



**UNIVERSITY OF KARACHI**

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**Self-Assessment Report**  
**Department of Biotechnology**  
**University of Karachi**

**M.Phil Programme**

Submitted to

**Quality Enhancement Cell**  
**University of Karachi**

**ASSESSMENT/PROGRAMME TEAM**

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## INTRODUCTION

The Department of Biotechnology, University of Karachi is the oldest institution in country for teaching biotechnology at M.Sc. level which established in 1996. Since then the department continues to develop and progress. Today Department of Biotechnology offers B.Sc. (Hons), M.Sc., M.Phil. and Ph.D. degree Programs.

The department is determined to keep the pace of development in the field of biotechnology and offers diversified subjects like Environmental Biotechnology, Food Biotechnology, Agriculture Biotechnology, Protein Bioinformatics, Advances in Genetics Engineering, Stem cell Culture, Tissue Engineering & Therapeutics, Biotransformation, Biotechnology and Health Care and Enzyme Technology. Highly qualified and experienced faculty is engaged in imparting quality education and conducting research. The faculty members have published various research articles in journals of national and international repute and have presented various oral and poster presentations at both national and international levels. The department regularly invites eminent scientists and academicians to deliver seminars on current topics of national importance to apprise the students and faculty members on recent advances related to the field of biotechnology.

To enlighten the overall experience as a university student, department of Biotechnology provides opportunities and encourages its students to get involved in extracurricular activities. Students of this department have been participating in Model United Nations' programs, sports, debate and poetry competitions and art contests. In this regard several bright students have all Karachi, all Sindh and all Pakistan trophies on their credit. Our students have also achieved most prestigious foreign scholarships like SUSI and Fulbright offered under USEFP Programs. Students also take active part in student's week activities and organize different events.

Graduates of this dynamic discipline have a wide variety of career opportunities in teaching and research institutes, pharmaceutical organizations, forensics and clinical laboratories, tissue culture laboratories, agro-based industry, food industry, polymer and textile industry, cosmetic industry, fuel industry, environmental organizations, forestry, fisheries, wildlife department, horticulture department and processing, certifying and patenting companies. Currently many of the graduates hold key positions in various national and multinational organizations as well as serving abroad and are making significant contributions in their field of specialization.

Dr. Raheela Rahmat Zohra  
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**CRITERION-1**

**PROGRAMME MISSION, OBJECTIVES AND OUTCOMES**

**Criterion-1: Programme Mission, Objectives and Outcomes**

**Mission Statement of the Department of Biotechnology**

To impart innovative knowledge-based education that established an impregnable foundation for comprehending developments in the rapidly advancing field of biotechnology and to produce graduates with the technical and cognitive skills needed to be competitive in the field locally and globally.

**Mission Statement of the M.Phil. Program:**

To impart research based quality education to make students capable of solving challenges facing industry and society.

**Standard 1-1: The Programme must have documented measurable objectives that support college and Institution mission statements.**

**Objectives of the Program:**

1. To conduct scholarly activities in a professional and ethical manner.
2. To analyze case studies representatives of key areas of biotechnology.
3. To make student proficient in applying scientific principles and methods at an advanced level to diagnose and solve problems.
4. To produce a researcher who has in-depth knowledge in specialized areas of biotechnology and the skills to carry out original research.

**Table: Programme Objectives Assessment**

<b>S. No.</b>	<b>Objectives</b>	<b>How Measured</b>	<b>When Measured</b>	<b>Improvement Identified</b>	<b>Improvement Made</b>
1	To conduct scholarly activities in a professional and ethical manner.	By monitoring presentations of student's research work nationally or internationally.	Throughout their course work & bench work	Awareness of scientific programs among scholars.	Students are being trained to take active part in conferences and not just attending.
2	To analyze case studies representatives of key areas of biotechnology.	By the specific assignment pertinent to the respective courses.	During course work and in the course examinations	Continuous upgradation of course materials.	Evaluation of course plan by departmental research committee.
3	To make student proficient in applying scientific principles and methods at an advanced level to diagnose and solve problems.	By the execution of their assignments and research project.	During the course and by the completion of their M. Phil program.	By evaluation of their research projects to fulfill the said objective.	Students are encouraged to opt for the projects of good quality.
4	To produce a researcher who has in-depth knowledge in specialized areas of biotechnology and the skills to carry out original research	By giving case study based assignments	During the course and by conducting bench work	By evaluation of their research projects to fulfill the said objective.	Students are encouraged to opt for the projects of good quality.

