



UNIVERSITY OF KARACHI

Self-Assessment Report

**Dr. A. Q. Khan Institute of Biotechnology and
Genetic Engineering (KIBGE), University of Karachi.**

PH.D PROGRAMME

Submitted to

**Quality Enhancement Cell
University of Karachi**

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INTRODUCTION

As the future of scientific success grows from past history and is reflected in the present efforts, one of the reflections is the creation of Dr. A. Q. Khan Institute of Biotechnology and Genetic Engineering (KIBGE), University of Karachi. KIBGE is the internationally oriented center for modern biological sciences and higher education at the University of Karachi. KIBGE was established through Dr. A. Q. Khan High Technology Trust. The statutes of KIBGE were formally approved by the Senate of the University of Karachi in December, 2006. The institute broadly aims to impart training in modern day biological sciences, biotechnology and genetic engineering. The main scientific focus of the institute is dissemination of hi-tech training using modern technology and wide range of innovative research projects in health, industrial, environmental and agriculture sectors to improve the economic well-being of the citizens of Pakistan. The Institute strives to become an educational institution of international standing entrusted with the responsibility of conducting basic and applied research and imparting education in modern biotechnology and genetic engineering.

Director General

KIBGE, University of Karachi

CRITERION-1

PROGRAM MISSION, OBJECTIVES AND OUTCOMES

Criterion-1: Program Mission, Objectives and Outcomes

Institutional Mission

Dr. A. Q. Khan Institute of Biotechnology and Genetic Engineering (KIBGE), University of Karachi, aims to impart training in modern day biological sciences; biotechnology and genetic engineering. The institute is engaged in dissemination of hi-tech training using modern technology to improve the economic well-being of the citizens of Pakistan by means of technological innovations in health, environmental, industrial and agriculture sectors. KIBGE has a purpose-built research complex constructed at 25 acres of land.

Program Mission Statement

The institute has become an educational institution of international standing entrusted with the responsibility of conducting basic and applied research and imparting education in modern biotechnology and genetic engineering. KIBGE provides talented young students and researchers an ideal environment for innovative research, interdisciplinary training and confidence in independent research.

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

KIBGE provides students a platform for achieving outstanding scientific level with wide-ranging certified biotechnological skills. The curriculum guarantees biotechnological specialization on a wide basis ranging from research communication skills to research and development. Prerequisite for PhD is a pertinent MPhil degree from an HEC recognized university with at least second division in one of the disciplines of biology; biochemistry, biotechnology, botany, genetics, microbiology, physiology, zoology or equivalent qualification. Four courses (801, 802, 803, and 804) including thesis dissertation are mandatory for completion of PhD degree. Objectives and aims of the courses are mentioned below.

Research Seminars:

Each student will deliver four seminars on the topic of the research.

Seminars on Current Advances in the Discipline:

Each student delivers four seminars on current advances of the discipline. Each student should have 75% attendance.

Thesis and Manuscript Writing Skills:

Each Ph.D. student develops the thesis and manuscript writing skills in consultation with the research Supervisor.

Development of Research Proposal for Funding Agencies

Each Ph.D. student develops a Research Proposal for a national or international funding agency, in consultation with the Research Supervisor.

Table: Program Objectives Assessment

S. No.	Objectives	How Measured	When Measured	Improvement Identified	Improvement Made
1	Research Seminars: 801 Each student delivers four seminars of one hour duration on the topic of the research.	A course Incharge is appointed at the beginning of each semester and three members of the Departmental Research Committee (DRC) to evaluate the student and award them grades A, B or C.	One seminar as synopsis defense later two to be delivered in the two semesters, and fourth seminar at the time of submission of the thesis.	Presentation and communication skills, understanding their research in a better way by getting feedback from the audience.	Students of KIBGE have presented their research in national and international conferences and won best presentation and poster awards several times due to the skills that they have been trained in this course.
2	Seminars on Current Advances in the Discipline:802 Each student delivers four seminars of one hour duration on current advances of the discipline.	As mentioned above	One seminar each, to be delivered in the first, second, third and fourth semester of the program.	Analytical reading and understanding other's research work in a better way by presenting research articles from high impact factor journals.	As mentioned above
3	Thesis and Manuscript Writing Skills: 803 Each Ph.D. student develops the thesis and manuscript writing skills in consultation with the research Supervisor.	The research supervisor is the Course Incharge and responsible for evaluating the students, awarding them grades A, B or C.	The Supervisor arranges lectures throughout PhD duration and submits the result at the end of the fourth semester.	Students are publishing their research in HEC recognized journals before submitting their thesis.	Students are encouraged to publish their research in high impact factor journals.

