Course offered for BS (Hons.) Physics Program.

Standard 2.3: The curriculum must satisfy the core requirements for the program, as specified by the respective accreditation body.

- Curriculum is designed as per HEC requirement.

Standard 2.4: The curriculum must satisfy the major requirements for the program as specified by the respective accreditation body.

- Curriculum is designed as per HEC requirement.

Standard 2.5: The curriculum must satisfy general education, arts, and professional and other discipline requirements for the program, as specified by the respective accreditation body/council.

- HEC Requirements (Accreditation Council Requirements if any)
- Program Requirements
- Deviations
- Justification for Deviations

Programs	Maths & Basic Sciences	Engineering Topics	General Education	Others
BS (Hons.) Physics	01	-	03	02

Table A.1 Minimum Requirements for Each Program

(Program Semester Credit hours)

Standard 2.6: Information technology component of the curriculum must be integrated throughout the program.

- Indicate the courses within the program that will satisfy the standard.
- Describe how they are applied and integrated though out the program.

- Computer sciences as minor subject
- Computational Physics
- Computer skills of students are improved. They learn to get information through e-learning.
- Different programs are developed by students for a given problem statement.

Standard 2.7: Oral and written communication skills of the student must be developed and applied in the program.

- Indicate the courses within the program that will satisfy the standard.
- Describe how they are applied.

➢ Students prepare tests, assignments, quiz and presentations for each course.

CRITERION 3: LABORATORIES AND COMPUTING FACILITIES

Indicate for each lab the following:

- Laboratory Title
- Location and area
- Objectives
- Adequacy for Instruction
- Courses taught
- Software available (if applicable)
- Major Apparatus
- Major Equipments
- Safety regulations

Standard 3.1: Manuals/documentation/instructions for experiments must be available and readily accessible to faculty and students.

- Explain how students and faculty have adequate and timely access to the manuals/documentation and instructions.
- Benchmark with similar departments in reputable institutions to identify short comings in laboratory.

➢ Students and faculty can get manuals for experiments from lab attendants.

Standard 3.2: There must be adequate support personnel for instruction and maintaining the laboratories:

- Indicate for each laboratory, support personnel, level of support, nature and extent of instructional support

➢ Satisfactory

Standard 3.3: The university computing infrastructure and facilities must be adequate to support program's objectives:

- Describe how the computing facilities support the computing component of your program.
- Benchmark with similar departments in reputable institutions to identify short comings in computing infrastructure and facilities if any

➢ Students are facilitated by IT department's computer lab. In parallel, they take advantage of student's laptop scheme.

➢ Computing facilities are satisfactory.

CRITERION 4: STUDENT SUPPORT AND ADVISING

Standard 4.1: Courses must be offered with sufficient frequency and number for students to complete the program in a timely manner:

- Provide the department's strategy for course offerings.
- Explain how often required courses are offered.
- Explain how often elective courses are offered.
- Explain how required courses outside the department are managed to be offered in sufficient number and frequency.

- BS (Hons.) Physics Program is divided in eight semesters.
- Compulsory and elective courses are offered in addition to Major Physics during Semester I and IV.
- Courses relating basic fields of Physics are offered during Semester V and VIII.
- Courses outside the department are managed by consulting relevant department's coordinator.

Standard 4.2: Courses in the major area of study must be structured to ensure effective interaction between students, faculty and teaching assistants:

- Describe how you achieve effective student/faculty interaction in courses taught by more than one person such as two faculty members, a faculty member and a teaching assistant or a lecturer.

- Effective student/faculty interaction in courses is achieved through presentations, quiz and seminars.

Standard 4.3: Guidance on how to complete the program must be available to all students and access to academic advising must be available to make course decisions and career choices:

- Describe how students are informed about program requirements.
- Describe the advising system and indicate how its effectiveness is measured.
- Describe the student counseling system and how students get professional counseling when needed.
- Indicate if students have access to professional counseling; when necessary.
- Describe opportunities available for students to interact with practitioners and to have membership in technical and professional societies.

