Department of Biotechnology
Lahore College for Women University, Lahore.

Self-Assessment Report

Ph.D. Programme

Submitted to

Quality Enhancement Cell

Lahore College for Women University, Lahore

Task accomplished by:

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T A B L E O F C O N T E N T S

INTRODUCTION

Biotechnology is the application of biological organisms, system or process to produce substances or process useful to mankind. New and modern biotechnology grew out of advances in biological sciences such as genetics, microbiology, and biochemistry and information technology. Teaching and research in the field of biotechnology must be strengthened in Pakistan not only to assimilate the progress made in the world but also to undertake research for solving our own specific problems. This would be possible only by producing well-trained scientific manpower in our country. It is therefore urgently required that well- planned academic programmes in biotechnology are incorporated in our education system.

Realizing the importance of strengthening teaching and research in this field, Lahore College for Women University, Lahore has established a state of the art Biotech and Microbiology department to cater the challenges of 21st century. This department will hopefully help in producing well-trained professionals who shall be instrumental in establishing and developing this crucial science and technology in Pakistan. Therefore, a great deal of attention must be paid to human resources and infrastructure development.

Mission of the Department

During education in at the department of Biotechnology the focus of the study will be on following disciplines:

1) Agriculture Biotechnology
2) Industrial Biotechnology
3) Plant Genomics
4) Microbial fermentation and enzyme production
5) Forensic Biotechnology
6) Bioinformatics
7) Proteomics
8) Clinical Bacteriology and parasitology

The aim of this education will be to:

1) Train human resources particularly women in this advanced and challenging field

2) Develop skills which are definitely job oriented
3) Produce skills which can help in solving the problems.
4) Establish a forum for exchange of information on national and international level.

- To develop the scientific attitude and demonstrate professional skills in teaching, research and managerial positions in wide range of professions in national and international organizations.

  The core values of the department are:

  - ➡ Quality
  - ➡ Honesty and character building
  - ➡ Value Addition
  - ➡ Hard work
  - ➡ Care
  - ➡ Esteem
  - ➡ Assurance
  - ➡ Accountability
  - ➡ Impartiality
  - ➡ Transparency
  - ➡ Conviction
  - ➡ Team spirit

Teaching Methodology:

In all courses included make an excellent mix-match of various methods including lectures, practical's, seminars, assignments, workshops, tutorials and group discussions using audio-visual aids. The teaching culminates in developing the ability in students to collect, recognize and interpret the information through various sources like the library and the internet. This creates originality amongst students enabling them to work with gravity of purpose with sharp learning skills.

CRITERION 1: PROGRAM MISSION, OBJECTIVES AND OUTCOMES

Quality Policy of Department of Biotechnology:

Our aim is to achieve excellence through development of productive skills for biotechnology professionals/research scholars to handle multifarious challenging needs. To achieve this commitment, we focus on the integration of understanding of biological problems e.g. at the genetic, molecular, microbial and ecological levels of analysis. We continually improve the effectiveness of our quality management system through human resource development and active faculty/student participation.

Standard 1.1: The program must have documented measurable objectives that support Faculty / College and institution mission statements.

Name of Programs	Duration	No. of Modules	Total Credit Hrs
• Ph.D. (after 18 years of education)	2 semesters + Research	(Course work + Comprehensive Exam + Research)	18

1.1: PROGRAM'S OBJECTIVES

1.1.1 Ph.D. Biotechnology (After 18 years of education):

In the first year of the program, the students complete course work of 18 credit hours in two semesters. Students securing minimum 3.00 GPA in the course work appear for comprehensive written test and in the third year the students submit their synopsis. They are also required to clear GAT before submission of the synopsis. After the approval of the synopsis from the concerned Bodies Ph.D. scholars proceed for their research work. For thesis submission it is compulsory for the students to publish their Ph.D. research work in an HEC recognized journal with impact factor. As per HEC policy thesis is evaluated from two external foreign examiners and one from any local University. Evaluation Reports are submitted and approved in Board of Advance Studies. After successful defense of the thesis and the approval from the Syndicate, the scholar is awarded Degree of Ph.D.

