

**Department of Biotechnology
Lahore College for Women University, Lahore.**

Self-Assessment Report
MS Program

Submitted to
Quality Enhancement Cell
Lahore College for Women University, Lahore

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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 Biotechnology 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 graduate and postgraduate level 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, practicals, 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 Department:

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
M.S. Biotechnology	2 Years	4 Semesters (Course work + Research)	36

1.1: PROGRAM'S OBJECTIVES

1.1.1 M.S. BIOTECHNOLOGY

This degree is based on the approved curriculum from HEC, Departmental Board of studies, Board of Advance and Research Studies and Academic Council of Studies. In the first year the students learn compulsory courses and advance courses related to the area of specialization offered by the department (Pharmaceutical Biotechnology, Plant biotechnology, Fungal biotechnology, Waste management, Water and waste water treatment, Biofuels and biorefineries, Molecular diagnostics, Biosensors, Radiobiology, Marine Biotechnology, Nano biotechnology, Virology, Cell and tissue culture and Fermentation Biotechnology). Research projects are offered to the students spanning the second year of the degree program.

1.1.2 M.S. Biotechnology Program Objectives:

MS Biotechnology Degree program aims to prepare the students for

1. Identifying, developing and focusing on a thorough knowledge of a specific research topic dealing with one or more areas.
2. Developing the ability to formulate an innovative research plan and carry out original independent research on a hypothesis to be tested in depth concerning novel ideas. Command on specific and advanced technical research skills (established or novel) that is necessary for testing the hypothesis.
3. Evolving aptitude to write and present the research topic, and defend the results and conclusions in a public forum and presentation of the research results to the larger community of scholars in the state, nationally and internationally.
4. Creating the awareness of issues concerning scientific misconduct and maintenance of high ethical standards in research.
5. Acquisition of teaching skills involving oral and written explanations of complex scientific ideas.

1.1.3 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 through workshops and training programs.
- vi) Encouraging the establishment of linkages at national and international level.
- vii) Establish liaison with the potential employers and provide economical consultancy services.
- viii) Develop moral basis of the students to impart concept of teams, honesty and discipline through ethical attitudes.

Assessment of Educational Objectives of each Program:

Table 1: MS Programs Objectives Assessment

OBJECTIVES	HOW MEASURED	WHEN MEASURED (FREQUENCY)	IMPROVEMENT IDENTIFIED	IMPROVEMENT MADE (CORRECTIVE & PREVENTIVE ACTION)
(1)	(2)	(3)	(4)	(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		

OBJECTIVES	HOW MEASURED	WHEN MEASURED (FREQUENCY)	IMPROVEMENT IDENTIFIED	IMPROVEMENT MADE (CORRECTIVE & PREVENTIVE ACTION)
(1)	(2)	(3)	(4)	(5)
	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 ii. Personal development topic like ethic, moral & code of conduct iii. Improvement in quality of iv. Administrative support	All the improvements identified have been implemented
	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	-

OBJECTIVES	HOW MEASURED	WHEN MEASURED (FREQUENCY)	IMPROVEMENT IDENTIFIED	IMPROVEMENT MADE (CORRECTIVE & PREVENTIVE ACTION)
(1)	(2)	(3)	(4)	(5)
	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 MS Biotechnology Program's Outcomes:

1. To relate everyday problems with the laboratory research to get valid and applicable solutions.
2. Acquire high tech research skills to be used for their career development at national and international level.
3. Achieve art of using scientific research for the improvement of community and society.
4. Dissemination of in hand knowledge through professional skills.