- Students of BS, Sem. VII get professional counseling at department and have meeting with carrier counseling department of the institution.

CRITERION 5: PROCESS CONTROL

Standard 5.1: The process by which students are admitted to the program must be based on quantitative and qualitative criteria and clearly documented. This process must be periodically evaluated to ensure that it is meeting its objectives:

- Describe the program admission criteria at the institutional level, faculty or department if applicable.
- Describe policy regarding program/credit transfer.
- Indicate how frequently the admission criteria are evaluated and if the evaluation results are used to improve the process.

- BS (Hons.) Physics Program is offered to those students who completed F.Sc. (Pre-Engg.) successfully. Admission criteria are on open merit and other quotas prescribed by HEC.

Standard 5.2: The process by which students are registered in the program and monitoring of students' progress to ensure timely completion of the program must be documented. This process must be periodically evaluated to ensure that it is meeting its objectives:

- Describe how students are registered in the program.
- Describe how student's academic progress is monitored and how their program of study is verified to adhere to the degree requirements.
- Indicate how frequently the process of registration and monitoring are evaluated and if the evaluation results are used to improve the process.

➢ Students are registered in the program as per university and HEC rules.

➢ Student's academic progress is monitored through examination system.

Standard 5.3: The process of recruiting and retaining highly qualified faculty members must be in place and clearly documented. Also processes and procedures for faculty evaluation, promotion must be consistent with institution mission statement. These processes must be periodically evaluated to ensure that it is meeting its objectives:

- Describe the process used to ensure that highly qualified faculty is recruited to the program.
- Indicate methods used to retain excellent faculty members.
- Indicate how evaluation and promotion processes are in line with institution mission statement.
- Indicate how frequently this process in evaluated and if the evaluation results are used to improve the process.

➢ The process is as per HEC criteria.

Standard 5.4: The process and procedures used to ensure that teaching and delivery of course material to the students emphasizes active learning and that course learning outcomes are met. The process must be periodically evaluated to ensure that it is meeting its objectives:

- Describe the process and procedures used to ensure that teaching and delivery of course material is effective and focus on students learning.
- Indicate how frequently this process is evaluated and if the evaluation results are used to improve the process.

➢ Lectures are delivered according to prescribed credit hours of each course. Course material is also delivered through multimedia and e-learning.

➢ The coordinator for each academic year for BS program conducts the meeting per month with her relevant faculty member to ensure the improvement of delivery process. It is further evaluated by overall BS coordinator and head of department.

Standard 5.5: The process that ensures that graduates have completed the requirements of the program must be based on standards, effective and clearly documented procedures. This process must be periodically evaluated to ensure that it is meeting its objectives.

- Describe the procedures used to ensure that graduated meet the program requirements.
- Describe when this procedure is evaluated and whether the results of this evaluation are used to improve the process

➢ The completion of the program is documented through tests, assignments, quizzes, seminars and examinations, following the academic calendar.

CRITERION 6: FACULTY

Standard 6.1: There must be enough full time faculty who are committed to the program to provide adequate coverage of the program areas/courses with continuity and stability. The interests and qualifications of all faculty members must be sufficient to teach all courses, plan, modify and update courses and curricula. All faculty members must have a level of competence that would normally be obtained through graduate work in the discipline. The majority of the faculty must hold a Ph.D. in the discipline:

- Complete the following table indicating program areas and number of faculty in each area.
- Each faculty member should complete a resume.
- Information recorded in Table 4.6 and faculty member's resumes will be sufficient to validate standard 6-1.

Program Area of Specialization	Courses in the Area and Average Number of Sections per Year	Number of faculty Members in Each Area	Number of Faculty with Ph. D Degree
Area 1. Compulsory subjects	**03/01**	**03**	**02**
Area 2. Elective subjects	**02/01**	**02**	**01**
Area 3. Physics (Theory)	**22**	**10***	**08**
Area 4. Physics (Lab)	**06**	**06***	**04**
Area 5. Project	**-**	**10***	**08**
Total			

* Faculty is taking multiple courses.