1.1.1.1 Ph.D. BIOTECHNOLOGY Program Objectives:

1. To impart knowledge about research in advanced Biotechnology through wide range of subjects related to the field.
2. To teach different methods of exploration, investigation, organization of data and its utilization in practical research.
3. To enable the Ph.D. research student to critically think for a research problem and find its solutions by reviewing the research done related to the field.
4. To train researchers in recently emerging technological and interdisciplinary fields such as Plant Biotechnology, Cell and Tissue culture, Fermentation Biotechnology, Bioinformatics, Molecular Biology, Biochemistry, Proteomics and Genomics. After completing the degree students will be able to apply knowledge to the respective fields and would go for consideration of the larger role of biology in society.

1.1.2 Strategies are based on:

i) Designing the program as per requirements of the students.
ii) Develop curriculum according to the need of the program.
iii) Regular revision of curriculum to keep them abreast with the national and international developments.
iv) Providing all resources including class room facilities, multimedia, computers, and properly equipped laboratories.
v) Updating the knowledge of teachers and students through workshops and training programs.
vi) Encouraging the establishment of linkages at national and international level.
vii) To prepare and train students in recently emerging technological and interdisciplinary fields such as plant biotechnology, cell and tissue culture, Recombinant DNA technology, Protein secondary structure prediction, Forensic biotechnology, completing the degree students will be able to apply knowledge to the respective fields and would go for consideration of the larger role of biotechnology in society.

1.1.3. Assessment of Educational Objectives of each Program:

Table 2: Ph.D. Programs Objectives Assessment

OBJECTIVES (1)	HOW MEASURED (2)	WHEN MEASURED (FREQUENCY) (3)	IMPROVEMENT IDENTIFIED (4)	IMPROVEMENT MADE (CORRECTIVE & PREVENTIVE ACTION) (5)
As given in Para 1.1	1 Regular assessment of student knowledge and ability to exhibit the skill by the teacher:	Regular	1) Regularity of attendees required 2) Work based teaching 3) Course / curriculum revision to enhance outcomes and make it more work based 4) Enhancing communication skills 5) Guidance to student	1) Attendance rules applied more strictly 2) Teachers training and development 3) Student encouraged to enhance their writing skills 4) Course / curriculum revised 5) Students encouraged to attend the National and International workshops /Seminars /Conference
	i) Class tests	1 pre mid term		
	i) Class exercises relating to problem	1 pre mid-term, 1 post mid term		
	ii) Presentation of relevant topic	Once in a semester		
	iii) Quizzes	As per course requirement		
	2. Written examination	Twice during each semester		
	3. Practical assignment in each modules	Once in a semester		
	4. Discussions	As per requirement		
	5. Research Project	Once during program		
	6. Teaching/ Learning Process Survey (teachers' evaluation by the student)	Once in a semester	Shortcomings as per survey identified	Teachers are intimated the survey report who make effort to improve which is monitored in next survey
	7. Faculty Survey Form	Once in a semester	1) More time to be spent on the following during teaching: i. Teacher student interaction	All the improvements identified have been implemented

OBJECTIVES (1)	HOW MEASURED (2)	WHEN MEASURED (FREQUENCY) (3)	IMPROVEMENT IDENTIFIED (4)	IMPROVEMENT MADE (CORRECTIVE & PREVENTIVE ACTION) (5)
			ii. Personal development topic like ethic, moral & code of conduct iii. Improvement in quality of iv. Administrative support	
	7. Suggestion received from students	As and when received	1) Administrative and personal problems of students 2) Laboratory facilities	Complaints are addressed immediately
	8. Students / Quality Assurance Advisor liaison			
	New Introductions 1. Employer Surveys:	Once a year	Results awaited	-
	2. Alumni Survey:	Once a year	Results awaited	-
	3. Survey of Graduating Students:	Once a year	Results awaited	-
	4. Latest Research Student Progress Review	As per requirement	Regular Assistance from the concerned quarters	Support and the cooperation from other organizations as per requirement of the project.
	5. Survey of Department offering Ph.D.	Every six month	-	-
	6. Faculty Resume	Once a year	1. Qualification 2. Training	1) Sent for higher studies 2) Internal and external training arranged

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.