Table 2: MS Program Outcomes

Program Objectives	Program Outcomes			
	1	2	3	4
1	X	X	X	X
2	X	X	X	X
3		X	X	
4	X		X	X
5		X		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) Work Environment
- iii) Well-equipped Laboratories (Annexure I)
- iv) Common Science Library
- v) Internet facilities

1.3.1. c. Weaknesses of Department:

- i) Departmental Library
- ii) Trained Laboratory Personals
- iii) Strengthening of existing Laboratory facilities
- iv) Development of high-tech research laboratories

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 3: Student's enrollment (MS regular)

Program	Year of Enrollment	No. of Enrolled Students
MS. Biotechnology	2018	41
MS. Biotechnology	2017	43
MS. Biotechnology	2016	43

Table 4: Student Teacher Ratio (MS regular)

Year	No of students	Teachers (teaching graduate & Postgraduate)	No of students per teacher
2018	121	12	40:1
2017	116	13	40:1
2016	92	12	34:1

Table 5: No. of Students Passed Out

Program	Passing out Year	No. of Students
MS	2018	42
	2017	32
	2016	18

Table 6: Number of Publications

Year	Papers published
2016	33
2017	14
2018	18

Table 7: Books in Library

Year	Purchased
2018	None
2017	30
2016	Nil
2015	Nil

Table 8: Workshops and seminars organized

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
No. of Workshops and seminars	Nil	Nil	4	7	6	4	4	5	3

Table 9: 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 10: 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 COMPLETE D
2.	<i>In vitro</i> conservation of some medicinally important endangered, threatened and	Prof. Dr. Shagufta Naz	2.7 million	Higher Education Commission	3 years	July 2010-july 2013

	near to extinct species of different ecological zones of Pakistan					
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- February 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 9 th 2012-Feb, 2013

9.	Genetic analysis of Glucoma in Pakistan	Dr. Rasheeda Bashir/ Dr. Faiza Saleem	0.5 million	Higher Education Commission	1 year	17 April 2103-Jan 2014
10.	Studying 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	4 th June, 2013-Feb 2014
11.	Application of molecular methods for the development of a pathogen-free certification program for grapevine in Pakistan	Prof. Dr Shagufta Naz	42.9 Million	HEC-USAID		
12.	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	3 years	2015-2018
13.	Collection identification and extraction of oil from various high oil yielding algal specie Molecular characterization and analysis of algal oil as a feedstock for biofuel production	Dr Neelma Munir/ Prof. Dr Shagufta Naz	10.1 Million	HEC-NRPU	3 year	2015-2018
14.	Concerted bioinformatics and proteomic approaches to define the role of post translation modifications in signaling proteins of	Dr Afshan Kaleem/ Dr Daniel C. Hoessli/ Dr Ikram-ul-Haq	2.8 Million	HEC-NRPU	3 year	2015-2018

	the insulin pathway					
15.	Expression Augmentation of Recombinant Human Therapeutic Peptides in Bacillus Expression System	Dr Faiza Saleem	5.888 Million	HEC-NRPU	3 year	2016-2019
16.	Genetic Analysis of Disease Causing Genes for Glucoma in Pakistani Population	Dr Rasheeda Bashir	1.846 Million	HEC-NRPU	3 year	2016-2019

Table 11: Linkages with other institutes and industry

S. No.	Institute/ Industry	
	National	International
1	Agriculture Department, Government of the Punjab	University of Davis California
2	University of Lahore	
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 12: 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	MS	MS, PH.D	MS, PH.D	MS, PH.D	MS, PH.D, M.Sc.	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, NCRC, different committee member	BOS, University Faculty Board, Advance Science & Research Board, NCRC, different committee member	BOS, University Faculty Board, Advance Science & Research Board, NCRC, different committee member	BOS, University Faculty Board, Advance Science & Research Board, NCRC, different committee member	BOS, University Faculty Board, Advance Science & Research Board, NCRC, different committee member	BOS, University Faculty Board, Advance Science & Research Board, NCRC, different committee member	BOS, University Faculty Board, Advance Science & Research Board, NCRC, different committee member	BOS, University Faculty Board, Advance Science & Research Board, NCRC, different committee member	BOS, University Faculty Board, Advance Science & Research Board, NCRC, different 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 genomics
- Algal Biotechnology
- Industrial Biotechnology
- Industrial and Clinical Microbiology
- Health Biotechnology
- Genetic Manipulation and protein Engineering
- Plant Biotechnology
- Human Genetics