Table 4.6: Faculty Distribution by Program Areas

Standard 6.2: All faculty members must remain current in the discipline and sufficient time must be provided for scholarly activities and professional development. Also, effective programs for faculty development must be in place:

- Describe the criteria for faculty to be deemed current in the discipline and based on these criteria and information in the faculty member's resumes, what percentage of them is current. The criteria should be developed by the department.
- Describe the means for ensuring that full time faculty members have sufficient time for scholarly and professional development.
- Describe existing faculty development programs at the departmental and university level. Demonstrate their effectiveness in achieving faculty development.
- Indicate how frequently faculty programs are evaluated and if the evaluation results are used for improvement.

- All faculty members are current in the discipline according to criteria prescribed by HEC.
- Faculty members are updated by means of workshops, seminars and conferences held within the campus as well as in other universities.
- Existing faculty development programs include national/ international seminars organized by department.

Standard 6.3: All faculty members should be motivated and have job satisfaction to excel in their profession:

- Describe programs and processes in place for faculty motivation.
- Obtain faculty input using Faculty Surveyon programs for faculty motivation and job satisfaction.
- Indicate how effective these programs are.

- Faculty is self-motivated as well as by the institution through incentives such as awards and research incentives.

CRITERION 7: INSTITUTIONAL FACILITIES

Standard 7.1: The institution must have the infrastructure to support new trends in learning such as e-learning

- Describe infrastructure and facilities that support new trends in learning.
- Indicate how adequate the facilities are.

- Students avail other department's facilities as well as their laptops for e-learning.

Standard 7.2: The library must possess an up-to-date technical collection relevant to the program and must be adequately staffed with professional personnel:

- Describe the adequacy of the library's technical collection.
- Describe the support rendered by the library.

- Students for BS program take advantage of main library. The services are satisfactory.

Standard 7.3: Class-rooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities:

- Describe the adequacy of the classrooms.
- Describe the adequacy of faculty offices

- There is room for improvement.

CRITERION8: INSTITUTIONAL SUPPORT

Standard 8.1: There must be sufficient support and financial resources to attract and retain high quality faculty and provide the means for them to maintain competence as teachers and scholars:

- Describe how your program meets this standard. If it does not explain the main causes and plans to rectify the situation.

To provide sound basic education in branches of Physics for BS students.

Students perform new experimental projects related to Physics theories
To prepare students for Post Graduate Studies
To develop scientific attitude and demonstrate professional skills in teaching and research.
To produce graduates having strong analytical and critical thinking skills for specialization recent emerging technologies.

- Describe the level of adequacy of secretarial support, technical staff and office equipment.

Technical staff and office equipment are adequate to fulfill the requirement. Labs are fully equipped, Lab. Incharge & teaching assistants are available.

Standard 8.2: There must be an adequate number of high quality graduate students, research assistants and Ph.D. students:

- Provide the number of graduate students, research assistants and Ph. D students for the last three years.

No research assistant and Ph. D students are available for BS classes.

- Provide the **faculty: graduate student ratio** for the last three years.

20 faculty members: 200 graduate students
Ratio: 1:10

Standard 8.3: Financial resources must be provided to acquire and maintain Library holdings, laboratories and computing facilities:

- Describe the resources available for the library.
- Describe the resources available for laboratories.
- Describe the resources available for computing facilities.

➢ Resources provided by university according to allocated budget.