4	Development of Research Proposal for Funding Agencies Each Ph.D. student develops a Research Proposal for a national or international funding agency, in consultation with the Research Supervisor.	The research supervisor is the Course Incharge and responsible for evaluation the students, awarding them grades A, B or C and submitting the result at the end of the fourth semester.	As mentioned above	Students of KIBGE have successfully won travel grants and competitive research projects funded by IDB, HEC, PSF and other international funding agencies.	Students of KIBGE have already been awarded national and international grants for their research projects
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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.

PROGRAM OUTCOMES

After completing of the PhD in Biotechnology the students shall be able to choose variety of career opportunities ranging from research and development, sales and marketing, manufacturing and quality control and assurance with biotechnology industry flourishing worldwide. The total number of biotechnology companies is increasing, with concomitant increase in the employment opportunities in biotechnology. Within each area of the biotechnology industry are several different job functions and often a career path. Biotechnology industry segments include agriculture, food sciences, bioinformatics, biomedical sciences, pharmaceutical sciences, forensic DNA analyses, nutraceuticals, nanotechnology etc.

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

a) Strengths and Weaknesses of the Program

i) Strengths:

The greatest strength of PhD program at KIBGE are PhD courses as mentioned above in the table of program objectives assessment, lab facilities and the duration of PhD. International standard functional labs and setup, optimized basic protocols and environment groom and flourish the students at KIBGE. One of the major strength is regularity and punctuality that creates an environment to accomplish the degree in the time span. The average duration for the award of PhD degree of the students of KIBGE has been three-and-a-half to four years. The faculty is also present full time to support and help students facing

problems during their research work, manuscript writing and dissertation writing.

ii) Weaknesses

Lengthy registration procedures, administrative issues raised by BASR (Board of Advanced Studies and Research) increases the duration of PhD. There should be a fast track method for getting comments from foreign reviewers in given time frame creates delays.

b) Future Development Plans

A team support from University of Karachi will reduce the duration of PhD up to three years.

An environment favorable for PhD research is necessary by providing adequate research funding, quality academic support, good mentorship, sufficient research resources and financial support.

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

Since its inception in 2006, average duration for the award of PhD degree of the students of KIBGE has been three-and-a-half to four years and till date 42 PhDs have received their degrees.

Currently 38 students are enrolled in MS/MPhil/PhD Program.

a)

S. No	Year	PhD Degree awarded
1	2007	2
2	2008	1
3	2009	1
4	2010	1
5	2011	1
6	2012	7
7	2013	19
8	2014	4
9	2015	5
10	2016	1

b) Student/Faculty Ratio

KIBGE has 01 Meritorious Professor, 01 Professor Emeritus, 16 Visiting Faculty, 01 Associate Professor, and 08 Assistant Professors to supervise 38 MS/MPhil/PhD Students. In average two students are supervised by one supervisor.

- c) i) Time for Bachelors
- ii) Time for M.S
- iii) **Time for PhD**

The average duration for the award of PhD degree of the students of KIBGE has been three-and-a-half to four years.

d) The average student grade point (CGPA)

NA

e Student/Faculty Satisfaction

The survey conducted by KIBGE among students and faculty conclude that students are very much satisfied from the faculty.

CRITERION-2

CURRICULUM DESIGN AND ORGANIZATION

Criterion-2 Curriculum Design and Organization

Program of Studies offered

Scheme of Studies of _____ PhD _____ Program

Standard 2-1: The Curriculum must be consistent and support the programs documented objectives

The following table manifests how the program content (Courses) meets the Program Objectives.