1.2.1. Ph.D. Program Outcomes:

1. Application of the acquired research experience on a wider scale to solve research problems related to the field.
2. Acquire the abilities for alliances with relevant public and private sector research organizations.
3. Achieve art of using scientific research for the improvement of community and society and for career development.

Table 5: Ph.D. Program Outcomes

Program Objectives	Program Outcomes		
	1	**2**	**3**
1	X		X
2		X	X
3			
4	X		

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

1.3.1. a. Actions taken on the basis of assessment:

1) Syllabus revision
2) Teachers training
3) Labs development
4) Faculty development

1.3.1. b. Strengths of Department:

i) Teamwork
ii) Infrastructure
iii) Work Environment
iv) Science Laboratory, Library and Internet facilities

1.3.1. c. Weaknesses of Department:

iii) Trained Laboratory Personals

iv) Strengthening of existing Laboratory facilities

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

1.4.1: Performance Measures:

Biotechnology department assesses the overall performance using quantifiable measures e.g. statistical method.

i) Student's enrollment
ii) Student passed out
iii) Attrition rate
iv) Student teacher ratio
v) Number of Publications
vi) Number of projects
vii) Books in Library
viii) Linkages and collaborations with other institutes and organizations
ix) Workshops and seminars
x) Purchase of equipment
xi) Other Performance indicators

Table 6: Student's enrollment

Program	Year of Enrollment	No. of Students
Ph.D. Biotechnology	2011	07
Ph.D. Biotechnology	2013	04
Ph.D. Biotechnology	2014	05
Ph.D. Biotechnology	2015	06
Ph.D. Biotechnology	2016	05
Ph.D. Biotechnology	2017	06
Ph.D. Biotechnology	2018	N/A

Table 7: Number of Publications

Year	Papers published
2010	8
2011	12
2012	19
2013	15
2014	24
2015	30
2016	33
2017	14
2018	18

Table 8: Number of projects

Serial No.	Title of the project	Name of faculty members	Amount (Million)	Funding Agency	Duration	From - To
1.	Development of turmeric production technology for enhancement of yield, curcumin and oleoresin content using tissue culture technology	Prof. Dr. Shagufta Naz	3.5 million	Higher Education Commission	**3 years**	July 2007-july 2010 COMPLETED
2.	*In vitro* conservation of some medicinally important endangered, threatened and near to extinct species of different ecological zones of Pakistan	Prof. Dr. Shagufta Naz	2.7 million	Higher Education Commission	**3 years**	July 2010-july 2013
3.	Establishment of Plant Tissue Culture lab. along with green houses in Bagh-e- Jinnah	Prof. Dr. Shagufta Naz	6.5 million	LCWU/ Government of Punjab	**25 years**	July 2009-July 2034
4.	Isolation of Natural compounds from Melia Azedarach and Azadirachta indica antifungal agent against early blight of potato	Prof Dr. Shagufta Naz/ Dr. Khajista Jabeen	0.5 million	Higher Education Commission	**1 year**	January 2011-January 2012