**Standard 1-2: The programme must have documented outcomes for graduating students. It must be demonstrated that the outcomes support the programme objectives and that graduating students are capable of performing these outcomes.**

### **PROGRAMME OUTCOMES**

After completion of the M. Phil in Biotechnology, students will be able to:

- i) conduct scholarly activities in a professional and ethical manner.
- ii) analyze case studies representatives of key areas of biotechnology.
- iii) be proficient in applying scientific principles and methods at an advanced level to diagnose and solve problems as well as to carry out original research.

**Standard 1-3: The results of programme's assessment and the extent to which they are used improve the programme must be documented.**

#### **a) Strengths and Weaknesses of the Programme**

##### **i) Strengths:**

The emerging field of biotechnology, its potential for innovation and inventions is itself a great strength of the department. Department has well trained highly qualified faculty. Currently 7 faculty members are involved in M.Phil program. Four faculty members have Ph.D degrees and two of them have foreign postdoctoral experience. 3 faculty members have M.Phil degree with vast teaching and research experience.

##### **ii) Weaknesses**

The Department is running in an under constructed building, which when fully constructed would be beneficial to the department's mission. Four functional labs are available for faculty and students. One is designated for research work of M.Phil and Ph.D students.

The department has inadequate equipment for research.

#### **b) Future Development Plans**

Obtaining research development grants for the department and advanced training of faculty to meet the requirements of fast emerging field.



**Standard 1-4: The department must assess its overall performance periodically.**

a) Student Enrolment

<b>S. No</b>	<b>Year</b>	<b>Degree-M.Phil</b>
1	2015	5
2	2016	7
3	2017	6

b) Student/Faculty Ratio 2:1

c) Time for M.S 2 years

d) The average student grade point (CGPA) 3.4

e) Student/Faculty Satisfaction

The facilities and capacity of department is gradually being upgraded and both faculty and students are satisfied with its progress. Moreover, the faculty is motivated and passionate for further development to prosper in the field.

**CRITERION-2**

**CURRICULUM DESIGN AND ORGANIZATION**

**Criterion-2 Curriculum Design and Organization****Programme of Studies offered****Year / Semester wise Scheme of Studies of M.Phil Programme****M. Phil (Semester I)**

S. No	Course Code	Course Title
1	Biotech-701	Advances in Genetic Engineering
2	Biotech-703	Basic Virology
3	Biotech-705	Stem cell culture
4	Biotech-707	Plant Tissue Culture
5	Biotech-709	Advances in Industrial Biotechnology
6	Biotech-711	Probiotics: the live therapies
7	Biotech-713	Protein & Enzyme Chemistry

**M. Phil (Semester II)**

S. No	Course Code	Course Title
8	Biotech-702	Gene expression and control
9	Biotech-704	Advanced Virology
10	Biotech-706	Tissue Engineering and therapeutics
11	Biotech-708	Biotransformation
12	Biotech-710	Legal, Economic & Ethical Dimensions of Biotechnology
13	Biotech-712	Biotechnology and Health care
14	Biotech-714	Enzyme Technology

**Standard 2-1: The Curriculum must be consistent and support the programme's documented objectives**

The following table manifests how the programme content (Courses) meets the Programme Objectives.

Courses	Programme's Objectives			
	1	2	3	4
Major Courses		Yes	Yes	Yes
Elective Courses		Yes	Yes	Yes
Practical (Field and Lab)	Yes		Yes	Yes
Thesis/Dissertation	Yes		Yes	Yes

**Standard 2-2: Theoretical background, problem analysis and solution design must be stressed within the programme's core material.**

The following table indicates the elements covered in core courses:

<b>Elements</b>	<b>Courses</b>
i) Theoretical Background	701, 702, 703, 711, 713 Thesis/Dissertation
ii) Problem Analysis	706, 709, 710, 711 Thesis/Dissertation
iii) Solution Design	704, 706, 705, 707, 708, 709, 714 Thesis/Dissertation

**Standard 2-3: The curriculum must satisfy the core requirements for the programme, as specified by the respective accreditation body.**

&

**Standard 2-4: The curriculum must satisfy the major requirements for the programme, as specified by the respective accreditation body/council.**

The curriculum designed for M.phil program has been approved by respective accreditation body i.e. KU Academic council.