Course Work:

Course work of 18 credit hours preferably in the first year of PhD

S. No	Course Code	Course Title	Credit hours
1	801	Research Seminars.	3
2	802	Seminars on Current Advances in the Discipline	3
3	803	Thesis and Manuscript Writing Skills	6
4	804	Development of Research Proposal for Funding Agencies	6

Research work

In addition to the above mentioned course PhD student has to conduct minimum three years of research work and write a dissertation. The plagiarism Test is conducted before its submission to the two foreign experts. The Ph.D. Dissertation is evaluated by at least two Ph.D. experts from technologically/ academically advanced foreign countries in addition to local Committee members.

Open defense

An open defense of Dissertation is conducted which is an essential part of PhD Program after positive evaluation.

Research Paper:

Acceptance/publication of at least one research paper in an HEC approved journal is a requirement for the award of Ph.D. degree.

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

Theoretical background knowledge and troubleshooting during experiment are discussed during the course 801 and students are benefitted with the valuable suggestions of the faculty and senior fellows.

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

The curriculum of the PhD is according to criteria defined by Higher Education Commission for PhD.

&

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

The curriculum of the PhD completely satisfies Higher Education Commission in terms of PhD course work, credit hours and research work criteria as per rule.

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

N.A

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

In KIBGE, Research Skills Development, Bioinformatics and Biostatistics courses are organized regularly which are open to all students. PhD students at KIBGE also take full benefit from these courses.

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

Research communication skills course (712) is organized in KIBGE as part of MPhil program but PhD students also take part in it and given a certificate of attendance after course completion.

CRITERION-3

LABORATORY AND COMPUTING FACILITIES

CITERION-3: Laboratory and Computing Facilities

Laboratory Facilities

KIBGE has state-of-the-art laboratory facilities in the field of biotechnology, molecular biology and genetic engineering. The infrastructure of the institute has been developed according to the needs and requirements of innovative and advanced research. The laboratory equipment's are comparable with any world's top ranking university and laboratory. Following laboratory equipment's and facilities are present in different section of KIBGE.

Agriculture Biotechnology section contains:

Genetic Transformation Lab (Agro-mediated, Biolistic, Heat Shock, Electroporation), Plant cell and tissue culture facility, Gene analysis Lab (Southern Blotting, Western Blotting), Plant Growth Room and Chambers, DNA extraction Lab, Molecular Systematics, Micropipettes sets, Electrophoresis and Documentation Lab, SDS PAGE, Refrigerators, Orbital Shakers, PCR, ELISA and Autoclave.

Industrial Biotechnology section contains:

Horizontal and Vertical Gel Electrophoresis Assemblies, 2-D electrophoresis Assembly, Gel Documentation System, Laminar Safety Cabinets, Fume Hoods, Liquid Nitrogen Inventory System, Refrigerators, -20 and -80 Freezers, Distillation and Deionization Units, Micropipettes sets, Chromatography Units, Capillary Electrophoresis Units and Hybridizer.

Medical Biotechnology section contains:

DNA Sequencer, DNA Synthesizer, Ultracentrifuge, High Speed Centrifuge, Multiblock and Standalone PCR, Real Time PCR, Cytovision, Horizontal and Vertical Gel Electrophoresis Assemblies, 2-D electrophoresis Assembly, Gel Documentation System, Laminar Safety Cabinets, Micropipettes set Fume Hood, CO₂ Incubators, Refrigerators, -20 and -80 Freezers, Liquid Nitrogen Inventory System, Autoclave, Distillation and Deionization Units.

Computer Facilities

Computers are provided to the PhD students to facilitate their write up, along with this laptop scheme has provided laptops to all Ph.D. students. There are also computers available for students in the library of KIBGE.

Internet Facility

High speed internet facility is available at KIBGE which has open access to all students, guests and visitors.

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

Laboratory manuals, history book, log books, documentation and instruction for experiments are available in the respective laboratory and readily accessible to all faculty and students.

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

Each section of KIBGE has one incharge and in each laboratory has one responsible person who has adequate knowledge about all the instruments of respective section and/or laboratory.

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

i) Computing Facilities

As mentioned above in computer facilities.

ii) Multimedia

Lecture halls of KIBGE are well equipped with projector, microphone, air-conditioners, sound system, screens and cameras.

iii) Website

KIBGE has an updated website <http://kibge.edu.pk/>

iv) Internet

As mentioned above in internet facilities.