- Fermentation Biotechnology
- Proteomics
- Bio-informatics
- Nano-Biotechnology
- Molecular Virology

1.4.3: Collaborations

1. Center of Excellence in Molecular Biology
2. PCSIR laboratories
3. School of Biological Sciences
4. PARAS Foods pvt Ltd. (Pakistan Atomic Energy Commission)
5. Children's Hospital
6. University of Veterinary and Animal Sciences
7. University of Health Sciences
8. Veterinary Institute of Research
9. Monsanto
10. Citrus Research Institute Sargodha
11. Shaker Gunj Mill, Jhang.
12. Dr. Panjwani Center for Molecular Medicine and Drug Research, International Center for Chemical and Biological Sciences, University of Karachi, Karachi, Pakistan

1.4.4: ACADEMIC CALENDER 2017-2019 and 2018-20 (Annexure I)

CRITERION 2: CURRICULUM DESIGN AND ORGANIZATION

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



PROGRAM MS. Biotechnology (Annexure II)
Road Map for MS Biotechnology (2018-2020) (36 Credit Hours)
Specialization: Molecular Biology, Microbiology, Industrial Biotechnology, Plant Biotechnology, Algal Biotechnology, Genetic Manipulation and Protein Engineering /Health Biotechnology

Semester I (12)

Semester II (12)

Semester III & IV (12)

Biotech-501 3(2+1)	Biotech-528 3(2+1)	Biotech-601 (2)
Instrumentation and Analytical	Advances in Bioinformatics	Seminar
Biotech-503 3(2+1)	Biotech-508 3(2+1)	Biotech-602 (10)
Molecular Biology	Enzyme Engineering and Technology	Research and Thesis
Biotech-529 3(2+1)	Biotech-526 3(2+1)	
Nano-biotechnology	Forensic Biotechnology	
Biotech-510 3(2+1)		
Elective Course I		

** Special courses from the approved list of HEC related to the area of specialization.

Curriculum Course Requirements – MS Biotechnology

Curriculum Breakup	Credit Hours
Core Courses • Instrumentation and Analytical • Molecular Biology • Plant Tissue Culture • Bioinformatics • Nanobiotechnology • Forensic Biotechnology • Elective Course I • Elective Course II	24
Seminar and Thesis	12
Total Credit Hours	36

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

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

➡ MS Biotechnology program contents/courses meet the program objectives as shown in the table.

Table 2.1: MS Courses versus Program Objectives

Courses/Groups of Courses	MS Courses	Objectives				
		1	2	3	4	5

Biotech-501	Instrumentation and Analytical	X	X			X
Biotech-503	Molecular Biology	X	X			X
Biotech-507	Plant Tissue Culture	X	X			X
Biotech-502	Bioinformatics	X	X	X	X	X
Biotech-511	Nanobiotechnology	X	X	X	X	X
Biotech-527	Forensic Biotechnology	X	X	X	X	X
Biotech-5**	Elective Course			X	X	X
Biotech-5**	Elective Course			X	X	X
Biotech-601	Seminar	X	X	X	X	X
Biotech-602	Research and Thesis	X	X	X	X	X

** Molecular Biology, Microbiology, Industrial Biotechnology, Plant Biotechnology, Algal Biotechnology, Genetic Manipulation and Protein Engineering /Health Biotechnology. Please see the Annexure II a, b, & c for details of Specializations.

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

Program: MS BIOTECHNOLOGY

The modules of all the programs adequately address:

- 1) Theoretical background
 - 2) Problem solving
 - 3) Solution design
 - 4) Application of the theoretical knowledge
- ➔ Some of the modules include the theoretical background and contain problem solving and solution design while others deal with Theoretical background, Problem analysis and Solution design separately.
 - ➔ 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: Standard 2-2 requirement for MS Program

Elements	Courses
Theoretical background	8
Problem analysis	8
Solution design	8

Application of the theoretical knowledge	8 + research
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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 MS program has 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.