5.	Molecular characterization of Fasciola isolates from Punjab, Pakistan	Dr. Asma Waheed/ Dr. Faiza Saleem	0.5 million	Higher Education Commission	**1 year**	May2011-March 2012
6.	Effect of induced mutation for varietal improvement and their molecular characterization in local cultivars of grapes	Dr. Neelma Munir/ Dr. Shagufta Naz	0.5 million	Higher Education Commission	**1 year**	June 2011-Febrary 2012 Completed
7.	Strengthening and Up-gradation of Microbial Biotechnology Lab in Department of Biotechnology & Microbiology at Lahore college for women University	Dr. Mehwish Iqtedar	0.98 million	Higher Education Commission	**1 year**	June 2011-June 2012
8.	Optimization of cultural conditions for the production of alpha amylase from different fungal isolates	Dr. Roheena Abdullah/Dr. Mehwish Iqtedar	0.5 million	Higher Education Commission	**1 year**	May 9th 2012-Feb, 2013
9.	Genetic analysis of Glaucoma in Pakistan	Dr. Rasheeda Bashir/ Dr. Faiza Saleem	0.5 million	Higher Education Commission	**1 year**	17 April 2103-Jan 2014
10.	Stydying the effect on expression of a recombinant protein by changing the nucleotides at the promotor and start of the gene	Dr. Farheen Aslam/ Dr. Neelma Munir	0.5 million	Higher Education Commission	**1 year**	4th June, 2013-Feb 2014
11.	Bioconversion of chitin from sea food waste (Shrimp shells) to produce commercially important biopolymers	Dr. Faiza Saleem	0.2 million	LCWU	**1 year**	12 June 2013

12.	Comparison of various algal asecies for oil production: A step forward in utilization of algae for biofuel production	Dr. Neelma Munir	0.2 million	LCWU	**1 year**	12 June 2013
13.	Renewable energy: Biofuel production from cellulolytic bacteria of termite gut using agro-industrail waste	Dr. Mehwish iqtedar	0.2 million	LCWU	**1 year**	12 June 2013
14.	Alpha amylase production by bacterial coculture using agricultural by products	Dr. Roheena Abdullah	0.2 million	LCWU	**1 year**	12 June 2013
15.	Genetic and Molecular characterization of corneal dystrophies prevalent in Pakistan	Dr. Shagufta Naz Dr. Tasneem Farasat, Dr. RehanSaddiq	2.99 Million	HEC	**03 year**	2013-2016
16.	Application of molecular methods for the development of a pathogen-free certification program for grapevine in Pakistan	Prof. Dr Shagufta Naz	28.69 Million	HEC-USAID		May 2015
17.	High throughput citrus Diagnosis and screening of pathogens of canker, greening scab and viruses from nurseries and orchards of Sargodha	Prof. Dr Shagufta Naz	05 Million	PARB	**03 year**	2015-2018
18.	Collection identification and extraction of oil from various high oil yielding algal specie Molecular characterization and analysis of	Dr Neelma Munir Prof. Dr Shagufta Naz	10.1 Million	HEC-NRPU	**03 year**	2015-2018

	algal oil as a feedstock for biofuel production					
19.	Concerned bioinformatics and proteomic approaches to define the role of post translation modifications in signaling proteins of the insulin pathway	Dr Afshan Kaleem Dr Daniel C Hoessli Dr Ikram-ul-Haq	2.8 Million	HEC-NRPU	**03 year**	2015-2018
20.		Dr. Madeeha Akra and Prof. Dr. Shagufta Naz	0.5 million	Higher Education Commission	**1 year**	2017-2018
21.	Expression Augmentation of Recombinant Human Therapeutic Peptides in Bacillus Expression System	Dr Faiza Saleem	5.888 Million	HEC-NRPU	3 year	2016-2019
22.	Genetic Analysis of Disease Causing Genes for Glaucoma in Pakistani Population	Dr Rasheeda Bashir	1.846 Million	HEC-NRPU	3 year	2016-2019

Table 9: Books in Library

Year	Purchased
2011-2012	40
2012-2013	52
2013-2014	38
2014-2015	32
2015-2016	N/A
2016-2017	N/A
2017-2018	30

Table 10: Linkages with other institutes and industry

S. No.	Institute/ Industry	
	National	**International**
1	Agriculture Department, Government of the Punjab	University of California, Davis, CA, USA.
2	University of Lahore	University of California, Riverside, CA, USA.

