

**DEPARTMENT OF PHYSICS**  
**LAHORE COLLEGE FOR WOMEN UNIVERSITY, LAHORE**

**SELF-ASSESSMENT REPORT**

**PhD**

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.

### **Ph.D PROGRAM**

#### **Mission Statement:**

Ph. D research intensive program is designed to attract doctoral level students with excellent academic potential, to prepare them to be the best in the field of science of technology and to become leading researchers to demonstrate excellent contribution to the knowledge in the different field of Physics. These researchers will be contributor in the industry of science & technology.

#### **LEARNING OBJECTIVES**

- To create advanced skills in teaching and research
- To develop within each candidate the expertise and skills necessary to be an effective educator and faculty member.
- To encourage creativity analytical thinking, critical analysis and innovative problem solving kills.
- To provide opportunity for considerable personal development.

<b>Objectives</b>	<b>How Measured</b>	<b>When Measured</b>	<b>Improvements Identified (Based on outcome Examination)</b>	<b>Improvements Made</b>
<b>1</b>	Mid term Test	As per tentative date sheet from examination branh	Enhancement in learning	To encourage creativity analytical thinking, critical analysis and innovative problem solving kills.
<b>2</b>	Assignment		Enhancement in learning	To create advanced skills in teaching and research
<b>3</b>	Final Test	As per tentative date sheet from examination branh	Enhancement in learning	To encourage creativity analytical thinking, critical analysis and innovative problem solving kills.
<b>4</b>	Quiz		Confidence and competition developed	To develop within each candidate the expertise and skills necessary to be an effective educator and faculty member.
<b>5</b>	Final exam	As per tentative date sheet from examination branh	Enhancement in learning	Students can provide innovative and creative solutions to Physics problems

## OUTCOMES

- Students can conduct empirical research and think analytically
- Students can provide innovative and creative solutions to Physics problems
- Students can communicate effectively both orally and in written form.
- Students with advanced capabilities in leadership and management.
- Students can provide significant intellectual contributions in the fields of Physics.

**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
To create advanced skills in teaching and research	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.

A survey of graduating seniors, alumni and employers are conducted to assess outcome of Ph. D program.

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 advanced concepts 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.

Answers:

- Courses outline was modified and more skills of teaching was added to meet modern time requirement.
- Program is satisfactory.
- New courses were introduced according to updated research based trends e.g: Plasma Physics, Advanced Fuel Cell Fundamentals & Technology, Advanced Renewable Energy Technology, Non-Linear Physics, Nano Biotechnology.
- Lack of lab characterization facilities and chemical availability to meet current levels of research.
- Students can apply skill based knowledge of physics and other specialties to society.
- To improve the gap of academia & industrial research.

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

#### 1.4.1 Performance Measures:

- Performance of students is measured by their results in test, quiz and exams. Faculty performance is assessed by the students involvement in the particular subject and percentage of their results.

**Table 3: No. of Students Enrolled**

Program	Session	No. of Students
PhD	2019-2022	06
	2018-2021	02
	2017-2020	02

ii) **Table 4: Student-Faculty Ratio**

Year	No. of Students	No. of Faculty Members	Student-Faculty ratio
2019	06	13	1:2
2018	02	07	1:3
2017	02	04	1:2

iii) **Table 5: No. of Students Passed Out**

Program	Passing out Year	No. of Students
PhD	2018	04
	2017	02

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

Year	%age of Honor Students Criteria: CGPA 3.75 and above	Attrition Rate (Admitted –pass out) *100 Admitted
2018	N. A	N. A
2017	N. A	N. A

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)**  
**Research Publications during July 2012-June 2013**

Year	Papers published
2018	28
2017	28

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. NILOP, Islamabad
2. CSSP, University of the Punjab
3. GCU, Lahore.
4. UET, Lahore.