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

- ➡ Faculty members themselves are responsible for instructions and tutorial related to the practicals. Laboratory staff is responsible for the maintenance of chemicals, glassware, equipment 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.

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 MS 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:

This is a 2 year degree program with minimum 36 credit hours. The program is divided in 4 semesters with 2 semesters each year.

Eligibility Criteria:

- Matric / O level (with science) : 60%
- F.Sc/ A level (pre-Medical) : 60%
- BS.....2.5 GPA and GAT (General)
- Departmental Entry test: Pass percentage 50%

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.
- ➔ Students requiring admission in M.S. Biotechnology program who have qualified from private universities are required to give equivalence certificates as per rules of Lahore College for Women University.

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.

Program areas	Module in area and semester per year	Number of faculty members in each area	Number of faculty with Ph.D. degree
MS	8 Courses + 1 year research 02 Semesters per year	12	11

Program areas	Module in area and semester per year	Number of faculty members							Number of faculty with Ph.D. degree
		2010	2011 - 2012	2013	2014		2015		
					Tea-chers	T.As	Tea-cher s	T.As	
Area 1. (Graduate)	8 Courses + 1 year research 02 Semesters per year	3	5	9	9	2	10	2	11

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 (Annexure III).

Sr.#	Faculty	Foreign Research / Training Experience
1.	Prof. Dr. Shagufta Naz	University of Davis California, USA

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:	05
2. General Labs:	02
3. Research Labs	03
4. Computer Lab	01
5. Seminar Room:	01
6. H.O.D Office	01
7. Store Rooms	01

- ➡ Multimedia is used to deliver lectures.
- ➡ 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 94 up-to-date books are available in Science library covers almost all the areas of programs.

- ➔ Institute provides services of digital library.
- ➔ Common Science library is available for consulting reference books.

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

- ➔ 5 class rooms, one staff room
- ➔ Office for Head of department.

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.

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

In 2018

Program	Year	No. of Students
M.S. Biotechnology	2014-2016	18
M.S. Biotechnology	2015-2017	43
M.S. Biotechnology	2016-2018	38

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

- ➔ Budget for Library is 0.1 Million Pak Rupees for 2011.
- ➔ Budget for Library is 0.1 Million Pak Rupees for 2012.
- ➔ Budget for Laboratory equipment is 0.2 Million Pak Rupees for 2013.
- ➔

Annexure I

(Session 2018-20)



Lahore College for Women University, Lahore
Academic Calendar (Session: 2018-2022)
BS/B.Com/BBA/BSCS/BE/BPA/B.Arch
M.A./M.Sc/MS

	Fall Semester	Spring Semester	Summer Semester
Start of Semester	15th Oct 2018	18th Feb 2019	1st Aug - 31st Aug 2019
Allocation of Assignment	1st Nov - 7th Nov 2018	4th Mar - 9th Mar 2019	
1st Mid Term Test	19th Nov - 24th Nov 2018	25th Mar - 30th Mar 2019	
Presentation / Quiz	3rd Dec - 21st Dec 2018	15th Apr - 25th Apr 2019	
2nd Mid Term Test	2nd Jan - 9th Jan 2019	6th May - 11th May 2019	
Follow-up Week	28th Jan - 1st Feb 2019	27th May - 31st May 2019	
Final Term	4th Feb - 17th Feb 2019	17th Jun - 6th July 2019	

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 2015-2019, 2013-2017 who are fail/improve CGPA, can appear with the regular sessions.
4. The students of Session 2017-2019, 2016-2020, 2017-2021 and 2018-2022 will clear their Probation only in the Summer Semester Examinations.
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 2019. The results declared till 30th November 2018, will be included in the Convocation.