Appendix 1

BS Scheme of Studies (Physics LCWU)
Session (2017-21) & Onwards

Semester I		
Course Code	**Course Title**	**Credit Hours**
CC/Eng-101	Language in use	3(3+0)
CC/Isl-101	Islamic Education	2(2+0)
Maj/Phy-101	Mechanics	4 (3+1)
Min/Chem-101 Min C/CS-101 Min/Stat-101	General Inorganic Chemistry Introduction to Computers Introductory Statistics	4 (3+1) 4 (3+1) 4 (3+1)
Min/Math-101	Elementary Differential & Integral Calculus	4+0
Total Credit Hours		**17**
Semester II		
Course code	**Course Title**	**Credit Hours**
CC/Eng-102	Academic Reading & Writing	3+0
CC/PS-101	Pakistan Studies	2+0

Maj/Phy-102	Electricity & Magnetism	4(3+1)
Min/Chem-102 Min C/CS-102 Min/Stat-102	Physico-Organic Chemistry-I Programming Fundamentals Introduction to Probability Distribution	4 (3+1) 4 (3+1) 4 (3+1)
Min/Math-102	Complex Numbers & Analytical Geometry	4+0
Total Credit Hours		**17**
Semester III		
Course Code	**Course Title**	**Credit Hours**
CC/Eng-201	Communication Skills	3+0
CC/Stat-201	Basic Statistics	2+0
Maj/Phy-201	Heat & Thermodynamics	3+1
Maj/Phy-202	Modern Physics	3+1
Min/Math-201	3DimensionalAnalyticalGeometry&DifferentialEquation	4
Total Credit Hours		**17**
Semester IV		
Course Code	**Course Title**	**Credit Hours**
CC/CS-201	Introduction to MatLab	2+1
CC/Eng-202	Advance Academic Reading & Writing	3+0
Maj/Phy-203	Waves & Oscillation	4 (3+1)
Maj/Phy-204	Nuclear Physics	4 (3+1)
Min/Math-202	Infinite Series & Linear Algebra	4
Total Credit Hours		**18**
Semester V		
Course Code	**Course Title**	**Credit Hours**
Maj/Phy-301	Mathematical Methods of Physics-I	4+0
Maj/Phy-302	Classical Mechanics	3+0
Maj/Phy-303	Quantum Mechanics-I	4+0
Maj/Phy-304	Electronics-I	4+0
Maj/Phy-305	Modern Physics Lab.	0+2
Total Credit Hours		**17**
Semester VI		
Course Code	**Course Title**	**Credit Hours**
Maj/Phy-306	Mathematical Methods of Physics-II	4+0
Maj/Phy-307	Statistical Mechanics	3+0
Maj/Phy-308	Quantum Mechanics-II	4+0
Maj/Phy-309	Electronics-II	4+0
Maj/Phy-310	Electronics Lab.	0+2
Total Credit Hours		**17**
Semester VII		
Course Code	**Course Title**	**Credit Hours**
Maj/Phy-401	Solid State Physics-I	4+0
Maj/Phy-402	Introduction to Plasma Physics*	3+0
Maj/Phy-403	Electricity & Magnetism	4+0
Maj/Phy-404	Computational Physics	2+1
Maj/Phy-405	Advanced Electronics	3+0
Total Credit Hours		**17**

Semester VIII		
Course Code	**Course Title**	**Credit Hours**
Maj/Phy-406	Solid State Physics-II	4+0
Maj/Phy-407	Advanced Electronics Lab.	0+2
Maj/Phy-408	Introduction to Material Science	4+0
Res/Phy-421	Project	0+6
Total Credit Hours		**16**

* Student may opt any one of the following

Sr. No.	**Course Code**	**Optional Paper ***	**Cr. Hrs.**
1.	EC/Phy-409	Methods of Experimental Physics	03
2.	EC/Phy-410	Surface Physics	03
3.	EC/Phy-411	Medical Physics	03
4.	EC/Phy-412	Environmental Physics	03
5.	EC/Phy-413	Particle Physics	03
6.	EC/Phy-414	Laser Physics	03
7.	EC/Phy-415	Cosmology & Relativity	03
8.	EC/Phy-416	Introduction to Nanotechnology	03

Total Credit Hours: 17+17+17+18+17+17+17+16 = **136**