**Departmental Achievements (others)**

**Honors and Awards**

2018: Research Incentive Award =10 papers

2017: Research Incentive Award =10 papers



**CRITERION 2: CURRICULUM DESIGN AND ORGANIZATION**

Semester	Course No:	Category (Credit Hours)				
		Maths & Basic Sciences		Core Courses	Humanities & Social Sciences	Technical Electives
		Maths	Basic Sciences			
1 <sup>st</sup>	Ph. D/Phy-701			Characterization Techniques		
	Ph. D/Phy-702			Advanced Material Science		
	Ph. D/Phy-703			Research Reading I		
2 <sup>nd</sup>	Ph. D/Phy-704			Research Reading II		
	Ph. D/Phy-705			Semiconductor Theory *		
	Ph. D/Phy-706			Magnetism in Condensed Matter *		
Optional Courses						
	Ph. D/Phy-707			Semiconductor Devices		
	Ph. D/Phy-708			Ceramic Processing		
				Advance Engineering materials		
	Ph. D/Phy-709					
				Physical properties of Engineering materials		
	Ph. D/Phy-710					
	Ph. D/Phy-719			Advanced Fuel Cell Technology		
	Ph. D/Phy-725			Biomaterials And Biomechanics		
	Ph. D/Phy-726			Advanced Data Analysis		
				Advanced Renewable Energy Technology		
	Ph. D/Phy-727					
	Ph. D/Phy-728			Energy Storage And Conversion Devices		
<b>Total</b>	15					
<b>Min. requirement</b>	6					

**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 4.4** linking 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
<b>1. Characterization Techniques</b>	The students can analyze the different properties of the materials.	like structure, morphology, magnetic, thermal, electrical and dielectrical properties etc.	They can suggest the applications of the material on the basis of their properties	They learn different data base software and also simulation software for analyzing the material characteristics
<b>2. Advanced Material Science</b>	Learning of different material formation phases	Students are able to fabricate materials with different techniques	They are able to describe the defects in the materials	
<b>3. Research Reading I</b>	After qualifying this subject, the students are given to a specific task to research	Students are able to consult different books, international publication	They learn how to make the literature survey	They can target their research
<b>4. Research Reading II</b>	After taking research reading II, they are able to write down the review articles	They are able to seek new problems	They are able to write their PhD synopsis	They get vast knowledge, learn research methodology
<b>5. Semiconductor Theory *</b>	They are able to study the structure of different semiconductor material	They are able to explain the band theory	They are able to describe the significance of semiconductor material in electronic industry	They are able to suggest the new semiconductor material with doing of different material and also their properties
<b>6. Magnetism in Condensed Matter *</b>	After taking this course the students are able to classify different magnetic material with respect to their applications	They are capable of making new magnetic material with doping of new materials	They learn how to describe the behavior of MH loop and inter link it with other properties	

**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**

<b>Elements</b>	<b>Courses</b>	<b>No of Courses</b>
Theoretical background	<p>1: Subjects are designed on the basis of pure physics background. To develop the skills and expertise in students to meet up the upcoming world-wide research and development. The programme emphasizes the theoretical side of physics but includes experimental aspects.</p> <p>2: It also includes a range of courses in pure and applied Physics and also an introduction to computing and research based subjects. Some of the topics covered nano technology, ceramics, characterization and analysis, semi-conductor devices, laser and material science etc.</p> <p>3: Espacialize and professional man power in the market. Graduates may also choose to go on to a career in teaching, institutes, organizations, medical institutes, Labs, hospitals, industries etc.</p> <p>4: student have some optional courses on the availability of Highly qualified faculty</p>	*****
Problem solving	All courses are designed to provide students with a solid background for further study or work in any area of experimental or theoretical physics. It includes plasma physics and characterization and analysis, semiconductor devices and nano-synthesis to be problem solving. Having a large mathematics and analysis component as an excellent foundation for work in almost any numerate or logical discipline like physics.	*****
Solution design	All courses are designed to be focus for particular solution through research both theoretical and experimental. First the Research objective, than accomplishment through experiments, analysis by using equipments and soft wares and computer skills to meet the advance research levels.	*****

\*\*\*\*\* Theoretical background, Problem solving and Solution design are the core elements for each Course offered for PhD Physics Program.