CRITERION-4

STUDENT SUPPORT AND ADVISING

Criterion-4 Student Support and Advising

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

The courses for PhD have been developed and approved by competent authorities /Boards of the University of Karachi. Their frequency and number of students attending these courses have been discussed in detail in the above section on curriculum design and organization. These courses are taught by faculty members of the institute and visiting faculty. The courses have attracted the students of the institute as well as other departments of the University of Karachi.

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

KIBGE provides PhD students an ideal environment to work effectively in the laboratory to pursue their research work. All faculty members are very interactive, friendly and deliver insight knowledge to students making them capable of doing independent research.

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

PhD students are free to choose their topic of research. Lab rotations are done every semester to expose them to all the facilities of KIBGE which helps them to design their project. Students are distributed among all sections equally on the basis of their career choices and academic advice is provided by highly competent professionals of KIBGE.

CRITERION-5

PROCESS CONTROL

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.

Students' admission process at KIBGE is very transparent. The admission program is announced and advertised through all the leading newspapers. For admission into the PhD minimum CGPA 3.0 (out of 4.0 in the Semester System) or First Division (in the Annual System) in MPhil/MS/Equivalent is required. Admissions are granted on the basis of test / interview to be conducted by the Departmental Research Committee in accordance with the instructions given in the Admission Prospectus. Prerequisite for PhD is an MPhil degree from an HEC recognized university in one of the disciplines of biology; biochemistry, biotechnology, botany, genetics, microbiology, physiology, zoology or equivalent qualification. The process is periodically evaluated to ensure that it is meeting its objectives and the criteria provided by University of Karachi and Higher Education Commission.

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.

All selected PhD students are required to complete 18 credit hour courses preferably in the first year. PhD Candidates are required to attend at least 75% classes of each course followed by a comprehensive examination for granting candidacy as PhD researcher. Faculty members of KIBGE holding PhD degree, and approved supervisors by University of Karachi/BASR/HEC are appointed as research supervisors of PhD candidates. Monitoring of academic progress is done biannually by Departmental Review Committee (DRC) which evaluates students' progress and ensures timely completion of PhD. All the meetings are properly documented and progress reports of PhD students are deposited in a timely manner.

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

They are upgraded as they develop their academic skills.

Appointments / Promotions Procedure:

It is as per University Code Book.

Basic Pay Scale (BPS)

BPS	19
BPS	20
BPS	21

b. Assistant Professor (BPS- 19):

- I. Minimum Qualification for Assistant Professor is PhD from an HEC recognized institution in Biological Sciences (Botany. Biochemistry. Biotechnology. Genetics. Microbiology, Physiology, Zoology or an allied subject).

c. Associate Professor (BPS- 20)

- I. **Minimum qualification** for Associate Professor is PhD from an HEC recognized institution in Biological Sciences (Botany. Biochemistry. Biotechnology. Genetics. Microbiology, Physiology. Zoology or an allied subject).
- II. **Professional experience** of ten (10) years teaching / research in HEC recognized University or postgraduate institution in the field of Biotechnology and Genetic Engineering in a National or International organization.
- III. **Ten (10) research publications** (with at least 5 publications in the last 5 years), in HEC recognized journals.

d. Professor (BPS-21)

- I. **Minimum qualification** for Professor is PhD from an HEC recognized institution in Biological Sciences (Botany. Biochemistry. Biotechnology. Genetics. Microbiology, Physiology. Zoology or an allied subject).
- II. **Professional experience** of fifteen (15) years teaching / research in HEC recognized University or postgraduate institution in the field of Biotechnology and Genetic Engineering in a National or International organization.
- III. **Fifteen (15) research publications** (with at least 5 publications in the last 5 years), in HEC recognized journals.

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.

Syllabus and course outline has been made according to the HEC's guidelines. All courses are taught accordingly and the evaluation of teaching and course content is made by the feedback received from the students at the end of every semester. These forms are studied by quality enhancement cell of the university. The teacher evaluation is done with the help of feedback obtained from students through Proforma which are filled by students at the end of semester.