**2-5: The curriculum must satisfy the general education, arts and other discipline requirements for the Programme as specified by the accreditation body.**

Not applicable for M. Phil Program

**Standard 2-6: Information technology component of the curriculum must be integrated throughout the programme.**

Not applicable for M. Phil Program

**Standard 2-7: Oral and written communication skills of the student must be developed and applied in the programme.**

Oral and written communications skills are a major part of all courses being offered and are also included in evaluated process.

**CRITERION-3**

**LABORATORY AND COMPUTING FACILITIES**

### **CITERION-3: Laboratory and Computing Facilities**

#### **Laboratory Facilities**

The department of biotechnology has 04 functional laboratories in the department building for students and faculty. These laboratories need upgradation for training of students for research.

#### **Computer Facilities**

The department of biotechnology has only four Core 2duo refurbished computers for academic labs and available for students, faculty and administrative office. Currently, we are in dire need of at least 15-20 up to date computers to fulfill the curriculum requirement.

#### **Internet Facility**

Karachi University Main Communication Network (LAN)

Karachi University WIFI

#### **Standard 3-1: Laboratory manuals/ documentation instruction for experiments must be available and readily accessible to faculty and students**

Laboratory manuals and supporting protocols are available to the students when needed.

#### **Standard 3-2: There must be adequate support personnel for instruction and maintaining the laboratories.**

Supporting staff / personnel for instruction and maintaining the laboratories are not sufficient.

#### **Standard 3-3: The University computing infrastructure and facilities must be adequate to support programme's objectives**

##### **i) Computing Facilities**

Inadequate

##### **ii) Multimedia**

One

##### **iii) Website**

##### **iv) Internet**

**CRITERION-4**

**STUDENT SUPPORT AND ADVISING**

**Criterion-4 Student Support and Advising**

Student advisor has been appointed for students' support and guidance. Also students are encouraged to interact with teachers to get advice relevant to their issues.

**Standard 4-1: Courses must have been offered with sufficient frequency and number for students to complete the programme in a timely manner.**

<b>Programme</b>	<b>Classes per Week</b>	<b>Practical Classes per Week</b>	<b>Research Guidance</b>
M.Phil	2-3 classes / course	2 practical session as per course requirement.	Available when needed

**Standard 4-2: Course in the major must be structured to ensure effective interaction between students, faculty and teaching assistants.**

Before the commencement of semester, course allocation is made in the staff meeting for each semester. Course instructors are available for any consultation regarding the course.

**Standard 4-3: Guidance on how to complete the programme must be available to all students and access to academic advising must be available to make course decisions and career choices**

Student Advisor is appointed by the chairperson of department to facilitate the student for the smooth running of their course plan and students are free to consult teachers to make course decision and career choices.



**CRITERION-5**

**PROCESS CONTROL**

**Criterion-5: Process Control**

**Standard 5-1: The process by which students are admitted to the programme 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.**

Students are inducted in the program by giving written test of subject and English.

They have to write a research proposal to be evaluated by Departmental Research Committee.

Interviews are held for final selection of the candidates.

**Standard 5-2: The process by which students are registered in the programme and monitoring of students progress to ensure timely completion of the programme must be documented. This process must be periodically evaluated to ensure that it is meeting its objectives.**

Courses are completed on time. Additional classes are adjusted after any unscheduled closure.

Monitoring procedures for students are documented regularly.

**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 institutional mission statement. These processes must be periodically evaluated to ensure that it is meeting with its objectives.**

**Faculty Recruitment / Retaining Policy**

**Appointments / Promotions Procedure:**

It is as per University Code Book.