3	Children's Hospital	
4	Pakistan Program for Collaborative Research(PPCR)	
5	VRI (Veterinary institute of research	
6	University of health sciences	
7	CAMB (university of Punjab)	
8	Citrus research Centre, Sargodha.	
9	PCSIR	
10	Dr. Panjwani Center for Molecular Medicine and Drug Research, International Center for Chemical and Biological Sciences, University of Karachi, Karachi, Pakistan	

Table 11: Workshops and seminars organized

Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
No. of Workshops and seminars	Nil	4	7	6	4	4	5	3

Table 12: Purchase of Equipment

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
No. of Equipment exceeding the price of Rs. 100,000	10	8	28	5	8	4	3	None	None

Table 13: Other Performance Indicators

Sr.	**Contents**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
1	QMS Certification	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
2	Programs Offered	Ph.D	Ph.D	Ph.D	Ph.D	Ph.D	MS, PH.D, M.Sc.	MS, MS-Replica, PH.D, M.Sc.	MS, MS-Replica, PH.D, M.Sc.	MS, MS-Replica, PH.D, M.Sc.
3	Membership of Professional Bodies	BOS, University Faculty Board, Advance Science & Research Board	BOS, University Faculty Board, Advance Science & Research Board	BOS, University Faculty Board, Advance Science & Research Board	BOS, University Faculty Board, Advance Science & Research Board	BOS, University Faculty Board, Advance Science & Research Board	BOS, University Faculty Board, Advance Science & Research Board, NCRC, different committee	BOS, University Faculty Board, Advance Science & Research Board, NCRC, different	BOS, University Faculty Board, Advance Science & Research Board, NCRC, different committee	BOS, University Faculty Board, Advance Science & Research Board, NCRC, different

							member	committee member	member	committee member
4	Revision of Syllabi	1	1	1	1	1	1	1	1	1

1.4.2: Research Areas

The Faculty is involved in research in the following areas:

- Plant Biotechnology
- Plant Genomics
- Algal biotechnology
- Genetic Manipulation and Protein Engineering
- Industrial Microbiology
- Industrial Biotechnology
- Industrial and Clinical Microbiology
- Health Biotechnology
- Human Genetics

1.4.3: Collaborations

- Center of Excellence in Molecular Biology
- PCSIR laboratories
- School of Biological Sciences
- PARAS Foods pvt Ltd. (Pakistan Atomic Energy Commission)
- Children's Hospital
- University of Vetinary and Animal Sciences
- University of Health Sciences
- Vetinary Institute of Research
- Monsanto -Multinational Biotech seed company
- Citrus Research Institute Sargodha
- Shaker Gunj Sugar Mill,Jhang.

1.4.4: ACADEMIC CALENDER 2011-2014 (Annexure1)

CRITERION 2: CURRICULUM DESIGN AND ORGANIZATION

Curriculum of Biotechnology for each program is developed on the basis of detailed guidelines given by the HEC

PROGRAM Ph.D. Biotechnology (Annexure I a, b & c)

Road Map for Ph.D. (18 Credit Hours)
Session 2014-onward

Semester I (9)	Semester II (9)
Biotech-732 (3) Journal club presentation	Biotech -735 (3) Innovation Through Design Thinking
Biotech -723 (3) Recombinant DNA Technology II	Biotech -728 (3) Research Reading II*
Biotech -727 (3) Research Reading I*	Biotech -733 (3) Structural Bioinformatics

*To be chosen from the list of courses for PhD in Biotechnology according to the specialization of the student

List of Courses for PhD Program

S. No.	Course Code	Course Title	Credit Hours
1.	Biotech-701	Analytical Techniques in Biotechnology.	3
2.	Biotech -702	Bioethics, Biosafety and IPR	3
3.	Biotech -703	Bioinstrumentation and Biostatistics.	3
4.	Biotech -704	Biology of Cloning Vectors.	3
5.	Biotech -705	Bioprocess Technology.	3
6.	Biotech -706	Bioremediation.	3
7.	Biotech -707	Biosensors and Bioelectronics.	3
8.	Biotech -708	Enzyme Engineering and Technology.	3
9.	Biotech -709	Environmental Biotechnology.	3
10.	Biotech -710	Environmental Microbiology and Public Health.	3
11.	Biotech -711	Gene Manipulation.	3