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

**Answer:**

1. Curriculum is designed as per HEC requirement.
2. 18 years of education.
3. Minimum 60 % cumulative score will be required in admission test as accomplish by department.
4. For award of Ph. D degree 18 credit hours of coursework along with research.
5. Student has to pass out comprehensive viva exam
6. Thesis evaluation from two foreign experts of advanced countries.

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

**Answer:**

1. Curriculum is designed as per HEC requirement
2. The overall curriculum fulfills 18 credit hours of coursework alongwith research work as required by HEC rule.
3. Student has to pass out comprehensive viva exam
4. The syllabus of each course is annually reviewed by Board of Studies.
5. Research work of Ph. D students is checked for plagiarism as per HEC rule.
6. Thesis evaluation from two foreign experts of advanced countries.
7. The final presentation of research work and viva exam is conducted in the presence of two external examiners from other universities as per HEC rule.

**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)  
All courses and thesis are HEC recognized at National Level for Ph. D Degree.
- Program Requirements  
A minimum of 18 years of education is required for applying to the Ph. D Programme in Physics. Applicants are expected to have obtained their MS/ M.Phil degree (CGPA = 3.0) from national or foreign institutions that are accredited or recognized by the Higher Education Commission (HEC) of Pakistan.
- Deviations as per HEC Rule
- Justification for Deviations N.A

Programs	Maths & Basic Sciences	Engineering Topics	General Education	Others
PhD Physics	Pure Physics and Maths Background	N.A	N.A	N.A

Table A.1 Minimum Requirements for Each Program  
(Program Semester Credit hours)

- Ph. D I and II: Course work (Semester I and II) 09 credit hours per semester
- Comprehensive Viva

- Synopsis Defence (Doctrol Committee, Board of Studies, ASRB)
- Research and Thesis
- Thesis evaluation from two foreign experts of advanced countries

**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.
- Research reading
- Different softwares and programs to plot graphs and do analysis
- 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.
- Laboratories are inadequate with lack of apparatus.

**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
- Lack of PhD laboratories and technical staff.

**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.
- Internet facilities are unsatisfactory.

#### **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.
- PhD Physics Program is divided in six semesters.
- Courses are offered during Semester I and II.
- Students have liberty to choose any Courses from scheme of studies.

**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 Ph. D get professional counseling at department and have meeting with carrier counseling department of the institution. Also by electronic media & prospectus. Also students are encouraged to participate in national & International seminars/conferences/workshops and to be active members in different scientific societies.

### **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.
- PhD Physics Program is offered to those students who has completed their 18 years of education successfully with 3.0 CGPA in their terminal degree. Admission criteria are on open merit as prescribed by HEC. It is conducted biannually.

**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 and their experimental work.
- After completion of experimental work they write research papers. Publication of research papers in impact factor journal is their achievement.

**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 is 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 PhD program conducts the meeting per month with her relevant faculty member to ensure the improvement of delivery process. It is further evaluated by overall PhD 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 with Ph. D Degree
Area 1. Material Science	02	04
Area 2. Ceramics	02	04
Area 3. Semi-conductor Physics	02	04
Area 4. Nano-technology	02	04
Area 5. Plasmas	02	02
Total		



**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 and other universities.

**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 Survey** on 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.
  - Faculty cannot carry research with satisfaction without independent offices and excellent internet facilities.

## **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.
  - Internet facilities are insufficient. Discontinuity issue is hindering the research progress. Wi-Fi to be used for laptops has always issues either unavailable or slow.

**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 PhD program take advantage of main library and HEC online library.
- The services are unsatisfactory. Departmental library is required.

**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 no classroom where PhD classes can be conducted.
- Just one staff room for all faculty. No separate offices are available for faculty.
- Even professors have no separate offices.

### **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.
- Describe the level of adequacy of secretarial support, technical staff and office equipment.
- There is no independent laboratory for PhD students
- There is a lack of technical staff.

**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.
- Provide the faculty: graduate student ratio for the last three years.
- PhD students from 2017-2019 are 12. No research assistants available.
- See table 4 in the standard 1.4.

**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 the university according to allocated budget.

**Answer:** Insufficient resources are provided by LCWU. No grants are provided for samples characterization, for those equipments which are not available in home institution LCWU.