**Basic Pay Scale (BPS)**

**BPS 18**

**BPS 19**

**BPS 20**

**BPS 21**

**a. Lecturer (BPS- 18):**

**Minimum Qualification**

MSc./BS in Biotechnology

**b. Assistant Professor (BPS- 19):**

**Minimum Qualification**

Ph.D in Biotechnology

Or

MS in Biotechnology with 4 years of relevant experience.

Or

MSc. in Biotechnology with 6 years of relevant experience.

**c. Associate Professor (BPS- 20)**

**Minimum Qualification**

Ph.D in Biotechnology

**Experience**

10 years of relevant experience

**Minimum Number of Publications**

10 research publications in HEC/ BASR approved journals

**d. Professor (BPS-21)**

**Minimum Qualification**

Ph.D in Biotechnology

**Experience**

15 years of relevant experience

**Minimum Number of Publications**

15 research publications in HEC/ BASR approved journals

**Bases for Appointments / Promotions**

Through selection board conducted by University of Karachi.

**Standard 5-4: The process and procedure 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.**

Meetings of Departmental Research Committee held at regular intervals to ensure and evaluate the active learning and the outcome of the program.

**Standard 5-5: The process that ensures that graduates have completed the requirements of the programme must be based on standards, effective and clearly documented procedures. This process must be periodically evaluated to ensure that it is meeting its objectives.**

1. Punctuality of the students in classes is stressed.
2. Exams are held regularly.
3. Only those students are allowed to submit synopsis who got minimum 3.0 CGPA in their course work.

**CRITERION-6**

**FACULTY**

## **Criterion-6 Faculty**

**Standard 6-1: There must be enough full time faculty who are committed to the programme to provide adequate coverage of the programme areas / courses with continuity and stability. The interest of all faculty members must be sufficient to teach all courses, plan, modify and update courses. The majority must hold a Ph.D. degree in the discipline.**

There are 09 regular faculty members who are able to teach, plan, modify and update courses. Most of the faculty members are Ph.D. or M.Phil. degree holders.

**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 programmes for faculty development must be in place.**

Faculty members regularly participate in seminars, conferences, workshops at national / international levels. Those who are engaged in improving qualification are provided relaxation in their teaching load.

**Standard 6-3: All faculty members should be motivated and have job satisfaction to excel in their profession.**

Job satisfaction is there but faculty members are required to be motivated by fair & timely promotions by the University of Karachi.

**CRITERION-7**

**INSTITUTIONAL FACILITIES**

## **Criterion-7 Institutional Facilities**

**Standard 7-1: The Institution must have the infrastructure to support new trends in learning such as E-learning.**

### **a) Departmental library and Internet Facility**

- Departmental seminar library has stock of about 500 books related to various field of biotechnology and is updated periodically.
- Having problem with departmental internet facility that will be resolved soon.

### **b) Main Library**

A well established main library has various sections that provides:

- numerous books
- scientific journals
- digital library having access to journals & e-books

### **c) Offices**

Department has adequate office for the faculty members.

### **d) Class Rooms**

Inadequate

**Standard 7-2: The library must possess on up-to-date technical collection relevant to the programme and must be adequately staffed with professional personnel.**

Seminar library has up-to-date technical collection with a professional person as librarian.

**Standard 7-3: Class rooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibility.**

### **Classrooms**

Classrooms are adequately equipped however, multimedia projectors are required.

### **Faculty Offices**

Faculty offices are adequate but not fully equipped.

**CRITERION-8**

**INSTITUTIONAL SUPPORT**



**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 teacher and scholars.**

Institution support is not sufficient enough. Financial resources are required to meet the program's objectives.

**Standard 8-2: There must be an adequate number of high quality graduate students, research assistants and Ph.D. Students**

Degree Programme	Years		
	2015	2016	2017
M.Phil	05	07	06

Student/Faculty Ratio (for the last three years): 2:1

**Standard 8-3: Financial resources must be provided to acquire and maintain library holding, laboratories and computing facilities.**

The University of Karachi provides limited financial resources to maintain library, laboratories and computing facilities. HEC is also requested to provide additional financial resources for strengthening the Department of Biotechnology.

## **Faculty CVs**

## **Survey's Results**