12.	Biotech -712	Genetic Engineering and Other aspects of Biotechnology.	3
13.	Biotech -713	Industrial Biotechnology.	3
14.	Biotech -714	Microbial Biotechnology.	3
15.	Biotech -715	Microbial Genetics.	3
16.	Biotech -716	Microbial Products.	3
17.	Biotech -717	Microbial Taxonomy.	3
18.	Biotech -718	Nanobiotechnology.	3
19.	Biotech -719	Phytochemicals and Herbal Medicines.	3
20.	Biotech -720	Plant Tissue Culture.	3
21.	Biotech -721	Commercial Application of Plant Tissue Culture	3
22.	Biotech -722	Recombinant DNA Technology I	3
23.	Biotech -723	Recombinant DNA Technology II	3
24.	Biotech -724	Cellular Signalling.	3
25.	Biotech -725	Industrial Production of Secondary Metabolites	3
26.	Biotech -726	Forensic Biotechnology	3
27.	Biotech -727	Research Reading I	3
28.	Biotech -728	Research Reading II	3
29.	Biotech -729	Advances in Plant Biotechnology	3
30.	Biotech -730	Gene and protein (Problem based learning)	3
31.	Biotech -731	Protein secondary structure prediction (Problem based learning)	3
32.	Biotech -732	Journal club presentation	3
33.	Biotech-733	Structural Bioinformatics	3
34.	Biotech-734	Innovation Through Design Thinking	3

Note: Any six subject will be selected for one year (3 subjects per semester)

Curriculum Course Requirements – Ph.D. Biotechnology

1) Definition of credit hours: 1 credit hour is equivalent to 15-16 teaching hours/semester.

Curriculum Breakup	Credit Hours
Semester I	
Journal Club	3
Recombinant DNA Technology II	3
Research Reading I	3
Semester II	
Structural Bioinformatics	3
Research Reading II	3
Innovation Through Design Thinking	3
Total Credit Hours	**18**

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

➡ Ph.D. Biotechnology programs contents/courses meet the program objectives as shown in the table.

Table 2.1(F): Ph.D. Courses versus Program Objectives

Courses/Groups of Courses	Objectives			
	1	2	3	4
Biotech-733 (3)			X	X
Biotech -723 (3)				
Biotech -727 (3)				
Biotech -735 (3)			X	
Biotech -728 (3)				
Biotech -732 (3)				

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

Program: Ph.D. Biotechnology

The modules of all the programs adequately address:

1) Problem solving
2) Solution design
3) Application of the theoretical knowledge

- ➡ Great emphasis of the program is on problem solving strategies and design of solution. The product of the task results in the application of the theoretical knowledge in the applied fields of natural sciences.
- ➡ All the modules provide adequate and practical application of the knowledge in different specializations with the exploitation of advance techniques.

Table 2.2 (D): Standard 2-2 requirement

Elements	**Courses**
Problem analysis	6
Solution design & Application of the theoretical knowledge	12

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

The curriculum satisfies both the core requirements of credit hours and criteria of admission lay down by Lahore College for Women University and HEC and are in par with the international standards.

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

The curriculum satisfies major requirements of the program. No formal accreditation with any professional body. The programs and curriculum has the approval of Board of Studies of Biotechnology.

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.

The curriculum satisfies general education disciplines requirements. No formal accreditation with any professional body but it fulfills all the necessary/basic requirements of the accreditation body. The programs and curriculum has the approval of Board of Studies of Biotechnology and Lahore College for Women University.

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

Requirement for the information technology component is fulfilled by various courses as well as through the presentations made by each student in almost every semester.

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

Oral and written communication skills of the student are developed by the structurally designed courses for English, seminars, question answers, debates and by the class participation of the students.

CRITERION 3: LABORATORIES AND COMPUTING FACILITIES

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

- The BS, MS and Ph.D. program have been provided with adequate laboratory manuals and related documents. Instructions to the students are available with the Module Leaders and before, they are made accessible to the students. Every laboratory has formulated safety guidelines with major equipment and electric gadgets which are clearly displayed in each laboratory.
- Laboratories are adequately equipped with the high-tech equipment

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

- There is laboratory staff available for routine laboratories maintenance (chemical, glassware and laboratory instruments). The program leaders and the module leaders supervise each experiment and provide practical guidance to each student.