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.

For this purpose PhD students are required to deliver four seminars of one hour duration on their research progress so far. One seminar is to be delivered as synopsis defense later two in semesters, and one at the time of submission of the thesis. All research students of KIBGE and the faculty must attend the seminars. Three senior most members of the Departmental Research Committee (DRC) evaluate the students' progress.

CRITERION-6

FACULTY

Criterion-6 Faculty

Standard 6-1: There must be enough full time faculty who are committed to the program to provide adequate coverage of the program areas / courses with continuity and stability. The 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.

KIBGE administration recruit highly qualified faculty members including 01 Meritorious Professor, 01 Professor Emeritus, 16 Visiting Faculty, 01 Associate Professor, and 08 Assistant Professors to supervise 38 MS/MPhil/PhD Students. All of the faculty member hold PhD degrees and excellent teaching and research experience.

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.

KIBGE is always vigilant and alive towards professional on-job development of the faculty members. Similarly, the faculty members are also cautious about their professional development. As a result, the faculty members are constantly engaged in the activities aimed at their development, such as:

- Publications in HEC recognized national and international Journals
- Participation in Seminars, Conferences and Symposia of national and international levels
- Organization of Seminars, Conferences and Workshops for the faculty as well as the students
- Invite Speakers and Experts at the Seminars and Conferences organized at the University for the Students as well as the faculty.
- International speakers are also invited to deliver lectures.

The faculty has enough time after their scheduled classes that they perform their scholarly activities and perform their research work. For this purpose their schedule is made in such way that they should have some free time.

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

KIBGE has adopted following steps for job motivation and satisfaction of its employees:

- Handsome salary package
- Tenure track appointments
- Timely promotions and placements according to HEC requirements.
- Medical facility
- The best possible working conditions and friendly environment
- Allowance and accommodations

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.

KIBGE has state-of-the-art laboratory facilities in the field of biotechnology, molecular biology and genetic engineering. The infrastructure of the institute has been developed according to the needs and requirements of innovative and advanced research. The laboratory equipment's are comparable with any world's top ranking university and laboratory. Since its inception in 2006, the institute has organized 31 international and national conferences and workshops.

a) Departmental library and Internet Facility

There is no departmental library but a main library located on the first floor of KIBGE. High speed internet facility is available at KIBGE which has open access to all students, guests and visitors.

b) Main Library

There is one up to date main library in KIBGE. All students get their library card after completing admission process. Main library is well equipped with syllabus books and research journals. There are more than 900 books on the subjects and 110 journals (archived and current). Students are also facilitated by arranging / purchasing additional books or journal on demand.

c) Offices

Offices are provides to only the faculty members of KIBGE. Students are provided sitting areas in their respective sections to increase their exposure to instruments.

d) Class Rooms

Lecture halls of KIBGE are well equipped with projector, sound system, microphone, air-conditioners, screens and cameras.

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

Main library is well equipped with up-to-date technical collection, syllabus books, research journals, and professional personnel to facilitate students.

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

Lecture halls of KIBGE are well equipped with multimedia and offices of faculty members of KIBGE are provided all basic needs to carry out their responsibilities.

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.

KIBGE has been actively involved in execution of research projects funded by various agencies including IDB, PSF, HEC, etc., and facilitates students and faculty members to avail international and national scholarships for conferences, symposia and workshops in the fields of medical, industrial, environmental and agriculture biotechnology. Students and faculty members of KIBGE have already been awarded international scholarships from DAAD, TWAS, USA Fulbright for PhD, split and sandwich PhD as well as Postdoctoral training.

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

Since its inception in 2006, 42 PhDs have received their degrees and currently 38 students are enrolled in MS/MPhil/PhD Program. There are 01 Meritorious Professor, 01 Professor Emeritus, 16 Visiting Faculty, 01 Associate Professor, and 08 Assistant Professors are available to supervise students at KIBGE. In average two students are supervised by one faculty member.

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

Adequate financial resources are available for maintaining library holding, laboratories and computing facilities. In addition to the grants from HEC/UGC, the faculty has been able to attract competitive grants for research projects from HEC, PSF and other agencies.

Faculty CVs

Survey's Results