Prof. Dr. Tahira Aziz Mughal
 Controller of Examinations



Lahore College for Women University, Lahore

Academic Calendar (Session: 2014, 2015, 2016, 2017)

BS/B.Com/BBA/BSCS/BE/BPA/B.Arch

M.A./M.Sc/MS

	Fall Semester	Spring Semester	Summer Semester	Thesis Submission Date
Start of Semester	3rd Sep 2018	26th Jan 2019		
Allocation of Assignment	17th - 22nd Sep 2018	11th Feb - 15th Feb 2019		
1st Mid Term Test	1st Oct - 6th Oct 2018	25th Feb - 1st Mar 2019		
Presentation / Quiz	1st Nov - 14th Nov 2018	18th Mar - 5th Apr 2019	1st Aug - 31st Aug 2019	15th July 2019
2nd Mid Term Test	19th Nov - 23rd Nov 2018	22nd Apr - 26th Apr 2019		
Follow-up Week	17th Dec - 21st Dec 2018	6th May - 10th May 2019		
Final Term	16th Jan - 25th Jan 2019	10th Jun - 21st Jun 2019		

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 Examinations.
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.
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Prof. Dr. Tahira Aziz Mughal
Controller of Examinations

Annexure II**LAHORE COLLEGE FOR WOMEN UNIVERSITY, LAHORE****SCHEME OF STUDY****MS (2-Year) Biotechnology
2018-2020****YEAR-1****SEMESTER-I**

Course No	Course Title	Credits
Biotech-501	Instrumentation and Analytical Biotechnology	3(2+1)
Biotech-503	Molecular Biology	3(2+1)
Biotech-510	Perspectives of Biotechnology	3(2+1)
Biotech-529	Bio-nanotechnology	3(2+1)
	Total Credits	12

SEMESTER-II

Course No	Course Title	Credits
Biotech-508	Enzyme Engineering and Technology	3(2+1)
Biotech-526	Forensic Biotechnology	3(2+1)
Biotech -527	Advances in Plant Biotechnology	3(2+1)
Biotech-528	Advances in Bioinformatics	3(2+1)
	Total Credits	12

* To be chosen from the Annexure A.

Course will be offered on the availability of the expertise in the department and number of students.

YEAR-2**SEMESTER-III & IV**

Course No	Course Title	Credits
Biotech-601	Seminar	2(2+0)
Biotech-602	Research & Thesis	10
	Total Credits	12

Total Hours: 12+12+12=36 CR

ANNEXURE A
LIST OF COURSES

Course Code	Course Title	Credits
Biotech-501	Instrumentation and Analytical Biotechnology	3(2+1)
Biotech-502	Bioinformatics	3(2+1)
Biotech-503	Molecular Biology	3(2+1)
Biotech-504	Project Planning, Monitoring and Evaluation	3(2+1)
Biotech-505	Genomics and Proteomics	3(2+1)
Biotech-506	Essentials of Microbiology	3(2+1)
Biotech-507	Plant Tissue Culture	3(2+1)
Biotech-508	Enzyme Engineering and Technology	3(2+1)
Biotech-509	Microbial Taxonomy	3(2+1)
Biotech-510	Perspectives of Biotechnology	3(2+1)
Biotech-511	Medical Biotechnology	3(2+1)
Biotech-512	Microbial Diversity	3(2+1)
Biotech-513	Applications of Genetic Engineering	3(2+1)
Biotech-514	Commercial Application of Plant Tissue Culture	3(2+1)
Biotech-515	Business and Technical Communication Skills	3(2+1)
Biotech-516	Fermentation and its Industrial Application	3(2+1)
Biotech-517	Cellular Microbiology	3(2+1)
Biotech-518	Food and Dairy Microbiology	3(2+1)
Biotech-519	Mycology	3(2+1)
Biotech-520	Immunology	3(2+1)
Biotech-521	Animal Biotechnology	3(2+1)
Biotech-522	Plant Biotechnology	3(2+1)
Biotech-523	Instrumentation in Biotechnology	3(2+1)
Biotech-524	Industrial Biotechnology	3(2+1)
Biotech-525	Biosensors and Bioelectronics	3(2+1)
Biotech -526	Forensic Biotechnology	3(2+1)
Biotech -527	Advances in Plant Biotechnology	3(2+1)
Biotech-528	Nanobiotechnology	3(2+1)