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

- The computing infrastructure of the Biotechnology department is inadequate (see criterion 8).

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:

- The strategy for programs (courses) offering is controlled. The BS, MS and Ph.D. courses are offered once a year.

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

- The effective student/faculty interaction in programs taught by more than one faculty members is streamlined by coordination of these faculty members and the commonality is maintained through any curriculum which is adopted for the particular module.
- The programs are structured to ensure effective interaction between students, faculty and the Head of Department. The students requiring extra help are provided services through tutorials, questions and answers. Questions are encouraged by the faculty from the students. Seminars are arranged where the students are free to discuss the topics relating to the program. Debates are initiated. The students are free to interact with the class in charge and Head of department in case of any shortcoming.

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:

- ➡ The students are provided guidance regarding the completion of the programs and having access to qualified faculty as well as student counseling. The students are encouraged to bring forward their suggestions and complaints through a complaint box which is maintained in the Institute. The students once in semester carry-out the teacher's evaluation.
- ➡ The counseling of the students are done in the following way:
  a) Module leaders are the first available source to the students for guidance
  b) Program managers provide further guidance followed-up by guidance from the senior faculty members e.g. Head of department and the Quality Assurance Advisor. The counseling is regarding the program, its effectiveness, teacher careers available to the students and any other difficulty of personal nature.
- ➡ The counseling is also availed at the Student counseling center of the university which deals with various issues.

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:

Ph.D. Biotechnology Program

This is a program with minimum following credit hours.

Ph.D (After completion of 18 Years of Education)……..……18Cr.Hours

The program is divided in different semesters with 2 semesters each year according to the programme

Eligibility Criteria:

•	BS	3GPA
•	MS	3GPA, GAT (General and subject Should be clear before synopsis approval)

Admission Criteria

Admission is strictly made on merit on the basis of the following weightage:

Academic record	35%
Publication	5%
Written Test	50%
Interview	10%
Total	100%

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:

- Advertisements are made in leading newspapers and on Lahore College for Women University website. The student academic progress is monitored regularly by the Module Leader and regular written examination system. The process of registration and monitoring are reviewed once in a year three months before the date of admission.

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:

- The standards are clearly indicated in the University Calendar which is followed. Qualifications which are required for each subject are kept in mind. The criteria for recruiting are qualification, experience which is judged through analysis of CVs, written test and personal interviews. In case of permanent faculty members, the recruiting is done by a board constituted by Lahore College for Women University whereas; visiting faculty members are recruited by a board constituted by the Institute. The input of the students for maintaining the quality of the teachers is done by evaluating the teachers regularly once in a semester by the students. The results of these studies are sent to the teachers who are asked to improve and in extreme cases, replacements are made.
- An Annual Confidential Report (ACR) is initiated by the Dean annually for each member of staff and retention of the staff, their increment and promotion are based on ACRs.
- The faculty members performing well are rewarded by increment and honorariums. Good working conditions provided job satisfaction, pays, providing facilities like Ph.D. programs and scholarships are incentive to faculty member who perform well.

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:

- There are process and procedure to ensure that the teaching and delivery of the program material to the students emphasizes active learning. For instance, exercises, tasks, activities, assignments and projects based on practicality of the knowledge are given to the students and research thesis is initiated at the end of the program. Process is monitored and assessed regularly.

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

- In order to ensure that graduates / outgoing students have completed the requirement of the programs are based on standards.
- The semester rules have been adopted by Biotechnology department and the module leaders, Program managers, QEC and the Head of Department ensure their compliance.
- The operation is reviewed once a year and is documented as Management of Academic Programs.

CRITERION 6: FACULTY

Standard 6.1: There must be enough full time faculty members 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:

- There is adequate full time faculty which provides adequate coverage of the program with continuity and stability. The interest and the qualifications of all faculty members are pre-judged and monitored for each course forming a part of the program. The level of competency of the faculty members are evaluated at time of induction and monitored during teaching. Out of total nine faculty members of Biotechnology department seven are Ph.D. holders.
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Program areas	Module in area and semester per year	Number of faculty members in each area	Number of faculty with Ph.D. degree
Area 2. **(Post-Graduate)**	6 Courses + 1 year research 02 Semesters per year	1	7

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:

➡ All the faculty members remain current in the disciplines and sufficient time is provided for scholarly activities and professional development. The newly inducted faculty is given enough time to familiarize with the working environment of the Institute. During this time they are monitored. Faculty is provided with centralized training by Registrar's office through NAHE and professional faculty development program of Learning Innovation Division (LID), HEC. They are encouraged to attend international seminars. Some of the faculty members had opportunity to get training and research experiences from foreign universities/institutions.

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

➡ The faculty members are regularly motivated and efforts are made to provide job satisfaction so that they excel in their profession. The satisfaction of the faculty and their input is measured by faculty survey form.

CRITERION 7: INSTITUTIONAL FACILITIES

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

Academic Building: (Dedicated/Owned)

1. Class rooms: 02
2. General Labs: 02
3. Research Labs 04

4. Seminar Room: 01
5. Committee Room 01
6. H.O.D Office 01
7. Store Rooms 03

- Department building is fully equipped with all latest new trends.
- Projectors are used in the class rooms.
- Internet facility is available throughout department.
- Access to HEC digital library.

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:

- Almost 1000 up-to-date books are available in Science library covers all the areas of programs.
- Library provides services of digital library, books borrowing and adequate reading space.
- There is no departmental Library; Main Science Library is approached by Faculty and students.

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

- 4 class rooms, 3 laboratories, 2 seminar rooms.

CRITERION 8: 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:

- Teachers are recruited on the basis of criterion established by the University.
- Existing faculty is sent to different courses of teaching organized to update the knowledge.
- Biotechnology Department has collaboration with industry, NGOs, government departments, universities, research institutes and various other organizations of the country.
- Secretarial support is provided to the teachers to meet the working needs.

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

Program	Year of Enrollment	No. of Students
Ph.D. Biotechnology	2011	07
Ph.D. Biotechnology	2013	04
Ph.D. Biotechnology	2014	05
Ph.D. Biotechnology	2015	06
Ph.D. Biotechnology	2016	05
Ph.D. Biotechnology	2017	06
Ph.D. Biotechnology	2018	N/A

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

- Budget for Library is 0.05 Million Pak Rupees for 2009-2010.
- Budget for Laboratory equipment is 0.35 Million Pak Rupees for 2009-2010

Academic Calendar (2017-2018)
BS/B.Com/BBA/BSCS/BE/BPA/B.Arch
M.A./M.Sc/MS/M.Phil/Ph.D

	Fall Semester	Spring Semester	Summer Semester	Thesi
Start of Semester	2nd Oct 2017	1st Feb 2018	2nd July 2018	25
Midterm Examination	22nd - 29th Nov 2017	21st - 28th Mar 2018	1st Aug 2018 (1st, 3rd, 5th, 7th Sem. Exams.)	
Start of Classes	1st Dec 2017	29th Mar 2018	3rd Sep 2018	25
Final Term Examination	24th - 31st Jan 2018	14th - 23rd May 2018	3rd Sep 2018 2nd, 4th, 6th, 8th Sem. Exams.)	

Note:

1. Academic Calendar should be followed strictly. In case of University is closed, owing to the circumstances beyond control, then special make-up classes will be arranged converting weekend or holidays to working days to cover the lapsed period of the students.
2. Theses/Internships/Projects/Dissertations should be submitted in time.
3. The students of Session 2013-2017, 2014-2018 who are fail/improve CGPA, can appear with the regular sessions.
4. The students of Session 2015-2019, 2016-2020 and 2017-2021 will clear their Probation only in the Summer Semester
5. Students must attain 75% attendance to qualify to appear in the final examinations.
6. No student can improve their CGPA after the issuing of Degree.
7. Convocation is expected from January-March 2018. The results declared till 30th November 2017, will be included in the Convocation.

Prof. Dr. Tahira
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